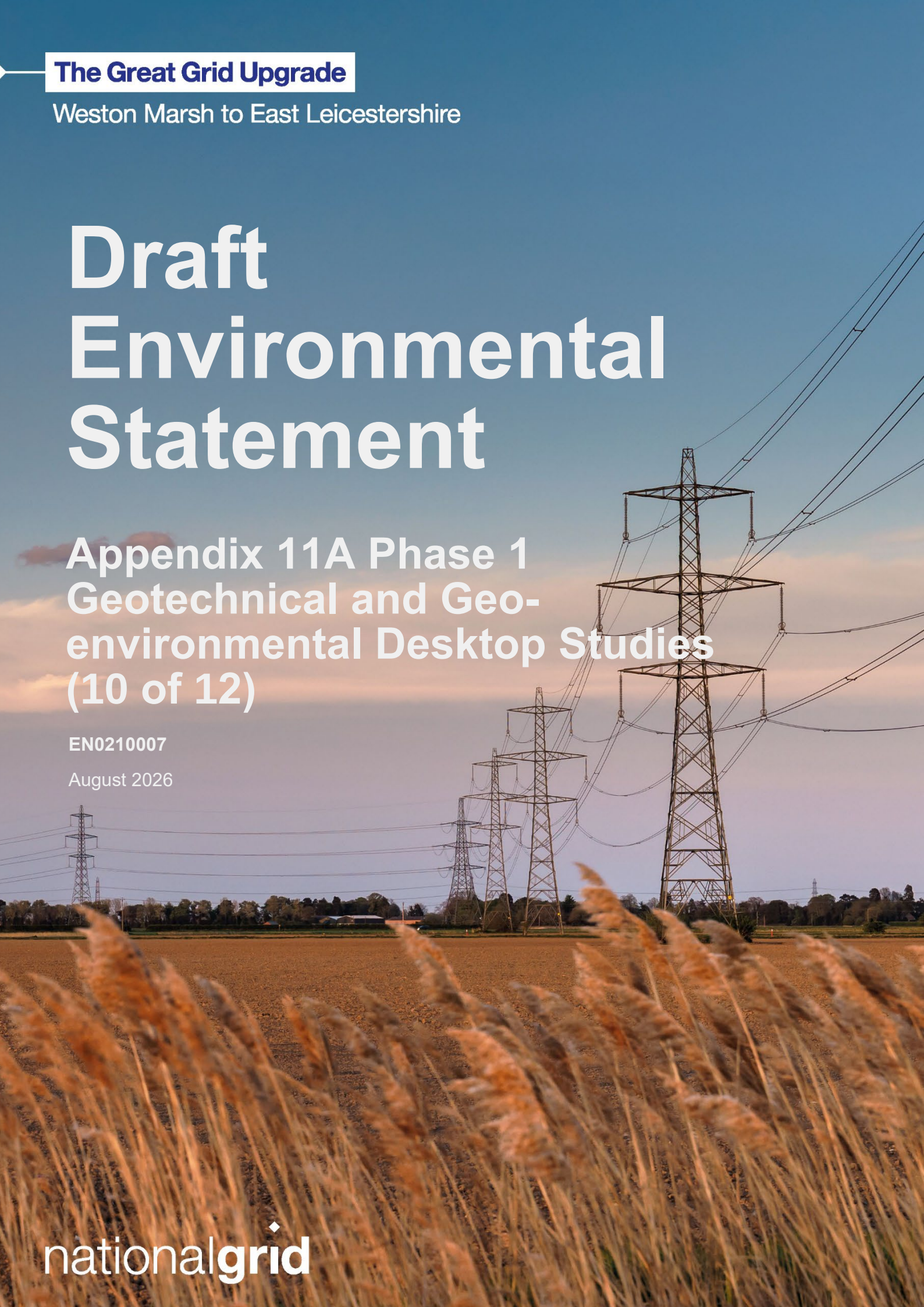




The Great Grid Upgrade

Weston Marsh to East Leicestershire

Draft Environmental Statement

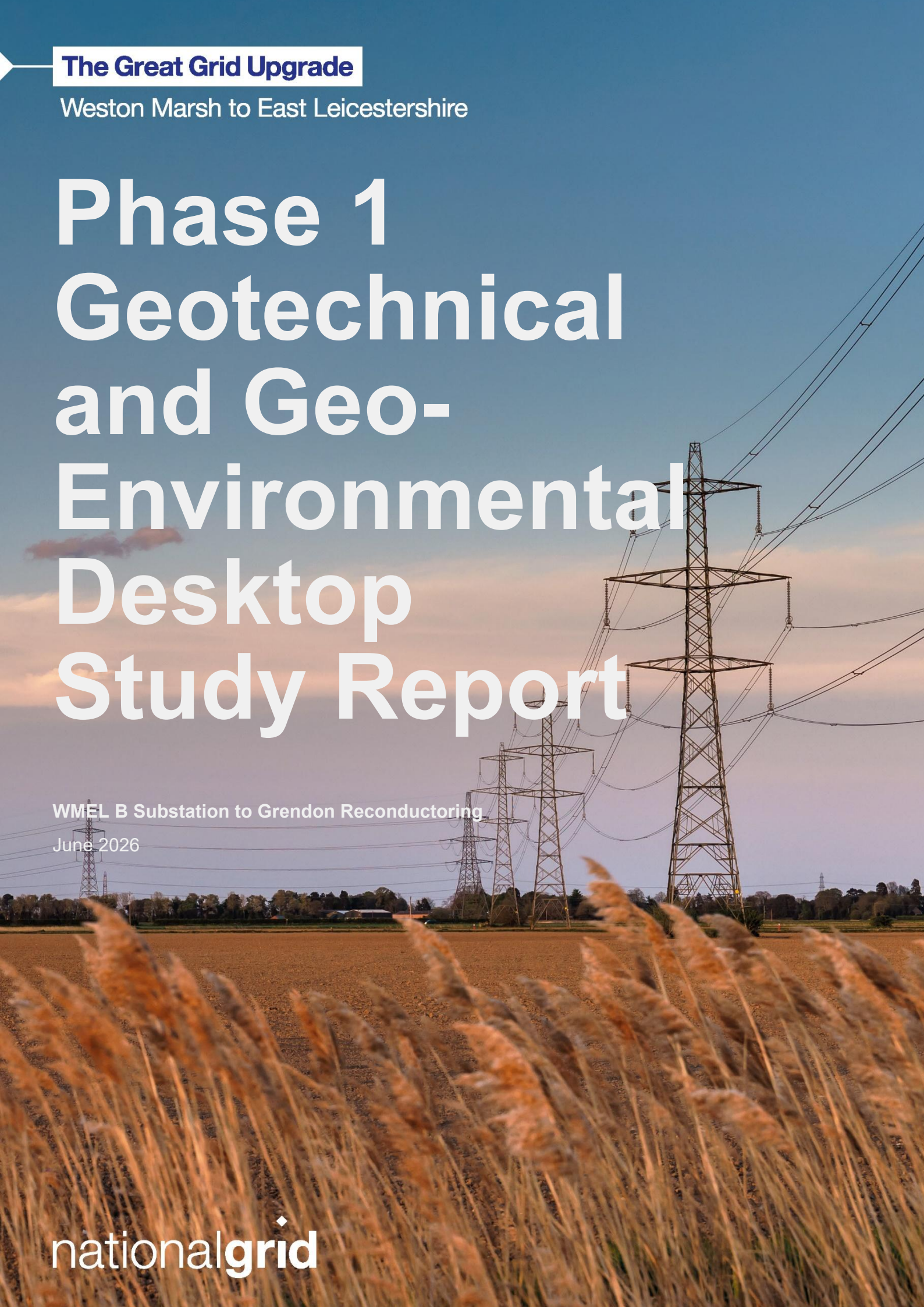
Appendix 11A Phase 1 Geotechnical and Geo- environmental Desktop Studies (10 of 12)

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August 2026

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11A. Phase 1 Geotechnical and Geo- environmental Desktop Studies



The Great Grid Upgrade

Weston Marsh to East Leicestershire

Phase 1 Geotechnical and Geo- Environmental Desktop Study Report

WMEL B Substation to Grendon Reconductoring

June 2026

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The methodology adopted and the sources of information used by AAJV in providing its services are outlined in this Report. The work described in this Report was undertaken between November 2025 and June 2026 and is based on the conditions encountered and the information available during the said period of time. The scope of this Report and the services are accordingly factually limited by these circumstances. AAJV disclaim any undertaking or obligation to advise any person of any change in any matter affecting the Report, which may come or be brought to AAJV's attention after the date of the Report.

Any risks identified in this Report are perceived risks, based on the information reviewed during the desk study and therefore partially based on conjecture from available information. The study is limited by the non-intrusive nature of the work and actual risks can only be assessed following a physical investigation of the Site.

The opinions expressed in this report and the comments and recommendations given are based on a desk assessment of readily available information. At this stage intrusive investigations have yet to be undertaken at Site to establish actual ground and groundwater conditions.

Reference to historical Ordnance Survey (OS) maps provides invaluable information regarding the land use history of a Site. However, it should be noted that historical evidence will be incomplete for the period pre-dating the first edition and between the release of successive maps.

Executive Summary

On the instruction of National Grid Electricity Transmission plc (National Grid), AECOM Arup Joint Venture (AAJV) has undertaken a Phase 1 Geotechnical and Geo-environmental Desk Study for proposed reconductoring works on a portion of the existing ZA 400kV overhead line (OHL). The reconductoring is proposed from tower ZA105, located at the proposed WMEL B substation, to tower ZA300D at Grendon substation. This desk study provides baseline ground information in support of the Development Consent Order (DCO) and establishes a preliminary understanding of the ground conditions underlying existing towers.

The works are understood to include replacement of existing conductor cables with new, higher capacity conductors, temporary access corridors and lay down areas to facilitate reconductoring, as well as potential steelwork and foundation upgrades at selected towers. Protection of crossing points (e.g. roads, rail, buildings, waterways) will be required during construction, which requires an understanding of the ground conditions to check stability of temporary works.

Recent or Site-specific ground investigation information is not currently available. Information on ground conditions is therefore largely limited to published British Geological Survey (BGS) mapping and local historical borehole records in the area with no in-situ testing. BGS mapping shows the Superficial Deposits overlying the Reconductoring Area to comprise of primarily Wolston Glacigenic Formation till. Deposits of Alluvium, Colluvium and River Terrace Deposits are also present, associated with watercourses and slopes along the route. Areas of Made Ground are mapped sporadically across the route, with these being corroborated by historical land use data from the Groundsure.

The preliminary ground models for the Site suggest that ground conditions will generally comprise a variety of superficial deposits, including glacial tills locally interspersed with Head, Alluvium, Colluvium and River Terrace. These are expected to be overlaying bedrock which can be grouped into three broad areas. Bedrock Area 1, in the north, is dominated by mudstones of the Middle Lias Group. Bedrock Area 2 is dominated by mudstones of the Upper Lias Group, and Bedrock Area 3, in the south, is dominated by of the Great Oolite Group locally and Inferior Oolite Group. A three part ground model is included in Section 8 of this report and presents the expected geological sequence in each of the Bedrock Areas.

The main ground related hazards vary across the Site, directly related to the geological composition and geotechnical properties of the superficial and bedrock materials, and groundwater regime. The most significant risks / constraints are currently considered to be potential localised slope instability, and possibility for unrecorded underground mining voids / features associated with historical ironstone mining. These hazards may affect existing assets and warrants further investigation. Consideration should also be given to the identified hazards during the design, construction and future maintenance of any new/replacement OHL towers.

Notable potential sources of contamination within 75m of existing National Grid electricity towers across the Site include localised areas of Made Ground (associated with current and historical structures and infrastructure) and infilled land (associated with infilled pits and ponds), with widespread general agricultural land use across the Site throughout its mapped history. Additionally, there are localised potential sources associated with chemical works, railway land, electrical substations, tanks, landfills, pumping stations (water and sewage), a sewage farm, unspecified works and other industrial land uses. Potential sources were also identified within access corridors. Risks from these potential contaminant sources have been assessed for three identified receptor groups (Human Health, Controlled Waters and Property). Risks to human health and property from sources within the access corridors have been excluded from the assessment due to the intermittent nature of access corridor use and a lack of property receptors within these areas. Human health risks are generally considered to be low to moderate, with the greatest risk present shared between construction workers, trespassers / public and adjacent site

users from the risk of inhalation of ground gas from the sludge storage, historical landfill and historical pumping station where a 'moderate' risk of ground gas generation in accordance with BS 8576 was identified. The risk is higher where any GI or construction workers may enter confined spaces where gases accumulate. A Moderate/Low risk is given for the inhalation of dust fibres, in particular asbestos fibres. It should be noted that parts of the site boundary are located within an area of 10-30% Radon risk. Controlled waters are the most sensitive receptors due to highly variable superficial geology that may allow contaminant migration, with risks highest where sources coincide with Secondary A or Principal Aquifers and lower where Made Ground, infilled land or agricultural land is present, or where sources are linked to less vulnerable aquifers (Secondary B or Unproductive). Surface water risk arises from groundwater baseflow permeable units and from surface runoff over impermeable units. Risks to property, including pylon foundations, livestock and crops, are considered Very Low to Low due to the relatively mild consequence. Risks during construction are anticipated to be reduced through use of mitigation measures such as appropriate PPE, RPE, dust suppression and working in line with Construction and Design Management Regulations.

It is recommended that Site reconnaissance is undertaken by suitably qualified geotechnical / geological and geo-environmental engineers and the findings from this should be incorporated into subsequent interpretive reporting. The findings of a Detailed UXO Risk Assessment should also be reviewed once available and considered in development of ground investigation Specifications and any intrusive construction.

The hazards and ground risks identified in this report should be carried forward into further assessments, designs and construction. A foundation Quantitative Risk Assessment is to be carried out to assess the suitability of foundations for reconductoring and shall use the base line geotechnical conditions documented in this report. Following this assessment, it is likely that site specific ground investigations will be required to confirm the ground and groundwater conditions on the Site, investigate and assess anticipated risks identified, and inform future designs and construction.

1.Introduction

1. Introduction

1.1 Terms of Appointment

- 1.1.1 On the instructions of National Grid Electricity Transmission plc (National Grid), hereafter referred to as 'the Client', the AECOM Arup Joint Venture ("AAJV") has carried out a Phase 1 Geotechnical and Geo-environmental Desktop Study of the Site known as WMEL B Substation to Grendon Reconductoring, herein referred to as "the Site".

1.2 Background and Proposed Development

- 1.2.1 The wider project comprises new sub-stations and high voltage overhead lines (OHL) as well as reconductoring of existing OHL which is associated with the overall Weston Marsh to East Leicestershire (WMEL) project ("the Scheme"). Specifically, the proposed project Scheme development scope includes:
- new substation near Corby Glen, Lincolnshire – WMEL-A.
 - new substation near Melton Mowbray, Leicester – WEML-B.
 - 29 km of new 400kV overhead line between Weston Marsh sub-station and WMEL-A.
 - Weston Marsh sub-station to be constructed as part of a separate National Grid project (GWNC).
 - 27 km of new 400 kV overhead line between WMEL-A and WMEL B.
 - 66 km of reconductoring the existing 'ZA' 400 kV overhead line between WMEL-B and an existing substation at Grendon, Northamptonshire.
- 1.2.2 This Report focuses on the reconductoring package of work, and complements similar desktop study reports prepared for new substations and OHL noted above.
- 1.2.3 The Report has been produced on the assumption that the Site is defined by the Design Freeze (DF) 2 Revision (Rev) B Redline Boundary and comprises OHL towers ZA105 to ZA300D, as shown in Appendix A Figure 1. The OHL is expected to be realigned between towers ZA105 to ZA107 as part of line entry to the proposed WMEL B substation. However, the design is in development and to account for potential change, this report includes ZA105 to ZA107.
- 1.2.4 This report has previously been released considering the DF1.5 boundary (DF1.5 Approved Draft Order Limits). An outline of changes to this report compared to the previous revisions are outlined in Section 1.5.
- 1.2.5 The works are understood to comprise the replacement of conductors along the route from existing 500 mm AAAC Rubus conductors to 620 mm Matthew conductors, with the construction of associated access corridors, pulling areas, supporting compounds, and the potential replacement of selected OHL towers. Figures F1-1 to F1-14 present the overall Reconductoring Area.

- 1.2.6 Haul roads or access tracks may be proposed to enable the construction of replacement towers (if needed). Haul roads, construction compounds and laydown areas may include earthworks (cut and fill). Protection of crossing points (e.g. scaffolding) will be required for existing infrastructure, which require an understanding of the ground conditions.
- 1.2.7 It is noted that the development proposals are in early development stages and consequently are subject to change. The findings of this Report should be reviewed once development proposals are confirmed.
- 1.2.8 The development of the Site is anticipated to require the following stages:
- Establishment of Site compounds / laydown areas.
 - Construction of haul roads or access tracks – if required (including earthworks and crossings).
 - Replacement or upgrade of selected towers and/or their foundations.
 - Replacement of overhead conductors.
- 1.2.9 At this time, areas associated with Site laydown / compound areas are also assumed to be constructed within the Site boundary.

1.3 Report Objectives

- 1.3.1 The primary objective of this Report is to provide baseline ground related information to support the Development Consent Order (DCO) for the scheme and inform an assessment of existing foundation suitability for re-use.
- 1.3.2 This Report has been prepared following the recommended best practice outlined in accordance with Eurocode 7 (BS EN 1997-2:2007) and the UK government guidance resource “Land contamination: risk management (LCRM)” (Updated 2025) and comprises:
- A description of the Site layout and setting.
 - A review of the Site’s geological, hydrological and hydrogeological setting, and public domain geo-environmental information to build up a more accurate understanding of the Site and surrounding environmental setting/sensitivity.
 - The identification and review of potential geotechnical hazards and constraints, including the production of a preliminary geotechnical risk register, with consideration given to presence of historical mining and underground structures.
 - An appraisal of current and historical development and land use across the Site and in the surrounding area, with a particular emphasis on identifying potential onsite and offsite contamination sources.
 - The production of an initial Conceptual Site Model and Preliminary (Qualitative) Risk Assessment in accordance with the guidance document Environment Agency, Land Contamination: Risk Management (LCRM 2025).
 - Preliminary recommendations for additional geotechnical and geo-environmental investigation and assessment works required.

1.4 Sources of Information

- 1.4.1 The following sources of information have been considered in the authoring of this Report, either accessed directly or within the project Geographic Information System (GIS) viewer:
- British Geological Survey (BGS) GeoIndex, mapping (1:50k and 1:10k scale) and accompanying memoirs.
 - Groundsure Insights GIS dataset, including historical mapping, associated with the DF2 Rev B boundary (included as part of the project GIS viewer and therefore not appended here).
 - Coal Mining/Mineral Extraction records, including Mining Remediation Authority map viewer.
 - Freely available InSAR data.
 - BGS /Institution of Civil Engineers (ICE) seismic hazard assessment for UK.
 - Environment Agency Magic Maps.
 - Environmental Agency Catchment Data Explorer.
 - RadonUK.
 - Council Planning portals.
 - LandIS Soilscales.
 - Fellows International Group (FIG) Preliminary UXO Risk Assessment (June 2026).
- 1.4.2 Specific information sources are referenced throughout the document, and a bibliography is included in the References section of this Report.
- 1.4.3 It is noted that a Site reconnaissance has not been feasible at the time of reporting and is subject to land access agreements. Once the Site reconnaissance has been completed, the findings of this report should be reviewed and updated as necessary.
- 1.4.4 Non-intrusive or intrusive survey data has not been made available at the time of writing and therefore has also not been considered. If survey information becomes available, the findings should be reviewed during the interpretative reporting stage of the project.

1.5 Revisions

- 1.5.1 The changes between DF1.5 and DF2 Rev B boundaries take the form of additional areas added to the study area which are understood to be corridors for access to towers from nearby public roads, additional space for winching equipment, and laydown areas. It is noted that boundary changes are relatively small compared to the Study Area overall and generally fall within the same local geological and environmental settings. Therefore, there are few significant changes to the overall ground stability and contamination risks presented in this Report compared to previous revisions. The table below summarises the parts of the Report which have been updated to incorporate local variations and additions at each revision.

Section	Details – Revision P02	Details – Revision P03
Overall	Updates to report to consider DF2 Revision A boundary.	Updates to report to consider DF2 Revision B boundary.
1.0 – 1.2	Redline boundary update referenced in text. Reference to Appendix A Figures 12-1 to 12-14 added.	Redline boundary update referenced in text.
2.0	No changes.	Added features that fall within updated boundary that were previously not discussed.
3.0	No changes.	Added features that fall within updated boundary that were previously not discussed.
4.0	Addition of summary information from screening of historic and recent satellite imagery available on Google Earth Pro. Summary table in Appendix B	Incorporated findings of Preliminary UXO Risk Assessment.
5.0	No changes.	No changes.
6.0	Addition of planning information relevant to contaminative land features sourced from screening local authority planning portals.	Added features that fall within access corridors forming part of the updated boundary for the datasets considered to be higher priority as potential contamination sources.
7.0	No changes.	No changes.
8.0	No changes.	Additional details on Grendon Member and Rotherby Clay Member superficial deposits to ground models.
9.0	Addition of towers potentially impacted by contamination features identified in Google Earth Pro satellite screening.	Added potential sources of contamination based on new features identified in Section 6 that fall within access corridors forming part of the updated boundary.

10.0	No changes.	Additional review of Geotechnical Risks, as applied to the access corridors and the construction of any potential access corridors.
11.0	Recommendation added to incorporate DF2 Rev A boundary changes into subsequent reports. Recommendation.	Minor changes to wording of geo-environmental conclusions to reflect changes to Section 9.
12.0	Minor changes to wording to reflect boundary update to DF2 Rev A.	No changes.
Appendix A	Addition of Figure set 12 illustrating DF1.5 and DF2 RevA Study Area boundaries.	Figures updated to reflect DF2 Rev B Study Area boundaries including additional Groundsure mapping up to the revised boundary.
Appendix B	Addition of historic satellite imagery review.	No changes.
Appendix C	No changes.	No changes.
Appendix D	Addition of identified impacted towers to Geo-environmental iCSM	Added impacted access corridors to relevant linkages for assessment of risks from these sources to controlled waters receptors.
Appendix E	No changes.	No changes.

2. Site Setting

2. Site Setting

2.1 Location

- 2.1.1 The site is linear in nature, spanning a c.66 km route between land c.6 km northwest of Melton Mowbray (470653 Easting (E), 322123 Northing (N)), and Grendon Substation, c.7 km southwest of Wellingborough (486938 E, 261320 N). Approximately 200no. OHL towers of the existing 'ZA' 400kV overhead line are under consideration from the southern boundary of the proposed WMEL-B substation to ZA300D at Grendon Substation, Northamptonshire. The Site location plan, including extents of associated Redline boundary, is presented in Figures F1-1 to F1-14.

2.2 Setting and Layout

- 2.2.1 The OHL route follows a broadly north-south trending route from northwest of Melton Mowbray through land which is primarily rural with scattered small villages. The route passes to the east of Market Harborough, and to the west of Wellingborough, east of Northampton to Grendon Substation, which is c.12 km east of Northampton. Table 2-1 summarises the features crossed by the route. Figures F1-1 to F1-14 present the observed features.

Table 2-1 Site Layout and Notable Features

Adjacent OHL Towers	Feature Type	Feature
ZA112 – ZA113	A Road	Crossing A6006
ZA118 – ZA119 and associated access corridor to east of ZA119		Crossing A607
ZA165 – ZA166		Crossing A47
ZA209 – ZA210		Crossing A427
ZA213 – ZA214		Crossing A6
ZA236 – ZA237		Crossing A14
ZA255 – ZA256		Crossing A43
ZA287 – ZA288		Crossing A4500
ZA293 – ZA294		Crossing A45
ZA136 - 137	B Road	Crossing B674
ZA142 – ZA143		Crossing B6047

Adjacent OHL Towers	Feature Type	Feature
ZA149 – ZA150		Crossing B6047
ZA155 – ZA156		Crossing B6047
ZA206 – ZA207		Crossing B664
ZA292 – ZA293		Crossing B573
ZA108 – ZA109	Railway	Crossing single-track railway tunnel.
ZA116 – ZA117		Crossing multi-track railway.
ZA216 – ZA217, associated access corridor to southwest of ZA216, and to southeast of ZA217		Crossing multi-track railway.
ZA115 – ZA116 and associated access corridor to east of ZA115	Major Waterbody	Crossing of River Wreake and pond adjacent to River Wreake
ZA122 – ZA123 and access corridor to east of ZA122 and ZA123		Crossing unnamed tributary of River Wreake.
ZA138 – ZA139 and associated access corridor to north of ZA139		Crossing Gaddesby Brook.
ZA159 – ZA160		Crossing Eye Brook.
ZA171 – ZA172		Crossing Stonton Brook.
ZA173 – ZA174		Crossing Stonton Brook.
ZA174 – ZA175 and associated access corridor to northwest of ZA174		Crossing Stonton Brook.
ZA178 – ZA179		Crossing Stonton Brook.
ZA196 – ZA195		Crossing of unnamed minor watercourse.
ZA199 – ZA200		Two crossings of River Welland.
ZA202 – ZA203 and associated access corridor west of ZA203		Crossing of River Welland.
ZA220 – ZA221		Crossing of River Jordan.

Adjacent OHL Towers	Feature Type	Feature
ZA230 – ZA231		Crossing of River Ise.
ZA264 – ZA265		Crossing of Pytchley Brook.
ZA271– ZA272 and access corridor southwest of ZA271		Crossing of Hardwick Brook.
ZA287 – ZA288		Crossing of Swanspool Brook.
ZA295 – ZA296		Three crossings of Mill Stream, River Nene, and River Nene Navigation.
ZA296 – ZA297		Crossing of local lake.
ZA297 – ZA298		Crossing of local two lakes.
Access corridor to east of ZA298		Crossing of Grendon Brook
ZA298 – ZA299		Crossing of local lake.
ZA105 – ZA106	Minor Waterbody	Crossing two unnamed tributaries of River Wreake.
ZA112 – ZA113		Crossing of unnamed minor watercourse.
ZA122 – ZA123		Crossing of unnamed minor watercourse.
ZA127 – ZA128		Crossing of unnamed minor watercourse.
ZA135 – ZA136		Crossing of unnamed tributary of Queensbury Brooke.
ZA139 – ZA140		Crossing of two unnamed tributaries of Queensbury Brooke.
ZA145 – ZA146		Crossing of unnamed minor watercourse.
ZA147 – ZA148		Crossing of unnamed minor watercourse.
ZA149 – ZA150		Crossing of unnamed tributary of Queensbury Brooke.
ZA152 – ZA153		Crossing of unnamed minor watercourse.
Access corridor 800m west of ZA152		Crossing of tributary to Queniborough Brook
ZA154 – ZA155		Crossing of unnamed minor watercourse.
ZA157 – ZA158		Crossing of unnamed tributary of Eye Brook.
ZA159 – ZA160		Crossing of unnamed tributary of Eye Brook.
ZA163 – ZA164		Crossing of unnamed tributary of Eye Brook.
ZA205 – ZA206		Crossing of unnamed tributary of River Welland.
ZA208 – ZA209		Crossing of unnamed tributary of River Welland.

Adjacent OHL Towers	Feature Type	Feature
ZA210 – ZA211 and associated access corridor east of ZA211		Crossing of Dingley Brooke.
ZA217 – ZA218		Crossing of unnamed minor watercourse.
ZA221 – ZA222		Crossing of unnamed tributary of River Jordan.
ZA235 – ZA236		Crossing of unnamed tributary of Slade Brook.
ZA238 – ZA239		Crossing of Slade Brook.
ZA242 – ZA243 and access corridor to northeast of ZA243		Crossing of unnamed watercourse leading to Thorpe-Malsor Reservoir
ZA246 – ZA247 and access corridor to east of ZA246		Crossing of unnamed watercourse leading to Cransley Reservoir
ZA247 – ZA248		Crossing of unnamed watercourse leading to Cransley Reservoir.
ZA251 – ZA252		Crossing of Cransley Brook.
ZA256 – ZA257		Crossing of Slade Brook.
ZA259 – ZA260 and access corridor to northeast of ZA260		Crossing of unnamed tributary of Pytchley Brook.
ZA264 – ZA265		Crossing of unnamed tributary of Pytchley Brook.
ZA300A – ZA300B		Crossing of unnamed minor watercourse, likely drainage for Grendon Substation.
ZA300B – ZA300C		Crossing of unnamed minor watercourse, likely drainage for Grendon Substation.

Notes:

- 1) No motorways were observed as present along the route.
- 2) 44no. roads classed as Minor, Local, and Restricted Local Access are crossed by the route.

2.3 Topography

- 2.3.1 The topography along the north portion of the OHL route, between towers ZA105 to ZA131 (Figures F2-2 to F2-4), primarily features gentle elevation changes, with moderate slope angles (less than 3.5° to not more than 15°). Between towers ZA112 and ZA118 a c.1.5 km wide, east-west trending, shallow river valley is present, associated with the River Wreake. Rare, localised areas with steep slopes (above 15°) are present, and are associated primarily with hedges/walls and the banks of watercourses. The valley descends very gently to the west.
- 2.3.2 Beyond tower ZA131, the topography broadly climbs over multiple shallow valleys / gullies c.100m – 200m wide with moderate slope angles (between 3.5° and 15°). Shallow slope angles (less than 3.5°) are typically present in wider valleys over c.200m in width. Areas with slope angles above 15° are present, primarily associated with the banks of watercourses. Between towers ZA134 and ZA140 the route crosses a c.700m wide shallow valley occupied by two meandering watercourses flowing into the River Wreake.
- 2.3.3 Between towers ZA151 to ZA160 (Figures F2-4 and F2-5), multiple steeply sloped valleys (greater than 15°) are present. These areas feature elevation changes of 20m – 40m over lengths of c.100m – c.200m and are associated with landslide deposits (see figure F10-4). Tower ZA154 lies within 10m of the crest of one such steep slope.
- 2.3.4 Between towers ZA160 and ZA169 the route crosses multiple shallow valleys and gullies primarily on an east-west orientation and leading to shallow valleys containing meandering minor watercourses, including Eye Brook.
- 2.3.5 Between towers ZA169 and ZA179 the route follows a c.1500m wide shallow valley (elevation change of c.30m between the crest and valley bottom) orientated broadly north-south, associated with the upper River Welland and tributaries flowing into it. The valley descends very from c.80m AOD to lower than c.70m AOD at ZA205. The route passes over a smooth hill, between ZA179 and ZA185, and between ZA185 to tower ZA208 (Figures F2-6 and F2-7), the route passes across a broad, gently sloping, valley associated with the River Welland. From here the route passes over a series of shallow valleys south of tower ZA223 with moderately steep slopes (less than 15°), to tower ZA2264 (Figures F2-7 to F2-12). This includes the River Ise, lying in a valley c.2.5 km wide and orientated west - east between Towers ZA226 and ZA236. The route passes over Slade Brook between ZA237 and ZA241, followed by a series of gently descending, northeast flowing, minor watercourses between ZA241 and ZA264.
- 2.3.6 From tower ZA264 the route (Figures F2-12 to F2-14) passes over three gently sloping valleys (slope angles of less than 3.5°), associated with gently descending streams that supply the River Ise. Areas with steeper slopes (greater than 15°) are present, however these are localised to the banks of watercourses and areas of highway earthworks.
- 2.3.7 From ZA292 the topography slopes gently downward to the broad valley of the River Nene, which is broadly level and features a number of wetland areas and ponds.

3. Geological and Environmental Setting

3. Geological and Environmental Setting

3.1 Overview

- 3.1.1 The environmental setting including the geology, hydrogeology and hydrology are the key factors that influence the way in which contaminants in the soil or groundwater can be transported on or off site, and also the way in which contamination can affect applicable receptors including controlled waters and users of the site. The following sections present the superficial and bedrock geology across the Reconductoring Area along with linear features, borehole records, geological hazards, mining records and the aquifer classifications of the strata present.

3.2 Geology

Published Geological Mapping

- 3.2.1 The associated available BGS published geological maps and their coverage is summarised below;
- 1:50,000/1:63,360 scale digital Map Sheets:
 - 142 Melton Mowbray, published 2002.
 - 156 Leicester, published 2007.
 - 170 Market Harborough, published 1969.
 - 185 Northampton, published 1980.
 - 186 Wellingborough, published 2007.
 - Circa 16no. 10,000 scale digital map sheets are held by BGS covering the OHL route.
- 3.2.2 Extracts of the superficial deposit and bedrock maps are included in the Groundsure data.

Made Ground

- 3.2.3 Multiple towers along the OHL route are located on ground classed as artificial ground, according to BGS mapping. Towers ZA242, ZA243, ZA244, ZA245, ZA247 are located on ground mapped as Worked Ground / Void, described as an area where the land surface (natural or artificial) has been lowered as a result of man-made excavations. The purpose of the excavation is unspecified.
- 3.2.4 Additional areas of Made Ground of differing types were also observed between the OHL towers:
- Made Ground (Worked Ground / Void as per BGS) mapped between towers ZA108 to ZA109, associated with railway infrastructure (Figure F3-2).

- Made Ground (Artificial Ground as per BGS) mapped between towers ZA112 to ZA113, associated with the A6006 (Figure F3-2).
- Made Ground (Worked Ground / Void as per BGS) mapped between towers ZA113 to ZA114 and associated access corridor to east of ZA113 (Figure F3-2).
- Made Ground (Infilled Ground as per BGS) mapped between towers ZA115 and ZA116 and associated access corridors to the east (Figure F3-2).
- Made Ground (Artificial Ground as per BGS) mapped between towers ZA116 to ZA117 and associated access corridor to west of ZA117 (Figure F3-2), associated with a section of railway.
- Made Ground (Artificial Ground as per BGS) mapped between towers ZA117 to ZA119 (Figure F3-2).
- Made Ground (Worked Ground / Void as per BGS) mapped between towers ZA139 to ZA140 (Figures F3-3 and F3-4).
- Made Ground (Worked Ground / Void as per BGS) mapped between towers ZA151 to ZA152 and associated access corridors to east of ZA151 and west of ZA152 (Figure F3-4). Associated with historical railway cuttings.
- Made Ground (Worked Ground / Void as per BGS) mapped on access corridor to northeast of tower ZA158 (Figure F3-5).
- Made Ground (Infilled Ground as per BGS) present mapped towers ZA233 and ZA234 (Figure F3-9).
- Made Ground (Infilled Ground as per BGS) present mapped towers ZA241 and ZA246 and associated access corridors east of towers (Figure F3-10).
- Made Ground (Infilled Ground as per BGS) present mapped towers ZA246 to ZA248 (Figure F3-10).
- Made Ground (Infilled Ground as per BGS) present mapped towers ZA249 to ZA250 and associated access corridor to south of tower ZA249 (Figure F3-10).
- Made Ground (Worked Ground / Void as per BGS) mapped between towers ZA250 to ZA251 (Figure F3-10).
- Made Ground (Artificial Ground as per BGS) present mapped towers ZA255 to ZA256, associated with the A43 (Figure F3-11).
- Made Ground (Infilled Ground as per BGS) present mapped towers ZA266 to ZA267 (Figure F3-12).
- Made Ground (Infilled Ground as per BGS) present mapped towers ZA272 to ZA273 (Figure F3-13).
- Made Ground (Artificial Ground as per BGS) present mapped towers ZA284 to ZA285 associated with Ashby quarry (Figure F3-13).
- Made Ground (Artificial Ground as per BGS) mapped between towers ZA287 to ZA288 and associated access corridors to the northeast and northwest of tower ZA288, associated with the A4500 (Figure F3-14).
- Made Ground (Artificial Ground or Void as per BGS) is present between towers ZA292 to ZA294, associated with the B573 / A45 junction (Figure F3-14).

- Made Ground (Void) present on access corridor associated with A45 bridge crossing west of tower ZA295 (Figure F3-14).
 - Disturbed Ground (Undivided) mapped between towers ZA295 to ZA299 (Figure F3-14).
 - Disturbed Ground (Undivided) mapped on access corridors within River Nene valley, east of tower ZA298, and west of towers ZA297 and ZA299 (Figure F3-14).
- 3.2.5 Towers ZA297 and ZA298 are located on ground mapped by BGS as Disturbed Ground which extends between towers ZA296 and ZA299 (Figure F3-14). The origin of the disturbed ground is unspecified by BGS, but it's likely to be sand and gravel aggregate extraction of underlying River Terrace Deposits.
- 3.2.6 The Groundsure data for historical industrial land use and historical landfills were also considered alongside the BGS records. These suggest more precise extents of made ground:
- Railway cuttings also listed as Unspecified Pit between ZA108 to ZA109 (Figure F3-2). Old Gravel Pit noted on access corridor 800m west of tower ZA163 (Figure F3-5).
 - Sewage farm listed between tower ZA203 and ZA204 including access corridors to west of these (Figure F3-7)
 - Warren Lodge between towers ZA213 and ZA214 (Figure F3-8).
 - Numerous railway cuttings listed between ZA216 and ZA217 including associated access corridors to east and west of these (Figure F3-8).
 - Unspecified Quarry, Unspecified Ground Workings, Unspecified Disused Quarry between towers ZA233 and ZA234 (Figure F3-9).
 - Unspecified Ground Workings between towers ZA234 and ZA235 (Figure F3-9).
 - Sand pits and unspecified pit between towers ZA236 and ZA237, overlapping with A14 (Figure F3-9).
 - Disused Ironstone quarries and unspecified pits between towers ZA241 and ZA242 including associated access corridors to east (Figure F3-10).
 - Unspecified Pits and Quarry and Disused Ironstone quarry between towers ZA242 and ZA244 (Figure F3-10).
 - Unspecified Pit between towers ZA245 and ZA246 (Figure F3-10).
 - Cuttings within 50m of tower ZA247 (Figure F3-10).
 - Unspecified Ground Workings are mapped within 50m of tower ZA265 (Figure F3-11).
 - Ashby Quarry between towers ZA284 and ZA285 (Figure F3-14).
 - Earl's Barton Quarry within 50m of tower ZA299 (Figure F3-14).

