The Great Grid Upgrade

Weston Marsh to East Leicestershire

Corridor Preliminary Routeing and Siting Study

June 2025

nationalgrid

Contents

Table 1-1 — Abbreviations

Abbreviations	Definition
AC	Alternating Current
AIS	Air Insulated Switchgear
ALC	Agricultural Land Classification
AONB	Area of Outstanding Natural Beauty
BESS	Battery Energy Storage System
BMV	Best and Most Versatile
CEMP	Construction Environmental Management Plan
CNP	Critical National Priority
CPRSS	Corridor Preliminary Routeing and Siting Study
CSNP	Centralised Strategic Network Plan
DC	Direct Current
DCO	Development Consent Order
Defra	Department for Environment, Food & Rural Affairs
DNO	Distribution Network Operator
ECML	East Coast Main Line
EIA	Environmental Impact Assessment
FEED	Front-End Engineering Design
FRA	Flood Risk Assessment
GIS	GIS Geographical Information Systems (or Gas Insulated Switchgear dependent upon context)
HDD	Horizontal Directional Drilling
HGV	Heavy Goods Vehicle
HND	Holistic Network Design
LCS	Lincolnshire Connection Substations
LDR	Long Distance Routes
LNR	Local Nature Reserve
MoD	Ministry of Defence
NCA	National Character Area
NCN	National Cycle Network

Abbreviations	Definition
NESO	National Electricity System Operator
NETS	National Grid Electricity Transmission System
NGED	National Grid Electricity Distribution Plc
NGET	National Grid Electricity Transmission Plc
NHLE	National Heritage List for England
NNR	National Nature Reserve
NPPF	National Planning Policy Framework
NPG	Northern Power Grid
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
OfGEM	Office of Gas and Electricity Markets
OHL	Overhead Lines
OS	Ordnance Survey
PRoW	Public Right of Way
RAF	Royal Air Force
RPG	Registered Park and Garden
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SEC	Sealing End Compound
SF_6	Sulphur Hexafluoride
SOR	Strategic Options Report
SPA	Special Protection Area
SPZ	Source Protection Zone
SQSS	Security and Quality of Supply Standard
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage Systems
UKPN	UK Power Networks
WFD	Water Framework Directive
WMEL	Weston Marsh to East Leicestershire

Table 1-2 — Glossary of Terms

Term	Definition
Air Insulated Switchgear (AIS)	An air insulated switchgear composing electrical disconnect switches or circuit breakers used to control, protect and isolate electrical equipment.
Alternating Current (AC)	A type of electrical current, in which the direction of the flow of electrons switches back and forth at regular intervals or cycles. Current flowing in transmission lines and normal household electricity that comes from a wall outlet is alternating current.
Boundaries	A boundary splits the system into two parts, crossing critical circuit paths that carry power between areas and where power flow limitations may be encountered. Boundaries help identify regions where reinforcement is most needed by enabling analysis of power transfers between separated areas. They can be local boundaries, which are small areas of the Transmission System with a high concentration of generation, or wider boundaries, which are large areas containing significant amounts of both generation and demand.
Corridor	A broad preliminary area, which National Grid seeks to identify within the Study Area where new transmission infrastructure for the Project (overhead lines and underground cables) could be routed.
Corridor Preliminary Routeing and Siting Study	The Corridor Preliminary Routeing and Siting Study (CPRSS) reports the process undertaken as part of the Options Identification and Selection Stage (Stage 2) to identify an emerging preferred corridor, Siting Zones and Siting Areas within which the required infrastructure for the Project may be located.
Direct Current (DC)	Direct current (DC) is electrical current which flows consistently in one direction. The current that flows in a torch or another appliance running on batteries is direct current.
Distribution Network Operator (DNO)	A Distribution Network Operator is the company that owns and operates the overhead power lines and infrastructure that connects the National Grid electricity transmission system to properties and businesses. The DNO in proximity to the Project National Grid Electricity Distribution (NGED).
National Electricity System Operator (NESO)	The National Electricity System Operator plans and operates the transmission system in Great Britain but does not own the transmission assets such as the overhead lines and substations. These are developed, owned and maintained by National Grid Electricity Transmission and other ‘Transmission Owner’ companies. Generation and interconnector customers apply to National Grid NESO when they wish to connect to the network. The