Superficial Deposits

- 3.2.7 A number of Superficial Deposits of the Anglian Stage and late Quaternary Period, are mapped by BGS across the route, as well as areas where Superficial Deposits are not present. Table 3-1 summarises the BGS information for each of the mapped deposits.

Table 3-1 Superficial Deposits

Parent Unit	Geological Stratum	BGS Description	BGS Thickness (m)
Mass Movement Deposits (MASMD)	Head	Head is poorly sorted and poorly stratified, angular rock debris and/or clayey hillwash and soil creep, mantling a hillslope and deposited by solifluction and gelifluction processes. Comprises gravel, sand and clay depending on upslope source and distance from source. Locally with lenses of silt, clay or peat and organic material.	N/A
Fluvial Deposits (FLUV)	Alluvium	Clay, silt, sand and gravel.	N/A
Head	Colluvium	Slope-foot deposits formed as the result of runoff and creep	N/A
Nene Valley Formation	Ecton Member	Gravel with sand, clay and, locally, peat.	0 – 4.5m
Nene Valley Formation	Grendon Member	Fluviatile sand and gravel: gravel composed mainly of flint, quartzite, ironstone, sandstone and limestone; includes lenses of silt and clay.	0 to 7.6m
N/A	River Terrace Deposits	Sand and gravel, locally with lenses of silt, clay or peat.	N/A
Soar Valley Formation	Birstall Sand and Gravel Member	Sand and gravel with minor clay and silt lenses.	c. 4m
Bytham Catchments Subgroup	Bytham Sand and Gravel Formation	Encompasses fluvial, lacustrine and organic deposits of the Bytham River.	Usually 3-5m
Wolston Glacigenic Formation	Oadby Till Member (Lias-rich)	Clay, brown to grey, and silty clay, with chalk and flint fragments; rich in 'Lias' rock fragments.	N/A
Wolston Glacigenic Formation	Oadby Till Member - Diamicton	Diamicton, grey, weathering brown, characterised by Cretaceous and Jurassic rock fragments; subordinate lenses of sand and gravel, clay and silt. Clay, brown to grey, and silty clay, with chalk and flint fragments.	Variable up to 20 m; typically 1-7 m.
Wolston Glacigenic Formation	Thrussington Till Member - Diamicton	Diamicton, brown to reddish-brown with stones and matrix derived primarily from Upper Carboniferous and Triassic rocks; subordinate sand, gravel and stoneless clay and silt. Red pebbly clay and silty clay with rock fragments	Variable up to 20 m; typically 1-7 m.

Parent Unit	Geological Stratum	BGS Description	BGS Thickness (m)
Wolston Glacigenic Formation	Oadby Till Member (Trias-rich)	Clay, brown to grey, and silty clay, with chalk and flint fragments; rich in 'Triassic' rock fragments.	Memoirs suggest 15-30m thickness.
Wolston Glacigenic Formation	Bosworth Clay Member	Lacustrine, commonly laminated clays and silts.	Over 25 m in thickness in the Wolvey area [SP 43 87].
Wolston Glacigenic Formation	Bozeat Till Member	Dark bluish grey diamicton with clasts of Jurassic lithologies and rare chalk	Up to 5m
Proglacial Deposits	Glaciofluvial Deposits	Mostly coarse-grained sediments (i.e. sand and gravel) with some finer-grained layers (i.e. clay and silt). Sand and gravel, locally with lenses of silt, clay or organic material.	N/A

Soilscape Classification

- 3.2.8 Information obtained from Soilsapes (Landis, 2026) classifies and describes the soils that intersect the Reconductoring Area. A summary of the Soilsapes descriptions encountered along the route is provided in Table 3-2.

Table 3-2 Soilsapes Descriptions

Soilscape Number	Distribution	Soilscape Description	Water Protection
18	Widespread in northern and central portions of OHL route. Associated with lower lying areas.	Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils	Drains to stream network. Main risks are associated with overland flow from compacted or poached fields. Organic slurry, dirty water, fertiliser, pathogens and fine sediment can all move in suspension or solution with overland flow or drain water.
9	Widespread in northern and central portions of OHL route. Associated with lower lying areas.	Lime-rich loamy and clayey soils with impeded drainage	Drains to stream network. Land is drained and nitrate vulnerable; potential for rapid pollutant transport; surface capping can trigger sheet erosion of fine sediment to stream network.

Soilscape Number	Distribution	Soilscape Description	Water Protection
7	Widespread in northern and central portions of OHL route. Associated with lower lying areas	Freely draining slightly acid but base-rich soils	Drains to local groundwater. Groundwater contamination with nitrate; siltation and nutrient enrichment of streams from soil erosion on certain of these soils.
20	Associated with significant waterbodies.	Loamy and clayey floodplain soils with naturally high groundwater	Drains to local groundwater feeding into river. Close proximity to river results in pollution risk from floodwater scouring and from drainage water after spreading of fertiliser or slurry.
6	Associated with significant waterbodies.	Freely draining slightly acid loamy soils	Drains to local groundwater and rivers. Groundwater contamination with nitrate; siltation and nutrient enrichment of streams from soil erosion on certain of these soils.
8	Higher ground between ZA230 and ZA240	Slightly acid loamy and clayey soils with impeded drainage	Drains to stream network. Farmed land is drained and therefore vulnerable to pollution run-off and rapid through-flow to streams; surface capping can trigger erosion of fine sediment.
24	Artificial Ground between ZA233 and ZA250	Restored soils mostly from quarry and opencast spoil	Drains to stream network. Many sites suffer from compaction and, as a consequence, run off and erosion. Acid seepage on certain restored mining sites.
5	Widespread between ZA261 to Grendon substation	Freely draining lime-rich loamy soils	Drains to chalk or limestone groundwater. Vulnerable to leaching of nitrate to groundwater; surface capping and erosion of chalk soils under cereals is linked with nutrient enrichment and silting of chalk streams and their gravel spawning beds.

Soil Chemistry

- 3.2.9 Groundsure data provided for the Reconductoring Area includes 881 sets of recordings for soil chemistry, with each set including Arsenic, Chromium, Cadmium, Nickel and Lead. Table 3-3 summarises the findings.

Table 3-3 Soil Chemistry Summary

Chemical	Recording Range (mg/kg)	Notes
Arsenic	<15 to 60 - 120	
Chromium	60 - 90 to >180	
Cadmium	<1.8	No readings higher than <1.8mg/kg across entire route.
Nickel	15 – 30 to 60 - 80	
Lead	<100 to 100 - 200	Highest levels recorded between ZA143 to ZA144 (Figure F3-4) and ZA172 to ZA175 (Figure F3-5).

Bedrock

- 3.2.10 The bedrock geology mapped along the OHL route can be broadly grouped into three areas, from north to south along the OHL route, these are presented in Table 3-4, Table 3-5, and Table 3-6. The groups are defined by their geographical distribution, but also geological hazards that are associated with them, detailed in Chapter 3.4. Bedrock Area 1 extends between OHL towers ZA105 to ZA152 (Figures F4-2 to F4-4) and is dominated by the Blue Lias Formation and Charmouth Mudstone Formation. Bedrock Area 2 extends between ZA152 and ZA233 (Figures F4-4 to F4-9) and is dominated by the Charmouth Mudstone Formation, Dyrham Formation, Marlstone Rock Formation and Whitby Mudstone Formation. Bedrock Area 3, extending between OHL towers ZA233 to ZA300D (Figures F4-9 to F4-14), is dominated by a sequence of Oolitic limestone formations comprising, Stamford Member, Rutland Formation, Wellingborough Limestone Member, Blisworth Limestone Member, Grantham Formation, Lower Lincolnshire Limestone Member. Table 3-4 presents the mapped units in Bedrock Area 1 and their descriptions, ordered broadly from oldest to youngest.

Table 3-4 Bedrock Geology – Area 1

Parent Unit	Geological Stratum	BGS Description	BGS Thickness (m)
Lias Group	Charmouth Mudstone	Dark grey laminated shales, and dark, pale and bluish grey mudstones; locally concretionary and tabular limestone beds; abundant argillaceous limestone, phosphatic or ironstone (sideritic mudstone) nodules in some areas; organic-rich paper shales at some levels; finely sandy beds in lower part in some areas.	To c.335m
Lias Group	Blue Lias Formation	Thinly interbedded limestone (laminated, nodular, or massive and persistent) and calcareous mudstone or siltstone (locally laminated). Individual limestones are typically 0.10-0.30m thick.	To c.140m
Lias Group	Scunthorpe Mudstone Formation	Grey, variably calcareous and silty, blocky or fissile mudstone with thin beds of argillaceous limestone (bioclastic or micritic) and calcareous siltstone, particularly near base and in upper part, which is ferruginous in the type area.	To c.128m

3.2.11 Bedrock Area 2, extending between ZA152 and ZA233 (Figures F4-4 to F4-9), is dominated by the geological sequence including the Charmouth Mudstone Formation, Dyrham Formation, Marlstone Rock Formation and Whitby Mudstone Formation. Table 3-5 presents the mapped units in Bedrock Area 2 and their descriptions, ordered broadly from oldest to youngest.

Table 3-5 Bedrock Geology – Area 2

Parent Unit	Geological Stratum	BGS Description	BGS Thickness (m)
Lias Group	Charmouth Mudstone	Dark grey laminated shales, and dark, pale and bluish grey mudstones; locally concretionary and tabular limestone beds; abundant argillaceous limestone, phosphatic or ironstone (sideritic mudstone) nodules in some areas; organic-rich paper shales at some levels; finely sandy beds in lower part in some areas.	To c.335m
Lias Group	Dyrham Formation	Pale to dark grey and greenish grey, silty and sandy mudstone, with interbeds of silt or very fine-grained sand (locally muddy or silty), weathering yellow. Variably micaceous. Impersistent beds or doggers of ferruginous limestone (some ooidal) and sandstone, which tend to occur at the top of sedimentary cycles. Sporadic large cementstone nodules.	To c.125m

Lias Group	Marlstone Rock Formation	Sandy, shell-fragmental and ooidal ferruginous limestone interbedded with ferruginous calcareous sandstone, and generally subordinate ferruginous mudstone beds. Locally any of these lithologies may pass by increase in iron content into generally ooidal ironstone, and in places any of these may dominate. The iron content (as ooids, altered shell material or in the groundmass) is berthierine (dark green iron-rich layered silicate formed in low-oxygen marine conditions), altering to siderite. Fossil content variable throughout but locally abundant especially in limestone beds.	To c.10m
Lias Group	Whitby Mudstone	Medium and dark grey fossiliferous mudstone, and siltstone, laminated and bituminous in part, with thin siltstone or silty mudstone beds and rare fine-grained calcareous sandstone beds; dense, smooth argillaceous limestone nodules very common at some horizons; phosphatic nodules at some levels. Nodular and fossiliferous limestones occur at the base in some areas.	To c.120m

3.2.12 Bedrock Area 3, extending between OHL towers ZA233 to ZA300D (Figures F4-9 to F4-14), is dominated by a sequence of oolitic limestone formations comprising, Stamford Member, Rutland Formation, Wellingborough Limestone Member, Blisworth Limestone Member, Grantham Formation, Lower Lincolnshire Limestone Member. Table 3-6 presents the mapped units and their descriptions, ordered broadly from oldest to youngest.

Table 3-6 Bedrock Geology – Area 3

Parent Unit	Geological Stratum	BGS Description	BGS Thickness (m)
Lias Group	Whitby Mudstone	Medium and dark grey fossiliferous mudstone, and siltstone, laminated and bituminous in part, with thin siltstone or silty mudstone beds and rare fine-grained calcareous sandstone beds; dense, smooth argillaceous limestone nodules very common at some horizons; phosphatic nodules at some levels. Nodular and fossiliferous limestones occur at the base in some areas.	To c.120m

Parent Unit	Geological Stratum	BGS Description	BGS Thickness (m)
Inferior Oolite Group	Northampton Sand Formation	Sandy, berthierine-oidal and sideritic ironstone, greenish grey where fresh, weathering to brown limonitic sandstone, typically displaying a box-stone structure. The basal part is commonly muddy and less ferruginous. The uppermost beds are generally more or less ferruginous sandstone. The unit includes lenses of mudstone and limestone in places, and contains a fairly abundant marine fauna of bivalves, brachiopods and ammonites, which are not generally evident in weathered sections.	To c.21m
Inferior Oolite Group	Grantham Formation	Mudstones, sandy mudstones and argillaceous siltstone-sandstone, which is commonly ferruginous, and containing generally abundant plant debris, interpreted as both non-marine and marine facies, comprising several shallowing-upwards, delta-type rhythms with typically a tripartite succession comprising: a generally pale, locally carbonate-cemented and commonly ferruginous more or less argillaceous sand or sandstone at the base, which may have a rootleted seatearth at the top, overlain in the type area at least, by a median unit of marine shaly sandy mudstone designated the Stainby Member, which farther to the south is represented by a dark carbonaceous shaly clay, named the "Coaly Bed", which may be equivalent, overlain by an upper, possibly rhythmic succession of alternating sand or sandstone with mudstone or sandy mudstone that may be rootletted in parts.	Typically about 2m to 5m in the type area, and extremely variable, locally ranging up to 15m in channels.
Lincolnshire Limestone Formation	Lower Lincolnshire Limestone Member	Limestones, dominated by low-energy calcilutite, and peloidal wackestone and packstone. Commonly includes sandy limestone or calcareous sandstone in basal part (locally known as Collyweston Slate) and contains substantial units of mudstone, particularly from the Lincoln area northwards.	0 to c.20m

Parent Unit	Geological Stratum	BGS Description	BGS Thickness (m)
Great Oolite Group	Rutland Formation	Interpreted as a succession of up to seven shallowing upward, essentially delta-type rhythms, comprising ideally of a grey marine mudstone passing up into non-marine mudstone and siltstone, with a greenish-grey rootlet bed at the top. The basal beds comprise mainly fluvial and lacustrine sandstones, designated the Stamford Member in the south, passing north in central Lincolnshire into the Thorncroft Sand Member. Subordinate sandstone beds occur higher in the sequence locally, as well as typically shelly and shell-detrital marine limestones and calcareous mudstones, notably in the mid part, the Wellingborough Limestone Member, in Northamptonshire. The Wellingborough Limestone thins and loses its character northwards such that it is not recognisable in Rutland, where the formation above the Stamford Member is called the Castle Member (Hudson and Clements, 2007).	Typically, from about 8 to 12 m, and up to about 15 m thick
Rutland Formation	Stamford Member	A pale greenish grey to yellowish and white, generally massive, fine-grained, generally friable, quartzose, unfossiliferous sandstone or siltstone, interpreted as mainly swamp and lacustrine, seen particularly in the upper part of the succession and in thicker successions as a sandy silty mudstone with plant debris, rootlets and thin lignite lenses, especially near the top, locally including interpreted lacustrine carbonaceous mudstones in hollows at the base and at the top.	Up to 12m, but typically 4m to 5m thick
Rutland Formation	Wellingborough Limestone Member	A massive argillaceous, sandy, shelly and shell-detrital limestone associated with rubbly oyster-rich limestone and marl and mudstones, passing northwards into sandstone.	Up to about 5 m thick, typically 3m to 4m

Parent Unit	Geological Stratum	BGS Description	BGS Thickness (m)
Great Oolite Group	Blisworth Limestone Formation	Pale grey to off-white or yellowish limestones with thin marls and mudstones, fossiliferous, bioturbated peloidal, ooidal and shell-fragmental more-or-less argillaceous packstones and wackestones, subordinate cross-bedded ooidal shell-fragmental grainstones: fauna may include rhynchonellids particularly in the lower part in the south (see the Roade Member), and may be dominated by oysters, notably in the upper part in the north (see the Longthorpe Member).	Typically from 6 m to 7m thick in the type area, up to about 12m to the south-west.

Linear Geological Features

3.2.13 Across the three Bedrock Areas of the OHL Route, 18no. linear geological features were identified on BGS mapping. Of these, 8no. lie within 50m of an OHL tower. The records are summarised in Table 3-7.

Table 3-7 Linear Geological Features

Feature Type	Location (Figure)	Notes
Approximate margin of buried (superficial deposit-filled) channel or valley	Underlying OHL tower ZA107 to ZA115 (F4-2)	
Fault	c.15m NW of OHL tower ZA123 (F4-3)	Striking at 353°, Inferred, displacement not stated.
Fault	c.49m NW of OHL tower ZA124 (F4-3)	Striking at 354°, Inferred, displacement not stated.
Fault	c.19m NW of OHL tower ZA170 (F4-5)	Striking at 45°, Inferred, displacement not stated.
2no. Faults	Intersection is c.16m S of OHL tower ZA265 (F4-12)	2no. faults intersecting at 79°, Fault 1 striking at 134°, Fault 2 striking at 213°, both faults Inferred, displacement not stated. Recorded as three separate features by BGS.
Fault	c.41m NE of OHL tower ZA268 (F4-12)	Striking at 101°, Inferred, displacement unknown.

Bedrock Chemistry

- 3.2.14 In the UK, sulphates and acids, which occur naturally in the ground can attack and damage concrete. BRE Special Digest 1 (SD1) provides guidance on assessing the potential for this, which includes identifying potentially pyrite bearing strata. Box C6 of SD1 lists the Charmouth Mudstone and Whitby Mudstone as known to contain pyrite, and highlights the potential for grey or black coloured alluvial deposits, coal measures to also contain sulphides. BGS memoirs also note the Dyrham Formation, Blue Lias formation / Scunthorpe Formation, Marlstone Rock, Blisworth Limestone Formation, Northampton Sand as containing sulfate minerals and/or acidic ground conditions.

Exploratory Hole Records

- 3.2.15 The BGS maintains an archive of historical exploratory hole records throughout the UK. AECOM has searched the database and those which are considered to provide useful information on the ground profile at the site are included in Table 3-8. 54no. historical boreholes are present within the Reconductoring Area, however 26no. of these are confidential and have not been provided to AECOM at the time of writing. The remaining 28no. boreholes have been referenced in producing this report. Figures F3-2 to F3-14 present the locations of the boreholes. Hyperlinks to these borehole records are included and relevant information from the records is considered as part of the Preliminary Ground Model in Chapter 1.

Table 3-8 BGS Exploratory Hole Records

Bedrock Area	BGS Hole ID	Easting (m)	Northing (m)	Year ¹	Depth (m)	Hyperlink to Borehole Log ²
Bedrock Area 1	SK61NE81	469986	319170	1980	3.35	Click Here
	SK61NE82	469862	319086	1980	3.35	Click Here
	SK71NW119	470021	318806	N.D.	3.05	Click Here
	SK71NW122	470070	318694	N.D.	3.05	Click Here
	SK71NW77	470050	318620	N.D.	Confidential	Confidential
	SK71NW129	470112	318596	1978	3.05	Click Here
	SK71NW163	470036	318471	N.D.	4.27	Click Here
	SK71NW160	470155	318413	N.D.	3.96	Click Here
	SK71NW158	470116	318211	N.D.	2.44	Click Here
	SK71NW159	470134	318324	N.D.	2.74	Click Here
	SK71NW156	470209	318237	N.D.	3.66	Click Here
	SK71NW38	470224	317762	N.D.	19.5	Click Here
Bedrock Area 2	SP79SW4	474980	294760	1953	45.72	Click Here

Bedrock Area	BGS Hole ID	Easting (m)	Northing (m)	Year ¹	Depth (m)	Hyperlink to Borehole Log ²
Bedrock Area 3	SP77NE220	479250	279710	1991	7	Click Here
	SP77NE219	479290	279710	1991	7.6	Click Here
	SP77NE218	479260	279730	1991	8.7	Click Here
	SP77NE170 ³	479420	279160	1909	240	Click Here
	SP77NE215	479400	279100	1883	240	Click Here
	SP77NE110 ⁴	479470	278690	1961	19	Click Here
	SP77NE111 ⁵	479490	278650	1961	7.62	Click Here
	SP87NW105	481330	276400	1892	Unknown	Click Here
	SP87NW114	481460	276200	N.D.	8	Click Here
	SP87NW124	481550	276160	1941	10	Click Here
	SP87SW27	486495	273842	1961	41.15	Click Here
	SP87SW41	482725	274702	1992	12	Click Here
	SP87SW66	482691	274677	1992	3	Click Here
	SP87SW34	482740	274640	1977	6	Click Here
	SP87SE14	485270	272570	1934	67	Click Here
	SP87SE15	485350	272350	1936	72	Click Here
	SP86SE48	486550	264560	1974	4.7	Click Here
Between ZA298 and ZA300B, BGS retains 26 confidential borehole records which are associated with “Skinners Land Earl Barton Quarry” these were not accessible prior to the issue of this report.						

Notes:

1 N.D. = No date available

2 Exploratory hole records referenced in the table are publicly available on the BGS GeoIndex Viewer

3 SP77NE170 misidentified in Groundsure records as SP87NW202.

3 SP77NE110 misidentified in Groundsure records as SP77NE71.

5 SP77NE111 misidentified in Groundsure records as SP77NE71.

3.3 Groundwater

- 3.3.1 Limited information on groundwater is available on the above exploratory hole logs. In general, groundwater was shallow in exploratory holes located in low lying areas and near surface water features. Commentary on groundwater is provided within the Preliminary Ground Model in Chapter 1 and Geotechnical Risk Register. It shall be noted that individual measured groundwater levels are subject to seasonal fluctuation and should be considered indicative in the absence of a groundwater monitoring programme.

3.4 Ground Stability Records

- 3.4.1 Following review of the Groundsure data, and BGS records covering the OHL route, three significant ground stability hazards were observed to be present within the Reconductoring Study Area.

Slope instability

- 3.4.2 Slope instability is a potential issue particularly on steep valley sides slopes, such as between towers ZA151 and ZA160. Notable landslipped areas that are shown on Sheet 142 Melton Mowbray may have formed under the wetter freeze-thaw periglacial conditions that prevailed during the Devensian times. These areas, together with outcrops of head and Slope Terrace Deposits that may contain relict shear surfaces, have the potential to be reactivated by loading, undercutting or excavating into slopes, or by introducing water into the slope from drains or soak-aways. Instability is more likely if there is increased ingress of water from natural or artificial sources, and at times of exceptionally heavy and sustained rainfall.

Compressible Deposits

- 3.4.3 Superficial Deposits within the reconductoring area, primarily Alluvium, Colluvium and Head are likely to be poorly consolidated giving them higher potential compressibility. Clays of the Lias and Inferior Oolite groups, notably Charmouth, Blue Lias, and Whitby Mudstones, can be of intermediate to very high plasticity, with strength generally increasing with depth as weathering and stress relief effects decline.

Ground Dissolution

- 3.4.4 Areas of the route are underlain by outcropping Great Oolite Group Limestones, notably Blisworth Limestone and Wellingborough Member of Rutland Formation along eastern Northamptonshire Uplands. Although not as pronounced as other geological formations in the country, karst features have been identified within Great Oolitic Limestones within the vicinity of the Study Area. A majority of karst features within vicinity of Study Area are associated with gull fissures as a result of mass movement. It is noted that glacial till may cover and mask karst features, and that the BGS karst database is incomplete in the area.

Running Sands

- 3.4.5 Colluvium, mainly present in the northern portions of the Reconductoring Area, is noted for its elevated running sands hazard, relative to the other strata along the route.
- 3.4.6 The Groundsure data includes hazard ratings for additional ground stability hazards, these have been included in Table 3-9, which shows the variable risk of ground stability hazards across the site, taken from the Groundsure data. The distribution of these hazards across the Reconductoring route are presented on Figures F10-1 to F10-14.

Table 3-9 Ground Stability Records

Hazard Type	Hazard Potential – Site Wide	Areas of Elevated Hazard Potential
Collapsible Ground Stability	Negligible to very low	Generally, very low across the entire OHL route. Areas of negligible risk associated with alluvium and colluvium deposits.
Compressible Ground Stability	Negligible to moderate	Generally, negligible across the entire OHL route. Areas of moderate risk associated with alluvium and colluvium deposits.
Ground Dissolution Stability	Negligible to low	Areas of very low risk associated with the Marlstone Rock, and oolitic limestone formations. Areas of low risk associated with oolitic limestone formations.
Landslide Ground Stability	Negligible to high	Generally, very low and low across route. Low risk areas associated with sloping ground. Negligible areas associated with areas of mapped artificial ground and Northampton Sand Formation. Between ZA152 to ZA155 (and associated access corridors, Figure F3-4), areas of moderate to high risk associated with sloping ground underlain by mudstones and clay soils, and high risk areas associated with mapped landslide deposits.
Running Sand Ground Stability	Negligible to moderate	Areas of very low risk associated with Glacial Till deposits. Areas of low risk associated with Alluvium. Areas of moderate risk associated with colluvium. Areas of negligible risk associated with mudstones and clay soils.
Shrinking or Swelling Clay Ground Stability	Negligible to low	Generally low across the Reconductoring Area. Areas of very low associated with colluvium and head, and areas of low associated with mudstones and clay soils. Areas of negligible risk associated with granular deposits, predominantly Northampton Sand Formation.

3.5 Ground Movements

- 3.5.1 The European Ground Motion Services (EGMS) provides freely available Synthetic Aperture Radar Interferometry (InSAR) ground movement data from the Sentinel-1 satellite constellation. This has been updated annually from 2016 to present, indicates that where locally recorded, settlements associated with infrastructure / developments on / adjacent to the OHL towers appears to be relatively low. This is based on the graduated scale provided by the EGMS on its web viewer. This has limits of +10mm to -10mm of movement, with data points lying near the centre of the scale. It is noted that while data points appear to have been collected upon, or in close proximity to the existing towers, these locations cannot be confirmed.
- 3.5.2 It is noted that data presented in the EGMS is understood to be updated on an annual basis and therefore may be out of date. Furthermore, the data presented is considered here purely as an indication of signs of ground movement and should be used with caution.

3.6 Seismic Hazard

- 3.6.1 A review of the BGS GeoIndex recorded earthquake map shows that 1 no. earthquake with a maximum European Macroseismic Scale (EMS) intensity of 0 (Not Felt) and a Richter local magnitude: 1.1 occurred in close proximity to OHL tower ZA180 (Figure F3-6) in April 2020. No other earthquakes are recorded within the Reconductoring Area.
- 3.6.2 In 2020 BGS seismologists completed a seismic hazard assessment for the UK, producing seismic hazard plans for the UK. This was undertaken with support from the Institution of Civil Engineers (ICE), other seismologists and engineers based in the UK and with oversight from the British Standard Institution (BSI) sub-committee B/525/8 for Eurocode 8 (EC8): Earthquake resistant design of structures.
- 3.6.3 The maps confirm that seismic hazard is generally low (as deemed by BGS) in the UK but that the hazard is slightly higher in areas like Wales and north central England. This largely reflects the higher rates of historical earthquake activity in these regions. The entire Reconductoring Area falls into a region mapped by BGS as having a peak ground acceleration of 0.01g for a 475 year return period.

3.7 Agricultural Land Classification

- 3.7.1 The majority of the site and its towers and access corridors sit within the Agricultural Land Classification (ALC) Grade 3. Details of the grades and the associated pylons and access corridors are included below:
- Grade 2 – ZA114 and ZA115 (including access corridors to east), ZA119 (and part of access corridor to east), ZA120 (although laydown area to east is Grade 3), ZA251 (including access corridors to east and partially to west), ZA273 (including access corridors to east and west), ZA274 and ZA275 (including access corridor/laydown area to west), ZA276 (including access corridor to east), ZA277, ZA281, ZA282 (and laydown area to east/access corridor to west), access corridor to east of ZA283, ZA287, ZA291 (and access corridor to the east), ZA292, ZA293, ZA294 (and access road to the west).

- Grade 3 – All other pylon towers and access corridors/laydown areas not listed.
- Grade 4 – ZA116 (including access corridors to east and west), ZA139, ZA153, ZA154 (and part of access corridors to the west), ZA155, ZA231, ZA239, ZA243, ZA244, ZA288 (and laydown area to the west), ZA296 (and access corridor to west), ZA297 (and access corridor to west).
- No data – ZA278, ZA279, ZA280.

3.8 Mining and Mineral Extraction

Planning Policy for Mineral Use

- 3.8.1 The National Planning Policy Framework (NPPF) for England requires minerals planning authorities to promote sustainable use of mineral resources in their Local Plans. This includes defining mineral safeguard zones to ensure that specific mineral resources of local or national importance are not sterilised by non-mineral development (but not assuming that the identified minerals will be worked). If it is necessary for non-mineral development to take place then the local planning authority should set out policies to encourage the prior extraction of minerals, where practicable and environmentally feasible.
- 3.8.2 When determining planning applications local planning authorities must ensure that, amongst other matters, that there are no unacceptable impacts on the natural and historic environment, human health or aviation safety (taking into account cumulative effects from multiple sites); unavoidable noise, dust and particle emissions, and vibrations are controlled, mitigated or removed at source; and to not normally permit other developments in mineral safeguard zones.
- 3.8.3 Groundsure data notes three surface mineral working planning areas within the reconductoring area:
- Earls Barton (Sand and Gravel – Located between ZA295 and ZA300A and associated access corridors to east and west of these towers (Figure F3-14), divided into 5 valid areas and 1 refused area.
 - Wilby (Silica sand, Clay, Sand) – Located between ZA282 and ZA285 (Figure F3-13), 1 valid area.
 - Loddington (Surface mineral working) – Located between ZA238 to ZA248 and associated access corridors to the east of the alignment along this length (Figure F3-10), 3 valid areas.

Aggregate/Mineral Quarrying and Mining

- 3.8.4 Based on a review of Groundsure data (including BritPits database and surface ground workings), Table 3-10 presents the available information on mining and quarrying operations, past and present that have taken place within the reconductoring area. Data obtained from Groundsure notes that an area of historical railway cuttings is mapped c.80m south of OHL tower ZA151 (Figure F3-4).
- 3.8.5 The BGS memoirs suggest that Ironstone mining is likely to have taken the form of opencast pits which were progressively backfilled with compacted spoil of various local lithologies and clinker derived from local steel production.

- 3.8.6 The BGS memoirs also note that the Northampton Sand Formation, Blisworth Limestone, Stamford Member, Lincolnshire Limestone, and Marlstone Rock may have been worked in the past suggesting that minor unrecorded quarrying may be present in these strata.
- 3.8.7 Sand and Gravel extraction is noted to have taken place within the River Terrace Deposits, Glaciofluvial Deposits, and in the north portion of the route, the Alluvium and River Terrace Deposits of the Soar and Wreake valleys.

Table 3-10 Quarrying within the reconductoring area

Nearby OHL Towers (Figure Number)	Name	Operator	Dates	Status/ Material Quarried
ZA234 – ZA235 (F3-9)	Harrington	Unknown	N/A	Ceased - Limestone
ZA236 – ZA237 (F3-9)	Sand Hill Farm Sand Pit	Unknown	N/A	Ceased - Sand
ZA241 – ZA242 (F3-10)	Old Orton Pit	Unknown	N/A	Ceased - Ironstone
ZA243 – ZA244 (F3-10)	Bransons Pit	Unknown	N/A	Ceased - Ironstone
ZA247 – ZA248 (F3-10)	Mawsley Pit	Unknown	N/A	Ceased - Ironstone
ZA298 – ZA299 (F3-14)	Earls Barton Sand Pit	Unknown	N/A	Ceased – Sand and Gravel
ZA299 – ZA300A (F3-14)	Earls Barton Quarry	Unknown	N/A	Ceased – Sand and Gravel

Coal Mining

- 3.8.8 The Mining Remediation Authority (MRA) web-GIS viewer (accessed 23/02/2026) shows that the Reconductoring Area between OHL towers ZA105 to ZA113 (Figure F3-2) lies within the Coal Mining Reporting Area, with BGS records showing the area is underlain by deep coal resource, defined by BGS as coal between 50m to 1200m below ground level. OHL towers ZA105 to ZA108 and access corridors/laydown areas lie within the extent of the Abandoned Mines Catalogue. Two mine entries are mapped c.2 km west of the Reconductoring Area.
- 3.8.9 Mine closure plan 16889 (accessed 10/06/2026) suggests workings are present below the study area, within the Deep Main Seam, at depths of over 550m bgl.
- 3.8.10 The Mining Remediation Authority web-GIS viewer shows no Surface Coal Areas, Mine Entry Potential Zones of Influence, Fissures, Breaklines, Surface Mining, Past

Shallow Coal Mine Workings, Probable Shallow Coal Mine Workings, Coal Outcrops are mapped within 1 km of the reconductoring area. There are no Development High Risk Areas mapped by the Mining Remediation Authority within the Reconductoring Area.

3.9 Radon

- 3.9.1 The UK Health Security Agency's UK Radon website was reviewed along with information from the more refined BGS database presented in the Groundsure GIS data to determine potential radon risks for the reconductoring area. The whole of the Reconductoring area is mapped with a minimum of 0% - 0.99% probability of a house having a radon concentration at or above a threshold level of 200 becquerels per cubic metre (Bq m³). Additional areas being mapped as elevated above 0.99%. Table 3-11 outlines the areas of elevated radon risk along the OHL route.

coal

Table 3-11 Radon Data

OHL Towers	Radon threshold probability Percentages
ZA105 – ZA107	1% to 2.99999%.
ZA112 – ZA117	1% to 2.99999%
ZA122 – ZA123	1% to 2.99999%
ZA131 – ZA138	1% to 2.99999%
ZA139 – ZA150	1% to 2.99999%
ZA152 – ZA155	1% to 2.99999%
ZA157 – ZA160	1% to 2.99999%
ZA160 – ZA164	1% to 29.9999% (locally 10% to 29.9999%)
ZA165 – ZA166	1% to 2.99999%
ZA175 – ZA176	1% to 2.99999%
ZA229 – ZA-230	5% to 9.99999%
ZA230 – ZA232	1% to 2.99999%
ZA232 – ZA240	5% to 9.9999% (areas mapped at 10% to 29.9999%, locally 30% to 100% between ZA235 to ZA236, ZA236 to ZA237, ZA239 to ZA240, and at access corridor west of tower ZA232)
ZA241 – ZA250	1% to 2.99999% (areas mapped at 10% to 29.9999%, and 30% to 100% between towers ZA241 to ZA242, ZA243 to ZA247 and locally at tower ZA248 and ZA249)
ZA250 – ZA252	5% to 9.9999% (areas of 10% to 29.9999%, and locally 30% to 100% between ZA250 and ZA251 and associated access corridor east of this)

ZA257 – ZA258	1% to 2.99999%
ZA264 – ZA265	5% to 9.99999%
ZA265 – ZA266	1% to 2.99999%
ZA267 – ZA272	1% to 2.99999% (5% to 9.99999% present at ZA271 and ZA272)
ZA274 – ZA275	1% to 2.99999% (areas mapped at 5% to 9.99999%)
ZA283 – ZA287	1% to 2.99999% (areas mapped at 10% to 29.9999%, and locally 30% to 100% around ZA286 to ZA287)
ZA287 – ZA289	5% to 9.9999% (areas mapped at 10% to 29.9999%, and locally 30% to 100% around ZA288 and associated access corridor to west)
ZA292 – ZA294	5% to 9.9999% (areas mapped at 10% to 29.9999%, including on access corridors to northeast of tower ZA292 and west of tower ZA294)

3.10 Hydrogeology

Groundwater Vulnerability & Aquifer Classification

- 3.10.1 Groundwater bodies are classified by the Environment Agency (EA) under the Water Framework Directive (WFD), whereby water bodies in England are classed as High, Good, Moderate, Poor or Bad. The chemical status assesses the compliance with environmental quality standards for pollutants (i.e., whether they exceed criteria) whilst ecological status evaluates whether groundwater affects water levels and dependent ecosystems (i.e., is it sustainable). With respect to the groundwater bodies, the chemical status has been provided.
- 3.10.2 A search of the EA's Catchment Data Explorer was conducted regarding the groundwater quality beneath the Site. Details of the WFD Groundwater Bodies beneath the Site and their overall status are included within Table 3-12.

Table 3-12 WFD Groundwater Bodies

OHL Towers (Figure)	Strata / Formation Names	Chemical Status ¹
ZA105 (North end of route) – ZA155 (F6-2, F6-3)	Soar - Secondary Combined (GB40402G990600)	Good
ZA154 – ZA227 (Intermittent presence) (F6-4 to F6-8)	Welland Lower Jurassic Unit (GB40502G304000)	Good
ZA207 – ZA222 (Intermittent presence) (F6-7, F6-8)	Warwickshire Avon - Secondary Mudrocks (GB40902G990900)	Good

OHL Towers (Figure)	Strata / Formation Names	Chemical Status ¹
ZA226 – ZA300D (South end of route) (F6-14)	Nene Mid Lower Jurassic Unit (GB40502G402400)	Good

¹All status details are taken from Cycle 3 2019 data.

3.10.3 The Environment Agency's Combined Groundwater Vulnerability Map. Figures F5-1 to F5-14 show the combined vulnerability ratings over the Reconductoring Area. These are summarised in the following sections and tables and are grouped according to aquifer designation. The classifications and vulnerability ratings set out by the EA in report SC040016/R New groundwater vulnerability mapping methodology in England and Wales. The vulnerability ratings are described as:

- High: Areas able to easily transmit pollution to groundwater. They are characterised by high leaching soils and the absence of low permeability Superficial Deposits.
- Medium: Areas that offer some groundwater protection. Intermediate between high and low vulnerability.
- Low: Areas that provide the greatest protection to groundwater from pollution. They are likely to be characterised by low leaching soils and/or the presence of low permeability Superficial Deposits.

Superficial Principal Aquifers

3.10.4 No superficial Principal Aquifer were identified intersecting the Reconductoring Area.

Secondary A Superficial Aquifers

3.10.5 Table 3-13 presents the Secondary A Superficial Aquifers that intersect the Reconductoring Area. These are permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.

Table 3-13 Secondary A Superficial Aquifers

OHL Towers (Figure)	Strata / Formation Names	Vulnerability
ZA105 – ZA107(F6-2)	Alluvium	Medium
ZA112 – ZA113 (F6-2)	Bytham Sand and Gravel Formation	Medium
ZA113 – ZA117 (F6-2)	Intermittent exposures of Birstall Sand and Gravel Member, Wanlip Sand and Gravel Member, and Alluvium	Medium to High
ZA122 – ZA123 (F6-3)	Alluvium	Medium to High
ZA135 – ZA136 (F6-3)	Alluvium	Medium

OHL Towers (Figure)	Strata / Formation Names	Vulnerability
ZA137 – ZA140 (F6-3, F6-4)	Alluvium, River Terrace Deposit	Medium
ZA151 – ZA152 (F6-4)	Alluvium	High
ZA154 – ZA156 (F6-4)	Glaciofluvial Deposits	Medium
ZA157 – ZA160 (F6-4)	Glaciofluvial Deposits, Alluvium	Medium
ZA163 – ZA167 (F6-5)	Glaciofluvial Deposits	Medium
ZA171 – ZA172 (F6-5)	Alluvium	High
ZA173 – ZA179 (F6-5)	Intermittent exposures of Alluvium	Medium
ZA179 – ZA181(F6-5, F6-6)	Glaciofluvial Deposits	Medium
ZA185 – ZA186 (F6-6)	Alluvium	Medium
ZA196 – ZA206 (F6-7)	Alluvium	Medium to High
ZA220 – ZA221 (F6-8)	Alluvium	High
ZA230 – ZA231 (F6-9)	Alluvium	Medium to High
ZA247 – ZA249 (F6-10)	Glaciofluvial Deposits, Alluvium	Medium to High
ZA264 – ZA265 (F6-12)	Alluvium	Medium
ZA271 – ZA272 (F6-12)	Alluvium	Medium to High
ZA287 – ZA288 (F6-14)	Alluvium	High
ZA294 – ZA300D (F6-14)	Alluvium, River Terrace Deposit (including undifferentiated, Grendon and Ecton members)	High

Secondary B Superficial Aquifers

- 3.10.6 Table 3-14 presents the Secondary B Superficial Aquifers that intersect the Reconductoring Area. These are predominantly lower permeability layers which may store/yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers.

Table 3-14 Secondary B Superficial Aquifers

OHL Towers	Strata / Formation Names	Vulnerability
ZA122– ZA125 (F6-3)	Colluvium	Medium
ZA127– ZA128 (F6-3)	Colluvium	Medium
ZA131 – ZA132 (F6-3)	Colluvium	Medium
ZA133 – ZA134 (F6-3)	Colluvium	Medium

OHL Towers	Strata / Formation Names	Vulnerability
ZA134 – ZA136 (F6-3)	Colluvium	Medium
ZA139 – ZA140 (F6-3, F6-4)	Colluvium	Medium
ZA141 – ZA143 (F6-4)	Colluvium	Medium
ZA145 – ZA146 (F6-4)	Colluvium	Medium
ZA148 – ZA150 (F6-4)	Colluvium	Medium
ZA152 – ZA153 (F6-4)	Colluvium	Medium
ZA157 – ZA159 (F6-4, F6-5)	Colluvium	Medium
ZA160 – ZA162 (F6-5)	Colluvium	Medium
ZA163 – ZA164 (F6-5)	Colluvium	Medium
ZA174 – ZA176 (F6-5, F6-6)	Colluvium	Medium

Secondary Undifferentiated Aquifers

- 3.10.7 Table 3-15 presents the Secondary Undifferentiated Aquifers that intersect the Reconductoring Area. These are assigned where it is not possible to attribute either category A or B to a rock type. In general, these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.

Table 3-15 Secondary Undifferentiated Superficial Aquifers

OHL Towers	Strata / Formation Names	Vulnerability
ZA105 – ZA151 (F6-2 to F6-4)	Glacial Till, Oadby Till Member, Head, Bosworth Clay Member	Medium to High
ZA154 – ZA171 (F6-4, F6-5)	Glacial Till, Oadby Till Member	Medium to High
ZA178 – ZA185 (F6-6)	Oadby Till Member	Medium
ZA211 – ZA215 F6-7, F6-8)	Oadby Till Member	Medium
ZA222 – ZA231 (F6-8, F6-9)	Oadby Till Member	Medium to High
ZA239 – ZA242 (F6-9, F6-10)	Oadby Till Member	High
ZA246 – ZA263 (F6-9 - F6-11)	Oadby Till Member	Medium to High
ZA266 – ZA284 (F6-9 - F6-11)	Oadby Till Member	Medium, locally High
ZA288 – ZA294 (F6-14)	Oadby Till Member	Medium to High

Principal Bedrock Aquifers

- 3.10.8 Table 3-16 presents the Principal Bedrock Aquifers that intersect the Reconductoring Area. These are characterised as geologies of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale. Generally principal aquifers were previously major aquifers.

Table 3-16 Principal Bedrock Aquifers

OHL Towers (Figure)	Strata / Formation Name	Vulnerability
ZA233 – ZA236 (F6.9)	Lower Lincolnshire Limestone Member	High
ZA257 – ZA268 (F6-11, F6-12)	Blisworth Limestone Formation	High
ZA275 – ZA285 (F6.13)	Blisworth Limestone Formation	Medium to High
ZA288 – ZA291 (F6.13)	Blisworth Limestone Formation	High

Bedrock Secondary A Aquifers

- 3.10.9 Table 3-17 presents the Secondary A Bedrock Aquifers that intersect the Reconductoring Area. These are characterised as permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.

Table 3-17 Secondary A Bedrock Aquifers

OHL Towers	Strata / Formation Names	Vulnerability
ZA153 – ZA170 (F6-4, F6-5)	Intermittent exposures of Marlstone Rock Formation	Medium to High
ZA180 – ZA181 (F6.6)	Marlstone Rock Formation	Medium
ZA232 – ZA234 (F6.9)	Northampton Sand Formation	High
ZA235 – ZA237 (F6.9)	Northampton Sand Formation	High
ZA239 – ZA240 (F6.9)	Northampton Sand Formation	High
ZA241 – ZA254 (F6-10, F6-11)	Intermittent exposures of Stamford Member, and Northampton Sand Formation	Medium to High
ZA257 – ZA258 (F6-11)	Intermittent exposures of Wellingborough Limestone Member, and Stamford Member.	Medium
ZA263 – ZA267 (F6-12)	Intermittent exposures of Wellingborough Limestone Member, Stamford Member, and Northampton Sand Formation.	High

OHL Towers	Strata / Formation Names	Vulnerability
ZA267 – ZA276 (F6-12)	Intermittent exposures of Wellingborough Limestone Member, Stamford Member, and Northampton Sand Formation.	Medium to High
ZA282 – ZA285 (F6-13)	Wellingborough Limestone Member, Stamford Member, and Northampton Sand Formation.	Medium to High
ZA285 – ZA289 (F6-13, F6-14)	Wellingborough Limestone Member, Stamford Member, and Northampton Sand Formation.	High
ZA291 – ZA294 (F6-14)	Wellingborough Limestone Member, Stamford Member, and Northampton Sand Formation.	High

Bedrock Secondary B Aquifers

3.10.10 Table 3-18 presents the Secondary Aquifers B Bedrock Aquifers that intersect the Reconductoring Area. These are described as predominantly lower permeability layers which may store/yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of former non-aquifers.:

Table 3-18 Secondary B Bedrock Aquifers

OHL Towers	Strata / Formation Names	Vulnerability
ZA253 – ZA258 (F6-11)	Rutland Formation	Medium to High
ZA263 – ZA266 (F6-12)	Rutland Formation	High
ZA267 – ZA268 (F6-12)	Rutland Formation	High
ZA271 – ZA275 (F6-13)	Rutland Formation	Medium to High
ZA282 – ZA286 (F6-13)	Rutland Formation	Medium to High
ZA288 – ZA289 (F6-14)	Rutland Formation	High
ZA290 – ZA293 (F6-14)	Rutland Formation	High

Secondary Undifferentiated Bedrock Aquifers

- 3.10.11 Table 3-19 presents the Secondary Undifferentiated Bedrock that intersect the Reconductoring Area. These are assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.

Table 3-19 Secondary Undifferentiated Bedrock Aquifers

OHL Towers (Figure)	Strata / Formation Names	Vulnerability
ZA105 (Proposed Substation Location) – ZA113 (F6.2)	Charmouth Mudstone Formation	Medium
ZA114 – ZA155 (F6.2)	Blue Lias Formation, Charmouth Mudstone Formation, Dyrham Formation	Medium to High
ZA156 – ZA164 (F6.4, F6.5)	Intermittent exposures of Dyrham Formation	Low to Medium
ZA169 – ZA211 (F6.4 to F6.7)	Charmouth Mudstone Formation, Dyrham Formation	Medium to High
ZA215 – ZA222 (F6.8)	Dyrham Formation	High
ZA233 – ZA237 (F6.9)	Intermittent exposures of Grantham Formation	High

Unproductive Strata

- 3.10.12 The following bedrock strata are classified by BGS as unproductive strata:
- Scunthorpe Mudstone
 - Whitby Mudstone

Source Protection Zones

- 3.10.13 No Source Protection Zones were identified within the Reconductoring Area.

Licensed Groundwater Abstractions

- 3.10.14 One historical groundwater abstraction was identified between towers ZA108 and ZA109, 160m from each.

Preliminary Hydrogeological Model & Flow Direction

- 3.10.15 Due to the extent Reconductoring Area, the groundwater flow direction within the superficial aquifers will likely be influenced by local topography and watercourses. The lowest recorded elevations are likely in areas where valleys / watercourses are noted, with it likely that they influence the direction of groundwater flow in alignment with the surface water flow via baseflow within permeable superficial deposits (hydraulic continuity). It should be noted that this baseflow is likely to be limited laterally within areas where cohesive deposits are noted (Till deposits and clay layers within the head deposits and Alluvium). The presence of the Whitby Mudstone and Scunthorpe Mudstone, unproductive aquifers, are recorded onsite may pose some limitations to the baseflow of groundwater.

3.11 Hydrology

Surface Water Features and Drainage

- 3.11.1 The Environment Agency Catchment Data Explorer, Groundsure data, and other publicly available sources have been reviewed to identify relevant hydrological features within the Reconductoring Area, including rivers, streams, drains, and tributaries passing into large surface water bodies. These have been listed below in Table 3-20 along with the associated EA Water Body Catchment and General Quality Assessment (GQA) status (if valid). It should be noted that minor surface water features are present in the vicinity of OHL towers ZA123, ZA135, ZA138, ZA139, ZA140, ZA185, ZA205, ZA238, ZA 246, ZA256, and ZA257 which do not have individual ratings, but may be in communication with the surface water features listed below.

Table 3-20 Environment Agency Water Bodies

Surface Water Feature ¹ (EA Water Body ID)	GQA Status ^{2 3 4} (Chemical) (Ecological)	Crossing Locations (Figure)	Notes
River Wreake GB104028047550	Chemical: N/A Ecological: Poor	ZA115 – ZA116, ZA122 – ZA123 (F7-2, F7-3)	Eye / Wreake from Langham Brook to Soar Water Body
Queniborough Brook (GB104028047450) (Possibly Queensborough Brook)	Chemical: N/A Ecological: Moderate	ZA135 – ZA136 (F7-3)	
Eye Brook GB104028047550	Chemical: N/A Ecological: Poor	ZA159 – ZA160 (F7.5)	Eye / Wreake from Langham Brook to Soar Water Body

Surface Water Feature ¹ (EA Water Body ID)	GQA Status ^{2 3 4} (Chemical) (Ecological)	Crossing Locations (Figure)	Notes
Stonton Brook (GB105031050460)	Chemical: N/A Ecological: Poor	ZA171 – ZA172, ZA173 – ZA174, ZA174 – ZA175, ZA178 – ZA179 (F7-5, F7-6)	
River Welland (GB105031045610)	Chemical: N/A Ecological: Moderate	ZA199 – ZA200, ZA202 – ZA203 (F7-7)	Confluence Jordan to confluence Langton Bk Water Body.
River Jordan (GB105031045600)	Chemical: N/A Ecological: Bad	ZA220 – ZA222 (F7-8)	
River Ise (Loddinton Arm) (GB105032045150)	Chemical: N/A Ecological: Moderate	ZA230 – ZA231 (F7-9)	
Slade Brook (GB105032045170)	Chemical: N/A Ecological: Moderate	ZA235 – ZA236, ZA238 – ZA239, ZA256 – ZA257 (F7-9, F7-10)	
Pytchley Brook (GB105032045110)	Chemical: N/A Ecological: Moderate	ZA264 – ZA265, ZA259 – ZA260, ZA264 – ZA265 (F7-12)	
Hardwick Brook (GB105032045100)	Chemical: Poor Ecological: Moderate	ZA271 – ZA272 (F7-13)	
Swanspool Brook (GB105032045070)	Chemical: N/A Ecological: Moderate	ZA287 – ZA288 (F7-13)	
River Nene and Navigation (GB105032045050)	Chemical: N/A Ecological: Moderate	ZA295 – ZA296 (F7-14)	Confluence Brampton Branch to confluence Ise data.
Unnamed minor watercourse, likely drainage for Grendon Substation	Chemical: N/A Ecological: Moderate	ZA300A – ZA300B, ZA300B – ZA300C (F7-14)	Likely in communication with Grendon Brook Water Body. (GB105032045330)
Grendon Brook (GB105032045330)	Chemical: N/A Ecological: Moderate	Access corridor to east of ZA299 (F7-14)	

¹ Minor waterbodies, such as streams and ditches that are present within the Reconductoring Area do not have individual ratings.

² Only Surface Water Features within the Reconductoring Area have been included in this table.

³ Data from latest available assessment period used (2022).

⁴ The classification status for the surface water body against the environmental standards for chemicals that are priority substances and priority hazardous substances. Chemical status is recorded as good or fail. A status of good means that concentrations of priority substances and priority hazardous substances do not exceed environmental quality standards. The chemical status classification for the water body, and the confidence in this (high or low), is determined by the worst test result. Chemical status and ecological status together define the overall surface water status of a water body.

⁵ Ecological status applies to surface water bodies and is based on the following quality elements: biological quality, general chemical and physicochemical quality, water quality with respect to specific pollutants (synthetic and non synthetic), and hydromorphological quality. There are five classes of ecological status (high, good, moderate, poor or bad). Ecological status and chemical status together define the overall surface water status of a water body.

Licensed Surface Water Abstractions

3.11.2 One surface water abstraction is present within the Reconductoring Area, c.33m northwest of OHL tower ZA265.

Risk of Flooding from Surface Water

3.11.3 The indicative floodplain map for the area, published by the EA, shows that the OHL route crosses numerous areas with recorded flood risk, these are divided into Flood Zones 1, 2 3, 3a, and 3b, however only zones 2 and 3 are present within the Reconductoring Area. They are defined as:

- Flood Zone 2: The medium probability zone, between 0.1 percent and 1 percent annual chance of flooding from rivers or the sea.
- Flood Zone 3: Flood Zone 3 is land with a 1 percent or greater annual probability of fluvial flooding.

3.11.4 The data is summarized in Table 3-21.

Table 3-21 Environment Agency Flooding Zones

OHL Towers (Figure)	Flood Zones Present	Notes
ZA105 – ZA106 (F8-2)	Floods Zones 2 & 3	Associated with minor watercourse.
ZA114 – ZA117 and associated access corridors to east / west (F8-2)	Floods Zones 2 & 3	Associated with River Wreake

OHL Towers (Figure)	Flood Zones Present	Notes
ZA122 – ZA123 and associated access corridor to east of ZA123 (F8-2)	Floods Zones 2 & 3	Associated with tributary to River Wreake
ZA135 – ZA136 and associated access corridor west of ZA135 (F8-3)	Floods Zones 2 & 3	Associated with tributary to River Wreake
ZA137 – ZA139 and associated access corridor east of ZA138/139 (F8-3)	Floods Zones 2 & 3	Associated with tributary to River Wreake
Access corridor 850m west of ZA152	Floods Zones 2 & 3	Associated with Queniborough Brook
ZA171 – ZA172 (F8-5)	Floods Zones 2 & 3	Associated with Stonton Brook, tributary to River Welland
ZA172 – ZA173 and associated access corridor to east (F8-5)	Floods Zones 2 & 3	Associated with Stonton Brook, tributary to River Welland
ZA173 – ZA179 (F8-5, F8-6)	Floods Zones 2 & 3	Associated with Stonton Brook, tributary to River Welland
ZA185 – ZA186 (F8-6)	Floods Zones 2 & 3	Associated with Glooston Arm, tributary to River Welland
ZA197 – ZA206 and associated access corridors (F8-7)	Floods Zones 2 & 3	Associated with River Welland
Access corridor east of ZA211 (F8-7)	Floods Zones 2 & 3	Associated with Dingley Brook
ZA220 – ZA221 and access corridor to east (F8-8)	Floods Zones 2 & 3	Associated with tributary to River Welland
ZA230 – ZA231 (F8-9)	Floods Zones 2 & 3	Associated with River Isle

OHL Towers (Figure)	Flood Zones Present	Notes
ZA246 – ZA247 and access corridor to east (F8-10)	Floods Zones 2 & 3	Associated with tributary to Cransley Reservoir
ZA264 – ZA265 (F8-12)	Floods Zones 2 & 3	Associated with tributary to River Isle
ZA271 – ZA272 and access corridor to west (F8-13)	Floods Zones 2 & 3	Associated with Hardwick Brook, tributary to River Isle
ZA295 – ZA300D and access corridors to east / west (F8-14)	Floods Zones 2 & 3	Associated with River Nene

4. Historical & Planned Development

4. Historical & Planned Development

4.1 Historical Ordnance Survey Mapping and Satellite Images

- 4.1.1 Historical Ordnance Survey (OS) maps of the Reconductoring Area and the wider environs were provided in the Groundsure Map Insight Report GIS data (scales 1:2,500, 1:10,560 and 1:10,000) and are reviewed in this section.
- 4.1.2 Assessment is based on the Groundsure data sourced for the DF2 Rev B boundary.
- 4.1.3 The tabulated summary of historical maps in Appendix B outlines the onsite features and those considered to be of consequence within 75m of the existing transmission towers. The summary does not include all historical features, only those considered to be relevant to the scheme from a geo-environmental and geotechnical perspective.
- 4.1.4 The historical OS maps obtained with the Groundsure GIS data cover the period from 1883 to 1995. It is noted that only indicative map scales are provided. Where dates are stated, these refer to the dates of maps on which the features are present, have changed use or are no longer annotated, and do not necessarily refer to the exact dates of existence of a particular feature. Development that may have occurred between map editions is recorded as occurring on the latter published map, hence there are some limitations to the accuracy to the date of development unless supplementary evidence is available.
- 4.1.5 Review of available Google Earth Pro satellite images from 1945 to 2025 (intermittent coverage in earlier years), indicates that the site is predominantly characterised by agricultural land, including livestock grazing, farmyards, areas of rural industry, associated stockpiles. The linear red line boundary is intersected by several major and minor roads and railways. The scope of assessment was limited to identifying features with potential contamination risk. Findings are summarised in Appendix B. This review was carried out on the assumption that the Site is defined by the DF2 Rev B Redline boundary. Aerial imagery has been reviewed considering a 250m radius, to account for potential distortion in aerial images and future potential DF boundary updates.

4.2 Summary of Site and Surrounding Area History

- 4.2.1 The Site is predominantly occupied by agricultural fields both in its present-day use and historically based on the review of historical mapping. These fields are seen to contain or historically contain numerous ponds, with drainage channels, paths / tracks and roads intersecting the fields, alongside rivers / streams which pass through the Site. Locally, historical quarry features, railway lines and other buildings / structures are or have historically been present.
- 4.2.2 The OHL towers in their current configuration appear on maps dating from 1959 onwards (noting the partial coverage of the route within each individual year of mapping). On mapping dated 1970, towers ZA300C and ZA300D are shown to link to gantries approximately 50m east and to a substation beyond which is not shown within the mapping extent.

- 4.2.3 Railway features were observed in 5no. areas of the Site. A railway line was present approximately 10m north of ZA297 from 1883 and was dismantled by 1970. From mapping dated 1884, a railway track passing through a tunnel was located approximately 20m north of ZA109 and remains present. A railway line passing through a tunnel was present approximately 60m north of ZA199 from the earliest mapping of this section of the OHL, dated 1885, but appears dismantled by 1989. Between 1900 and 1974, a railway line in cuttings was present approximately 50m northeast of ZA247. Mapping dated 1899 shows ground workings approximately 60m north of ZA246, with this area appearing as a railway sidings by 1926, and being dismantled by 1993.
- 4.2.4 With regards to ponds, 21no. ponds were observed on the earliest mapping (dated 1883-1885) within 75m of the following towers: ZA109, ZA113, ZA117, ZA118, ZA125, ZA131, ZA144, ZA145, ZA150, ZA156, ZA167, ZA176, ZA184, ZA210, ZA215, ZA220, ZA222, ZA274, ZA277, ZA281, and ZA294. Additional ponds (6 no.) appeared on later maps, within 75m of ZA191 (1902), ZA143 (1959), 3no. ponds at ZA294 (1970) and ZA259 (1972). Across the available mapping, 15no. of these ponds disappeared from later maps and have potentially been infilled (ZA215 by 1900, ZA109 by 1903, ZA210 by 1924, ZA220 by 1971, ZA294 by 1972, ZA131 by 1979, ZA150, ZA156 and 3no. ponds at ZA294 by 1982, ZA125 by 1983, ZA191 by 1992 and ZA144 by 1995) with a total of 12no. ponds remaining present at the end of the mapped period. It is considered likely that infill to ponds was unengineered Made Ground.
- 4.2.5 Ground workings / quarries were observed in 5no. locations within 75m of OHL towers. An area of potential worked ground was present 75m southeast of ZA249 between 1900 and 1972. Potential ground workings were initially mapped in 1926 75m south of ZA266, recorded as a disused quarry by 1972 and no longer present by 1989. Ground workings were present 55m northeast of ZA118 between 1968 and 1992. A sand pit was located approximately 60m southwest of ZA284 by 1970 and identified as disused by 1993. Areas of sand and gravel workings were located adjacent to the north of ZA243 and 65m northwest of ZA244 between 1950 and 1972.
- 4.2.6 A hydraulic ram was mapped 70m north of ZA265 in 1926, with a covered pumping station recorded nearby 35m south of ZA265 in 1950. By 1972, the covered pumping station was no longer labelled, although the structure was still present, and the hydraulic ram had been relabelled as a disused covered reservoir.
- 4.2.7 A 'Works' was present approximately 40m south of ZA220 from 1961 and remained present on the latest mapping dated 1993. Features identified as relevant from a geo-environmental perspective have been listed in Section 9.2. Features of identified and potential geotechnical / geo-environmental consequence should be inspected / reviewed during Site reconnaissance.

4.3 Unexploded Ordnance Mapping

- 4.3.1 The regional unexploded ordnance (UXO) mapping published by Zetica (accessed 05/03/2026) show that the OHL route lies within a zone that experiences a low risk of Unexploded Bombs (UXB) This is defined by Zetica as an “area indicated as having 15 bombs per 1000 acres or less.” It is noted that these maps only include information on potential for bombing to have occurred in the area, and do not include all potential sources of UXO such as historical land use.
- 4.3.2 A Preliminary UXO Risk Assessment has been undertaken for the Site by Fellows International Group (FIG, 2026). FIG’s assessment includes research and review of satellite and aerial photography, historic mapping, archival material, First and Second World War UK bombing data within a 5 km radius of the Site. The assessment aims to identify military or potential UXO related activities that raises the risk of encountering a UXO during intrusive activities (e.g. below-ground construction, ground investigation).
- 4.3.3 FIG’s Preliminary UXO Risk Assessment has identified potential sources of UXO risk on or within 5 km of the Site as listed in Table 4-1.

Table 4-1 Sources of potential UXO identified by Preliminary Assessment

Potential UXO Source	Description of source	Approximate location of sources
WW2 Aerial Bombing	Bombing activity gives rise to the potential existence of undiscovered unexploded bombs. Initial research has identified five areas of WW2 bombing in proximity to the site.	3.8 km East of ZA107 2.2 km West ZA211 3.3 km Northeast of ZA230 3.3 km Northeast of ZA236 2.1 km East of ZA279 1.5 km Northeast of ZA292
Military Training Areas/Firing Ranges	Military Training Areas/Firing Ranges are used for various types of military training and practice with various types of weapons systems. Initial research has identified one WW2 firing range in proximity to the site.	4.6 km East of ZA128
Military Airfields	Military airfields were sometimes subjected to attack and are also related to military activity. This can result in potential encounter with UXO in areas located in proximity to an airfield site. Three military airfields have been identified in proximity to the site.	4.4 km East of ZA120 1.7 km southwest of ZA237 2.5 km West of ZA276

Bombing Decoy Sites	RAF and Royal Navy decoy sites were constructed in the vicinity of legitimate targets to deceive and decoy enemy bombers. For obvious reasons, such sites were often built in remote and uninhabited areas. Some were more successful than others and received relatively high bombing rates. One decoy site has been identified in proximity to the site.	4.5 km West of ZA163
Explosive Ordnance Clearance (EOC) Tasks & Reports	EOC tasks are potential indicators of the existence of legacy munitions. There is a record of three post-war explosive ordnance clearance tasks in proximity to the site.	3.5 km Northwest of ZA105 1.5 km East ZA110 3.7 km West of ZA182
Ordnance Factory/Ordnance Storage Facilities	Ordnance factories were responsible for the manufacture of arms and ammunition, and ordnance storage facilities were used for storing of live munitions. One ordnance factory / ordnance storage facility has been identified in proximity to the site.	4.8 km Northeast of ZA118

- 4.3.4 Given the potential sources of UXO identified, it is recommended that a Detailed UXO Risk Assessment is carried out. Detailed assessment has been commissioned and is in production at the time of report Issue. This assessment should be reviewed and findings incorporated into subsequent ground investigation specifications and any intrusive construction works.

5. Review of Historical Site Investigation

5. Review of Historical Site Investigation

- 5.1.1 Aside from the historical borehole logs held by BGS and listed in Table 3-8, no historical ground investigation reports held by the Client have been provided. AAJV has not been able to locate pre-existing NG ground investigation reports at the time of writing. If relevant historical reports become available, subsequent interpretive reporting should be consider the investigation findings.

6. Regulated Activities and Statutory Consultation

6. Regulated Activities and Statutory Consultation

6.1 Introduction

- 6.1.1 The key relevant features that characterise the Site and surrounding area are summarised in this Section, along with an indication of the risk to the land quality of the Site. Information on groundwater and surface water abstractions is detailed previously and is not repeated here.
- 6.1.2 Given the purpose of the desktop study report is to provide baseline information to support the Development Consent Order (DCO) for the scheme and inform an assessment of existing foundation suitability for re-use, a search area of 75m was considered sufficient to identify potential off-site sources of contamination.
- 6.1.3 Assessment is based on the Groundsure data sourced for the DF2 Rev B boundary and a 75m search area around the OHL. A further assessment of the additional access corridors located within the DF2 Revision B Redline boundary has been undertaken for the datasets considered to be higher priority as potential contamination sources and features identified within these access corridors have been tabulated.

6.2 Regulatory Database Review

- 6.2.1 Table 6-1 summarises information on regulated processes contained in the Groundsure data. The report collates data from a variety of sources including the EA and the BGS. All data suppliers are referenced in the report.
- 6.2.2 Regulatory information is excluded from the table below where it is not within the Reconductoring Area as depicted on the maps in Appendix A, where there is no information for the given topic or where entries are duplicated.

Table 6-1 Regulatory Database Review

Subject	Number present within 75m of an OHL Tower	Relevant OHL Towers	Details
Regulatory Processes			
Pollution Incidents	2	ZA185 ZA220	1no. entry dated September 2011 approximately 70m east of ZA185, relating to Other Sewage Materials (Sewage Materials); classified as Air – Category 3 (Minor), Land – Category 4 (No Impact), Water – Category 2 (Significant). 1no. entry dated September 2001 approximately 50m southwest of ZA220, relating to Other Inert Material or Waste (Inert Materials and Waste); classified as Air – Category 4 (No Impact), Land – Category 3 (Minor), Water – Category 4 (No Impact).
Discharges to Controlled Waters	1	ZA299	Discharge to Whiston Brook approximately 32m southwest of ZA299 at Earls Barton Quarry. The effluent type is listed as Trade Discharges for Process Effluent (not a Water Company). The discharge was effective from December 1991 and revoked in March 1995.
Licensed Waste Management Facilities and Industrial Land Uses			
Historical Landfills	3	ZA213 ZA214 ZA284 ZA299	Warren Lodge (Licensed, Inert Landfill) – approximately 23m east of ZA213 and 93m northeast of ZA214. The license was issued in August 1991 and no surrender date is listed. The last input date is listed as December 1993. Ashby Road (Licensed, Inert Landfill) - approximately 58m southwest of ZA284. The license was issued November 1984 and surrendered December 1986. Earls Barton Quarry (Licensed, Inert Landfill) – approximately 26m west of ZA299. The license was issued October 1979 and surrendered September 1986.

Landfill Waste Exemptions	4	ZA108 ZA164 ZA241	WEX411312 (2no. entries) approximately 62m north of ZA108 for a storing waste exemption for storage of waste in a secure place on a farm and a using waste exemption for use of waste in construction on a farm. WEX100931 approximately 17m west of ZA164 for a storing waste exemption for the storage of sludge on a farm. WEX418556 approximately 52m east of ZA241 for a storing waste exemption for the storage of sludge on a farm.
Railway and Tunnel Features	4	ZA109	The Old Dalby Test Track with an associated railway tunnel runs northwest to southeast approximately 28m northeast of ZA109.
Historical Railway and Tunnel Features	26	ZA109 ZA199 ZA297	A historical railway tunnel (dated 1884-1991) is located approximately 23-30m north of existing electricity tower ZA109, this is noted to be the Old Dalby Test Track running northwest to southeast. A historical railway, with historical railway sidings (dated 1928-1967) from approximately 45m north of ZA199. A historical/abandoned railway is located approximately 23m north of ZA297.
Historical Energy Features	1	ZA300B ZA300C ZA300D	2no. entries for an Electrical Substation (dated 1970 and 1984) located at the site of ZA300B, ZA300C and ZA300D. The electrical substation is currently present however the current extent from aerial imagery differs from the extent of the historical features.
Recent Industrial Land Uses	242	All towers	234no. entries for Pylons relating to the towers. 1no. entry for a Sewage Pumping Station approximately 57m northeast of ZA115. 1no. entry for Works (Unspecified Works or Factories) approximately 64m south of ZA220. 1no. entry for an Electrical Substation approximately 38m south of ZA278 2no. entries for a Crane Hire service approximately 62m west of ZA278. 4no. entries for Silos, approximately 66-69m west of ZA293. 1no. entry for Mooring Posts approximately 73m northwest of ZA296. 1no. entry for a Gantry (Travelling Cranes and Gentries) approximately 47m east of ZA300C. 1no. entry for a Gantry (Travelling Cranes and Gentries) approximately 59m east of ZA300D.

Historical Industrial Land Use	128	ZA109	6no. entries for a Tunnel (dated 1884-1969) approximately 23-30m northeast of ZA109.
		ZA151	1no. entry for Cuttings (dated 1884) approximately 71m northwest of ZA109.
		ZA185	2no. entries for Railway Sidings (dated 1902-1950) approximately 67m south of ZA151.
		ZA199	2no. entries for Cuttings (dated 1902-1950) approximately 67m south of ZA151.
		ZA203	2no. entries for a Railway Station / Disused Railway Station (dated 1958-1967) approximately 73-74m southeast of ZA151.
		ZA205	
		ZA217	1no. entry for Unspecified Disused Works (dated 1991) approximately 61m east of ZA185.
		ZA220	4no. entries for Railway Sidings (dated 1928-1967) approximately 38-40m north of ZA199.
		ZA241	1no. entry for a Sewage Farm (dated 1950) approximately 72m south of ZA203.
		ZA243	1no. entry for a Sewage Works (dated 1901) approximately 74m southwest of ZA205.
		ZA244	1no. entry for a Pumping Station (dated 1950) approximately 69m southeast of ZA205.
		ZA246	2no. entries for Cuttings (dated 1885-1958) approximately 70m northeast and 72m north of ZA217.
		ZA247	
		ZA265	1no. entry for an Unspecified Works (dated 1971) approximately 19m southwest of ZA220.
		ZA266	1no. entry for an Unspecified Tank (dated 1971) approximately 65m southwest of ZA220.
		ZA277	1no. entries for a Disused Ironstone Quarry (dated 1950) approximately 70m east of ZA241.
		ZA278	2no. entries for an Unspecified Disused Quarry / Disused Ironstone Quarry (dated 1950) located at the site of ZA243.
		ZA284	
		ZA292	2no. entries for an Unspecified Pit (dated 1927) approximately 65m north of ZA244.
		ZA293	1no. entry for Tramway Sidings (dated 1950) located at the site of ZA246.
		ZA296	1no. entry for Tramway Sidings (dated 1899) approximately 41m southeast of ZA246.
		ZA300C	2no. entries for Tramway Sidings (dated 1927-1950) and 1no. entry for an Unspecified Pit (dated 1899) approximately 52-54m northwest of ZA246.
		ZA300D	2no. entries for Tramway Sidings (dated 1927-1950) approximately 35-42m northeast of ZA247.
			2no. entries for Cuttings (dated 1950-1974) approximately 39-52 m east / northeast of ZA247.
			1no. entry for a Pumping Station and Covered Reservoir (dated 1950) approximately 21m west of ZA265.
			1no. entry for Unspecified Ground Workings (dated 1971) approximately 29m west of ZA265.
			1no. entry for an Unspecified Pit (dated 1950) approximately 73m southeast of ZA266.

			2no. entries for an Unspecified Heap (dated 1989-1992) approximately 65m south of ZA277. 2no. entries for an Industrial Estate (dated 1989-1992) approximately 72m south of ZA278. 4no. entries for a Sand Pit (dated 1977-1992) approximately 59m southwest of ZA284. 1no. entry for Cuttings (dated 1988) approximately 65m southeast of ZA292. 1no. entry for Cuttings (dated 1988) approximately 58m southeast of ZA293. 1no. entry for a Sand Pit (dated 1972) approximately 8m south of ZA296. 2no. entries for an Electrical Substation (dated 1972-1988) approximately 30m southeast of ZA300C. 2no. entries for an Unspecified Heap (dated 1972-1988) approximately 3m north of ZA300D.
Tanks	2	ZA220	2no. entries for an Unspecified Tank (dated 1961-1993) approximately 65m southwest of ZA220.
Industrial Tanks	1	ZA216	1no. entry for a Roofed Storage Tank is located approximately 75m southwest of ZA216.
Hazardous Substances			
List 2 Dangerous Substances	1	ZA211	One inactive entry approximately 46m northeast of tower ZA211 for Cpl Aromas Ltd - Flavour Division. Substances listed as pH.
Sensitive Land Uses			
Sites of Special Scientific Interest (SSSI)	2	ZA247 ZA248 ZA296 ZA297 ZA298 ZA299	Birch Spinney and Mawsley Marsh: The SSSI lies between ZA247 and ZA248. The south boundary of the SSSI is located approximately 55m north of existing electricity tower ZA248. Upper Nene Valley Gravel Pits: ZA296, ZA297 and ZA298 are located within the SSSI boundary. The southern border of the SSSI is located approximately 28m west and 30m north of ZA299.