Term	Definition
	NESO is a wholly independent company within the wider National Grid Group.
Electricity Transmission System	In England and Wales, the electricity transmission system is made up largely of 400kV and 275kV assets connecting separately owned generators, interconnectors, large demands fed directly from the transmission system, and distribution systems. The electricity transmission system is designed to make sure there is sufficient transmission capacity to ensure that the system can be operated in an economic and efficient way by the NESO, ensuring power can be moved from where it is generated to demand centres across Great Britain. The planning and development of the electricity transmission system is governed by the Security and Quality of Supply Standard (SQSS) which ensures that the network is developed and operated securely and is resilient to any foreseeable network faults and disruption.
Emerging Preferred Corridor	An area within which the transmission infrastructure for the Project may be located, based on the findings of the Options Identification and Selection Stage (Stage 2).
Emerging Preferred Siting Area	An area within which the substation or SEC infrastructure for the Project may be located, based on the findings of the Options Identification and Selection Stage (Stage 2).
Emerging Preferred Siting Zone	An area within which the Emerging Preferred Siting Area may be located, based on the findings of the Options Identification and Selection Stage (Stage 2).
Future Energy Scenarios (FES)	Published annually by the NESO to indicate possible future power requirements and where future connections may occur across the network.
Gas Insulated Switchgear (GIS)	Gas insulated switchgear (usually Sulphur hexafluoride (SF_6)) composing electrical disconnect switches or circuit breakers used to control, protect and isolate electrical equipment.
Graduated Swathe	Shaded areas within the emerging preferred corridor, Siting Zone and Siting Areas within which Project infrastructure is considered more or less likely to be located, shown by the varying levels of shading. Darker shaded areas represent where infrastructure is likely to be better located, in NGET's emerging view at this stage, within the corridor, Siting Zone and Siting Areas.
Holford Rules	A series of guidelines/rules for the routeing and design of new overhead lines or overhead line extensions. The guidelines were initially developed in 1959 and have been reviewed on a number of occasions by National Grid and by the other UK transmission

Term	Definition
	licence holders. The guidelines provide a set of design criteria that have stood the test of time and became accepted industry best practice in overhead line routeing. The guidelines now form an important part of national planning policy relating to the development of electricity networks, as set out in National Policy Statement EN-5[1].
Horlock Rules	A series of guidelines/rules for the siting and design of new substations, or substation extensions, including consideration of line entries and sealing end compounds (SECs). The guidelines were initially developed in 2003 and have been reviewed on a number of occasions by National Grid, with a revised version issued in 2009. The Horlock Rules provide a set of principles which avoid, or reduce the environmental impacts associated with the development of new substation infrastructure.
LiDAR	A remote sensing technology that uses laser light to measure distances. It works by emitting laser beams towards an object or surface and then measuring the time it takes for the reflected light to return to the receiver. This information is used to create detailed maps and 3D models of the scanned area.
National Grid	Throughout this Report the term National Grid is used to refer to the National Grid Electricity Transmission Plc (see below). The wider National Grid Group comprises several businesses, including National Grid Ventures and National Grid Electricity Distribution. These businesses are not licenced Transmission Owners and do not develop the national transmission system.
National Grid Electricity Distribution Plc (NGED)	In June 2021 Western Power Distribution was acquired by National Grid Group. It remains a separate company from NGET, operating within the wider National Grid Group and was recently rebranded as National Grid Electricity Distribution. NGED is a distribution network operator (DNO) operating in proximity to the Project.
National Grid Electricity Transmission Plc (NGET)	National Grid Transmission Plc (NGET) operate the national electricity transmission network across Great Britain and own and maintain the network in England and Wales, providing electricity supplies from generating stations to local distribution companies. National Grid does not distribute electricity to individual premises, but its role in the wholesale market is vital to ensuring a reliable, secure, and quality supply to all.
National Policy Statement (NPS)	Government planning policy relating to the development of Nationally Significant Infrastructure Projects (NSIPs) is set out in the relevant National Policy Statement (NPS). NSIPs should be

[1] National Policy Statement for Electricity Networks Infrastructure (EN-5).