Conserved Wetland Sites (Ramsar)	1	ZA296 ZA297 ZA298 ZA299	Upper Nene Valley Gravel Pits: The Ramsar area correlates with the SSSI area noted above. ZA296, ZA297 and ZA298 are located within the SSSI boundary. The southern border of the SSSI is located approximately 28m west and 30m north of ZA299.
Special Protection Areas (SPA)	1	ZA296 ZA297 ZA298 ZA299	Upper Nene Valley Gravel Pits: The SPA area correlates with the SSSI and Ramsar area noted above. ZA296, ZA297 and ZA298 are located within the SSSI boundary. The southern border of the SSSI is located approximately 28m west and 30m north of ZA299.
Nitrate Vulnerable Zones (NVZ)	4	All towers	The entirety of the linear red line boundary and all towers fall within NVZ comprising of, Northampton Sands (Groundwater), River Nene (Surface Water), River Welland (Surface Water), Soar R (Surface Water) and Thrapston lake Eutrophic Lake (Eutrophic Water).
Habitat Networks	7	ZA246 ZA247 ZA248 ZA298 ZA299 ZA300A ZA300B ZA300C	ZA247 and ZA248 fall within an approximately 9.3 hectare (ha) habitat network area, made up of an outer Network Enhancement Zone 1 in which ZA247 and ZA248 are located and an inner Primary Habitat zone located approximately 60m northwest of ZA248. ZA298, ZA299, ZA300A and ZA300B fall within an approximately 15ha habitat network area, made up of a Primary Habitat zone approximately 14m west of ZA299, a Network Enhancement Zone 2 which ZA298 is located and a Network Enhancement Zone 1 in which ZA299, ZA300A and ZA300B are located. The habitat network area is located approximately 61m north of ZA300C.
Open Mosaic Habitat	1	ZA213 ZA214	Environment Agency Historical Landfill Site: ZA213 is located within the Open Mosaic Habitat area boundary. The area is located approximately 65m north of existing electricity tower ZA214.
Agri-Environment Schemes			
Environmental Stewardship Scheme Agreement	18	See 'Details' column	The towers which lie within Environmental Stewardship areas are specified below: Entry Level Stewardship: ZA156, ZA157, ZA158, ZA159, ZA210, ZA211, ZA212, ZA213, ZA256, ZA257, ZA258, ZA269, ZA270 Entry Level plus Higher Level Stewardship: ZA105, ZA115, ZA164, ZA166, ZA167, ZA168, ZA169, ZA199, ZA207, ZA239, ZA240, ZA283, ZA284

Countryside Stewardship Scheme Agreement	73	See 'Details' column	The towers which lie within Countryside Stewardship areas are specified below: Middle Tier: ZA105, ZA109 – ZA110, ZA118, ZA120 – ZA121, ZA123 – ZA125, ZA127 – ZA130, ZA132 – ZA133, ZA135, ZA139, ZA144 – ZA148, ZA150 – ZA151, ZA154 – ZA155, ZA159 – ZA163, ZA170 – ZA171, ZA176 – ZA178, ZA188 – ZA194, ZA211 – ZA213, ZA215, ZA218, ZA220 – ZA221, ZA224 – ZA225, ZA235 – ZA240, ZA245 – ZA247, ZA251 – ZA253, ZA258, ZA260 – ZA264, ZA268 – ZA272, ZA274 – ZA276, ZA281 – ZA282, ZA285 – ZA286, ZA289 and ZA292 – ZA295. Higher Tier: ZA136 and ZA140.
Tree Felling Licences	6	ZA171 ZA174 ZA185 ZA226 ZA245	Selective Fell/Thin Unconditional licence area (covering approximately 0.96 ha) approximately 26m south of ZA171. Selective Fell/Thin Unconditional licence area (covering approximately 1.8ha) approximately 21m northeast of ZA174. Clear Fell Unconditional licence area (covering approximately 0.07ha) approximately 24m northwest of ZA185. Selective Fell/Thin Conditional licence area (covering approximately 0.05ha) approximately 59m west of ZA226. 2no. entries for Selective Fell/Thin Conditional / Unconditional licence areas (covering approximately 0.05ha) approximately 75m southwest of ZA245.

- 6.2.3 Information relating to environmental designations (for example, SSSI and Ramsar sites) will be reviewed separately and has therefore not been taken forward for further assessment in this report.
- 6.2.4 No entries were recorded for the following: Contaminated Land Register Entries and Notices; Prosecutions Relating to Controlled Waters; Enforcement and Prohibition Notices; Integrated Pollution Controls; Integrated Pollution Prevention and Control; Local Authority Integrated Pollution Prevention and Control; Local Authority Pollution Prevention and Controls; Local Authority Pollution Prevention and Control Enforcements; Prosecutions Relating to Authorised Processes; Registered Radioactive Substances; Substantiated Pollution Incident Register; Water Industry Act Referrals; Active or Recent Landfills; Control of Major Accident Hazards Sites (COMAH); Explosive Sites; Notification of Installations Handling Hazardous Substances (NIHHS); Planning Hazardous Substance Consents; Planning Hazardous Substance Enforcements; Fuel Stations; Gas Pipelines; Electricity Cables; Scheduled Ancient Monuments; National Parks; Areas of Outstanding Natural Beauty; World Heritage Sites; National Nature Reserves (NNR) Local Nature Reserves (LNR); Special Areas of Conservation (SAC); Designated Ancient Woodland; Biosphere Reserves; Forest Parks; Marine Conservation Zones and Green Belt.
- 6.2.5 A further review of the additional access corridors located within the DF2 Revision B Redline boundary has been undertaken, with the findings listed in Table 6-2.

Table 6-2 Regulatory Database Review (DF2 Rev B)

Subject	Location Description	Details
Historical Landfills	Access corridor east of ZA242 Access corridor west of ZA299	2no. entries for Uplands Farm Tip/Uplands Farm – (Licensed, Inert Landfill) – located within access corridor approximately 720m east of ZA242. Separate licenses were issued in February 1979 and November 1980 and surrendered in February 1984 and July 1991. 1no. entry for Earls Barton Quarry – (Licensed, Inert Landfill) – approximately 105m and 580m northwest of ZA299. The license was issued October 1979 and surrendered September 1986.
Historical Industrial Land Use	Access corridor east of ZA151 Access corridor west of ZA162 Access corridor east of ZA185 Access corridor west of ZA199 Access corridor west of ZA203 Access corridor west of ZA216	8no. entries for Cuttings/Railway Sidings (dated 1884-1982) approximately 100m southeast of ZA151. 7no. entries for Gravel Pit/Old Gravel Pit/Unspecified Pit (dated 1884-1967) approximately 790m southwest of ZA162. 1no. entry for Unspecified Disused Works (dated 1991) approximately 80m east of ZA185. 2no. entries for Railway Building (dated 1928-1950) approximately 90m west of ZA199.

	Access corridor east of ZA242 and ZA243	4 no. entries for Railway Sidings (dated 1928-1967) from approximately 75m west of ZA199.
	Access corridor east of ZA245	1no. entry for Sewage Farm (dated 1950) approximately 90m southwest of ZA203.
	Access corridor west of ZA249	5no. entries for Cuttings (dated 1885-1958) approximately 141m southwest of ZA216.
	Access corridor west of ZA293	1no. entry for Ironstone Quarry (dated 1927) approximately 690m northeast of ZA242.
	Access corridor west of ZA295	5no.entries for Tramway Sidings (dated 1899-1950) from approximately 430m east of ZA243.
	Access corridor west of ZA298	1no.entry for Tramway Sidings (dated 1899) approximately 150m northeast of ZA245. 3no. entries for Unspecified Old Quarry (dated 1901-1950) approximately 130m southwest of ZA249. 3no. entries for Pumping Station (dated 1901-1988) approximately 135m northwest of ZA293. 1no. entry for Corn Mill (dated 1883) approximately 130m west of ZA295. 2no. entries for Railway Sidings (dated 1950) approximately 800m west of ZA298.
Tanks	Access corridor west of ZA259.	2no. entries for Roofed Storage Tanks approximately 360m southwest of ZA259.
Industrial Tanks	Access corridor west of ZA259.	1no. entry dated 1993 approximately 360m southwest of ZA259.

6.3 Regulatory Consultation

Planning Information

- 6.3.1 The council web-based planning portals identified within the site extent, were reviewed to determine whether any existing planning conditions relate to the site area. The review was carried out on the assumption that the Site is defined by the DF2 Rev B Redline boundary.
- 6.3.2 The councils of which planning portals were reviewed, and associated findings are summarised in Table 6-3.

- 6.3.3 Only planning information that revealed a change in land use involving a potentially contaminative feature/s beyond pre-existing land use, and not already identified in Appendix B and Section 6.2, was considered. A buffer area of 75 m of an existing electricity tower was used for Melton Borough Council, Harborough District Council and West Northamptonshire Council. For North Northamptonshire Council, where this was not practicable due to the density of planning applications shown on interactive mapping, the review was done with a postcode search. Postcodes were obtained along the extent of the administrative boundary and searched in the database. These postcodes were taken at a regular frequency of approximately one postcode every 10 towers and therefore it is likely that not all planning applications within the vicinity of the site were captured. Additionally, the Planning-Simple Search does not provide the buffer applied when searching the database.
- 6.3.4 A review of all relevant planning application data is outside of the scope of this report.
- 6.3.5 Applications that have not been approved have been excluded from the summary table.

Table 6-3 Summary of Planning Information

Planning Council	Nearest Tower/s	Findings
Melton Borough Council	ZA106 - ZA144	No relevant findings within scope.
Harborough District Council	ZA145 - ZA199	No relevant findings within scope
West Northamptonshire Council	ZA201	No relevant findings within scope
North Northamptonshire Council	ZA200 - ZA209	For land at Marigold Farm Welham Road Great Bowden LE16 7FN. For “Anaerobic Digestion Plant, Associated Infrastructure, Lagoons and Feedstock Clamps (Leicestershire County Council reference 2023/CM/0053/LCC)”. Decision: No Objection. Status: Decided.
	ZA209 - ZA228	For land at Dingley Hall Estate Dingley LE16 8PJ. For “Car port, store and fuel store”. Ref: KR/1961/0040. Decision: Application Permitted/Approved. Status: Decided.
	ZA209 - ZA228	For land at 11 Church Close Braybrooke LE16 8LD. For “Paint storage shed”. Ref: KR/1968/0047. Decision: Application Permitted/Approved. Status: Decided

ZA228 - ZA237	For land at Falls Farm 34 High Street Harrington NN6 9NU. For "Change of use of barn from agricultural to gin distillery". Ref: KET/2012/0348. Decision: Application Permitted/Approved. Status: Decided
ZA235	For land at Newfield Lodge (land adj.) Harrington NN6 9NF. For "Mineral extraction - Lincolnshire limestone". Ref: KET/1989/0662. Decision: Application Permitted/Approved. Status: Decided
ZA228 - ZA237	For land at Pendennis and Prospect Cottage Kelmarsh Road (Field at Rear) Thorpe Underwood NN6 9PA. For "Septic tank". Ref: KET/1981/0225. Decision: Application Permitted/Approved. Status: Decided.
ZA228 - ZA237	For land at Church Farm High Street Harrington NN6 9NT. For "Erection of an agricultural building and construction of a slurry store". Decision: Application Permitted/Approved. Status: Decided.
ZA237 - ZA269	For land at Mawsley Lodge Farm Harrington Road Loddington NN14 1LB. For "Construction of electricity substation". Ref: KET/2013/0422. Decision: Application Permitted/Approved. Status: Decided
ZA237 - ZA269	For land at Mawsley Lodge Mawsley Lane Loddington NN14 1LB. For "Use of buildings and yard area for repair of motor vehicles, engineering and fabrication being uses falling within class B2 of the Town and Country Planning Use Classes Order 1987 (as amended)". Ref: KET/2006/0661 Decision: Application Permitted/Approved.
ZA237 - ZA269	For land West of Loddington Kettering NN14 1LB. For "Infilling with inert materials of former mineral railway line to bring up to level of adjoining agricultural land". Ref: KET/1982/0378. Decision: Application Permitted/Approved. Status: Decided.
ZA213	For land at Warren Lodge Dingley for "Disposal of surplus inert spoil arising from the construction of the A6 market Harborough bypass" Ref: KET/1991/0184. Decision: No Objection. Status: Decided
ZA28, ZA283	For land Opposite Glebe Barn Near Wilby Spinney Mears Ashy Road Wilby Wellingborough Northamptonshire for "Filling of former quarry with inert material and restoration to agricultural use". Ref BW/1984/0666. Further details unavailable.

7. Site Reconnaissance

7. Site Reconnaissance

- 7.1.1 This Report has been prepared to support the Development Consent Order (DCO) scoping and preliminary assessment stages. Access for a Site reconnaissance (walkover) was not available prior to the completion of this report.
- 7.1.2 Accordingly, all risk ratings presented herein are provisional and based on a precautionary assessment of available desktop data. These will be reviewed and updated within the final interpretive reporting following the completion of the walkover and intrusive investigations.
- 7.1.3 The Site will be revisited ahead of any intrusive works by AAJV Geotechnical / Geo-environmental Engineers to inform future works. Any findings additional to those outlined in this report will be accounted for in subsequent reporting and specifications.

8. Preliminary Ground Model

8. Preliminary Ground Model

- 8.1.1 Differing ground conditions with a variety of superficial and bedrock geology is expected across the length of the OHL route with the bedrock geology being divided into 3 bedrock areas, as set out in Section 3.2. Based on the review of published geological, hydro-geological information, and the selected historical borehole records presented in Paragraph 0, this section provides indicative descriptions, thicknesses and any additional relevant details for the mapped strata, and the expected broad sequence of strata in each Bedrock Area.
- 8.1.2 Table 8-1, Table 8-2 and Table 8.3 provide a summary of Bedrock Area 1 (between ZA105 to ZA152), Bedrock Area 2, (between ZA152 and ZA233) and Bedrock Area 3 (ZA233 and ZA300D).

Table 8-1 Bedrock Area 1 – Bedrock Summary

Geological Stratum	Anticipated Occurrence	BGS Description and Notes	Anticipated Thickness (including BGS estimates)
Topsoil	Across entire area, except in areas which existing and historical development.	Topsoil	Typically 0.30m. 0.15m – 0.45m encountered within Bedrock Area 1
Made Ground	Developed areas, existing infrastructure and deposits mapped by BGS. See Paragraph 3.2.2.	Variable. See referenced logs. Mixed natural and anthropogenic materials.	Shallow unmapped deposits up to 1.0m may be present throughout area. Potential for significantly deeper thickness where mapped deposits are present.
Alluvium	Likely to be present in close proximity to existing or historical watercourses. Mapped between in the vicinity of the Review Wreake and its tributaries, and between ZA105 – ZA106.	Clay, silt, sand and gravel.	c.1.0m – c.2.2m (base not proven in all holes) encountered within Bedrock Area 1 c.3.0m of potential Alluvium proven between ZA238 and ZA239
Colluvium	Associated with the base of slopes and gullies.	Clay, silt, sand and gravel	Variable.
River Terrace Deposits	Associated with rivers and larger streams. Mapped between ZA137 - ZA139 .	Sand and gravel, locally with lenses of silt, clay or peat.	c.1.0m – c.2.1m (base not proven) encountered within Bedrock Area 1

Geological Stratum	Anticipated Occurrence	BGS Description and Notes	Anticipated Thickness (including BGS estimates)
Bytham Sand and Gravel Member	BGS notes in proximity to Bytham River. Single deposit mapped between ZA112 and ZA113.	Commonly basal coarse-grained gravel, overlain by red fine- to medium-grained sand.	3m to 5m
Birstall Sand and Gravel Member	Single deposit mapped between ZA113 and ZA115.	Sand and gravel.	To c.4m.
Wanlip Sand and Gravel	Single outcrop between ZA114 to ZA115.	Sand and gravel with minor clay and silt lenses	To c.4m
Oadby Till Member - Diamicton	Widespread across relatively higher ground. Overlying other till formations.	Diamicton, grey, weathering brown, characterised by Cretaceous and Jurassic rock fragments; subordinate lenses of sand and gravel, clay and silt. Clay, brown to grey, and silty clay, with chalk and flint fragments. Frequently described as firm to very stiff. BGS Memoirs suggest shear strength range of 100-300 kPa.	Variable up to 20 m; typically 1-7m. (BGS Lexicon) 19.25m proven at SK17NW38 within Bedrock Area 1.
Thrussington Till Member- Diamicton	Above the level of River Wreake valley. Underlying non-Lias Oadby member Diamicton. No outcrops mapped south of ZA115.	Diamicton, brown to reddish-brown with stones and matrix derived primarily from Upper Carboniferous and Triassic rocks; subordinate sand, gravel and stoneless clay and silt. Red pebbly clay and silty clay with rock fragments. BGS Memoirs suggest shear strength range of 100-300 kPa.	Variable up to 20 m; typically 1-7m. (BGS Lexicon) c.1.70m – c.2.40m (base not proven) encountered within Bedrock Area 1
Bosworth Clay Member	Associated with hillsides in the River Wreake Valley.	Lacustrine, commonly laminated clays and silts.	Over 25m in thickness in the Wolvey area [SP 43 87].

Geological Stratum	Anticipated Occurrence	BGS Description and Notes	Anticipated Thickness (including BGS estimates)
Oadby Till Member (Lias-rich)	Above the level of river valleys. Underlying non-Lias Oadby member Diamicton. No outcrops mapped south of ZA119.	Clay, brown to grey, and silty clay, with chalk and flint fragments; rich in 'Lias' rock fragments. BGS Memoirs suggest shear strength range of 100-300 kPa.	c.26m
Oadby Till Member (Trias-rich)	Underlying non-Lias Oadby member Diamicton. Single exposure mapped between ZA137 and ZA139.	Clay, brown to grey, and silty clay, with chalk and flint fragments; rich in 'Triassic' rock fragments. BGS Memoirs suggest shear strength range of 100-300 kPa	Not encountered on available historical logs.
Charmouth Mudstone	Underlying Superficial Deposits in north-most portion of the area, north of ZA113, and south-most portion of area, south of ZA139.	Dark grey laminated shales, and dark, pale and bluish grey mudstones; locally concretionary and tabular limestone beds; abundant argillaceous limestone, phosphatic or ironstone (sideritic mudstone) nodules in some areas; organic-rich paper shales at some levels; finely sandy beds in lower part in some areas.	c.335m
Scunthorpe Mudstone Formation	Underlying Superficial Deposits in northern portion of the area, between ZA112 to ZA115.	Grey, variably calcareous and silty, blocky or fissile mudstone with thin beds of argillaceous limestone (bioclastic or micritic) and calcareous siltstone, particularly near base and in upper part, which is ferruginous in the type area.	c.140m
Blue Lias Formation	Underlying Superficial Deposits in central portion of area between ZA113 to ZA139.	Thinly interbedded limestone (laminated, nodular, or massive and persistent) and calcareous mudstone or siltstone (locally laminated). Individual limestones are typically 0.10-0.30m thick. Described as very stiff.	c.128m

Table 8-2 Bedrock Area 2 – Bedrock Summary

Geological Stratum	Anticipated Occurrence	BGS Description and Notes	Anticipated Thickness (including BGS estimates)
Topsoil	Across entire area, except in areas which existing and historical development.	Topsoil	Typically 0.30m. 0.15m – 0.45m encountered within Bedrock Area 1
Made Ground	Developed areas, existing infrastructure and deposits mapped by BGS. See Paragraph 3.2.2.	Variable. See referenced logs. Mixed natural and anthropogenic materials.	Shallow unmapped deposits up to 1.0m may be present through out area. Potential for significantly deeper thickness where mapped deposits are present.
Landslide Deposits	Mapped between ZA152 to ZA158. Typically associated with over-steepened slopes.	Variable, dependent on the nature of the upslope material and the type of slip failure.	Variable.
Alluvium	Likely to be present in close proximity to existing or historical watercourses. Mapped in the vicinity of the River Ise, River Welland, Gaddesby Brook, Eye Brook and Stonton Brook	Clay, silt, sand and gravel.	c.1.0m – c.2.2m (base not proven in all holes) encountered within Bedrock Area 1 c.3.0m of potential Alluvium proven between ZA238 and ZA239
Colluvium	Associated with the base of slopes and gullies.	Clay, silt, sand and gravel	Variable.

Geological Stratum	Anticipated Occurrence	BGS Description and Notes	Anticipated Thickness (including BGS estimates)
Oadby Till Member - Diamiction	Widespread across relatively higher ground. Overlying other till formations.	Diamicton, grey, weathering brown, characterised by Cretaceous and Jurassic rock fragments; subordinate lenses of sand and gravel, clay and silt. Clay, brown to grey, and silty clay, with chalk and flint fragments. Frequently described as firm to very stiff. BGS Memoirs suggest shear strength range of 100-300 kPa.	Variable up to 20 m; typically 1-7m. (BGS Lexicon)
Glaciofluvial Deposits	Infrequently underlying Oadby Till Member on slopes.	Mostly coarse-grained sediments (i.e. sand and gravel) with some finer-grained layers (i.e. clay and silt). Sand and gravel, locally with lenses of silt, clay or organic material.	Not encountered on available historical logs.
Whitby Mudstone	Mapped underlying glacial till formations and at the top of hills where glacial till is not present. Overlying the Marlstone Rock Formation. Where outcropping it forms portions of upper slopes above the Marlstone Rock Formation.	Medium and dark grey fossiliferous mudstone and siltstone, laminated and bituminous in part, with thin siltstone or silty mudstone beds and rare fine-grained calcareous sandstone beds; dense, smooth argillaceous limestone nodules very common at some horizons; phosphatic nodules at some levels. Nodular and fossiliferous limestones occur at the base in some areas.	c.1.2m – c.18m

Geological Stratum	Anticipated Occurrence	BGS Description and Notes	Anticipated Thickness (including BGS estimates)
Marlstone Rock Formation	Underlying Whitby Mudstone and overlying Dyrham Formation. May form benches between the at the base of slope formed by the Whitby Mudstone.	Sandy, shell-fragmental and ooidal ferruginous limestone interbedded with ferruginous calcareous sandstone, and generally subordinate ferruginous mudstone beds. Locally any of these lithologies may pass by increase in iron content into generally ooidal ironstone, and in places any of these may dominate. The iron content (as ooids, altered shell material or in the groundmass) is berthierine (dark green iron-rich layered silicate formed in low-oxygen marine conditions), altering to siderite. Fossil content variable throughout but locally abundant especially in limestone beds.	To c.10m
Dyrham Formation	Forming slopes underlying the Marlstone Rock Formation.	Pale to dark grey and greenish grey, silty and sandy mudstone, with interbeds of silt or very fine-grained sand (locally muddy or silty), weathering yellow. Variably micaceous. Impersistent beds or doggers of ferruginous limestone (some ooidal) and sandstone, which tend to occur at the top of sedimentary cycles. Sporadic large cementstone nodules. Springs may be located at upper boundary with base of Marlstone Rock.	To c.15m – c.25m
Charmouth Mudstone	Underlying Dyrham Formation, generally on valley floors. May be overlain by Glacial Tills or quaternary deposits associated with surface water features.	Dark grey laminated shales, and dark, pale and bluish grey mudstones; locally concretionary and tabular limestone beds; abundant argillaceous limestone, phosphatic or ironstone (sideritic mudstone) nodules in some areas; organic-rich paper shales at some levels; finely sandy beds in lower part in some areas.	c.335m

NOTE: No historical borehole logs were obtained within the Reconductoring Area for Bedrock Area 2.

Table 8.3 Bedrock Area 3 – Ground Model

Geological Stratum	Anticipated Occurrence	BGS Description and Notes	Anticipated Thickness (including BGS estimates)
Topsoil	Across entire area, except in areas which existing and historical development.	Topsoil	Typically 0.30m. 0.15m – 0.45m encountered within Bedrock Area 1
Made Ground	Developed areas, existing infrastructure and deposits mapped by BGS. See Paragraph 3.2.2.	Variable. See referenced logs. Mixed natural and anthropogenic materials.	Shallow unmapped deposits up to 1.0m may be present through out area. Potential for significantly deeper thickness where mapped deposits are present.
Alluvium	Likely to be present in close proximity to existing or historical watercourses. Mapped overly River Terrace deposits in the River Nene Valley.	Clay, silt, sand and gravel.	c.1.0m – c.2.2m (base not proven in all holes) encountered within Bedrock Area 1 c.3.0m of potential Alluvium proven between ZA238 and ZA239
Ecton Member	Underlying Grendon Substation	Gravel with sand, clay and, locally, peat.	0 – 4.5m (BGS Lexicon)

Geological Stratum	Anticipated Occurrence	BGS Description and Notes	Anticipated Thickness (including BGS estimates)
Grendon Member	Underlying access corridors east of ZA299	Fluviatile sand and gravel: gravel composed mainly of flint, quartzite, ironstone, sandstone and limestone; includes lenses of silt and clay.	0 – 7.6m (BGS Lexicon)
River Terrace Deposits (undifferentiated)	Associated with rivers and larger streams. In particular the River Nene Valley.	Sand and gravel, locally with lenses of silt, clay or peat.	c.1.0m – c.2.1m (base not proven) encountered within Bedrock Area 1
Oadby Till Member - Diamiction	Widespread across relatively higher ground. Overlying other till formations and the limestone bedrocks.	Diamicton, grey, weathering brown, characterised by Cretaceous and Jurassic rock fragments; subordinate lenses of sand and gravel, clay and silt. Clay, brown to grey, and silty clay, with chalk and flint fragments. Frequently described as firm to very stiff. BGS Memoirs suggest shear strength range of 100-300 kPa.	Variable up to 20 m; typically 1-7m. (BGS Lexicon) c.0.30m to c.5.50m proven in Bedrock Area 2.
Glaciofluvial Deposits	Infrequently underlying Oadby Till Member on slopes. Mapped between ZA247 to ZA249.	Mostly coarse-grained sediments (i.e. sand and gravel) with some finer-grained layers (i.e. clay and silt). Sand and gravel, locally with lenses of silt, clay or organic material.	Not encountered on available historical logs.
Sequence present between ZA233 and ZA242, overlying Northampton Sand Formation.			

Geological Stratum	Anticipated Occurrence	BGS Description and Notes	Anticipated Thickness (including BGS estimates)
Lower Lincolnshire Limestone Member	Underlying Oadby Till Member on higher ground.	Limestones, dominated by low energy calcilutite, and peloidal wackestone and packstone. Commonly includes sandy limestone or calcareous sandstone in basal part (locally known as Collyweston Slate) and contains substantial units of mudstone, particularly from the Lincoln area northwards.	c.16m
Grantham Formation	Underlying Lower Lincolnshire Limestone Member.	Mudstones, sandy mudstones and argillaceous siltstone-sandstone, which is commonly ferruginous, and containing generally abundant plant debris, interpreted as both non-marine and marine facies, comprising several shallowing-upwards, delta-type rhythms with typically a tripartite succession comprising: a generally pale, locally carbonate-cemented and commonly ferruginous more or less argillaceous sand or sandstone at the base, which may have a rootletted seatearth at the top, overlain in the type area at least, by a median unit of marine shaly sandy mudstone designated the Stainby Member, which farther to the south is represented by a dark carbonaceous shaly clay, named the "Coaly Bed", which may be equivalent, overlain by an upper, possibly rhythmic succession of alternating sand or sandstone with mudstone or sandy mudstone that may be rootletted in parts.	c.4m
Sequence present between ZA242 and ZA300D, overlying Northampton Sand Formation.			
Blisworth Limestone Formation	Underlying Oadby Till Member on higher ground.	Pale grey to off-white or yellowish limestones with thin marls and mudstones, fossiliferous, bioturbated peloidal, ooidal and shell-fragmental more-or-less argillaceous packstones and wackestones, subordinate cross-bedded ooidal shell-fragmental grainstones: fauna may include rhynchonellids particularly in the lower part in the south (see the Roade Member), and may be dominated by oysters, notably in the upper part in the north (see the Longthorpe Member).	c.6m – c.7m

Geological Stratum	Anticipated Occurrence	BGS Description and Notes	Anticipated Thickness (including BGS estimates)
Rutland Formation	Underlying Blisworth Limestone Formation.	Interpreted as a succession of up to seven shallowing upward, essentially delta-type rhythms, comprising ideally of a grey marine mudstone passing up into non-marine mudstone and siltstone, with a greenish-grey rootlet bed at the top. The basal beds comprise mainly fluviatile and lacustrine sandstones, designated the Stamford Member in the south, passing north in central Lincolnshire into the Thorncroft Sand Member. Subordinate sandstone beds occur higher in the sequence locally, as well as typically shelly and shell-detrital marine limestones and calcareous mudstones, notably in the mid part, the Wellingborough Limestone Member, in Northamptonshire. The Wellingborough Limestone thins and loses its character northwards such that it is not recognisable in Rutland, where the formation above the Stamford Member is called the Castle Member (Hudson and Clements, 2007).	c.10m
Wellingborough Limestone Member	Underlying Rutland Formation with some exposures covered by Oadby Till Member.	A massive argillaceous, sandy, shelly and shell-detrital limestone associated with rubbly oyster-rich limestone and marl and mudstones, passing northwards into sandstone.	c.2.4m
Stamford Member	Underlying Rutland Formation and overlying Northampton Sand Formation.	A pale greenish grey to yellowish and white, generally massive, fine-grained, generally friable, quartzose, unfossiliferous sandstone or siltstone, interpreted as mainly swamp and lacustrine, seen particularly in the upper part of the succession and in thicker successions as a sandy silty mudstone with plant debris, rootlets and thin lignite lenses, especially near the top, locally including interpreted lacustrine carbonaceous mudstones in hollows at the base and at the top.	c.6m

Geological Stratum	Anticipated Occurrence	BGS Description and Notes	Anticipated Thickness (including BGS estimates)
The following formations underly the above sequences across Bedrock Area 3, exposures are frequently overlain by Superficial Deposits listed above.			
Northampton Sand Formation	Underlying the Stamford Member and Grantham formation, outcropping at valley sides.	Sandy, berthierine-oidal and sideritic ironstone, greenish grey where fresh, weathering to brown limonitic sandstone, typically displaying a box-stone structure. The basal part, is commonly muddy and less ferruginous. The uppermost beds are generally more or less ferruginous sandstone. The unit includes lenses of mudstone and limestone in places, and contains a fairly abundant marine fauna of bivalves, brachiopods and ammonites, which are not generally evident in weathered sections.	0-7m c.3.00m in thickness at SP77NE111
Whitby Mudstone	Underlying the Northampton Sand Formation forming valley floors.	Medium and dark grey fossiliferous mudstone and siltstone, laminated and bituminous in part, with thin siltstone or silty mudstone beds and rare fine-grained calcareous sandstone beds; dense, smooth argillaceous limestone nodules very common at some horizons; phosphatic nodules at some levels. Nodular and fossiliferous limestones occur at the base in some areas.	21m-65m c.14.60m in thickness at SP77NE170 and SP77NE215

9. Conceptual Site Model and Preliminary Risk Assessment

9. Conceptual Site Model and Preliminary Risk Assessment

9.1 Introduction

- 9.1.1 The preliminary CSM has been developed to identify potentially complete contaminant linkages that may require further investigation to assess their existence and/ or potential significance. The potential sources of contamination on or in the vicinity of the site, receptors on or near the site, and pathways on or near the site are discussed within the following sub-sections. A 75m distance either side of the current towers has been used to assess sources and receptors.
- 9.1.2 A summary of the applicable legislative and planning framework, and AECOM's approach to assessment used in the following sections is presented in Appendix C.

9.2 Sources of Potential Contamination

- 9.2.1 Based on the Site setting, history and land-uses described in preceding sections, the sources of contamination and contaminants of potential concern (CoPC) listed in Table 9-1 have been identified. An impacted tower is defined as being within 75m of an identified potential source of contamination. An impacted access corridor is defined as one where a source has been identified within the boundary of that access corridor.
- 9.2.2 The CoPC are based on information provided in the Department of Environment Industry Profiles, known contamination identified at the site and AECOM's industry experience.

Table 9-1 Potential Sources of Contamination

Source	Impacted Tower(s)/Access corridors	Description	CoPC
Agricultural land	All	Agricultural land is noted across most of the Site and in the surrounding area – including several silos (66-69m west of ZA293) and associated buildings and stockpiles.	Metals and metalloids, total petroleum hydrocarbons (TPH) (anticipated to be minimal), ammoniacal nitrogen, herbicides and pesticides.
Made Ground/Infilled Land	ZA109, ZA118, ZA125, ZA131, ZA144, ZA150, ZA156, ZA185, ZA191, ZA199, ZA210, ZA215, ZA220, ZA243, ZA244, ZA246, ZA247, ZA249, ZA266, ZA284, ZA294, ZA297, access corridors east of ZA150, west of ZA162, west of ZA199, west of ZA216, east of ZA242 and ZA243, east of ZA245, west of ZA249 and west of ZA298	Associated with 15no. potentially infilled ponds, 5no. potentially infilled ground workings impacting towers and 3no. potentially infilled ground workings impacting access corridors, potential infilling of 1no. ford and presence of 5no. areas of railway land impacting towers and 6no. areas of railway land impacting access corridors, detailed in Section 4.2.	Metals and metalloids, polycyclic aromatic hydrocarbons (PAH), pH, asbestos-containing material (ACM) / asbestos and ground gas (carbon dioxide and methane),
Legacy Foundation Coatings	All	Associated with foundations of existing electricity towers, assets are over 40 years old.	Assumed strong likelihood of asbestos-containing materials and PAH (coal-tar) coatings on buried steel and concrete structures.

Source	Impacted Tower(s)/Access corridors	Description	CoPC
Chemical works: cosmetics and toiletries manufacturing works	ZA211	Associated with List 2 Dangerous Substances record for Cpl Aromas Ltd - Flavour Division (inactive).	Metals and metalloids, semi-volatile organic compounds (SVOC), volatile organic compounds (VOC), TPH, PAH, sulphide, pH, ACM / asbestos.
Railway land	ZA109, ZA199, ZA246, ZA247, ZA297, access corridors east of ZA151, west of ZA199, west of ZA216, east of ZA243, east of ZA245 and west of ZA298.	Associated with 5no. areas of railway land impacting towers observed from historical mapping: Old Dalby Test Track 20m north of ZA109 (1884-present), 10m north of ZA297 (1883-1970), 60m north of ZA199 (1885-1989), 50m northeast of ZA247 (1900-1974) and 60m north of ZA246 (1899-1993), and 6no. areas of railway land impacting access corridors: 8no. entries for cuttings on access corridor east of ZA151 (1884-1982), 2no. entries for railway building (1928-1950) and 4 no. entries for railway sidings (1928-1967) on access corridor west of ZA199, 5no. entries for cuttings (1885-1958) on access corridor west of ZA216, 2no. entries for tramway sidings (1899-1950) on access corridor east of ZA243 , 1no.entry for tramway sidings (1899) on access corridor east of ZA245 and 2no. entries for railway sidings (1950) on access corridor west of ZA298.	Metals and metalloids, SVOCs, VOCs, TPH, PAH, polychlorinated biphenyls (PCBs), sulphate, herbicides and glycols.

Source	Impacted Tower(s)/Access corridors	Description	CoPC
Electrical substations	ZA216, ZA278, ZA300B, ZA300C, ZA300D	Associated with 1no. electrical substation approximately 38m south of ZA278, the existing Grendon Substation and 2no. historical entries for an electrical substation at its location (1970 and 1984). Electrical Substation first identified in 2025 satellite imagery at location of ZA216.	TPH and PCBs.
Tanks	ZA216, ZA220, access corridor west of ZA259	Associated with 1no. unspecified tank (1961-1993) 65m southwest of ZA220, 1no. roofed storage tank 75m southwest of ZA216 and 2no. roofed storage tanks on access corridor west of ZA259.	PAH, asbestos and TPH.
Landfills / waste treatment and disposal sites	ZA108, ZA164, ZA213, ZA214, ZA241, ZA284, ZA299, access corridors east of ZA242 and west of ZA299	Associated with 4no. historical inert landfills: Earls Barton Quarry 26m west of ZA299 and on access corridor west of ZA299 (1979-1986), Ashby Road 58m southwest of ZA284 (1984-1986), Warren Lodge 23m east of ZA213 (1991-1993), Uplands Farm Tip on access corridor east of ZA242 (1979-1991) and 2no. entries for waste exemptions for use of waste in construction and storage of waste in a secure place 62m north of ZA108.	Metals and metalloids, SVOCs, VOCs, TPH, PAH, pH, ACM / asbestos, phenols and ground gas (carbon dioxide and methane).
Historical water pumping station	ZA265, access corridor west of ZA293	Associated with pumping station and covered reservoir recorded on historical maps dated 1950 and disused by 1972, a nd pumping station on access corridor west of ZA293 (dated 1901-1950).	Metals and metalloids, cyanides (total, free), SVOCs, VOCs, TPH, PCBs, nitrate, sulphate, sulphide, pH, ACM /asbestos and ammoniacal nitrogen.

Source	Impacted Tower(s)/Access corridors	Description	CoPC
Sewage / storage of sludge sites	ZA115, ZA164, ZA203, ZA205, ZA220, ZA241, access corridor west of ZA203	Associated with a sewage pumping station 57m northeast of ZA115, sewage farm 72m south of ZA203 and on access corridor west of ZA203 (dated 1950), a sewage works 74m southwest of ZA205 (dated 1901), a sewage/water treatment works Approximately 15 m southwest of ZA220 (identified on aerial imagery from 2004) and 2no. entries for waste exemptions for storage of sludge on a farm 17m west of ZA164 and 52m east of ZA241.	Metals and metalloids, cyanides (total, free), SVOCs, VOCs, TPH, PCBs, nitrate, sulphate, sulphide, pH, ACM/asbestos, ammoniacal nitrogen, pathogens and ground gas (carbon dioxide and methane).
Dockyards and dockland	ZA296	Associated with 1no. Moorings and Unloading Facilities	Metals and metalloids, SVOCs, VOCs, PAH-16, Organochlorine Pesticides, PCBs, Sulphate, Sulphide, ACM/asbestos, Ammoniacal nitrogen, Free Sulphur

Source	Impacted Tower(s)/Access corridors	Description	CoPC
Industrial land use	ZA226, ZA277, ZA278, ZA300D, access corridors east of ZA185 and west of ZA295	Recent: Crane Hire service 62m west of ZA278. Development of a grass field into multiple agricultural/industrial yards 40 m north of ZA226. Large industrial area (Logistics and transport) 20 m west of ZA278. Historical: 2no. unspecified heaps 65m south of ZA277 (1989-1992) and 3m north of ZA300D (1972-1988) and 2no. entries for an Industrial Estate 72m south of ZA278 (1989-1992). 1no. entry for Unspecified Disused Works (1991) on access corridor east of ZA185. 1no. entry for Corn Mill (1883) on access corridor west of ZA295.	Unknown, could include metals and metalloids, cyanides (total, free), SVOCs, VOCs, TPH, PCBs, pH, ACM/asbestos.
Unspecified Works/Factory	ZA185, ZA220	Associated with 2no. works: unspecified disused works 61m east of ZA185 (1991) and unspecified works recorded on historical mapping 40m south of ZA220 dated 1961 and remaining present in 1993.	Unknown, could include metals and metalloids, SVOCs, VOCs, PAH, nitrate, sulphate, pH and ACM/asbestos.

Quarries, Pits and Ground Workings	ZA118, ZA216, ZA241, ZA243, ZA244, ZA249, ZA265, ZA266, ZA284, ZA296, ZA300A, access corridors west of ZA162, east of ZA242 and west of ZA249.	From historical mapping, ground workings / quarries were observed in 5no. locations within 75m of OHL towers: 75m southeast of ZA249 (1900-1972). 75m south of ZA266 (1926-1989), 55m northeast of ZA118 (1968-1992), sand pit 60m southwest of ZA284 (1970-1993). sand and gravel workings adjacent to the north of ZA243 and 65m northwest of ZA244 (1950-1972). Groundsure data also provides 22no. records of historical industrial land use relating to quarries: 7no. entries for old gravel pit on access corridor west of ZA162 (1884-1967), disused ironstone quarry 70m east of ZA241 (1950), 1no. entry for ironstone quarry (1927) of access corridor east of ZA242, 2no. entries for an unspecified disused quarry / disused ironstone quarry at the site of ZA243 (1950), 2no. entries for an unspecified pit 65m north of ZA244 (1927), 3no. entries for unspecified old quarry on access corridor west of ZA249 (1901-1950), unspecified ground workings 29m west of ZA265 (1971), unspecified pit 73m southeast of ZA266 (1950), 4no. entries for a sand pit (dated 1977-1992) approximately 59m southwest of ZA284 and a sand pit 8m south of ZA296 (1972). Surface workings were identified in satellite images from 2004 at the location of ZA300A. There was evidence of ground disturbance and construction at the location of ZA216 in 2022 satellite imagery.	Petroleum Hydrocarbons (TPH, PAHs, BTEX), Heavy Metals (Lead, Arsenic, Cadmium, Zinc, Mercury), Acid Mine Drainage (Sulphate, Iron, Aluminium), Explosive Residues and Asbestos/ACM.
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9.3 Ground Gas Sources

- 9.3.1 The identified sources of ground gas within Table 9-1 above have been further characterised in Table 9-2 below using BS 8576:2013 “Guidance on investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOCs)” – Figure 6 to determine the ground gas generation potential of the sources.

Table 9-2 Potential Sources of Ground Gas Contamination

Source	BS 8576 Ground Gas Generation Potential	Justification
Infilled/Made Ground	Very Low to Low	Associated with 15no. potentially infilled ponds, 5no. potentially infilled ground workings and potential infilling of 1no. ford based on a review of historical mapping up until 1989 as well presence of various, railways, pits, and quarries. The risk from ground gas generation is Very Low in accordance with BS 8576, as it is likely that the Made Ground present is of low biodegradable organic content (<5% organic matter).
Historical Pumping Station	Low	It is not anticipated that the pumping station has potential for sewage sludge deposition as it is associated with a covered reservoir. The pump is therefore anticipated to associated with a water supply. However, as sewage sludge represents a potential ground gas generation source further consideration may be required.
Sludge Storage	Low to Moderate	From the landfill waste exemption entries, it is unknown the details of the sludge, whether it is of sewage origin or not. In accordance with BS5876 the presence of sewage sludge results in a Moderate ground gas generation potential.
Landfill	High to Very High	Associated with identified historical landfills: Earls Barton Quarry, Uplands Farm Tip, Ashby Road and Warren Lodge, details provided in Table 6-1. Based on BS 8576 these landfills have a High to Very High ground gas generation potential determined by when they were last active.
Mine Gas	Negligible*	The preliminary risk is indicated to be negligible with reference to CL:AIRE guidance

*Reference should be made to Paragraph 0 and considers the CL:AIRE Figure 13.1 mine gas risk matrix.

9.4 Mining Remediation Authority and Preliminary Mine Gas Risks

- 9.4.1 In October 2021, Contaminated Land Applications in Real Environments (CL:AIRE) published updated guidance on mine gas risk assessment: 'Good Practice for Risk Assessment for Coal Mine Gas Emissions'. The site has been characterised for preliminary mine gas risk in accordance with CL:AIRE guidance as part of the north section of the site, WMEL-B to Asfordby (north of NGR 469961 318997) is within a Mining Remediation Authority Mining Reporting Area (representing Step 1 in the preliminary mine gas risk flow chart in CL:AIRE Figure 13.1). The remaining areas of site south of Asfordby is out of a Mining Reporting Area and therefore no further assessment is required.
- 9.4.2 The following information has been reviewed for this section of the site to determine the mine gas risk level for the land north of Asfordby.

Table 9-3 Preliminary Mine Gas Risks – north of Asfordby

Step No.	Question	Answer	Discussion
2	Are mine entries >50m from the site boundary?	Yes	No known mine entries identified on the MRA Map Viewer are indicated to be present within 50 m of the site boundary.
	Are mine workings >150m depth?	Yes	The 1:10,000 BGS Mineral Resources map of Leicestershire and Rutland (2002) and BGS GeoIndex indicates the site to be in a region of deep coal at a depth of up to 1200 m. The Seam Depth for the underground workings onsite on the MRA Viewer are noted as -400 to -420 m AOD.
	No faults or other potential pathways connecting surface to deeper unflooded workings?	Yes	GeoIndex faults are listed within the site boundary, however it is present to the south of the Mining Reporting Area with respect to the site boundary, extending into this area offsite to the east. There are no listed outcrops or seam level contours on the site, and the coal seam level is listed as -400 m further north, not intersected by this fault.
	Outside an area of past or probable shallow workings on Mining Remediation Authority viewer?	Yes	The MRA Map Viewer does not identify any known past or probable shallow workings within the site boundary. Underground mine workings are present >150m in depth.

The preliminary risk is indicated to be negligible with reference to CL:AIRE guidance suggesting no need for further assessment.

9.5 Potential Receptors

9.5.1 Potential receptors associated with the Site are shown on Table 9-4.

Table 9-4 Potential Receptors

Receptor Group	Receptor	Description
Human Health	Construction and Ground Investigation Workers	Workers involved in the GI and construction phases.
	Maintenance Workers	Maintenance workers of the pylons and OH cables.
	Trespassers / General Public	Areas where pylons/OHL are located are within open fields which are accessible to users of public footpaths or trespassers.
	Site Users	Site users include owners and users of the various land uses crossed by the OHL alignment including farmland with crops and livestock
Controlled Waters	Secondary-A Superficial Aquifers	Alluvium, Bytham Sand and Gravel Formation, Intermittent exposures of Birstall Sand and Gravel Member, Wanlip Sand and Gravel Member and Alluvium, River Terrace Deposit, Glaciofluvial Deposits, Intermittent exposures of Alluvium.
	Secondary-B Superficial Aquifer	Colluvium
	Secondary-Undifferentiated Aquifers	Glacial Till, Oadby Till Member, Head.
	Principal Bedrock Aquifers	Lower Lincolnshire Limestone Member and Blisworth Limestone Formation.
	Secondary-A Bedrock Aquifer	Intermittent exposures of Marlstone Rock Formation, Marlstone Rock Formation, Northampton Sand Formation, Intermittent exposures of Stamford Member, Intermittent exposures of Wellingborough Limestone Member.
	Secondary-B Bedrock Aquifer	Rutland Formation
	Secondary (Undifferentiated) Bedrock	Charmouth Mudstone Formation, Blue Lias Formation, Dyrham Formation, Intermittent exposures of Dyrham Formation, Intermittent exposures of Grantham Formation.
	Unproductive Strata	Scunthorpe Mudstone, Whitby Mudstone

Receptor Group	Receptor	Description
	Surface waters	Major watercourses inclusive of rivers, streams and drains as described in Paragraph 3.9 and those connecting to them.
Property	Buildings & Infrastructure – Concrete	Concrete foundations associated with the pylons
	Buildings & Infrastructure – Structures with Enclosed Spaces	Buildings adjacent to the Site inclusive of housing, commercial units, substations etc.
	Buildings & Infrastructure – Services	Underground services passing beneath the Site associated with the surrounding land uses.
	Livestock	Livestock and crops in fields adjacent to the electricity towers.
	Crops	

9.6 Potential Pathways

9.6.1 Potential pathways associated with the proposed development are shown in Table 9-5.

Table 9-5 Potential Pathways

Pathway Group	Pathway
Human Health	Ingestion of soil and dust
	Inhalation of dust - indoor and outdoor
	Dermal contact - indoor and outdoor
	Vapour intrusion and inhalation – indoors and outdoors
	Gas ingress – explosive atmosphere
	Gas ingress – inhalation
Controlled Waters	Leaching and vertical migration through unsaturated zone
	Lateral migration in groundwater
	Vertical migration in groundwater
	Direct run-off
	Baseflow from groundwater to surface water
	Migration via preferential pathways (underground services, trenches, faults, granular material etc)

Pathway Group	Pathway
Built Environment	Gas intrusion - explosion
	Direct contact - corrosion
	Direct contact - permeation of water pipe
	Plants via root uptake / Direct Uptake
	Dermal contact / inhalation of dust / ingestion

9.7 Discounted Sources / Pathways / Receptors

9.7.1 The sources, pathways and receptors shown in Table 9-6 are discounted from the conceptual site model with the justification presented:

Table 9-6 Discounted Sources / Pathways / Receptors

Group	Discounted Item	Justification
Sources	Potential sources of contamination > 75 m from existing electricity towers	Discounted due to distance/ lateral separation
	Dockyards and dockland (ZA296)	Discounted due to its association with the canal – contamination risk likely to be negligible.
Pathways	Preferential pathways – service ducts	Due to the extent of the Site, its rural setting and the localised construction / GI works taking place in the vicinity of the pylons, services are unlikely to pass close to the towers themselves. Therefore, the pathway is considered very unlikely to be present.
	Direct contact – permeation of water pipe	Current water supply pipes likely have been positioned away from pylons.
	Gas Ingress – explosion for Very Low to Low sources	In line with BS 8576 where ground gas sources are of Very Low to Low risk (Made Ground, infilled land, animal waste, underground coal mining, and shallow workings). With this in mind, the likelihood of it generating gas to a high enough concentration to cause explosion (particularly as the site is in an open-air environment) is negligible.
	Plants via root uptake (for sensitive sites only)	Sensitive sites have been removed as a receptor; therefore, associated pathways are void.
Receptors	Potential receptors > 75 m from proposed development	Discounted due to distance/ lateral separation

Group	Discounted Item	Justification
	Potential human health/property receptors using access corridors	Discounted due to intermittent nature of access corridor use by human health receptors, lack of buildings/structures proposed and lack of livestock/crop presence within these areas
	Unproductive Strata	Low permeability and negligible significance for water supply or river base flow
	Maintenance Workers	Maintenance workers will be attending to the transmission towers and overhead cables above ground and will be unlikely to be in contact with the ground for extended periods of time. The risk to them is considered low enough that it can be discounted at this stage.

9.8 Preliminary Risk Assessment

- 9.8.1 AAJV's approach to the preliminary risk assessment follows the guidance outlined in CIRIA C552 (2001) and is described in further detail in Appendix C.
- 9.8.2 The qualitative preliminary risk assessment of the possible linkages of the above sources, exposure and transport pathways and receptors is provided in detail in Appendix C. The majority of the Site is deemed as low risk due to the low-level contaminative sources or where a credible pathway is not present between the source and receptor.
- 9.8.3 A summary of the risk assessment where risk rating was determined > low and percentage of towers impacted, calculated using 233 existing electricity towers identified in the Groundsure data, has been included in Table 9-7.

Table 9-7 Summary of moderate/low to moderate risks and % of towers impacted

Receptor	Pathway	Source(s)	Risk Rating	Towers Impacted (%)
Human Health - General public and site users post development / during construction i.e., owners of land or public passing through rights of way	Inhalation of dust & asbestos	Historical Water Pumping Station, Chemical Works, Electrical Substation/Features, Landfills, Industrial Land Use and Unspecified Works/Factory	Moderate/Low	9.87
	Inhalation of vapours – outdoors	Sewage/Sludge Storage Sites, Landfills	Moderate/Low	9.44
	Gas Inhalation	Sewage/Sludge Storage Sites, Landfills	Moderate/Low	9.44
Human Health - Construction / Ground Investigation Workers	Inhalation of contaminants in soil-derived dust and asbestos fibres.	Historical Water Pumping Station, Chemical Works, Electrical Substation/Features, Landfills, Industrial Land Use and Unspecified Works/Factory	Moderate/Low	9.44
	Dermal contact with and ingestion of contaminants in soil, soil-derived dust and water.	Historical Water Pumping Station, Chemical Works, Electrical Substation/Features, Landfills, Industrial Land Use and Unspecified Works/Factory	Moderate/Low	9.44
	Inhalation of contaminants in soil-derived dust and asbestos fibres.	Infilled Land adjacent to ZA210	Moderate/Low	0.50
	Dermal contact with and ingestion of contaminants in soil, soil-derived dust and water.	Infilled Land adjacent to ZA210	Moderate/Low	0.50

Receptor	Pathway	Source(s)	Risk Rating	Towers Impacted (%)
	Gas ingress – inhalation	Sludge Storage Sites, Historical Landfill	Moderate/Low	9.01
	Gas ingress – inhalation	Recent Landfill (post 1990)	Moderate	0.86
Controlled Waters - Secondary Undifferentiated Aquifers	Leaching of contaminants in the unsaturated zone to groundwater in underlying aquifers & Lateral and vertical migration of groundwater	Made Ground, Infilled Land and Agricultural Land	Moderate/Low	90.45
		Railway Land, Chemical Works, Electrical Substation/Features, Tanks, Sewage / Storage of Sludge Sites, Landfill/Waste Treatment and Disposal Sites, Unspecified Works/Factory	Moderate	9.05
Controlled Waters - Principal and Secondary A Aquifers	Leaching of contaminants in the unsaturated zone to groundwater in underlying aquifers & Lateral and vertical migration of groundwater	Made Ground, Agricultural Land and Infilled Land	Moderate/Low	54.08
		Principal and Secondary A Aquifers – Railway Land, Electrical Substation/Features, Tanks, Landfill/Waste Treatment and Disposal Sites, Historical Water Pumping Station, Sewage / Storage of Sludge Sites, Industrial Land Use, Unspecified Works/Factory, Quarries, Pits and Ground Workings	Moderate	52.36

Receptor	Pathway	Source(s)	Risk Rating	Towers Impacted (%)
Controlled Waters - Surface Water Features listed in Section 3.6.1, including numerous named and unnamed drains/drainage channels.	Areas of Impermeable Soils (cohesive deposits) Discharge of contaminants entrained in surface water run-off followed by overland flow and discharge.	All	Moderate/Low	27.04
	Areas of Permeable Soils (granular deposits) Lateral migration of contaminated groundwater with discharge to surface watercourses as base flow.		Moderate/Low	52.36

9.9 Discussion of Acute Risk to Future Construction Workers & Off-Site Receptors

- 9.9.1 AAJV understands that the proposed development works will be undertaken in compliance with Construction Design and Management (CDM) 2015 regulations.
- 9.9.2 Prior to work commencing, a health and safety risk assessment should be carried out by the appointed Principal Contractor / developed in accordance with current health and safety regulations. This assessment should cover potential risks to construction staff, permanent site staff and the local population. Based on the findings of this risk assessment, appropriate mitigation measures should be implemented during the construction period.
- 9.9.3 The greatest potential for generation of dust will be during the Site works and therefore dust generation should be kept to a minimum in accordance with general best practice, as outlined in, for example, 'Environmental Good Practice on Site', CIRIA Publication C692 to reduce this risk.
- 9.9.4 The risk to construction workers during the excavation and construction phases in terms of potential exposure to high concentrations of contaminants is considered to be low given the historic and current land uses identified at the Site. Should gross contamination be identified during the construction phase, then this may pose a potential acute risk to construction works. It is likely to be able to be effectively managed through good health and safety practices and protocols. Adoption of appropriate dust suppression techniques would also mitigate the degree of potential particulate migration off-site

10. Review of Geotechnical Risk and Preliminary Engineering Assessment

10. Review of Geotechnical Risk and Preliminary Engineering Assessment

10.1 Study area geotechnical hazards

- 10.1.1 A preliminary geotechnical risk register is given in Appendix E which describes the main ground related hazards on the site (excluding ground contamination) and mitigation measures which may be implemented to eliminate or reduce the risk by means for further investigation or during the design phase. The following hazards / constraints are currently anticipated associated with the OHL route:
- Sparse information on the ground conditions across the route, in particular between towers ZA118 and ZA236, increasing the likelihood for unexpected ground conditions.
 - Lateral and vertical changes in ground conditions and ground engineering properties, including geological boundaries, faulting and buried channels / valleys, resulting in sudden changes in natural geology.
 - Presence of mapped landslide terrains, and moderate to high-risk potential between towers ZA152 and ZA172.
 - Mapped areas with moderate compressible ground hazard potential, particularly associated with alluvium and colluvium deposits (in particular near surface water features e.g., River Wreake and River Nene).
 - Mapped areas with moderate running sand hazard potential, associated with colluvium deposits and other water bearing granular deposits.
 - Areas with low ground dissolution hazard potential, associated with oolitic limestone formations.
 - Areas of shrinking or swelling clay hazard potential, associated with clay bedrock and superficial deposits.
 - Potential for aggressive ground chemistry, anticipated to be most prevalent in mudstone bedrock formations (e.g. Charmouth Mudstone and other Lias Group formations), and potentially within superficial deposits such as Glacial Till alluvium and colluvium derived from sulphate rich parent rock formations (e.g. Lias rich member).
 - Potential for shallow groundwater in topographic depressions and adjacent to surface water features. Perched groundwater where geology contains contrasting permeability such as fluvial deposits (granular channel deposits with fine grained horizons) and where soil deposits inter-finger at the base of slopes. Lower permeability formations (e.g. mudstones, fine-grained glacial tills) overlying higher permeability soil and rock (e.g. sandstones) increases potential for confined aquifers creating conditions for springs and artesian groundwater.
 - Potential for shallow bedrock and natural obstructions, including boulders in tills and possible harder rock beds within bedrock stratum.

- Potential presence on anthropogenic deposits and obstructions, associated with areas of mapped made ground.
- Potential for unrecorded / unidentified buried utilities, increasing in likelihood in the vicinity of existing developments.

10.2 Structural Foundations

- 10.2.1 Where existing tower foundations are proposed for reuse, a Quantitative Risk Assessment (QRA) will be undertaken according to NG Technical Specification TS 2.04. A QRA considers available geological, geotechnical and historical design and construction information with foundation loading from the proposed new conductor system. The QRA aims to identify any geotechnical or foundation loading risks associated with their reuse. The outcomes of this assessment will inform the need for further investigations, such as foundation exposure, intrusive ground investigation or material testing, to confirm the suitability of the foundations for reuse or requirement for upgrade.
- 10.2.2 The need for new OHL towers is currently not confirmed. If new towers are required, or if upgrades are required to existing foundations, new foundations and upgrades will depend on ground conditions, structural loading requirements and site-specific constructability constraints. Typical foundation solutions for overhead line towers (OHL) may include pad and chimney foundations, grillage foundations, or piled foundations where shallow ground conditions are unsuitable.

10.3 Access Corridors

- 10.3.1 Reconductoring will require vehicle access to existing overhead line towers for cable pulling, and to selected crossings (roads, rail etc) for protection works. The need for significant ground work to establish tracks will likely be dependant on seasonal ground conditions (i.e. more robust works likely needed during wet conditions) and duration of track use. Track matting may be considered in place of significant ground works for temporary access.
- 10.3.2 Where longer term access (months to years) is required to facilitate construction of new towers, or maintenance access, haul roads may potentially be required. In general, haul roads / pavements (except where constructed atop of any designed embankments) are anticipated to be predominantly formed on variable natural subgrade strata. Where the subgrade comprises predominantly clay soils, relatively low long-term equilibrium design CBR or subgrade modulus values may be expected. The CBR values depend on factors such as the plasticity index of the clays and the depth to groundwater. In such cases, ground improvement measures (to be informed by a specialist ground improvement contractor) and / or the inclusion of a geogrid layer may require consideration in the haul road design. A separation geotextile may also be required to prevent migration of fines from the subgrade into the capping layer.

- 10.3.3 Consideration should also be given to the shrink–swell behaviour of clay soils, together with potential indirect and direct root influences from existing trees, proposed planting, or trees to be removed. The significance of these effects will depend on the confirmed plasticity of the on-site soils. Where necessary, mitigation measures may include increasing pavement foundation thickness and excavation and replacement of desiccated soils at formation level with suitable engineered fill.
- 10.3.4 The presence of hard spots formed by boulders in tills is considered likely (alongside in areas of weathered limestone / sandstone bedrock), which poses a risk of differential settlement beneath haul roads / pavement areas. Hard spots could be managed through breaking these out and backfilling to an engineering specification.
- 10.3.5 Where haul roads / pavements are formed on engineered fill i.e. where embankments are required, the design CBR / subgrade modulus value would be subject to the type of fill materials and as-built quality of the earthworks.
- 10.3.6 Access Corridor alignment is indicated by the DF2 Rev B boundary outline. Several higher risk areas are identified in Table 10-1. These may require further ground investigation, geotechnical assessment and design in order to facilitate plant tracking these areas.

Table 10-1 Access Corridors Potentially at Risk

Access Corridor Location	Identified Source of Risk
East of ZA112, East of ZA113, East of ZA115 & ZA116, West of ZA117, East of ZA119, East of ZA123 & ZA124, West of ZA128, East of ZA133, West of ZA135, East of ZA140 & ZA141, West of ZA161, East of ZA171, West of ZA173, East of ZA174, West of ZA199, ZA201, ZA202, ZA203, ZA204, West of ZA271, West of ZA 295, West of ZA296.	Portions of access corridors traverse potentially soft Quaternary deposits, such as Head, Alluvium, Colluvium.
West of ZA145, East of ZA151,	Traverses moderately to steeply sloping ground (above 15°)
West of tower ZA153	Traverses areas of mapped landslide deposits
East of Z115, East of ZA151, East of ZA139, West of ZA203, East of ZA111, East of ZA220, Northwest of ZA260, West of ZA271.	Portions of access corridors traverse mapped water bodies.
West of ZA216.	Portions of access corridors traverses railway
East of ZA151, Four access points east of tower ZA242 to ZA247	Within area of mapped worked ground, high potential for soft / variable subgrade conditions
Notes: Likely additional routes not yet identified within original DF1.5 boundary.	

10.4 Preliminary Geotechnical Complexity Class

- 10.4.1 The geotechnical works relate to the potential construction of a new OHL towers and access corridors (including associated earthworks and crossing points), alongside construction / laydown areas. Existing ground investigation information available for the Site is limited / largely absent, consequently there is uncertainty in the lateral variations in superficial soils, the depth of bedrock and the groundwater regime across the Site. Furthermore, there is potential slope instability and historical surface mining which, alongside other features, will impact the geotechnical complexity of the Site.
- 10.4.2 A Geotechnical Complexity Class (GCC) of GCC2 is preliminarily applied for this Site in accordance with EC7. This classification can be reviewed once further assessment, including Site reconnaissance, is undertaken and then once ground investigations are completed.

10.5 Preliminary Geotechnical Category

- 10.5.1 Geotechnical structures are classified into a Geotechnical Category that combines the uncertainty and complexity of the ground and ground-structure interaction with the consequence of failure of the structure.
- 10.5.2 The project is preliminary classified as Geotechnical Category (GC) 2 as defined in EC7 based on the proposals stated in Section 0, assuming the preliminary GCC2 classification and an assumed Consequence Class of CC2 (Medium). This will be reviewed as the project progresses.

11. Conclusions

11. Conclusions

11.1 Geotechnical Conclusions

- 11.1.1 The preliminary anticipated ground models for the Site suggest that ground conditions generally comprise a variety of superficial deposits, including Glacial Tills locally interspersed with Head, Alluvium, Colluvium and River Terrace. These are expected to be overlaying bedrock which can be grouped into three broad areas. Bedrock Area 1, in the north, is dominated by mudstones of the Middle Lias Group. Bedrock Area 2 is dominated by mudstones of the Upper Lias Group, and Bedrock Area 3, in the south, is dominated by of the Great Oolite Group locally and Inferior Oolite Group. A three part ground model is included in Section 8 of this report and present the expected geological sequence in each of the Bedrock Areas.
- 11.1.2 Variations and complexities in these successions are anticipated in areas e.g. due to solution of limestone bedrock forming karst features, surface mining of ironstone and potentially other minerals, slope instabilities and other more localised developments historically and present day, including infilled pits / ponds and demolished historical structures.
- 11.1.3 The changes in ground conditions and topography moving across the Reconductoring Area will result in different engineering characteristics and ground hazards / constraints as outlined in the preliminary geotechnical risk register, these hazards may affect existing assets and necessitate further field investigation at selected OHL towers. Consideration should also be given the identified hazards during the design, construction and future maintenance, of any new/replacement OHL towers. The most significant of these ground hazards is currently areas of landslide terrains, although due consideration will need to be given to all identified hazards / constraints within the Reconductoring Area.
- 11.1.4 A Quantitative Risk Assessment (QRA) in accordance with National Grid Technical Specification TS 2.04 (Issue 6) is to be carried out using the geological and geotechnical findings of this report. The QRA will assess the suitability of existing foundations for re-use and determine the need for further investigation.
- 11.1.5 Consideration should also be given the identified hazards during the design, construction and future maintenance, of any new/replacement OHL towers. The most significant of these ground hazards is currently areas of landslide terrains, although due consideration will need to be given to all identified hazards / constraints within the Reconductoring Area.

11.2 Geo-environmental Conclusions

- 11.2.1 Potential sources of contamination have been identified within 75m of existing National Grid electricity towers across the linear extent of the Site and within access corridors due to various historical and current potentially contaminative activities. Isolated areas of Made Ground and infilled land are considered likely to be present relating to the historical and current land use at the Site. Additionally, site-wide historical and current agricultural land use also represents a source of contamination. These sources are considered as being associated with relatively low levels of contamination. Sources of higher-level contamination are also present within 75m of existing National Grid electricity towers across the linear extent of the Site and within access corridors.
- 11.2.2 With regard to human health the risks are generally considered to be low to moderate for long term human health, with the greatest risk present shared between construction workers, trespassers / public and adjacent site users from the risk of inhalation of ground gas from the sludge storage, historical landfill and historical pumping station where a 'moderate' risk of ground gas generation in accordance with BS 8576 was identified. The risk is higher where any GI or construction workers may enter confined spaces where gases accumulate. A Moderate/Low risk is given for the inhalation of dust fibres, in particular asbestos fibres. Greatest risk is to any GI or construction workers where certain sources have asbestos as a CoPC further consideration is required, however risk is still considered Low. This is because significant disturbance of these facilities which note asbestos as a source are not anticipated as part of the proposed development and risk of exposure during construction is anticipated to be reduced through use of appropriate PPE, RPE, dust suppression and working in line with Construction and Design Management Regulations. The open-air environment of the Site reduces likelihood and magnitude of exposure. Risks to human health from sources within the access corridors have been excluded from the assessment due to the intermittent nature of access corridor use. These acute, short-term exposure risks to ground investigation (GI) and construction personnel will be mitigated through the enforcement of the Construction Environmental Management Plan (CEMP). The CEMP will mandate localised dust suppression, mandatory respiratory protective equipment (RPE) during intrusive works within 75m of waste boundaries, and atmospheric gas monitoring in all excavations deeper than 1.2m bgl. Following the completion of construction, these temporary corridors do not constitute long-term chronic exposure sources for human health receptors.
- 11.2.3 Controlled waters are considered to be a sensitive receptor and although the risk of occurrence of contamination is considered unlikely as significant ground disturbance is not anticipated as part of the proposed development, further consideration based on determined potential severity of consequences is required. Superficial geology on site is noted to be highly variable potentially enabling migration of contamination (if present). The risk to controlled waters is greatest where sources are present within the vicinity of a Secondary A, Secondary (Undifferentiated) or Principal Aquifer, reducing in risk where 'lower risk' sources such as Made Ground and agricultural land are present or where less vulnerable aquifers such as Secondary B Aquifers are recorded. The risk to surface waters is present through baseflow groundwater movements and surface runoff. For impermeable soils where surface waters are unlikely to infiltrate downwards and movements within soils may be limited the risk via baseflow is typically Low, with a higher risk of Moderate/Low for surface runoff. For permeable soils, the surface waters have the opposite effect, with infiltration rates

likely to be higher in granular soils leading to lower risk of surface runoff, therefore the risk via baseflow is Moderate/Low and via runoff Low. These pathways during access and temporary construction in corridors will be managed via standard surface water management controls and localised temporary clear-span crossings during tracking operations as per a Construction Environmental Management Plan (CEMP).

- 11.2.4 The risks to property inclusive of electricity tower foundations, livestock and crops are Low, due to the fact that significant groundworks and ground disturbance are not anticipated and as it is anticipated that sufficient mitigation measures will be in place during construction where/when necessary to prevent potential contamination associated with plant and tools and equipment (heavy metals, fuel etc.). Where new electricity tower foundations are required as part of the development anti-corrosion foundation covers should be used to prevent exposure to potentially aggressive ground conditions from potential legacy foundation coatings. Consideration should be taken in areas of livestock grazing, for example removing livestock from proximity prior to commencement of reconductoring works. Risks to property from sources within the access corridors have been excluded from the assessment due to a lack of property receptors within these areas.

12. Preliminary Recommendations

12. Preliminary Recommendations

12.1 Summary of Recommendations

- 12.1.1 Further assessment and investigation are required to confirm the ground conditions, groundwater regime, investigate hazards / constraints and inform the design and construction of the proposed development. The below is an outline of recommended further works to update and refine the risk to the proposed development as part of desk-based reporting updates:
- General: Site reconnaissance, comprising inspection of the Site by a suitably qualified and experienced engineering geologist / geotechnical engineer and geo-environmental engineer / scientist to identify any signs of instability / subsidence and contamination (including potential sources, pathways and risks), with specific focus on karst, mining, slope instability / cambering features.
 - UXO risk: Detailed UXO Risk Assessment should be carried out. The findings and recommendations are to be considered in the development of ground investigation Specifications and any intrusive construction work.
 - A Quantitative Risk Assessment (QRA) in accordance with National Grid Technical Specification TS 2.04 (Issue 6) is to be carried out using the geological and geotechnical findings of this report. The QRA will assess the suitability of existing foundations for re-use, and determine the need for further investigation.
- 12.1.2 Once the design is advanced to DF2, the following geotechnical and geo-environmental works are recommended:
- Preparation of a Ground Investigation Specification and schedule, outlining the proposed ground investigation methodologies, including non-intrusive surveying, intrusive exploratory test hole drilling, sampling, testing, installations and monitoring activities.
 - Site specific ground investigation and subsequent interpretative Ground Investigation Report to confirm the ground and groundwater conditions on the site, investigate and assess anticipated risks, and inform designs and construction.

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Appendix A

Figures

Appendix A Figures

Figure 1 – Site Location Plan

Figure 2 – Topography and Slope

Figure 3 – Published Superficial Geology and Artificial Ground

Figure 4 – Published Bedrock Geology and Artificial Ground

Figure 5 – Hydrogeology

Figure 6 – Hydrogeology - Aquifers

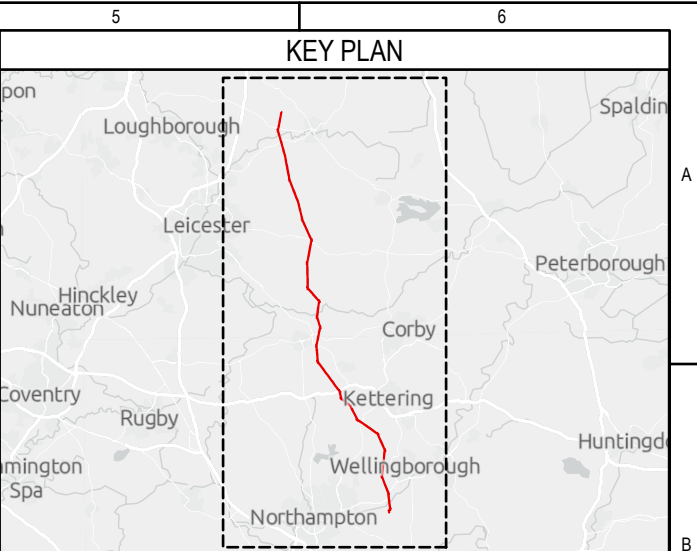
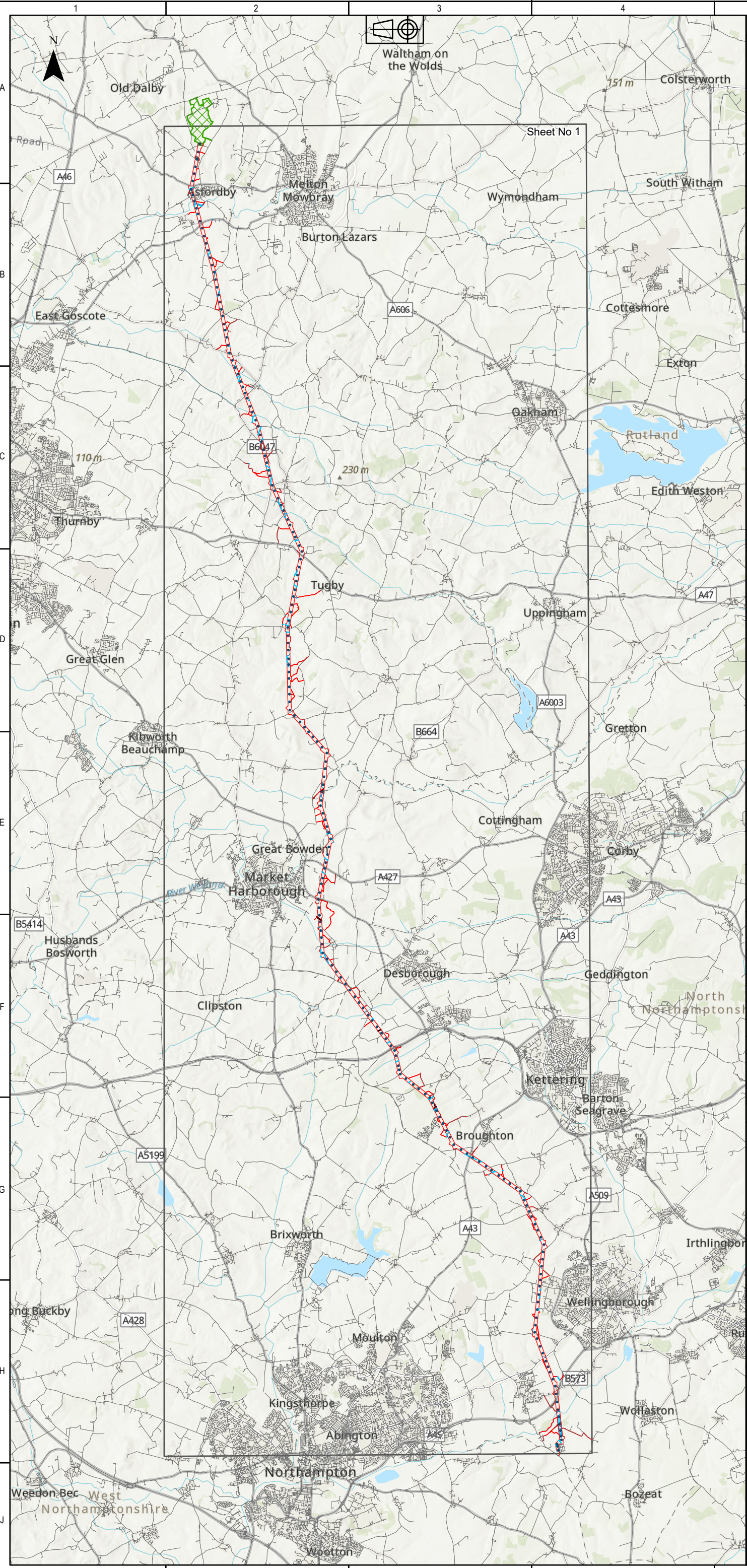
Figure 7 – Hydrology and Risk of Flooding

Figure 8 – Hydrology and Flooding

Figure 9 – Licensed Waste and Industrial Land Uses and Hazardous Substances

Figure 10 – Anticipated Geotechnical Hazards and Constraints

Figure 11 – Radon Risk



- Legend
- DF2 Rev B Boundary - Reconductoring Area
 - Towers
 - OS Open Roads
 - OSM Historical Railway
 - OS Surface Water Features - Lines
 - WMEL-B
 - OS Surface Water Features - Areas
 - Historical Railway Feature HD
 - Historical Railway Feature LD