Term	Definition
	developed in accordance with the relevant NPS. In the case of new transmission routes, the relevant energy-related NPS are EN-1; Overarching NPS for Energy[2] and EN-5[1]; Electricity Networks Infrastructure
Non-statutory Consultation	An engagement process which will be undertaken to capture public, stakeholder and landowner feedback on the emerging preferred corridor, Siting Zone and Siting Areas, and the graduated swathe. The feedback received will inform the onward development of the Project.
Options Appraisal	A robust and transparent process used to compare options and to assess the potential impacts they may have across a wide range of criteria including environmental, socio-economic, technical and cost factors.
Options Identification and Selection	Work undertaken to determine the emerging preferred corridor and preliminary routeing options for the Project. It is intended to demonstrate how National Grid's statutory duties, licence obligations, policy considerations, environmental, socio-economic, technical, cost, and programme issues have been considered and to provide information on the approach to the identification and appraisal of corridors.
Overhead Line	An above ground electricity line that safely and securely transmits electricity through a series of conductors (wires). An overhead line comprises a series of components including: supporting structures, such as pylons; line fittings, such as electrical insulators and conductor spacers; an earthwire (to protect the line from electrical faults and carry control data); and the conductors themselves.
Project Need Case	Sets out the reasons why the Project is required.
Pylon	Overhead line structure used to carry overhead electrical conductors, insulators and fittings.
Ramsar Site	An area of land designated under the Ramsar Convention to conserve wetlands, especially those providing waterfowl habitat.
Sealing End Compound (SEC)	A secure compound within which the transition between underground cables and overhead lines is made. Buried cables are brought to the surface and directed vertically through insulated post structures before connecting onto overhead line conductors (wires) secured (via insulators) to anchor blocks or gantry structures.

[2] Overarching National Policy Statement for Energy (EN-1).

Term	Definition
Security and Quality of Supply Standard (SQSS)	The SQSS sets out a coordinated set of criteria and methodologies for planning, constructing and operating the National Grid electricity transmission system.
Site of Special Scientific Interest (SSSI)	An area of land designated by Natural England as of special interest by reason of its flora, fauna or geological or physiographical features.
Siting Area	An area of land within a study area, within which a substation or cable sealing end compound (SEC) could be sited.
Siting Zone	An area of land within a study area, within which multiple Siting Areas could be located.
Special Area of Conservation (SAC)	An area of land designated under the under Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora to protect one or more special habitats and/or species.
Special Protection Area (SPA)	An area of land designated under the Directive 79/409 on the Conservation of Wild Birds to protect the habitats of migratory birds and certain particularly threatened birds.
Strategic Proposal	The outcome of the strategic options appraisal process; the Strategic Proposal is taken forward to the Options Identification and Selection Stage (Stage 2).
Substation	A secure node on the electricity system where: switching may be undertaken to direct power flows; operating voltages may be altered through the use of electricity transformers and; sources of electricity import, generation and/or demand can be connected, substations may be located either outdoors or within a building but will always be enclosed by a secure perimeter fence.
Sulphur hexafluoride (SF_6)	Sulphur hexafluoride is a highly effective electrical insulator used in high-voltage electrical applications. It's a greenhouse gas that has a global warming impact of 22,800 times that of carbon dioxide.
Tee-Point	The point at which two electrical routes connect.
UK Power Networks (UKPN)	A power distribution company operating in east England. UKPN is a DNO operating in proximity to the Project.
Underground Cable	An insulated conductor carrying electric current designed for underground installation.
Wirescape	Caused by multiple overhead lines running in different angles or the proximity of multiple overhead lines.

Corridor Preliminary Routeing and Siting Study
Document control

Document Properties	
Organisation	National Grid
Author	National Grid, AECOMArup
Approved by	Ian Wheaton, Senior Project Manager - Consents
Title	Corridor and Preliminary Routeing and Siting Study (CPRSS)
Document Register ID	07599-AEAR-ENV-REP-0001
Published Document Ref	07599-AEAR-ENV-REP-0001 - CPRSS
Data Classification	Public

Version History

Document	Version	Status	Description / Changes
June 2025	1.0	Final	For non-statutory consultation

Executive summary

National Grid Electricity Transmission Plc (NGET) own, build and maintain the high-voltage electricity transmission network in England and Wales. NGET is responsible for making sure electricity is transported safely and efficiently from where it is produced to where it is needed.