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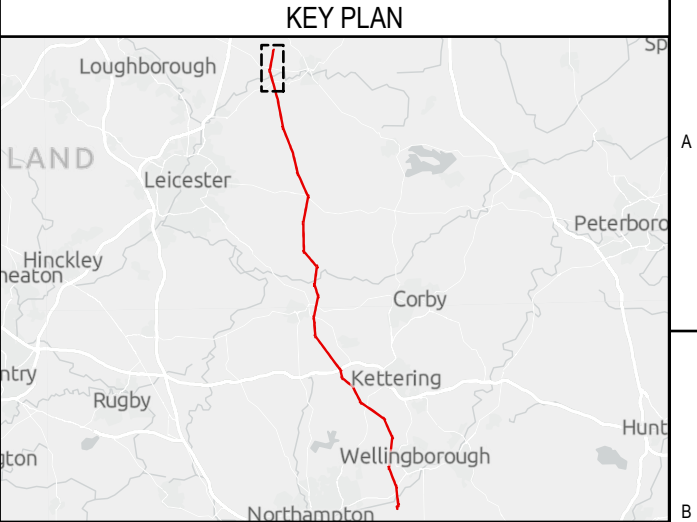
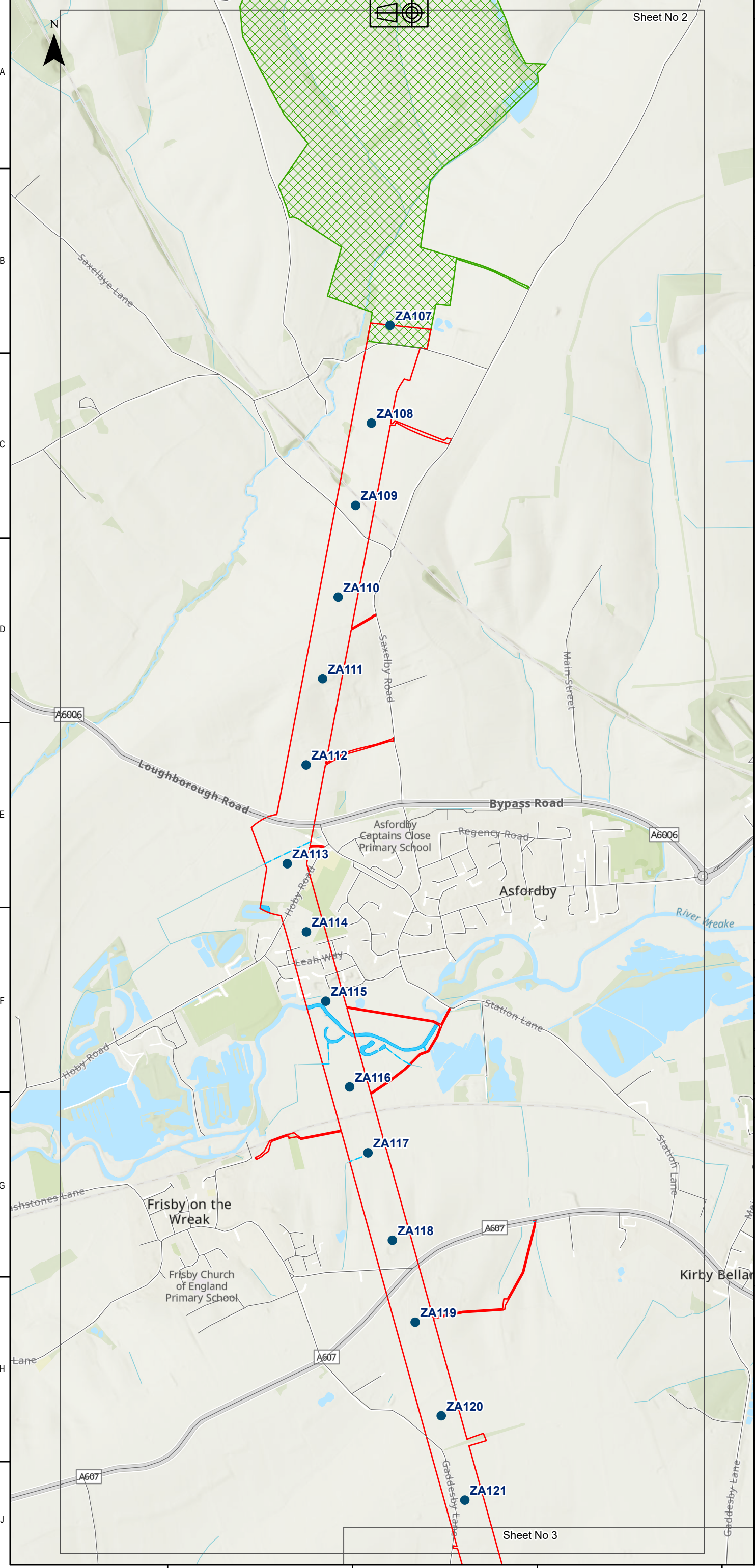
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Site
Weston Marsh to East Leicestershire

Title
Reconductoring Route
Phase 1 Geotechnical and Geo-environmental Desk Study:
Figure 1-1
Site Location Plan

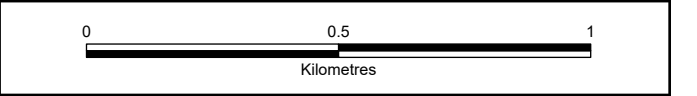
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- Legend
- DF2 Rev B Boundary - Reconductoring Area
 - WMEL-B
 - Towers
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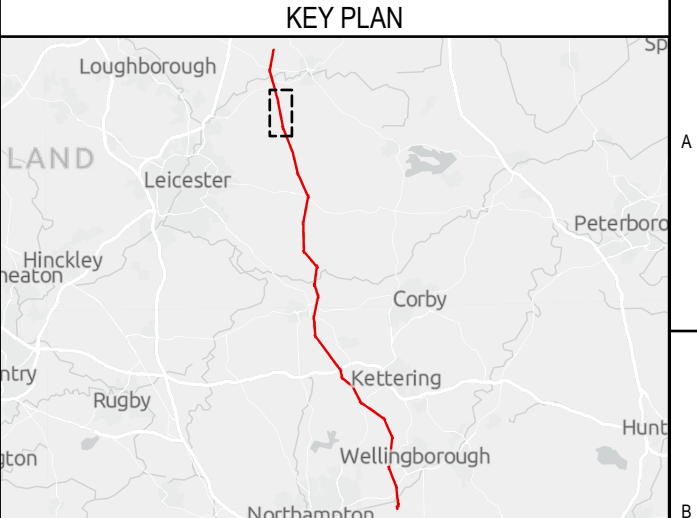
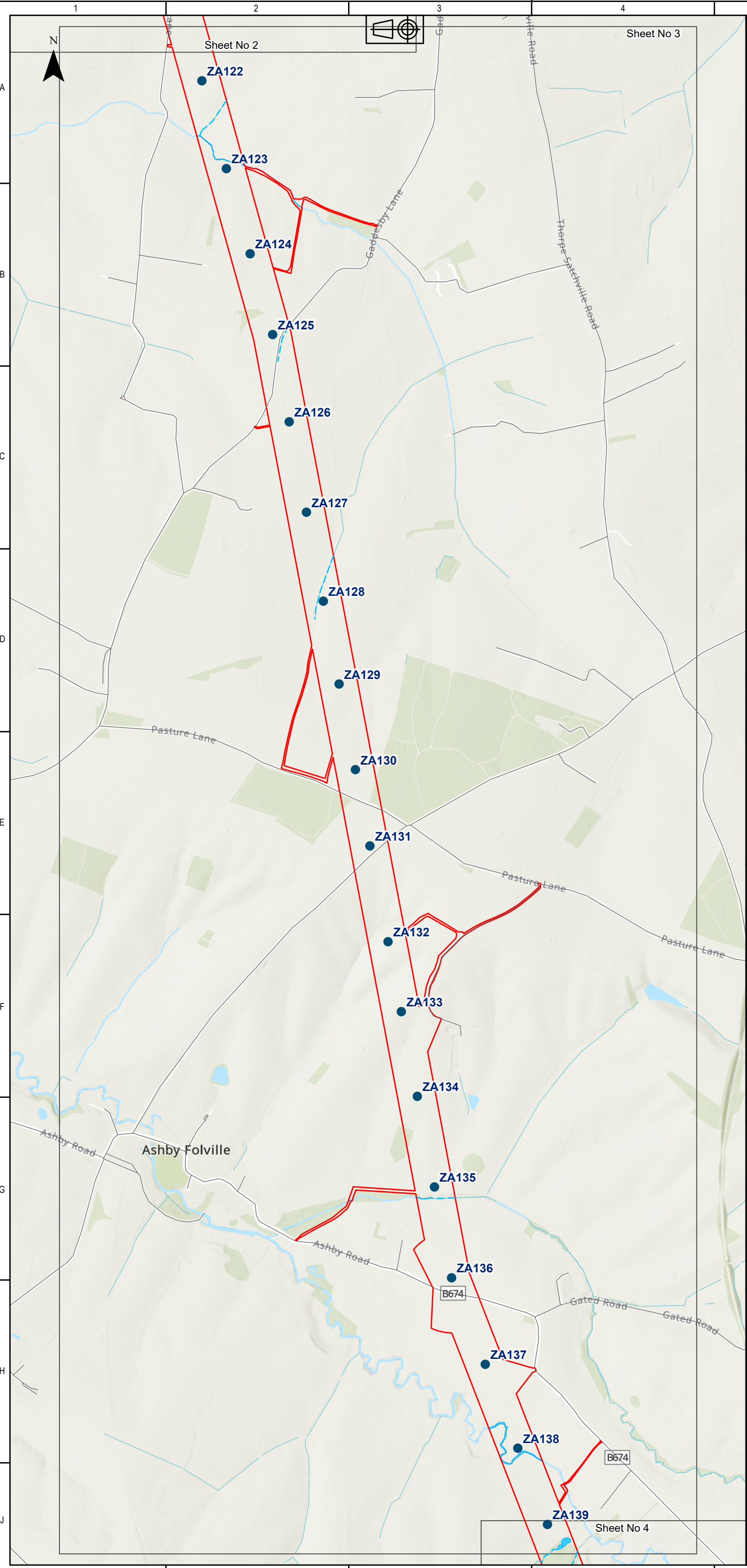
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Site
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Title
Reconductoring Route
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Figure 1-2
Site Location Plan

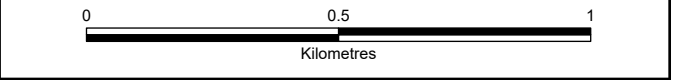
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- Legend
- DF2 Rev B Boundary - Reconductoring Area
 - Towers
 - OS Open Roads
 - OS Surface Water Features - Lines
 - OS Surface Water Features - Areas

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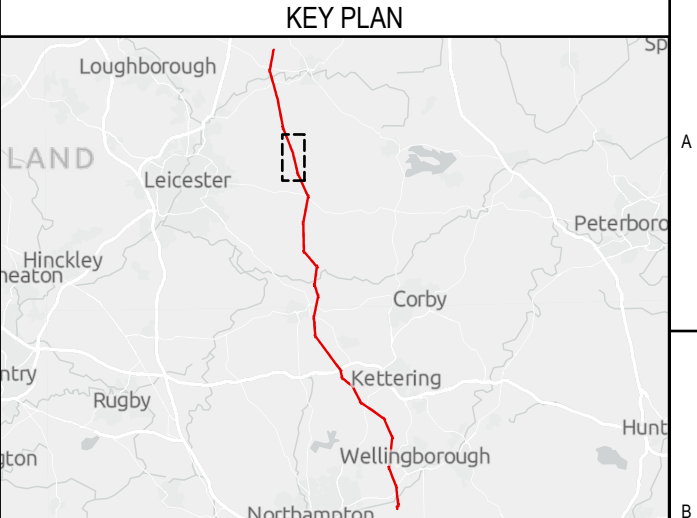
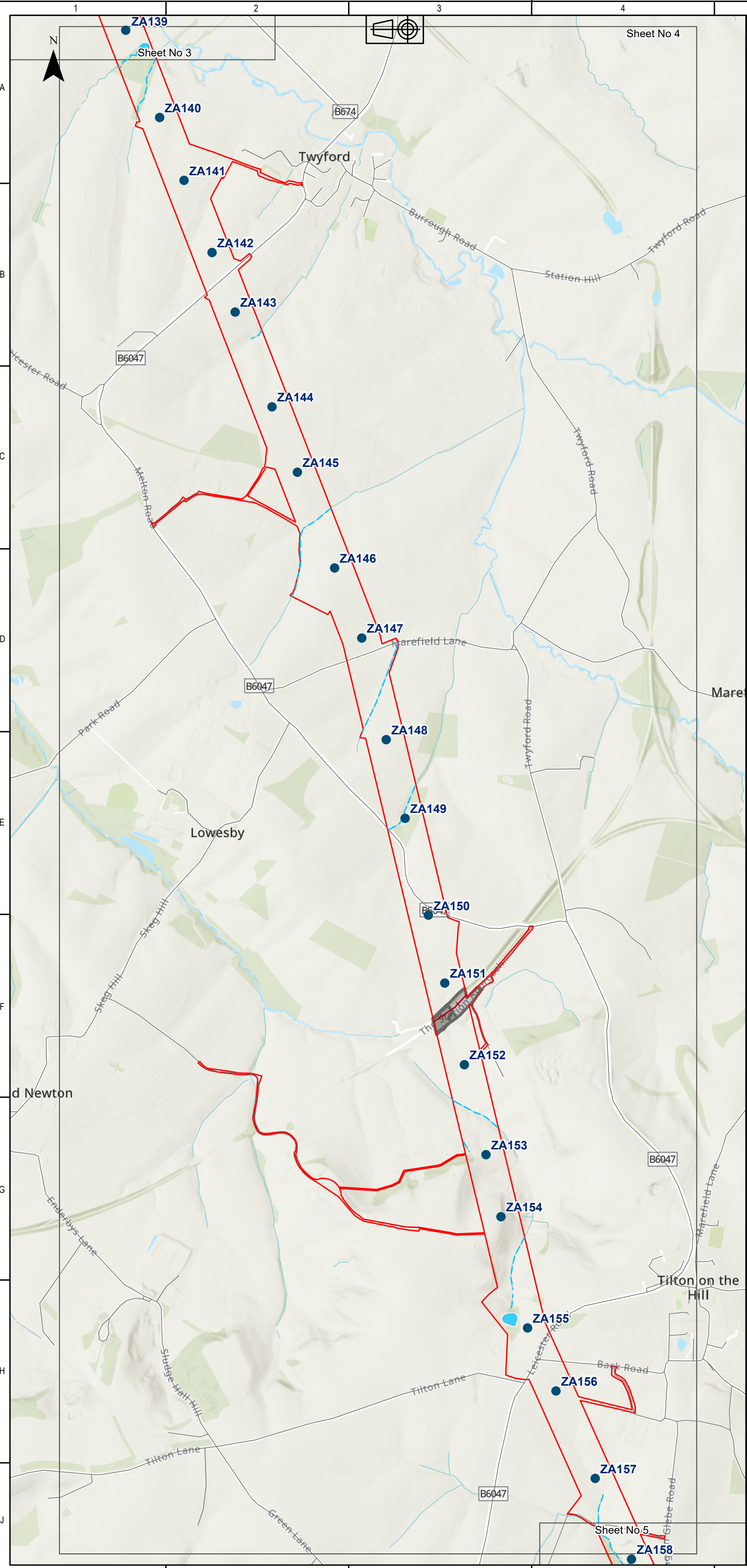
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Site
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Title
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Figure 1-3
Site Location Plan

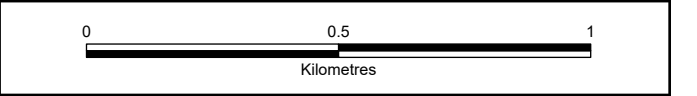
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- Legend
- DF2 Rev B Boundary - Reconductoring Area
 - Towers
 - OS Open Roads
 - OSM Historical Railway
 - OS Surface Water Features - Lines
 - OS Surface Water Features - Areas
 - Historical Railway Feature LD

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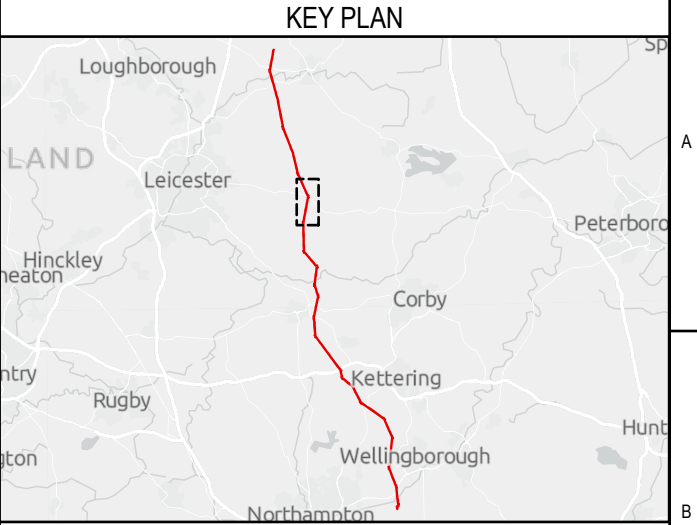
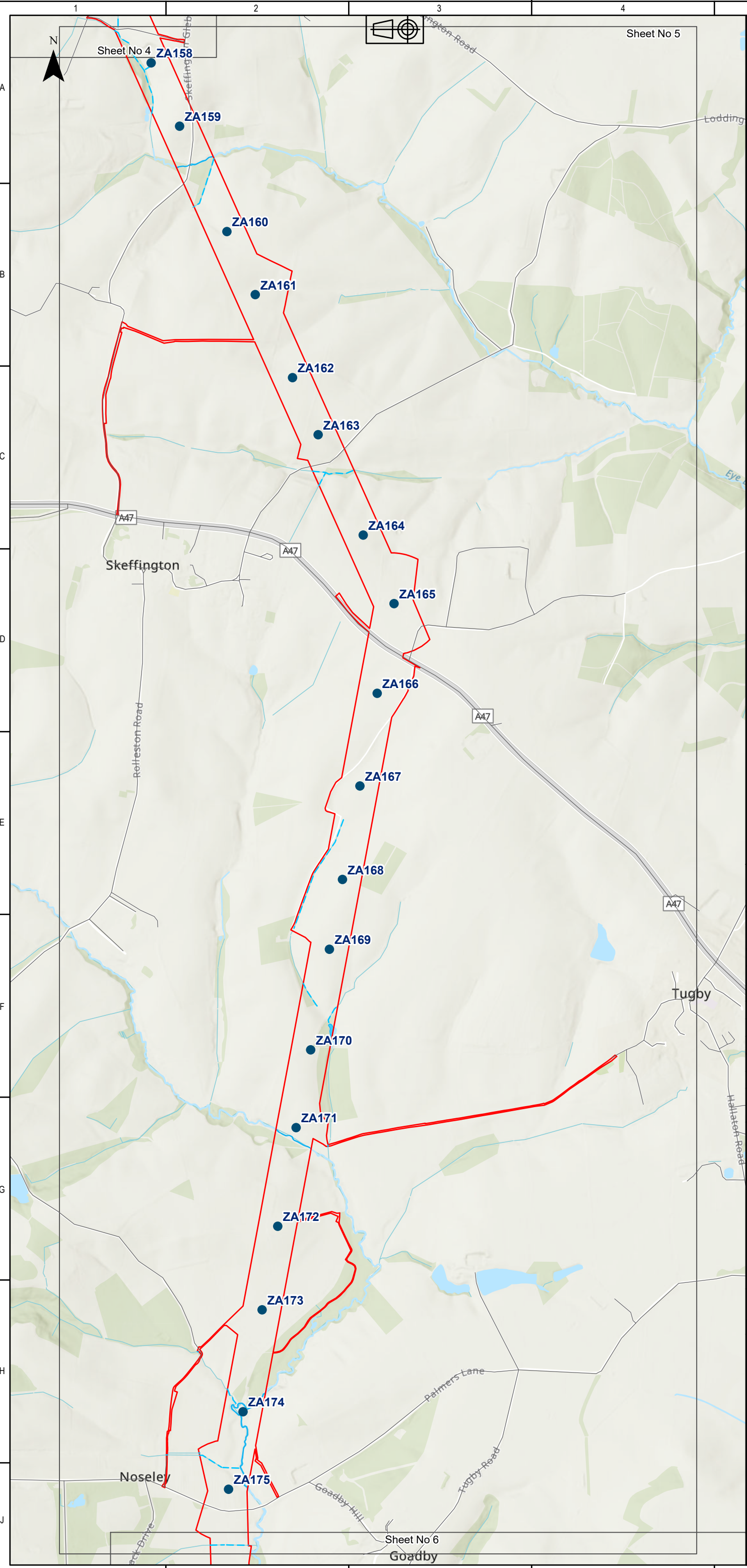
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Site
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Site Location Plan

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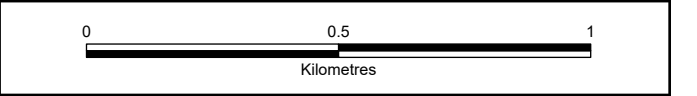


Legend

- DF2 Rev B Boundary - Reconductoring Area
- Towers
- OS Open Roads
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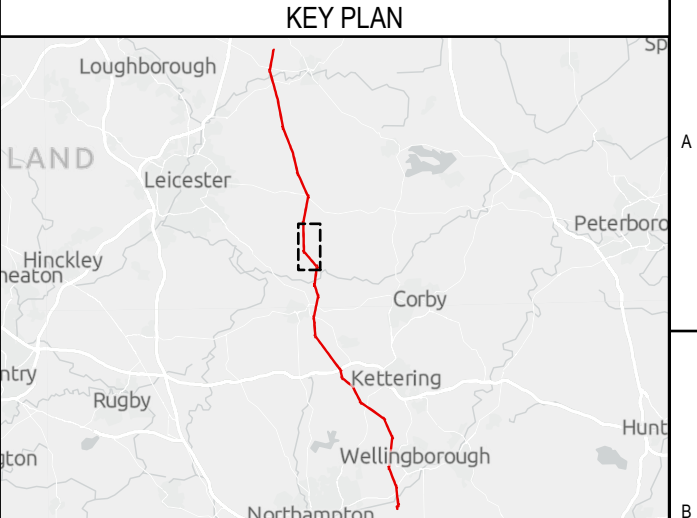
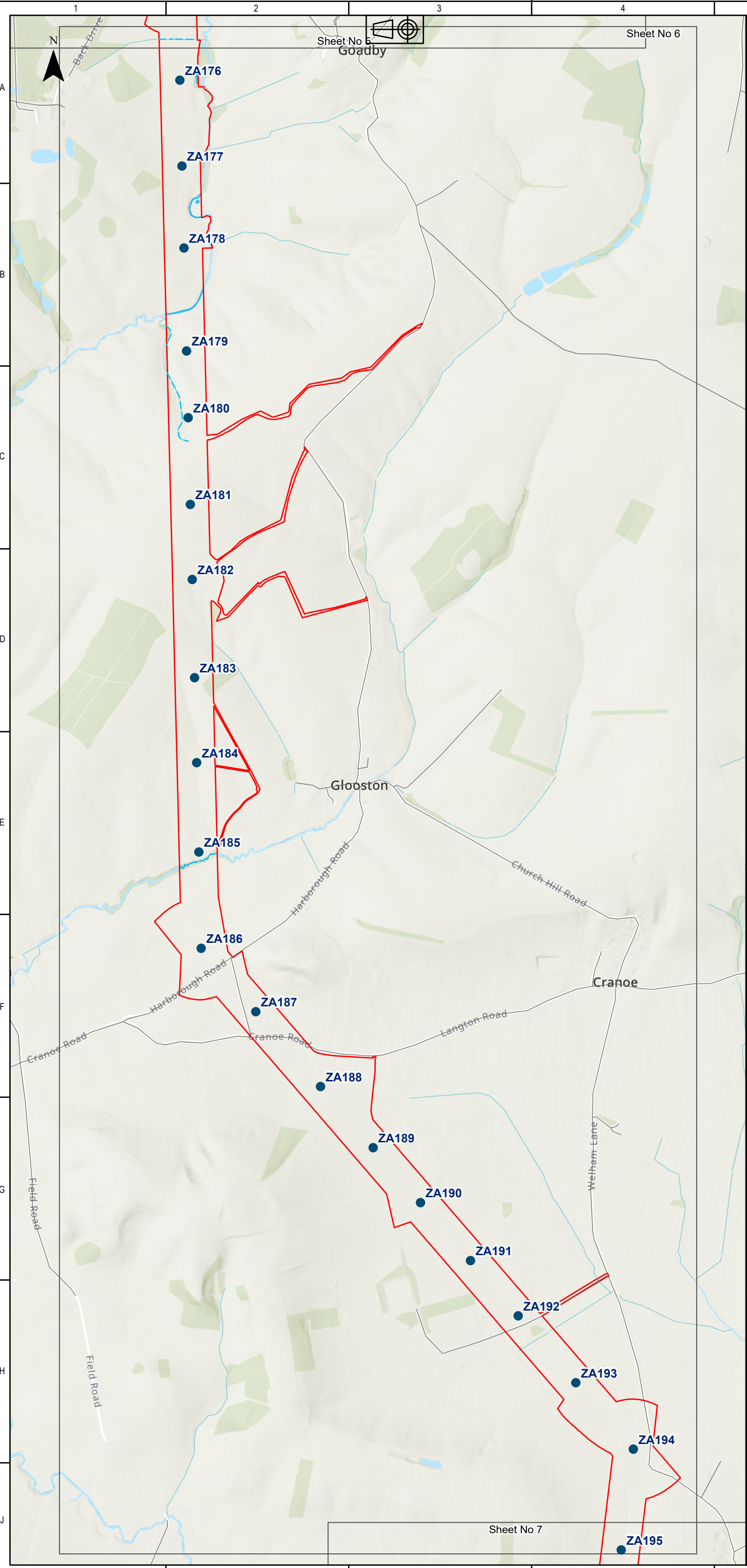
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Site
Weston Marsh to East Leicestershire

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Reconductoring Route
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Figure 1-5
Site Location Plan

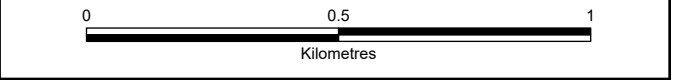
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- Legend**
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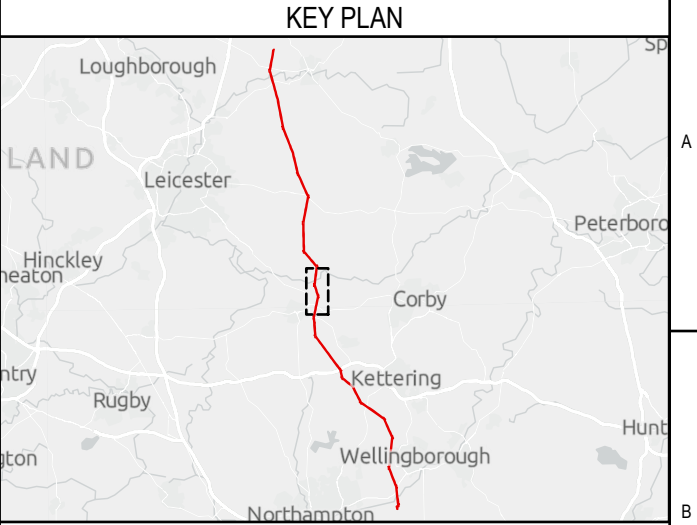
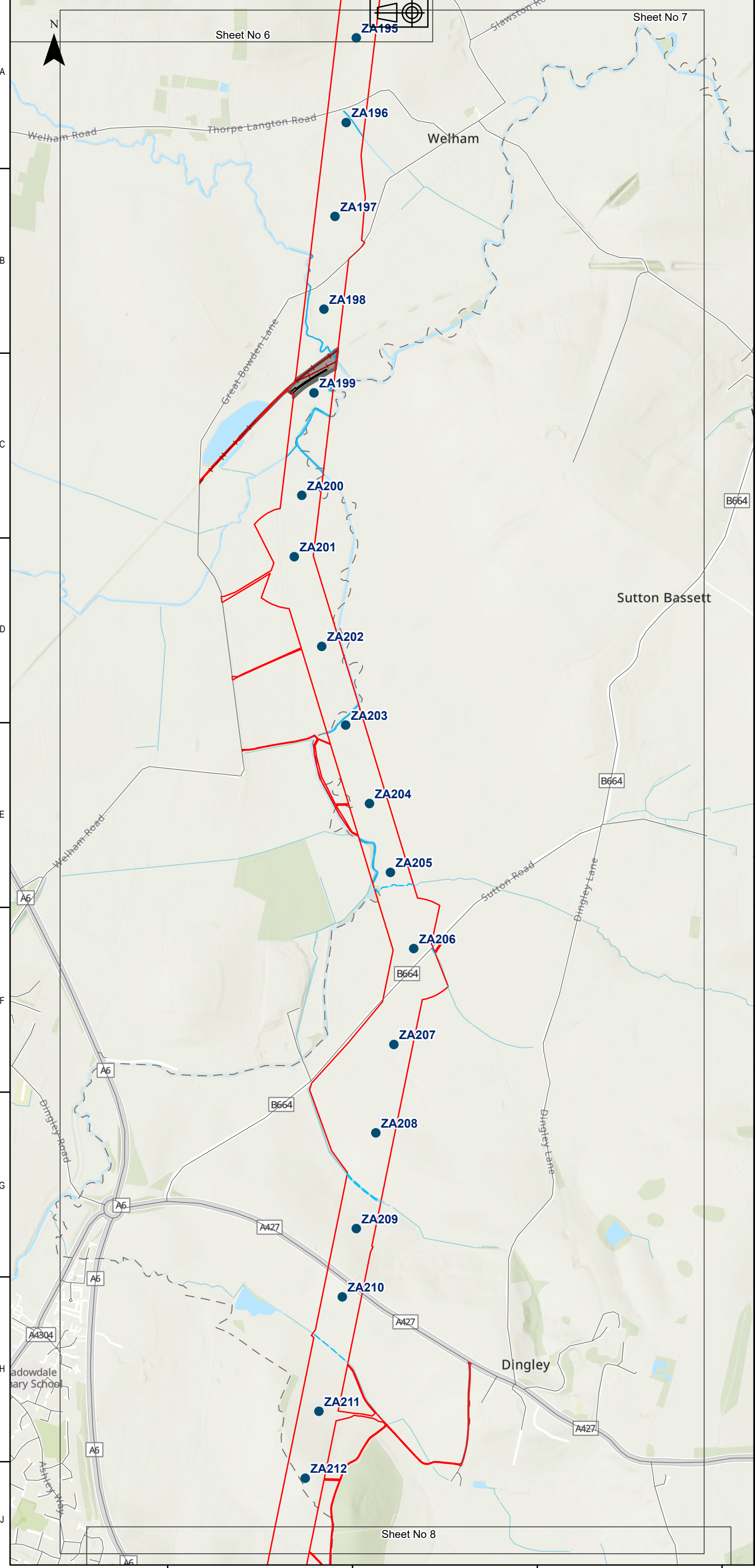
Contractor



Site
Weston Marsh to East Leicestershire

Title
Reconductoring Route
Phase 1 Geotechnical and Geo-environmental Desk Study:
Figure 1-6
Site Location Plan

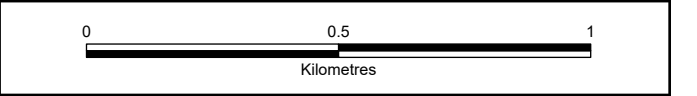
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Drawn A.MORGAN		Checked M.BLAKEY		
Reviewed M.BLAKEY	Approved J.CHASTNEY	Date 22/06/2026	Scale 1:15,000	Size A3



- Legend
- DF2 Rev B Boundary - Reconductoring Area
 - Towers
 - OS Open Roads
 - OSM Historical Railway
 - OS Surface Water Features - Lines
 - OS Surface Water Features - Areas
 - Historical Railway Feature HD
 - Historical Railway Feature LD

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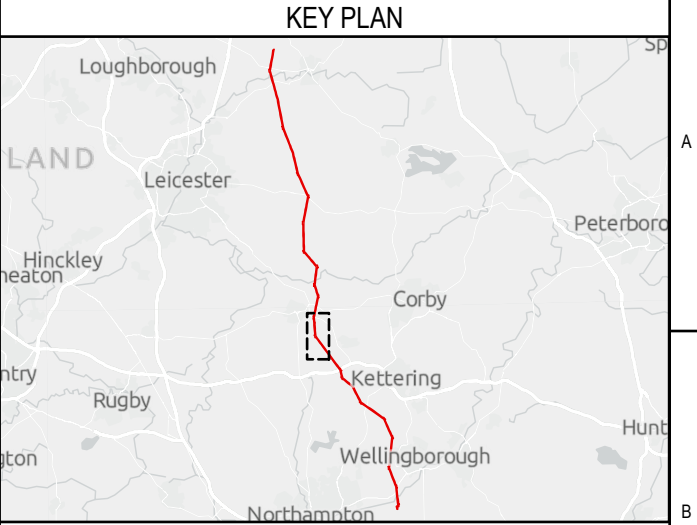
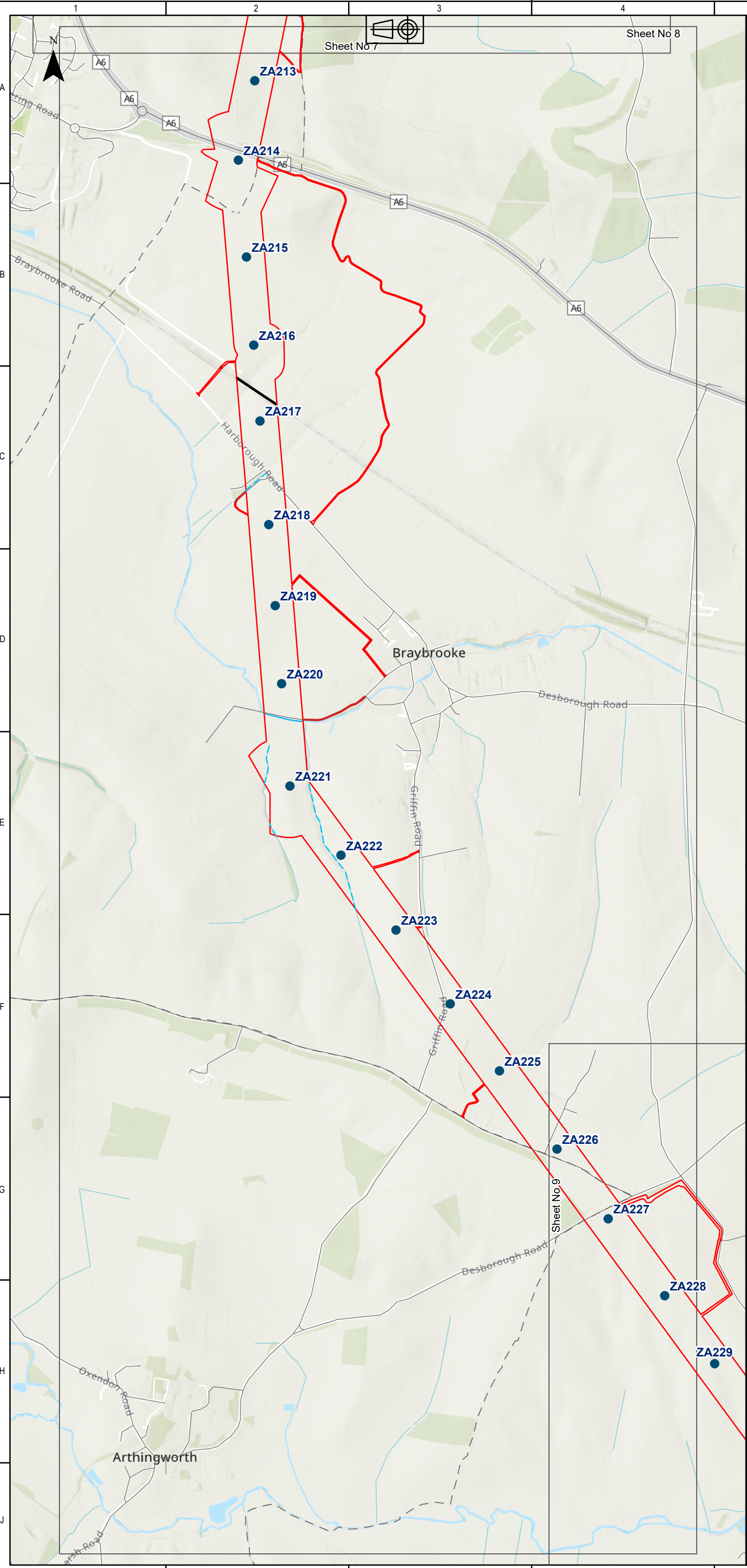
National Grid plc, Warwick Technology Park, Gallows Hill, Warwick, CV34 6DA.

Contractor

Site
Weston Marsh to East Leicestershire

Title
Reconductoring Route
Phase 1 Geotechnical and Geo-environmental Desk Study:
Figure 1-7
Site Location Plan

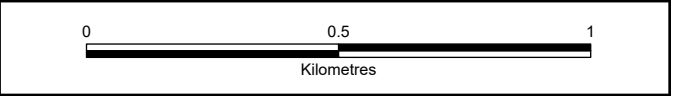
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Customer Drawing No. N/A			Sheet 7 of 14	Issue A
Drawn A.MORGAN		Checked M.BLAKEY		
Reviewed M.BLAKEY	Approved J.CHASTNEY	Date 22/06/2026	Scale 1:15,000	Size A3



- Legend
- DF2 Rev B Boundary - Reconductoring Area
 - Towers
 - OS Open Roads
 - OS Surface Water Features - Lines
 - OS Surface Water Features - Areas
 - Historical Railway Feature HD

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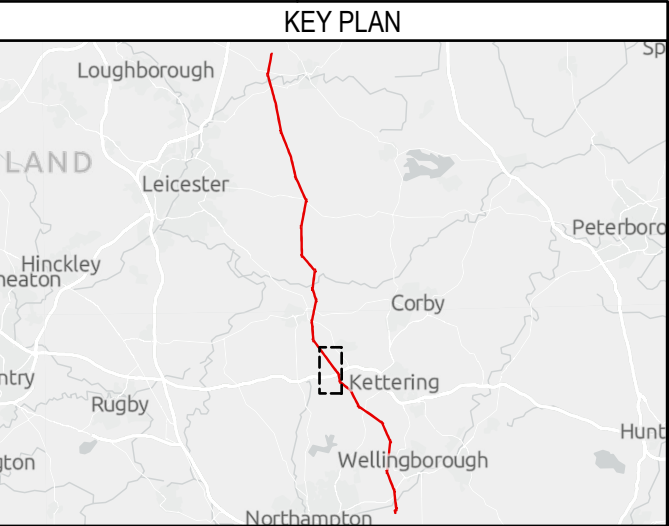
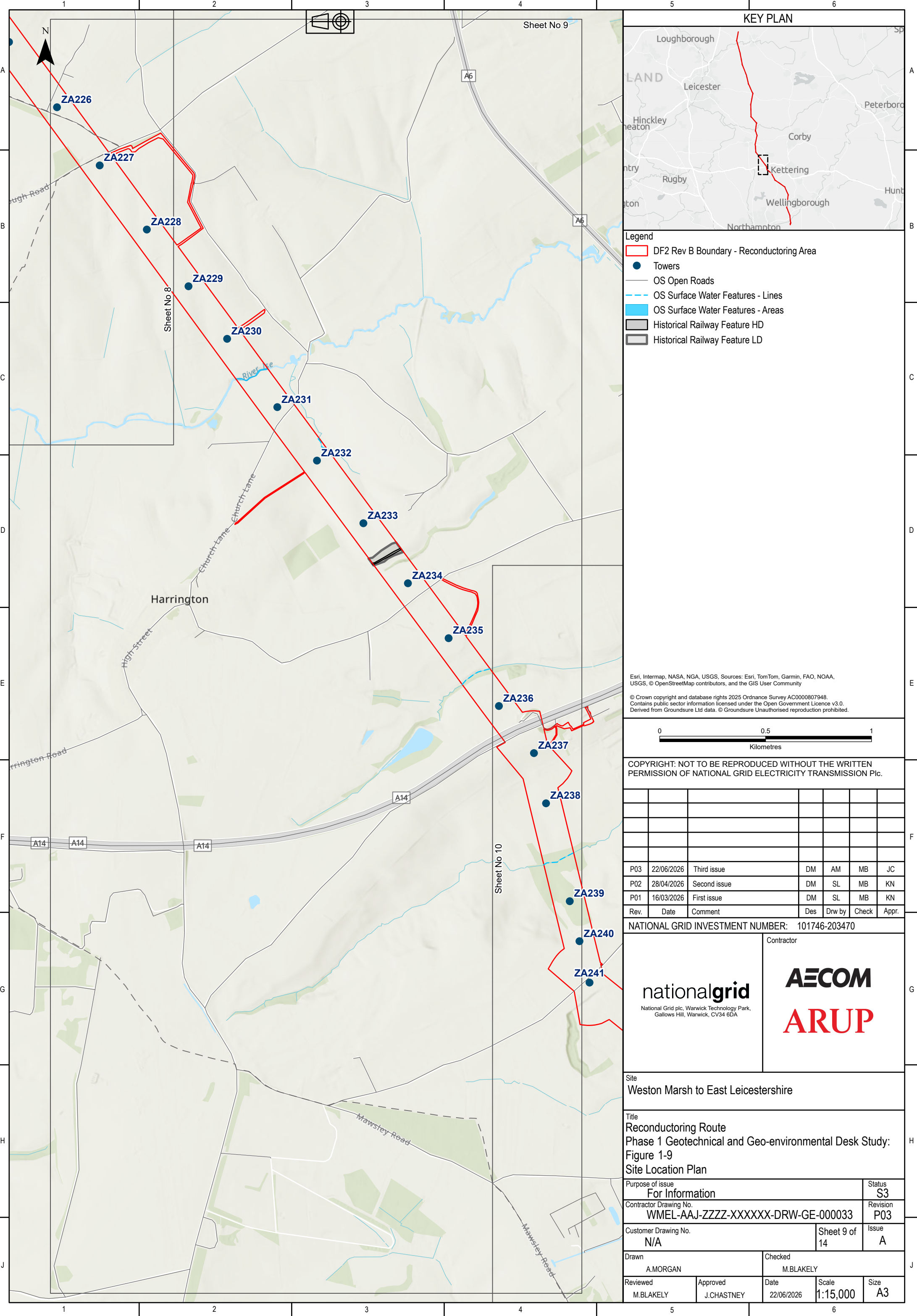
National Grid plc, Warwick Technology Park, Gallows Hill, Warwick, CV34 6DA.

Contractor

Site
Weston Marsh to East Leicestershire

Title
Reconductoring Route
Phase 1 Geotechnical and Geo-environmental Desk Study:
Figure 1-8
Site Location Plan

Purpose of issue For Information				Status S3
Contractor Drawing No. WMEL-AAJ-ZZZZ-XXXXXX-DRW-GE-000033				Revision P03
Customer Drawing No. N/A			Sheet 8 of 14	Issue A
Drawn A.MORGAN		Checked M.BLAKEY		
Reviewed M.BLAKEY	Approved J.CHASTNEY	Date 22/06/2026	Scale 1:15,000	Size A3



- Legend
- DF2 Rev B Boundary - Reconductoring Area
 - Towers
 - OS Open Roads
 - OS Surface Water Features - Lines
 - OS Surface Water Features - Areas
 - Historical Railway Feature HD
 - Historical Railway Feature LD

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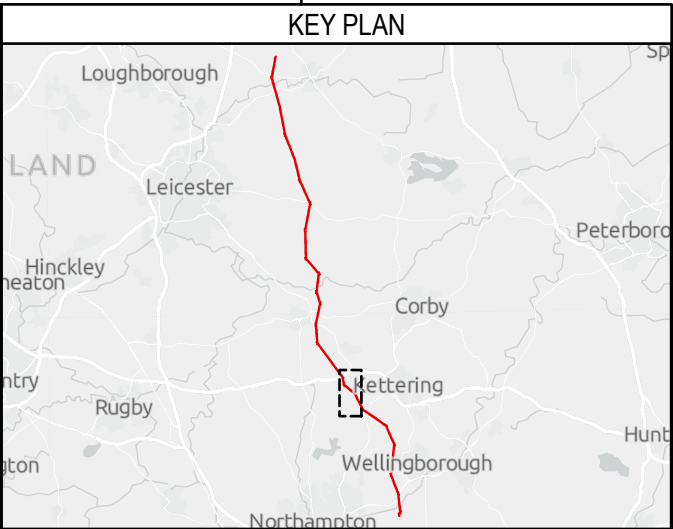
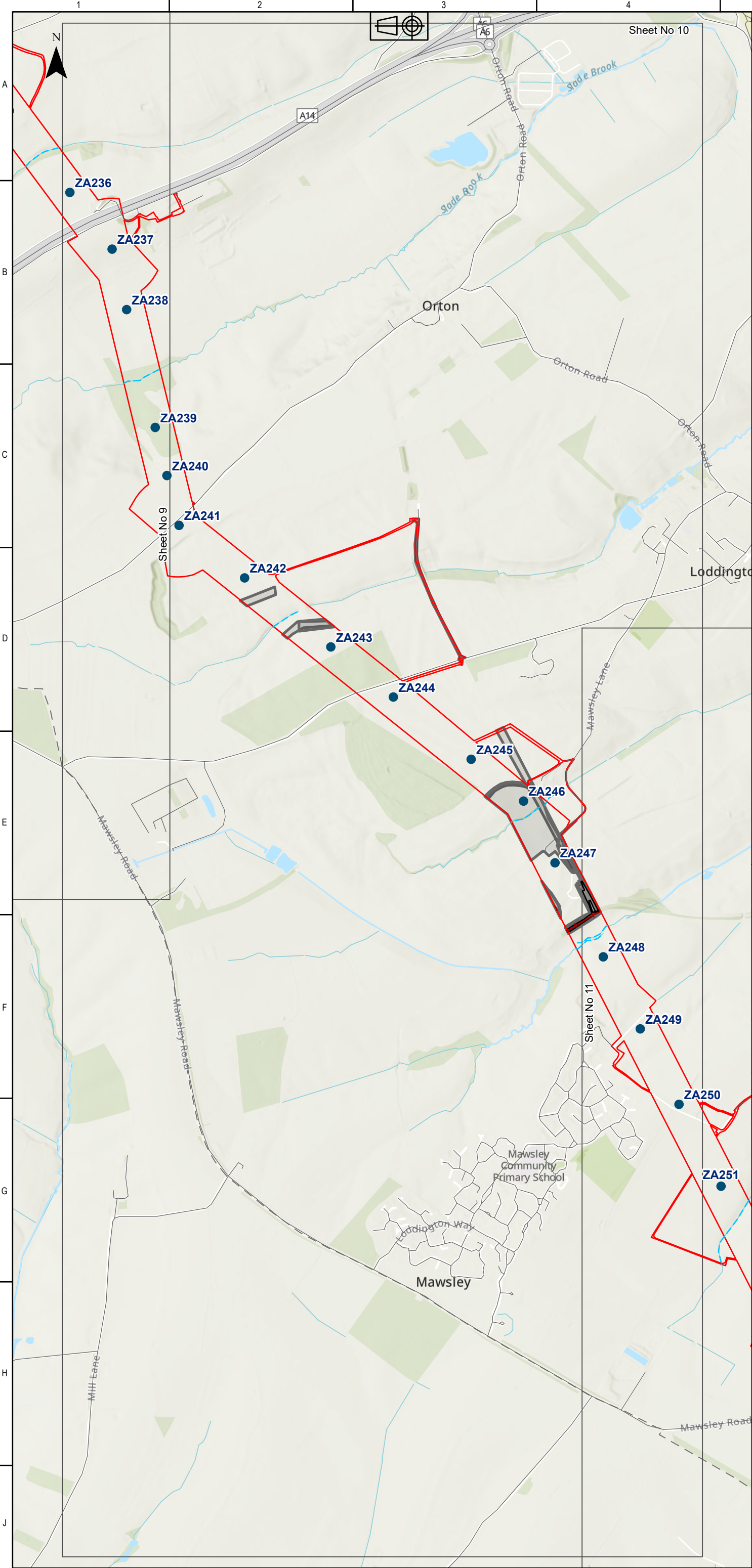
National Grid plc, Warwick Technology Park,
Gallows Hill, Warwick, CV34 6DA.

Contractor

Site
Weston Marsh to East Leicestershire

Title
Reconductoring Route
Phase 1 Geotechnical and Geo-environmental Desk Study:
Figure 1-9
Site Location Plan

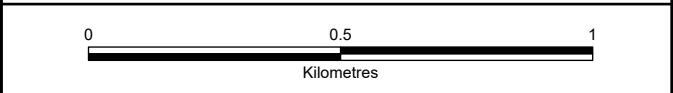
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Customer Drawing No. N/A			Sheet 9 of 14	Issue A
Drawn A.MORGAN		Checked M.BLAKEY		
Reviewed M.BLAKEY	Approved J.CHASTNEY	Date 22/06/2026	Scale 1:15,000	Size A3



- Legend
- DF2 Rev B Boundary - Reconductoring Area
 - Towers
 - OS Open Roads
 - OSM Historical Railway
 - OS Surface Water Features - Lines
 - Historical Railway Feature HD
 - Historical Railway Feature LD

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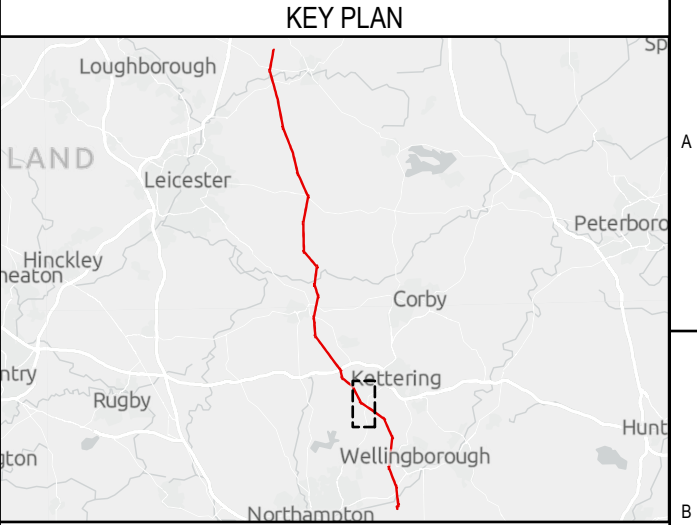
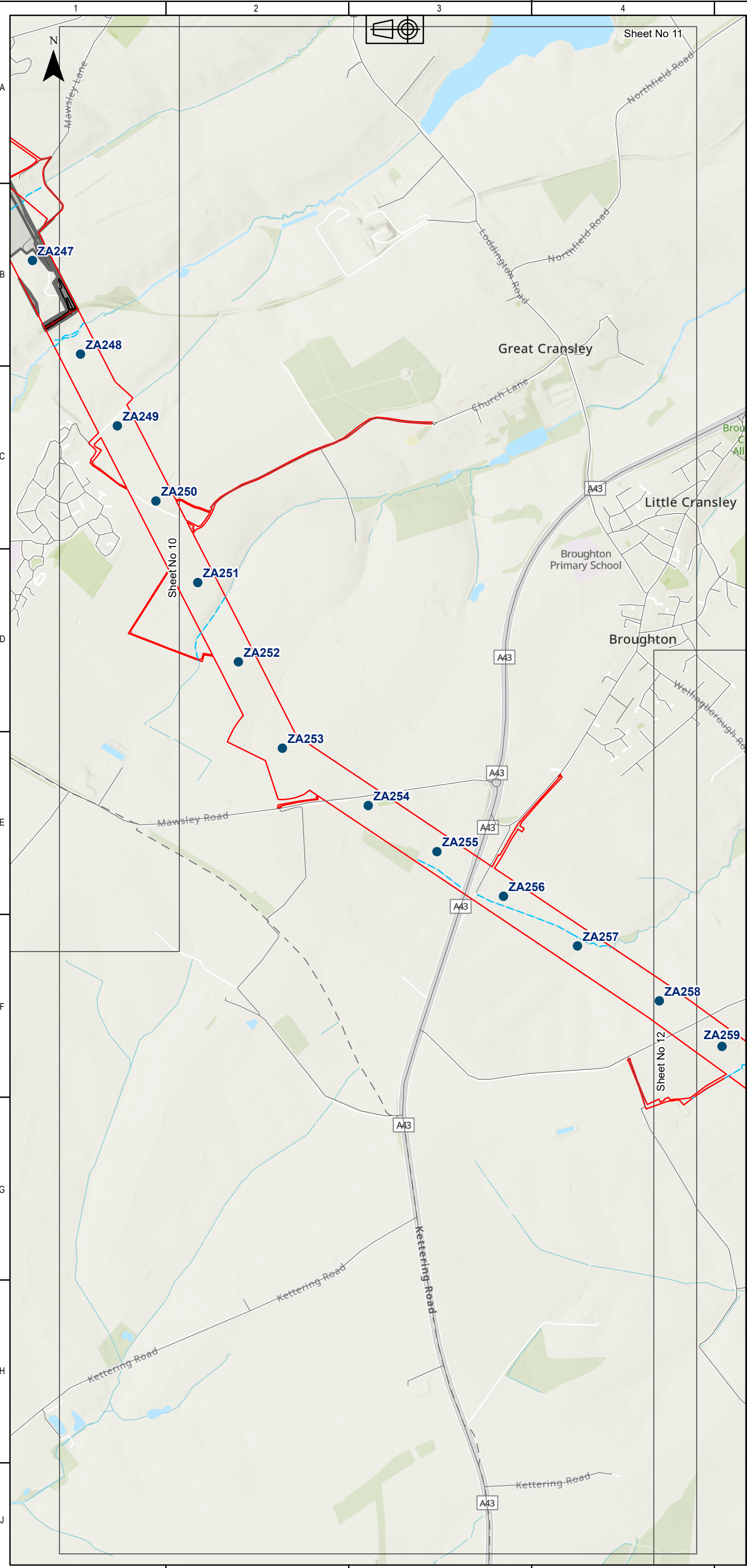
National Grid plc, Warwick Technology Park, Gallows Hill, Warwick, CV34 6DA.

Contractor

Site
Weston Marsh to East Leicestershire

Title
Reconductoring Route
Phase 1 Geotechnical and Geo-environmental Desk Study:
Figure 1-10
Site Location Plan

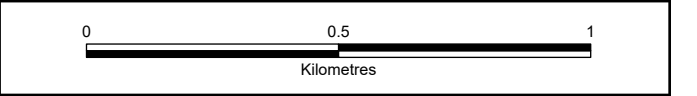
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Customer Drawing No. N/A			Sheet 10 of 14	Issue A
Drawn A.MORGAN		Checked M.BLAKEY		
Reviewed M.BLAKEY	Approved J.CHASTNEY	Date 22/06/2026	Scale 1:15,000	Size A3



- Legend
- DF2 Rev B Boundary - Reconductoring Area
 - Towers
 - OS Open Roads
 - OSM Historical Railway
 - OS Surface Water Features - Lines
 - Historical Railway Feature HD
 - Historical Railway Feature LD

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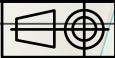
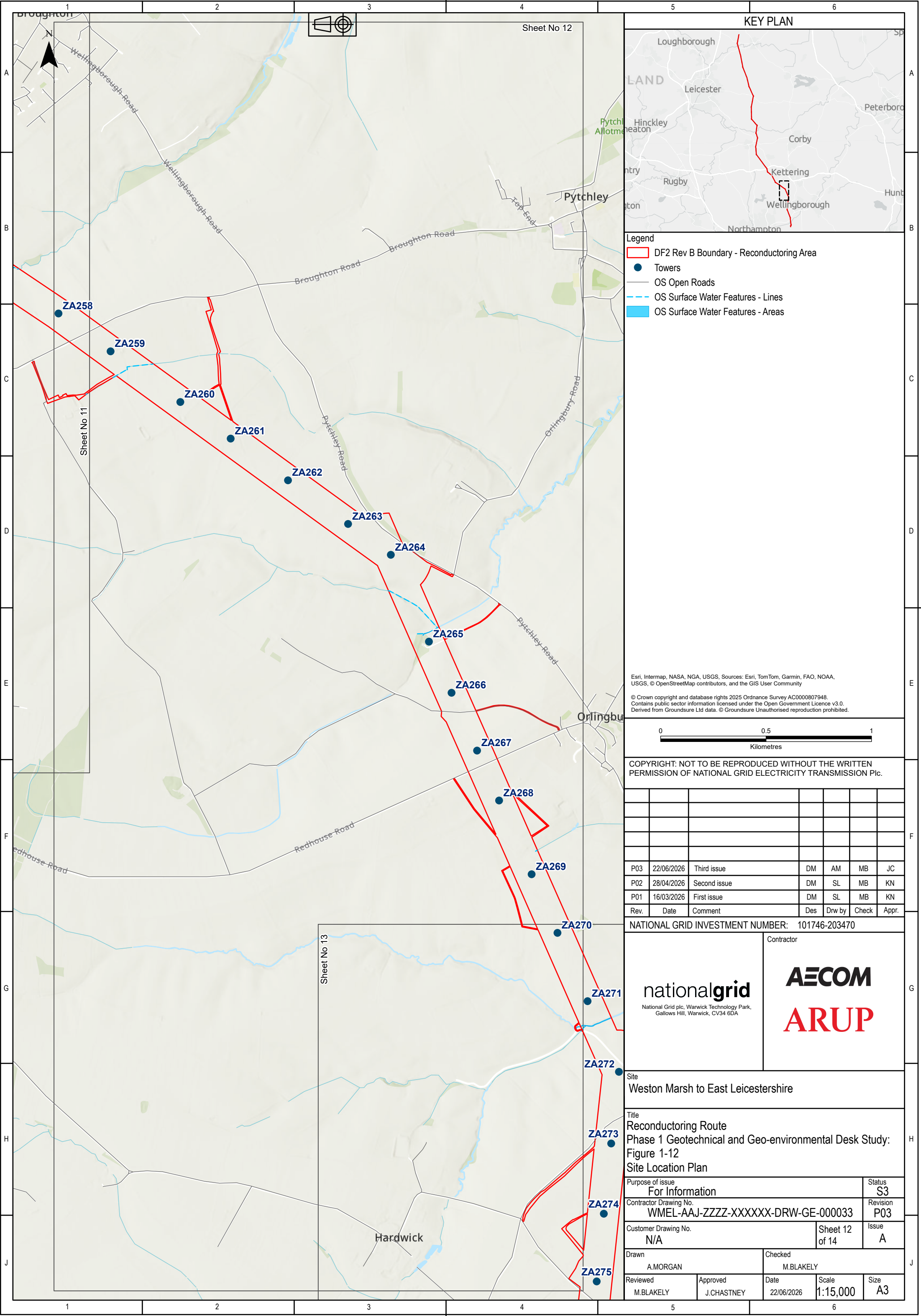
National Grid plc, Warwick Technology Park, Gallows Hill, Warwick, CV34 6DA.

Contractor

Site
Weston Marsh to East Leicestershire

Title
Reconductoring Route
Phase 1 Geotechnical and Geo-environmental Desk Study:
Figure 1-11
Site Location Plan

Purpose of issue For Information				Status S3
Contractor Drawing No. WMEL-AAJ-ZZZZ-XXXXXX-DRW-GE-000033				Revision P03
Customer Drawing No. N/A			Sheet 11 of 14	Issue A
Drawn A.MORGAN		Checked M.BLAKEY		
Reviewed M.BLAKEY	Approved J.CHASTNEY	Date 22/06/2026	Scale 1:15,000	Size A3



Sheet No 12

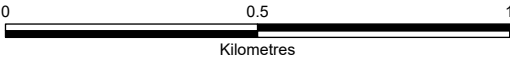
KEY PLAN



- Legend
- DF2 Rev B Boundary - Reconductoring Area
 - Towers
 - OS Open Roads
 - OS Surface Water Features - Lines
 - OS Surface Water Features - Areas

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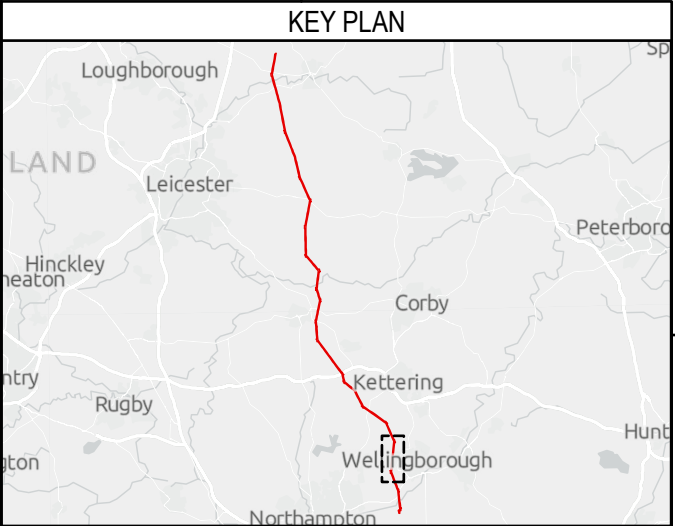
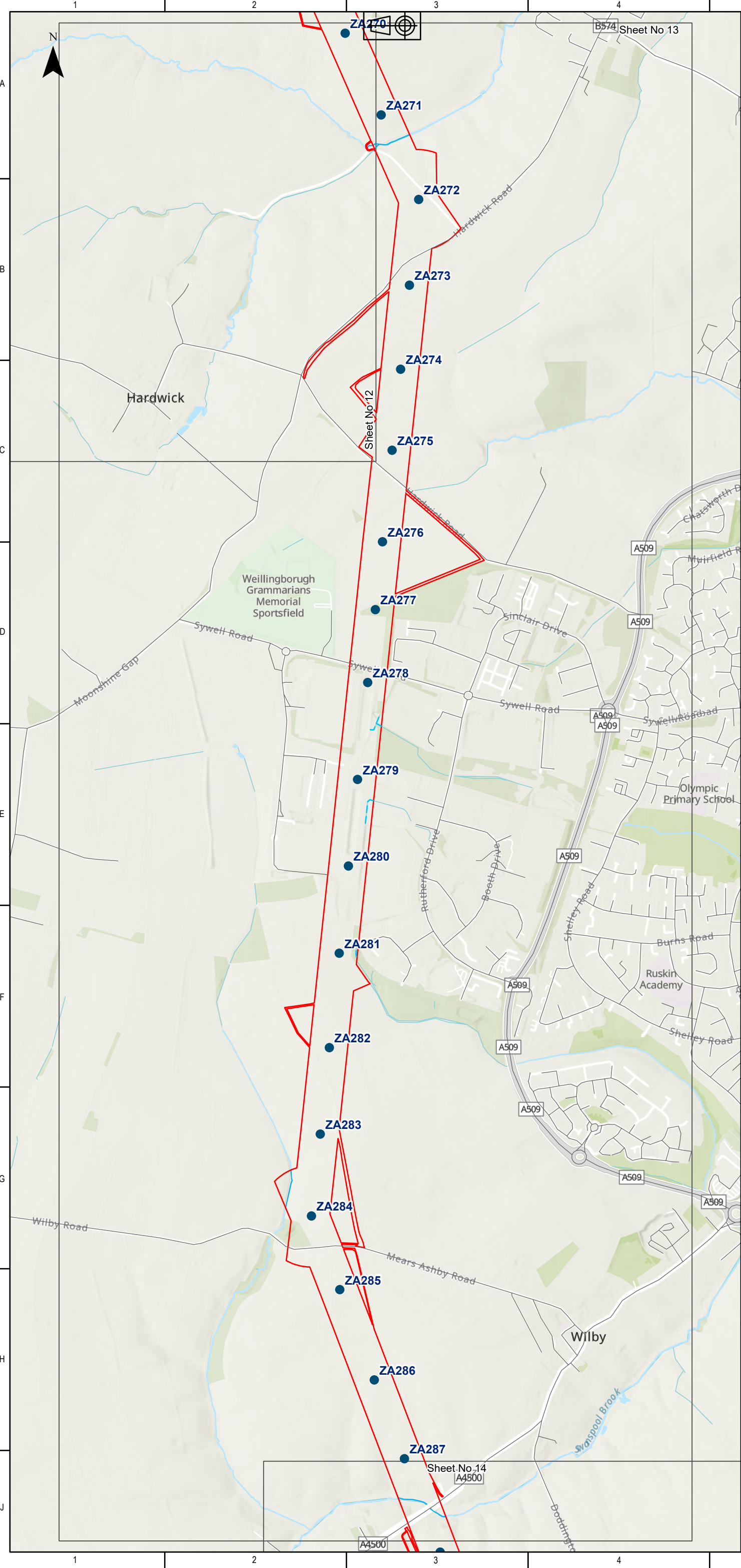
National Grid plc, Warwick Technology Park, Gallows Hill, Warwick, CV34 6DA.

Contractor

Site
Weston Marsh to East Leicestershire

Title
Reconductoring Route
Phase 1 Geotechnical and Geo-environmental Desk Study:
Figure 1-12
Site Location Plan

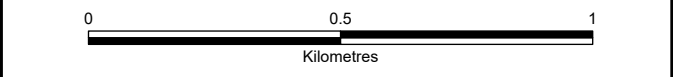
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Customer Drawing No. N/A			Sheet 12 of 14	Issue A
Drawn A.MORGAN		Checked M.BLAKEY		
Reviewed M.BLAKEY	Approved J.CHASTNEY	Date 22/06/2026	Scale 1:15,000	Size A3



- Legend**
- DF2 Rev B Boundary - Reconductoring Area
 - Towers
 - OS Open Roads
 - OS Surface Water Features - Lines
 - OS Surface Water Features - Areas

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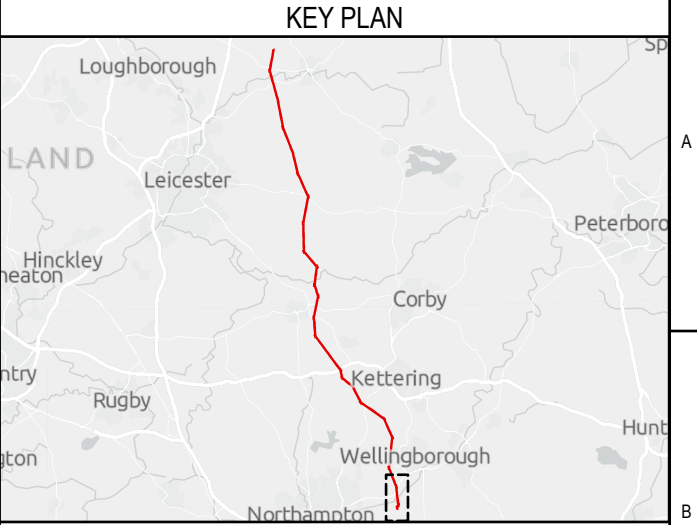
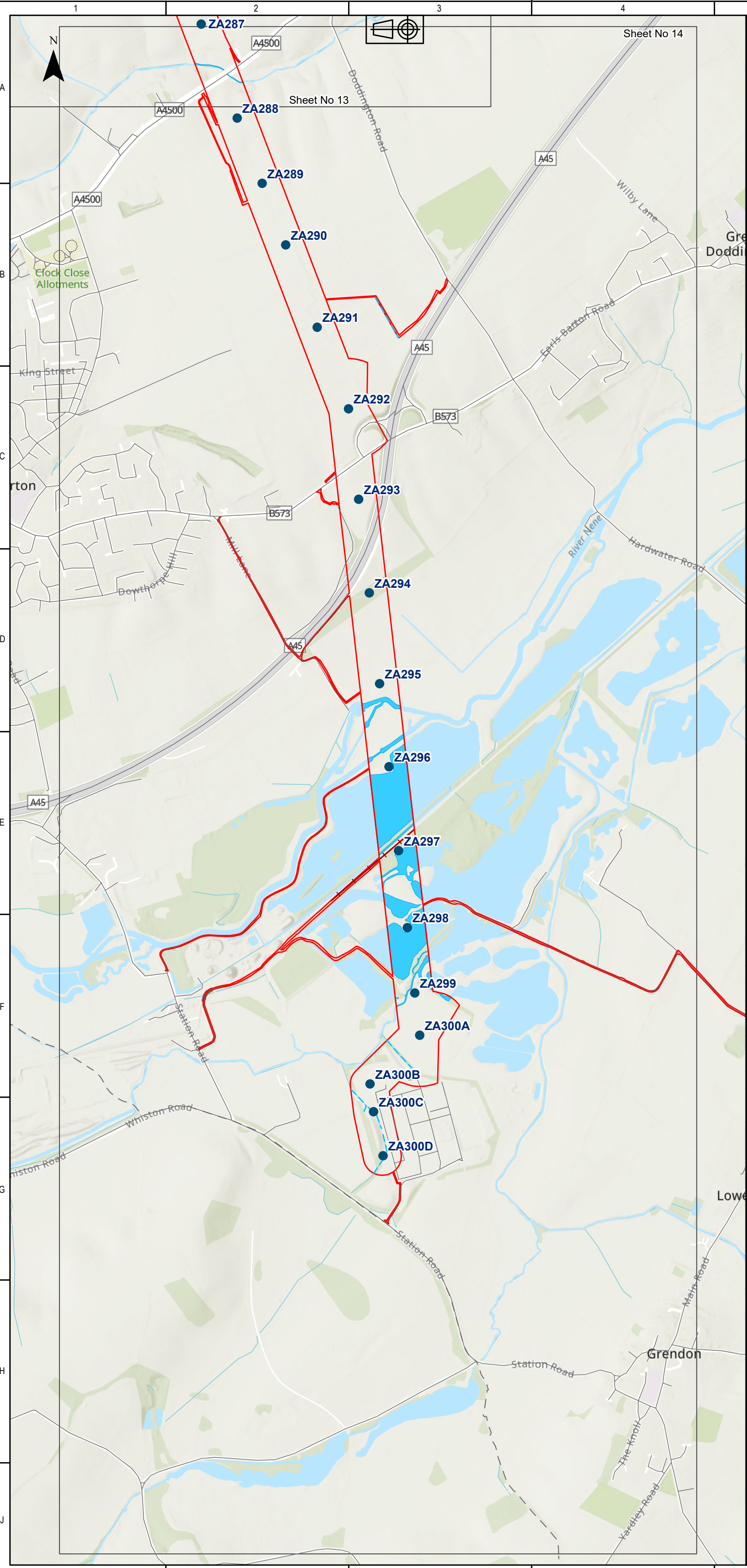
National Grid plc, Warwick Technology Park, Gallows Hill, Warwick, CV34 6DA.

Contractor

Site
Weston Marsh to East Leicestershire

Title
Reconductoring Route
Phase 1 Geotechnical and Geo-environmental Desk Study:
Figure 1-13
Site Location Plan

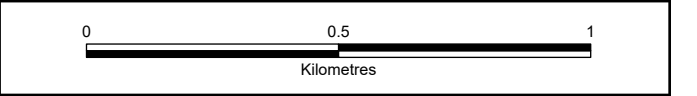
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Customer Drawing No. N/A			Sheet 13 of 14	Issue A
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Reviewed M.BLAKEY	Approved J.CHASTNEY	Date 22/06/2026	Scale 1:15,000	Size A3



- Legend
- DF2 Rev B Boundary - Reconductoring Area
 - Towers
 - OS Open Roads
 - OSM Historical Railway
 - OS Surface Water Features - Lines
 - OS Surface Water Features - Areas
 - Historical Railway Feature LD

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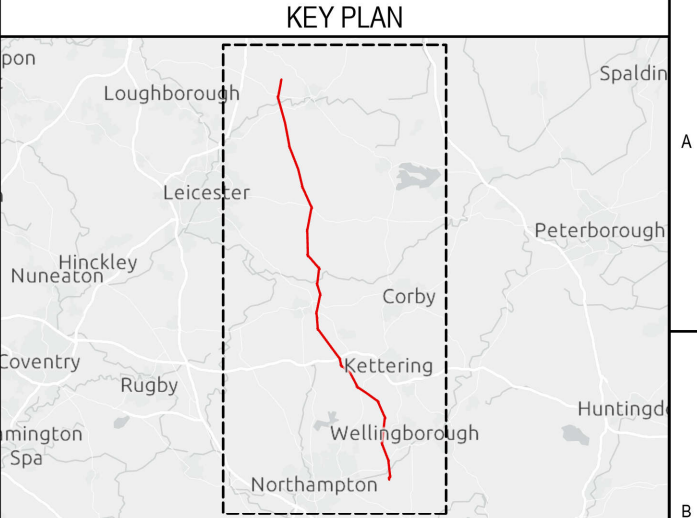
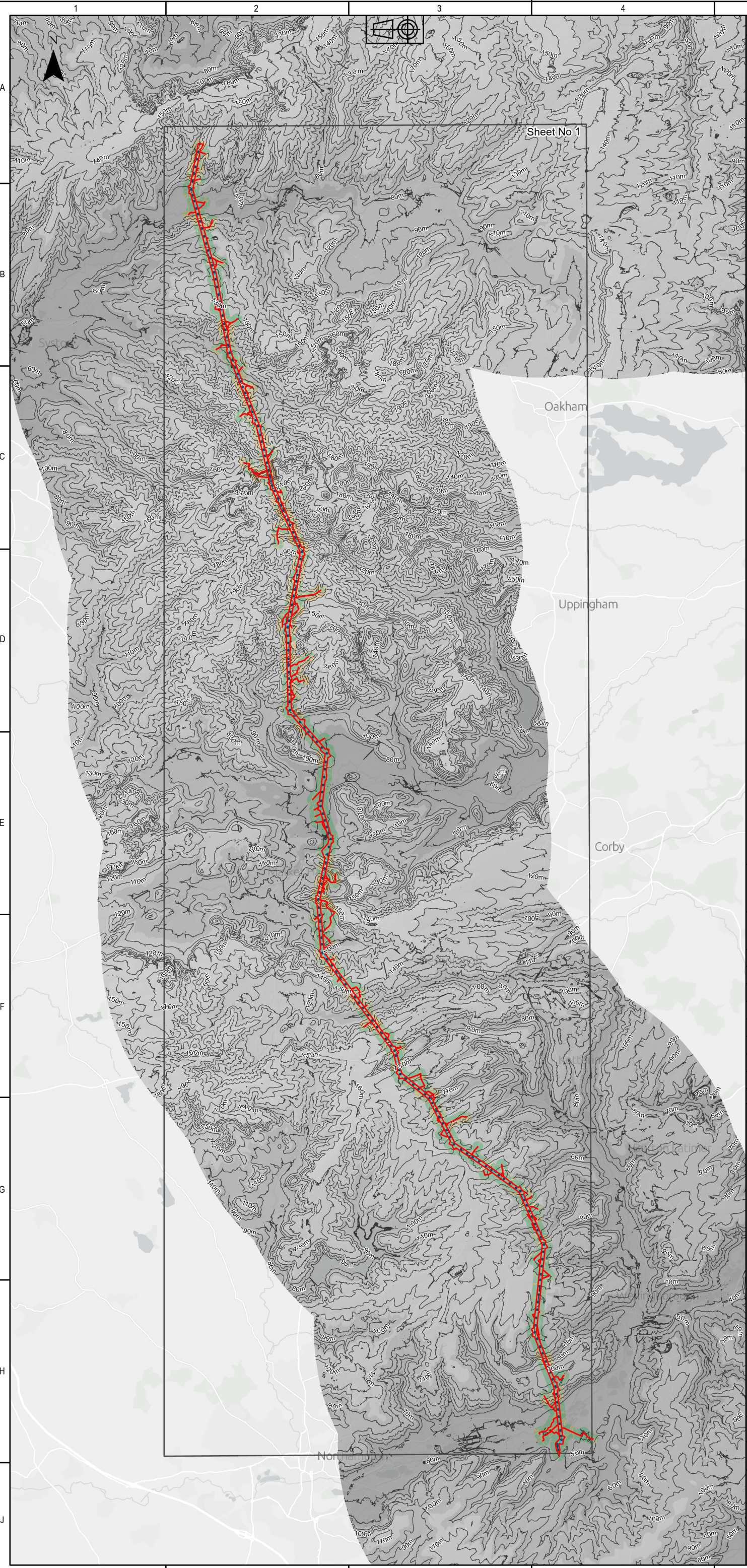
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Contractor

Site
Weston Marsh to East Leicestershire

Title
Reconductoring Route
Phase 1 Geotechnical and Geo-environmental Desk Study:
Figure 1-14
Site Location Plan

Purpose of issue For Information				Status S3
Contractor Drawing No. WMEL-AAJ-ZZZZ-XXXXXX-DRW-GE-000033				Revision P03
Customer Drawing No. N/A			Sheet 14 of 14	Issue A
Drawn A.MORGAN		Checked M.BLAKEY		
Reviewed M.BLAKEY	Approved J.CHASTNEY	Date 22/06/2026	Scale 1:15,000	Size A3