The Weston Marsh to East Leicestershire project (WMEL) (the 'Project') is a new overhead electricity transmission line reinforcement that is currently being developed by NGET. The Project, located in the East Midlands, England, is required to help deliver the UK Government's Net Zero targets. It forms part of a major programme of reinforcement of the electricity transmission system which will help provide much-needed additional capacity between the North of England and the Midlands. As part of The Great Grid Upgrade, the Project will help the country meet future energy demands.

The indicative location for the proposed reinforcement was identified through a Strategic Options Appraisal[3] undertaken at the Strategic Proposal Stage (Stage 1)[4]. Several strategic options were considered to meet the need to reinforce the network in the region. The preferred option identified is a new 400kV transmission connection between the new Weston Marsh 400kV substation infrastructure and a new 400kV substation (WMEL-B) on the ZA 400kV line north of Market Harborough. Routeing the proposed reinforcement via a new 400kV substation (WMEL-A) on the 4VK 400kV line north of Ryhall, and reconductoring part of the existing network between Market Harborough and Grendon delivers the greatest power carrying capacity benefit.

This report is the ***Corridor Preliminary Routeing and Siting Study*** (**CPRSS**) for the Project, which details the work undertaken at the Options Identification and Selection Stage (Stage 2). This includes development and refinement of Preliminary Corridor options, preliminary Siting Zones and preliminary Siting Areas, and initial end-to-end Route Options. A comparative assessment of these options to identify NGET's proposed corridor, proposed Siting Zones and proposed Siting Areas was undertaken. The findings are reported, identifying the broad location of the new infrastructure required to meet the Project need.

This report considers the routeing of new electricity transmission infrastructure and the siting of new substations. In summary, the component parts of the Project are as follows:

- Approximately 60km of new 400kV overhead line from Weston Marsh 400kV substation (to be constructed under the Grimsby to Walpole Project) to WMEL-B 400kV substation via WMEL-A 400kV substation. Assumed to be supported by typical metal lattice towers;

[3] Strategic Options Report, LRN6, National Grid, 2025. Published as part of non-statutory consultation documentation.

[4] National Grid's Approach to Consenting outlines the project development process, divided into six stages, for major infrastructure projects; Strategic Proposal, Options Identification & Selection, Defined Proposal & Statutory Consultation, Assessment & Land Rights, Application, Examination & Decision and Construction, with Strategic Proposal being Stage 1 and Construction being Stage 6. National Grid's Approach to Consenting is detailed in Chapter 3 of this report.

- New 400kV substation at WMEL-A on the existing 4VK (Cottam – Wymondley) overhead line, with 11 bays;
- New 400kV substation at WMEL-B on the existing ZA (Cottam – Sundon) overhead line, with 9 bays (to be confirmed);
- Reconductoring of approximately 55km of existing overhead transmission line from the WMEL-B substation to Grendon substation, east of Northampton.

A summary description of, and reasons for selecting, the emerging preference for each key aspect of the Project is provided below.

Overhead Line between new Weston Marsh substation infrastructure and WMEL-B substation

The emerging preferred corridor leaves Weston Marsh substation infrastructure west crossing the River Welland and A16, then passes through a commercial and residential area along the B1356 between Crossgate and Surfleet. The emerging preferred corridor crosses the River Glen and a rail line before following Pinchback North Fen, Dunsby Fen and Hanconby Fen, on to Haconby. Crossing the A15, then routeing between Callan's Lane Wood and Spring Wood, it then crosses A151, passing south of Corby Glen. Heading southwest the emerging preferred corridor crosses the East Coast Main Line (ECML), passes Swayfield, crosses the A1 and passes between North Witham and South Witham. Heading northwest the emerging preferred corridor crosses the A607 before heading directly west, passing to the north of Melton Mowbray, before reaching the existing ZA 400kV overhead line in proximity to Ab Kettleby and Wartnaby.

This represents the best opportunity to limit environmental and socio-economic impacts and technical complexity, whilst also representing the most direct, and a lower cost route. It enables the overhead line to connect to the WMEL-A and WMEL-B Siting Areas, which are emerging as preferred options.