Legend

- DF2 Rev B Boundary - Reconductoring Area
- Towers
- Contour Lines (10m)
- OS Surface Water Features - Lines

Digital Terrain Model LiDAR (1m)

- 31 - 75
- 76 - 105
- 106 - 140
- 141 - 230
- Less than 3.5°
- 3.5° to 5.7°
- 5.7° to 15°
- Greater than 15°

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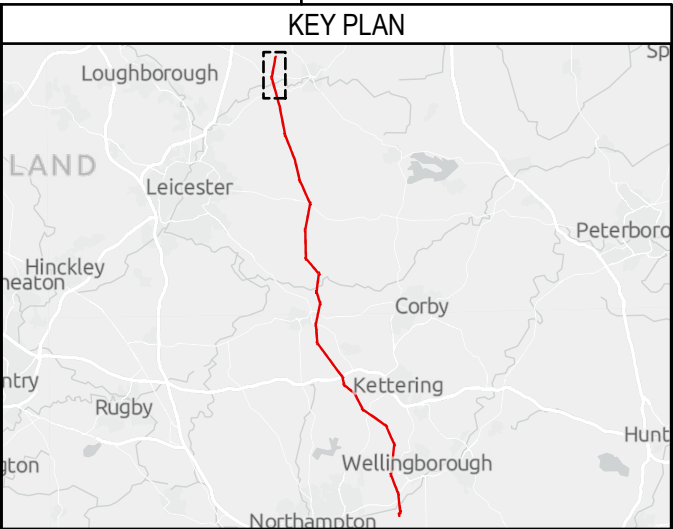
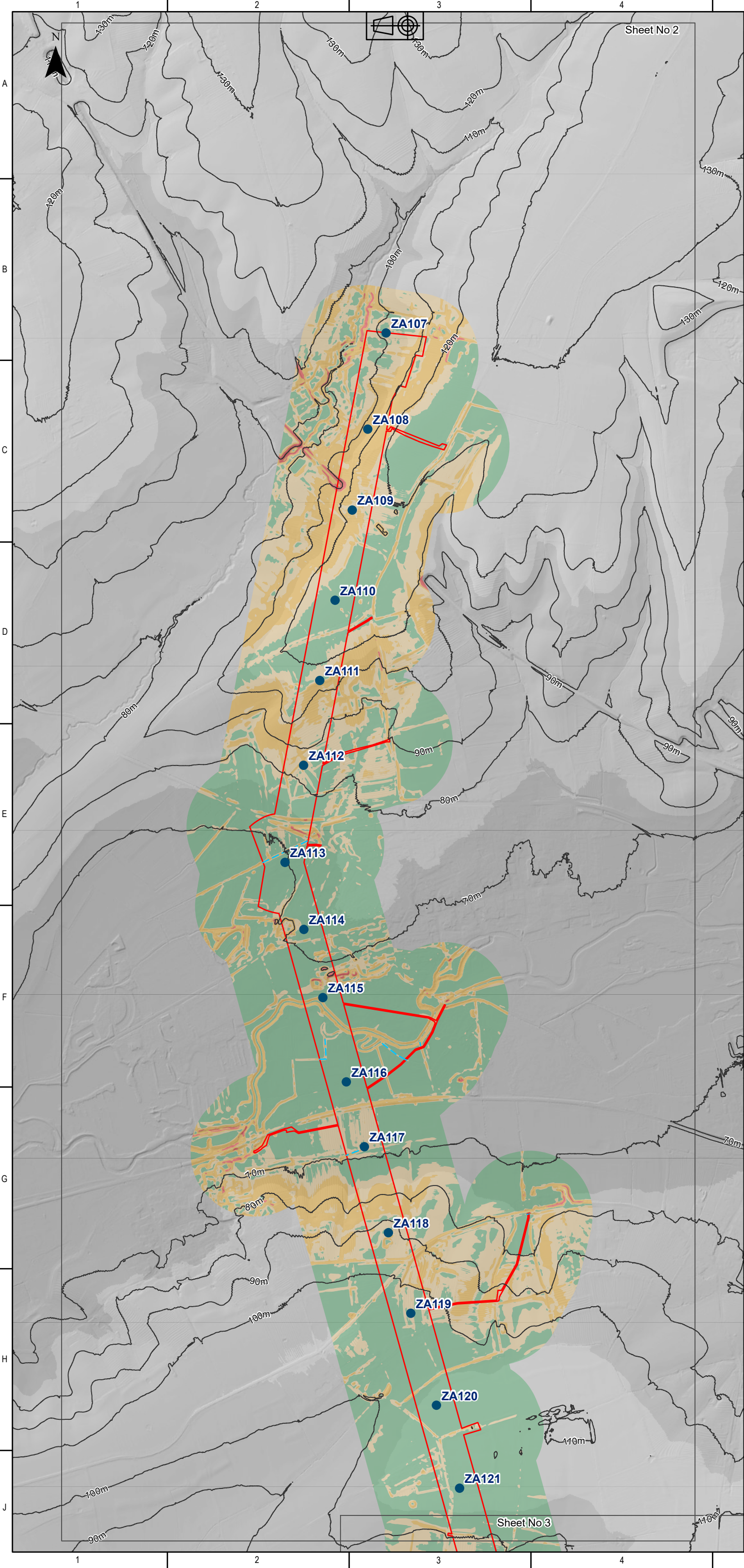
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Gallows Hill, Warwick, CV34 6DA

Contractor

Site
Weston Marsh to East Leicestershire

Title
Reconductoring Route
Phase 1 Geotechnical and Geo-environmental Desk Study:
Figure 2-1
Topography and Slope

Purpose of issue For Information				Status S3
Contractor Drawing No. WMEL-AAJ-ZZZZ-XXXXXX-DRW-GE-000034				Revision P03
Customer Drawing No. N/A			Sheet 1 of 14	Issue A
Drawn A.MORGAN		Checked M.BLAKEY		
Reviewed M.BLAKEY	Approved J.CHASTNEY	Date 22/06/2026	Scale 1:175,000	Size A3



Legend

- DF2 Rev B Boundary - Reconductoring Area
- Towers
- Contour Lines (10m)
- OS Surface Water Features - Lines

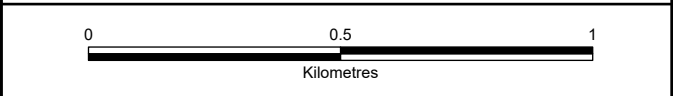
Topographic Slope Gradient

- Less than 3.5°
- 3.5° to 5.7°
- 5.7° to 15°
- Greater than 15°

Digital Terrain Model LiDAR (1m)

- 31 - 75
- 76 - 105
- 106 - 140
- 141 - 230

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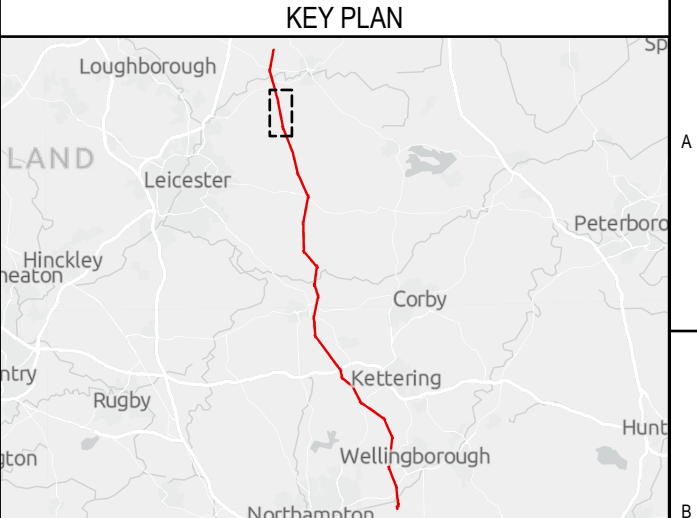
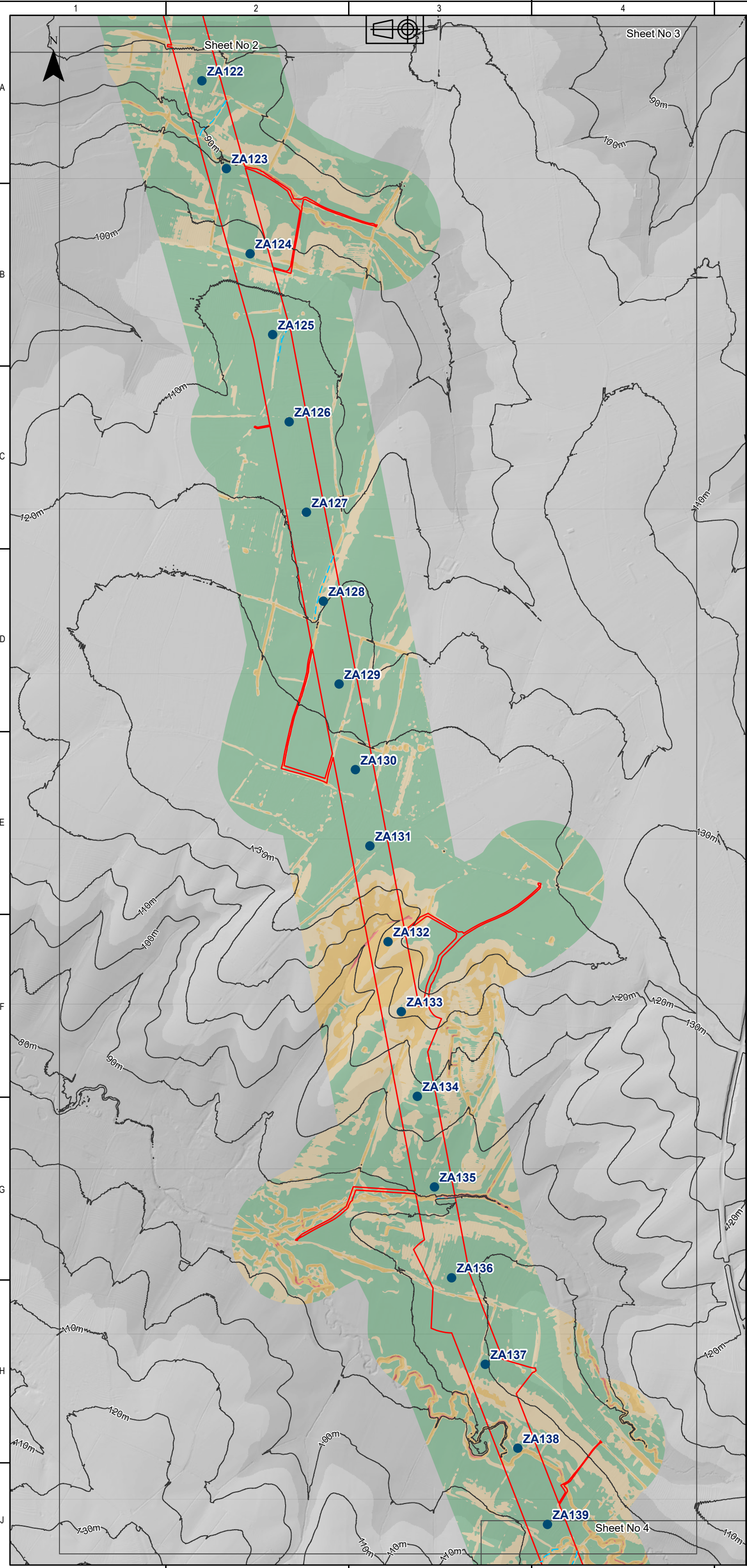
National Grid plc, Warwick Technology Park,
Gallows Hill, Warwick, CV34 6DA.

Contractor

Site
Weston Marsh to East Leicestershire

Title
Reconductoring Route
Phase 1 Geotechnical and Geo-environmental Desk Study:
Figure 2-2
Topography and Slope

Purpose of issue For Information				Status S3
Contractor Drawing No. WMEL-AAJ-ZZZZ-XXXXXX-DRW-GE-000034				Revision P03
Customer Drawing No. N/A			Sheet 2 of 14	Issue A
Drawn A.MORGAN		Checked M.BLAKEY		
Reviewed M.BLAKEY	Approved J.CHASTNEY	Date 22/06/2026	Scale 1:15,000	Size A3



Legend

- DF2 Rev B Boundary - Reconductoring Area
- Towers
- Contour Lines (10m)
- OS Surface Water Features - Lines

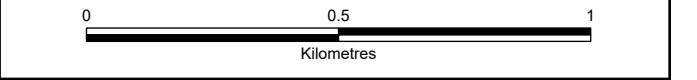
Topographic Slope Gradient

- Less than 3.5°
- 3.5° to 5.7°
- 5.7° to 15°
- Greater than 15°

Digital Terrain Model LiDAR (1m)

- 76 - 105
- 106 - 140
- 141 - 230

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Rev.	Date	Comment	Des	Drw by	Check	Appr.

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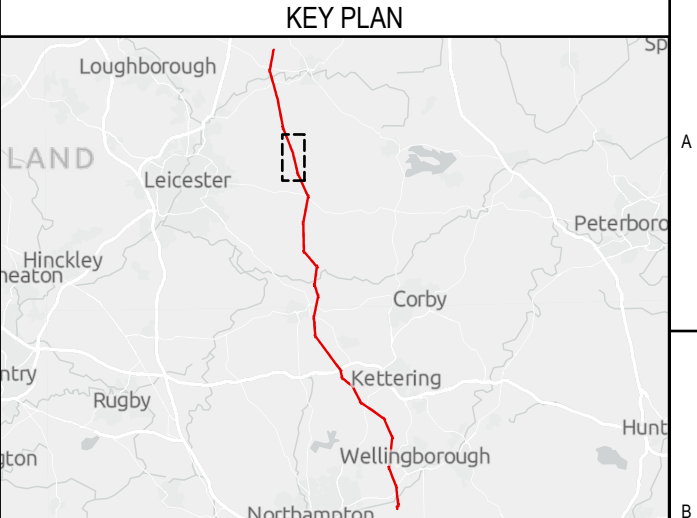
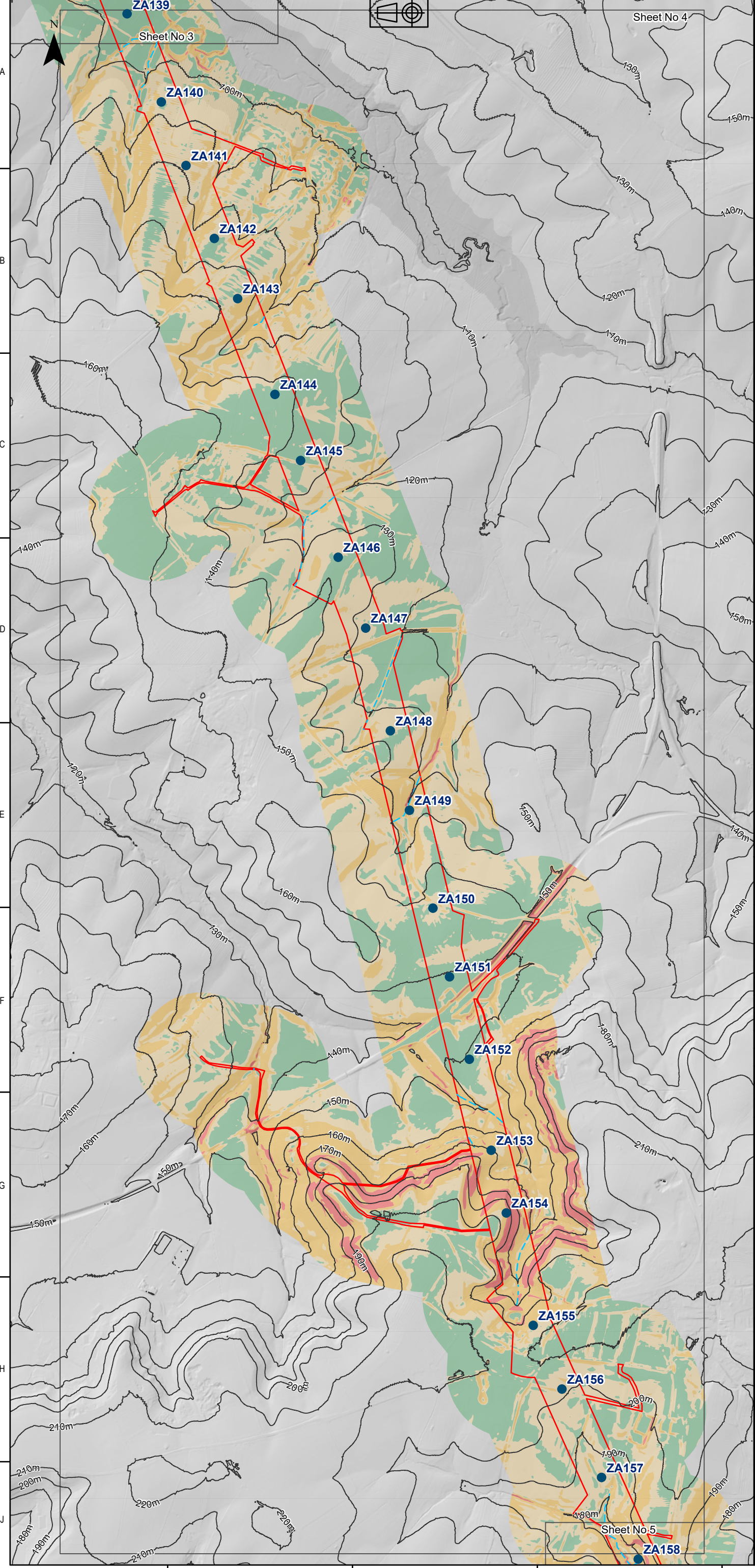
National Grid plc, Warwick Technology Park, Gallows Hill, Warwick, CV34 6DA.

Contractor

Site
Weston Marsh to East Leicestershire

Title
Reconductoring Route
Phase 1 Geotechnical and Geo-environmental Desk Study:
Figure 2-3
Topography and Slope

Purpose of issue For Information				Status S3
Contractor Drawing No. WMEL-AAJ-ZZZZ-XXXXXX-DRW-GE-000034				Revision P03
Customer Drawing No. N/A			Sheet 3 of 14	Issue A
Drawn A.MORGAN		Checked M.BLAKEY		
Reviewed M.BLAKEY	Approved J.CHASTNEY	Date 22/06/2026	Scale 1:15,000	Size A3



Legend

- DF2 Rev B Boundary - Reconductoring Area
- Towers
- Contour Lines (10m)
- OS Surface Water Features - Lines

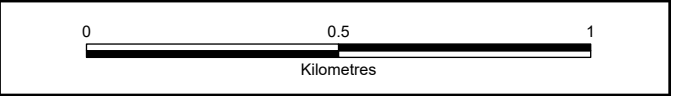
Topographic Slope Gradient

- Less than 3.5°
- 3.5° to 5.7°
- 5.7° to 15°
- Greater than 15°

Digital Terrain Model LiDAR (1m)

- 76 - 105
- 106 - 140
- 141 - 230

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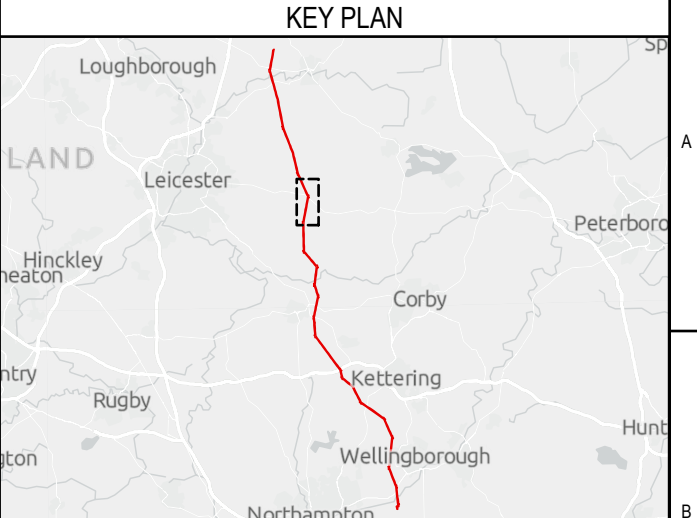
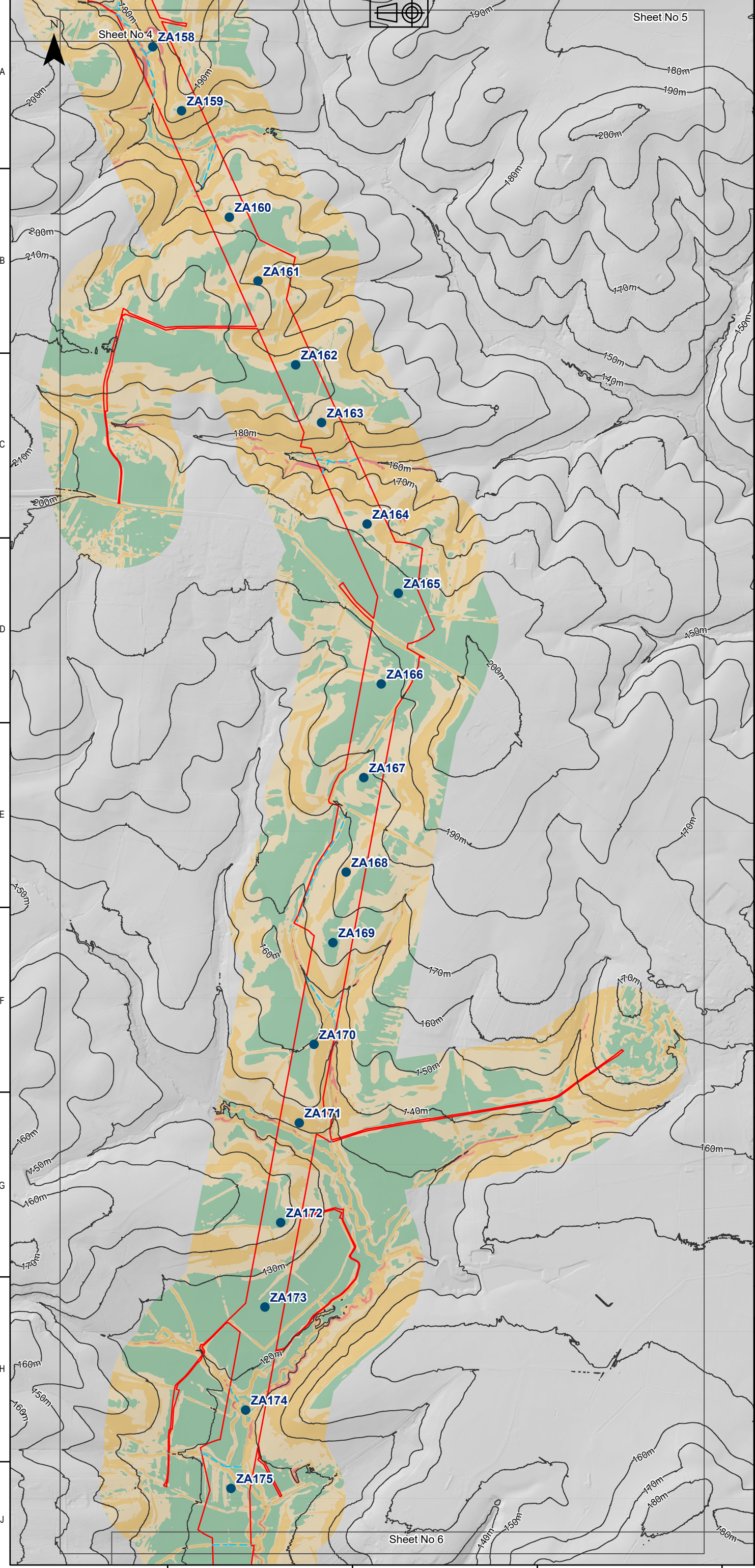
National Grid plc, Warwick Technology Park,
Gallows Hill, Warwick, CV34 6DA.

Contractor

Site
Weston Marsh to East Leicestershire

Title
Reconductoring Route
Phase 1 Geotechnical and Geo-environmental Desk Study:
Figure 2-4
Topography and Slope

Purpose of issue For Information				Status S3
Contractor Drawing No. WMEL-AAJ-ZZZZ-XXXXXX-DRW-GE-000034				Revision P03
Customer Drawing No. N/A			Sheet 4 of 14	Issue A
Drawn A.MORGAN		Checked M.BLAKEY		
Reviewed M.BLAKEY	Approved J.CHASTNEY	Date 22/06/2026	Scale 1:15,000	Size A3



Legend

- DF2 Rev B Boundary - Reconductoring Area
- Towers
- Contour Lines (10m)
- OS Surface Water Features - Lines

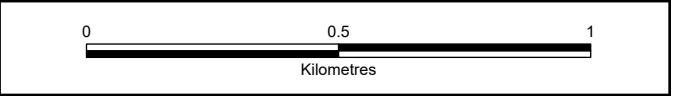
Topographic Slope Gradient

- Less than 3.5°
- 3.5° to 5.7°
- 5.7° to 15°
- Greater than 15°

Digital Terrain Model LiDAR (1m)

- 106 - 140
- 141 - 230

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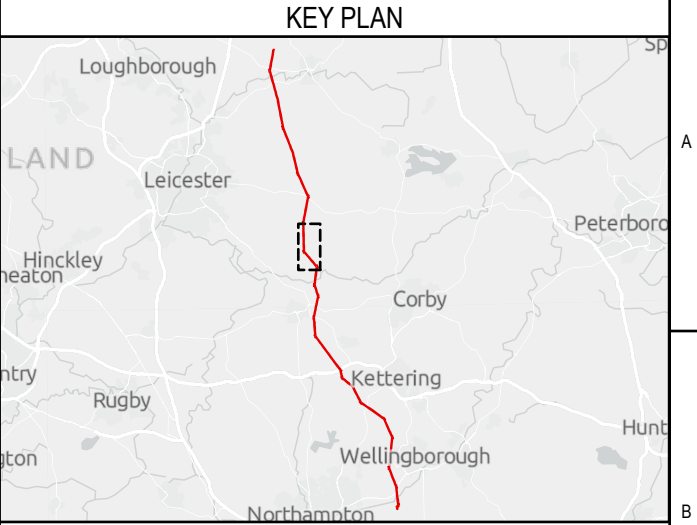
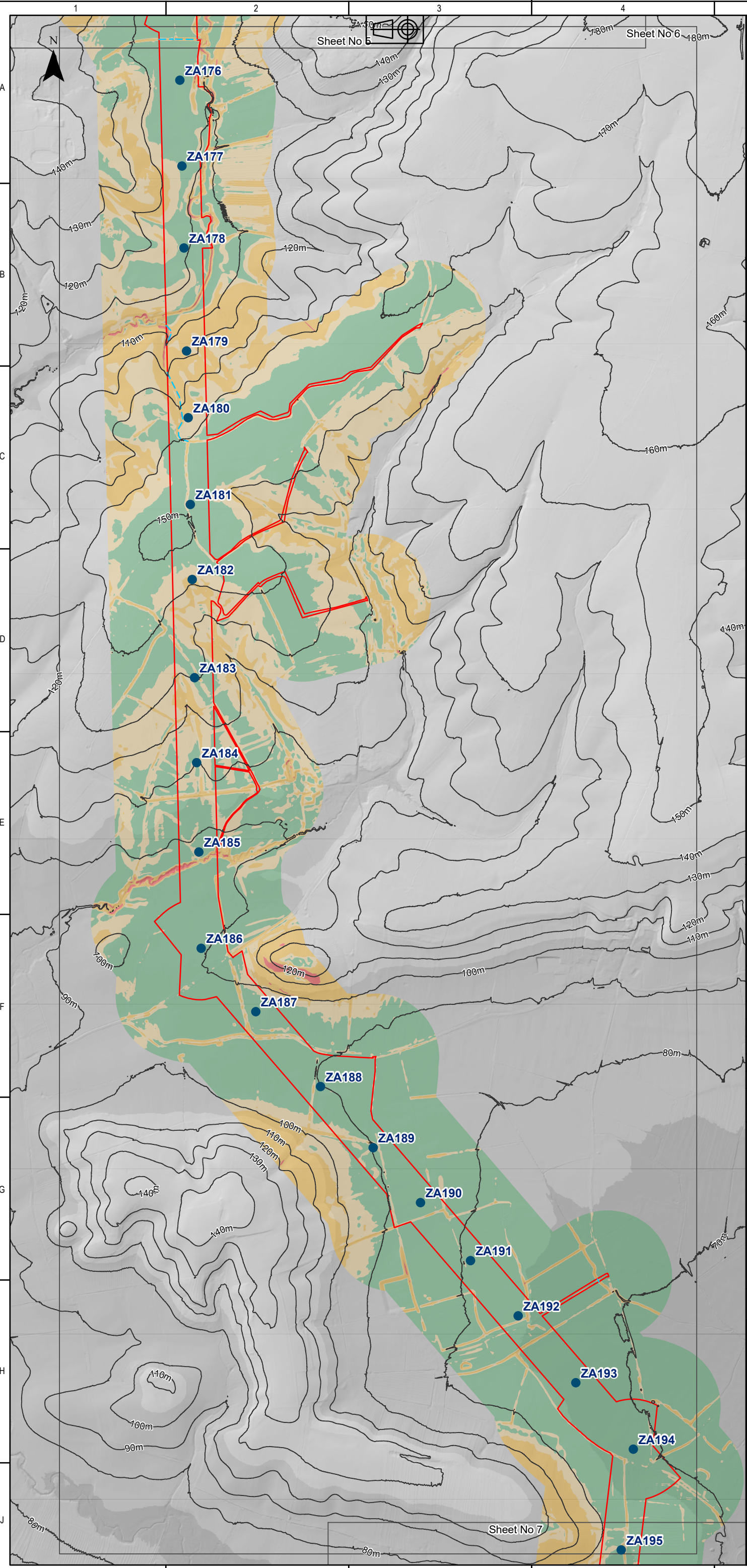
National Grid plc, Warwick Technology Park,
Gallows Hill, Warwick, CV34 6DA.

Contractor

Site
Weston Marsh to East Leicestershire

Title
Reconductoring Route
Phase 1 Geotechnical and Geo-environmental Desk Study:
Figure 2-5
Topography and Slope

Purpose of issue For Information				Status S3
Contractor Drawing No. WMEL-AAJ-ZZZZ-XXXXXX-DRW-GE-000034				Revision P03
Customer Drawing No. N/A			Sheet 5 of 14	Issue A
Drawn A.MORGAN		Checked M.BLAKEY		
Reviewed M.BLAKEY	Approved J.CHASTNEY	Date 22/06/2026	Scale 1:15,000	Size A3



Legend

- DF2 Rev B Boundary - Reconductoring Area
- Towers
- Contour Lines (10m)
- OS Surface Water Features - Lines

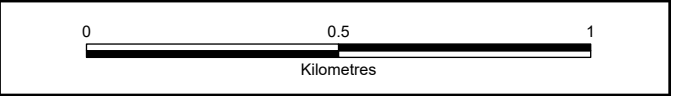
Topographic Slope Gradient

- Less than 3.5°
- 3.5° to 5.7°
- 5.7° to 15°
- Greater than 15°

Digital Terrain Model LiDAR (1m)

- 31 - 75
- 76 - 105
- 106 - 140
- 141 - 230

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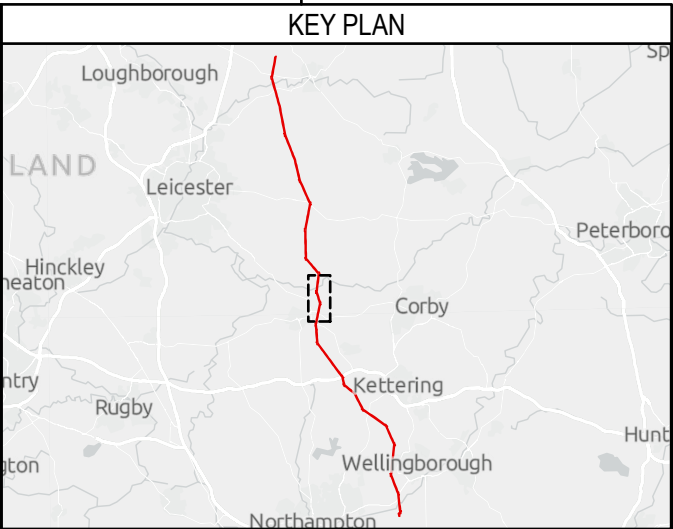
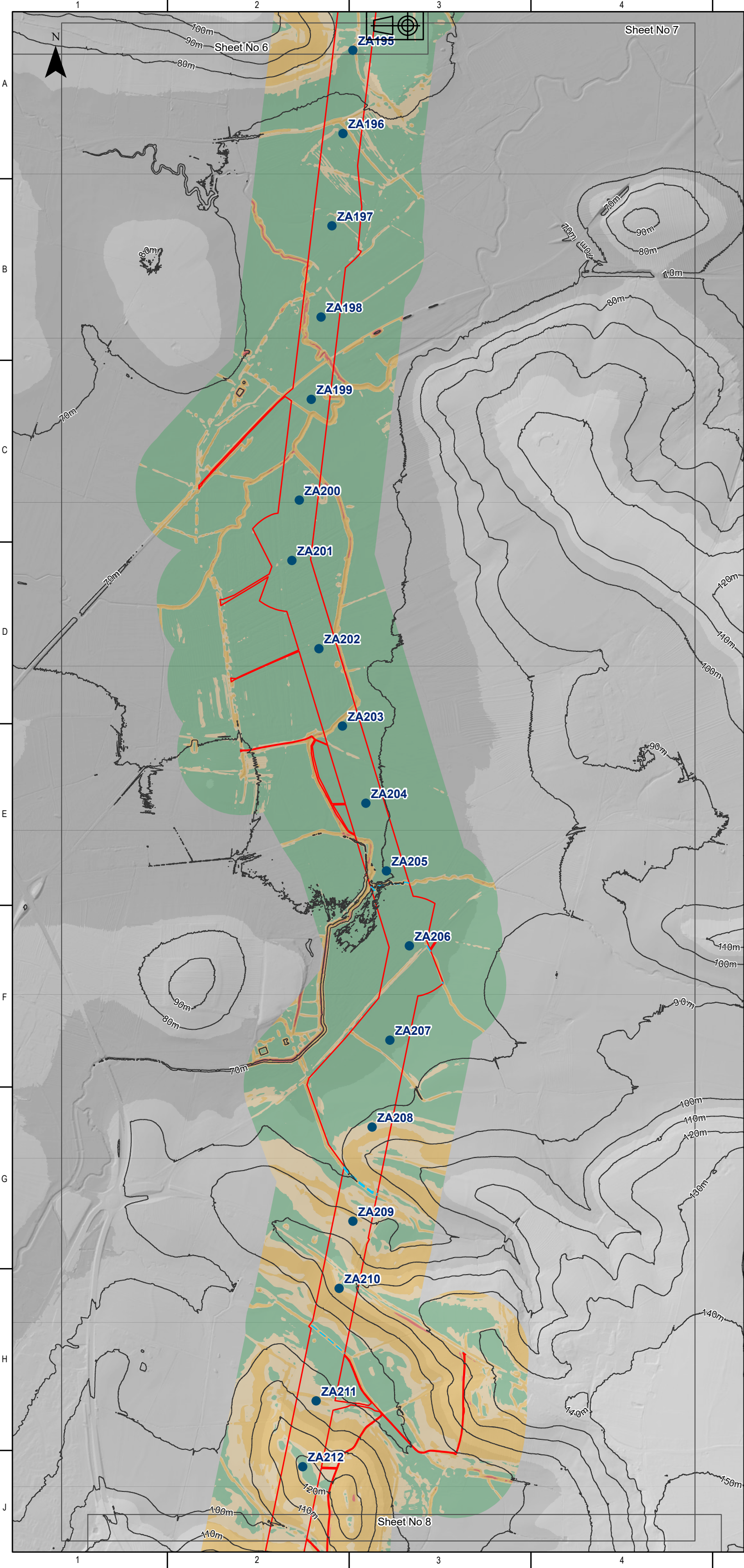
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Gallows Hill, Warwick, CV34 6DA.

AECOM
ARUP

Site
Weston Marsh to East Leicestershire

Title
Reconductoring Route
Phase 1 Geotechnical and Geo-environmental Desk Study:
Figure 2-6
Topography and Slope

Purpose of issue For Information				Status S3
Contractor Drawing No. WMEL-AAJ-ZZZZ-XXXXXX-DRW-GE-000034				Revision P03
Customer Drawing No. N/A			Sheet 6 of 14	Issue A
Drawn A.MORGAN		Checked M.BLAKEY		
Reviewed M.BLAKEY	Approved J.CHASTNEY	Date 22/06/2026	Scale 1:15,000	Size A3



Legend

- DF2 Rev B Boundary - Reconductoring Area
- Towers
- Contour Lines (10m)
- OS Surface Water Features - Lines

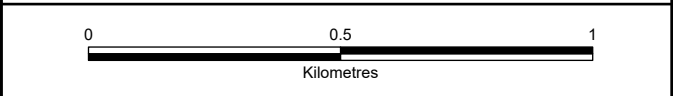
Topographic Slope Gradient

- Less than 3.5°
- 3.5° to 5.7°
- 5.7° to 15°
- Greater than 15°

Digital Terrain Model LiDAR (1m)

- 31 - 75
- 76 - 105
- 106 - 140
- 141 - 230

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National Grid plc, Warwick Technology Park,
Gallows Hill, Warwick, CV34 6DA.

Contractor

Site
Weston Marsh to East Leicestershire

Title
Reconductoring Route
Phase 1 Geotechnical and Geo-environmental Desk Study:
Figure 2-7
Topography and Slope

Purpose of issue For Information				Status S3
Contractor Drawing No. WMEL-AAJ-ZZZZ-XXXXXX-DRW-GE-000034				Revision P03
Customer Drawing No. N/A			Sheet 7 of 14	Issue A
Drawn A.MORGAN		Checked M.BLAKEY		
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