WMEL-A substation

The emerging preferred location for the WMEL-A substation is in line with the existing 4VK 400kV overhead line south of Burton-le-Coggles, immediately northwest of the A141 and west of the ECML. The siting of the WMEL-A substation represents the greatest opportunity to limit adverse environmental effects, overhead line deviations of the existing 4VK 400kV overhead line and reduces technical complexity during construction and operation. It also represents one of the greatest opportunities to limit the visual impacts of the substation while limiting length of the new overhead line connection for the Project.

WMEL-B substation

The emerging preferred location for the WMEL-B substation is in line with the existing ZA 400kV overhead line southwest of Wartnaby. The siting of the WMEL-B substation represents the greatest opportunity to limit adverse environmental effects, such as retaining existing vegetation for visual screening, minimising overhead line deviations of the existing ZA 400kV overhead line and reduces technical complexity during construction and operation. It also represents one of the greatest opportunities to limit the length of the new overhead line connection for the Project.

Graduated swathe

A 'graduated swathe' has been identified within the emerging preferred Route Option and within each of the emerging preferred Siting Areas. The graduated swathe is a way of showing the areas within the emerging preferred Route Option and Siting Areas where the required Project infrastructure is considered more or less likely to be located. The graduated swathes are shown with a colour shading, with the depth of shading indicating NGET's emerging view of where infrastructure would be better located based on the work undertaken to date. Darker shading indicates more likely locations, while lighter shading indicates less likely locations.

The use of the graduated swathe is intended to emphasise the preliminary nature of judgements made to date in respect of infrastructure locations within the emerging preferred Route Option, and Siting Areas. This will be informed by feedback received during non-statutory consultation and therefore there is the potential for the final design of the Project to extend beyond the graduated swathe. This will be fully considered through the development of the Project, whilst maintaining the principles used to develop the current graduated swathe, for instance, the avoidance of areas of highest constraint such as settlements.

Non-statutory consultation

This CPRSS will be used to inform the non-statutory consultation and engagement with key stakeholders, including landowners. The non-statutory consultation is currently scheduled to take place in summer 2025.

During non-statutory consultation, NGET will be inviting feedback from local communities and stakeholders about our work to date, the proposed Route Option and graduated swathe and matters that they would like us to consider as we further develop our detailed proposals. The feedback from non-statutory consultation, along with information from surveys undertaken to obtain baseline data and ongoing design studies will inform the further development of the Project. Following this, the design will be developed and will be subject to statutory Environmental Impact Assessment and public consultation as part of the application for a Development Consent Order.

1. Introduction

1.1 Overview

1.1.1 National Grid Electricity Transmission Plc (NGET) owns, builds and maintains the high-voltage electricity transmission system in England and Wales. NGET, no longer forming part of the National Grid group of companies, is responsible for making sure electricity is transported safely and efficiently from where it's produced to where it's needed and for developing upgrades to the network as agreed with the industry regulator, Office of Gas and Electricity Markets (Ofgem).

1.1.2 The UK's 2023 Energy Act[5] established an independent system planner and operator to help accelerate Great Britain's energy transition, this included the separation of the National Energy System Operator (NESO) from the National Grid group. The NESO (formally the Electricity System Operator (ESO)) controls and operates the high-voltage electricity transmission system, balancing supply and demand to ensure homes and businesses in Great Britain have the electricity they need 24/7. As of summer 2024, NESO no longer forms part of the National Grid companies. The NESO facilitates several roles on behalf of the electricity industry, including making formal offers to connection applicants to the National Electricity Transmission System (NETS).

1.1.3 NGET's transmission system in England and Wales consists of approximately 7,250km of overhead lines (OHL) and a further 1,450km of underground cabling, operating at 400kV and 275kV. The 275kV grid was developed in the 1950's to provide a national transmission system and then further developed from the mid 1960's, at 400kV to increase the power carrying capacity. The OHLs and cables connect around 350 substations to form a highly interconnected network. The substations provide points of connection to the local distribution networks, which operate at voltages from 132kV down to 240V (the voltage at which the power is distributed to domestic consumers). The distribution networks are owned by Distribution Network Operators (DNOs), including Northern Power Grid (NPG), National Grid Electricity Distribution (NGED) and UK Power Networks (UKPN) in the Humber, East Midlands, East of England and East Anglia regions of England.

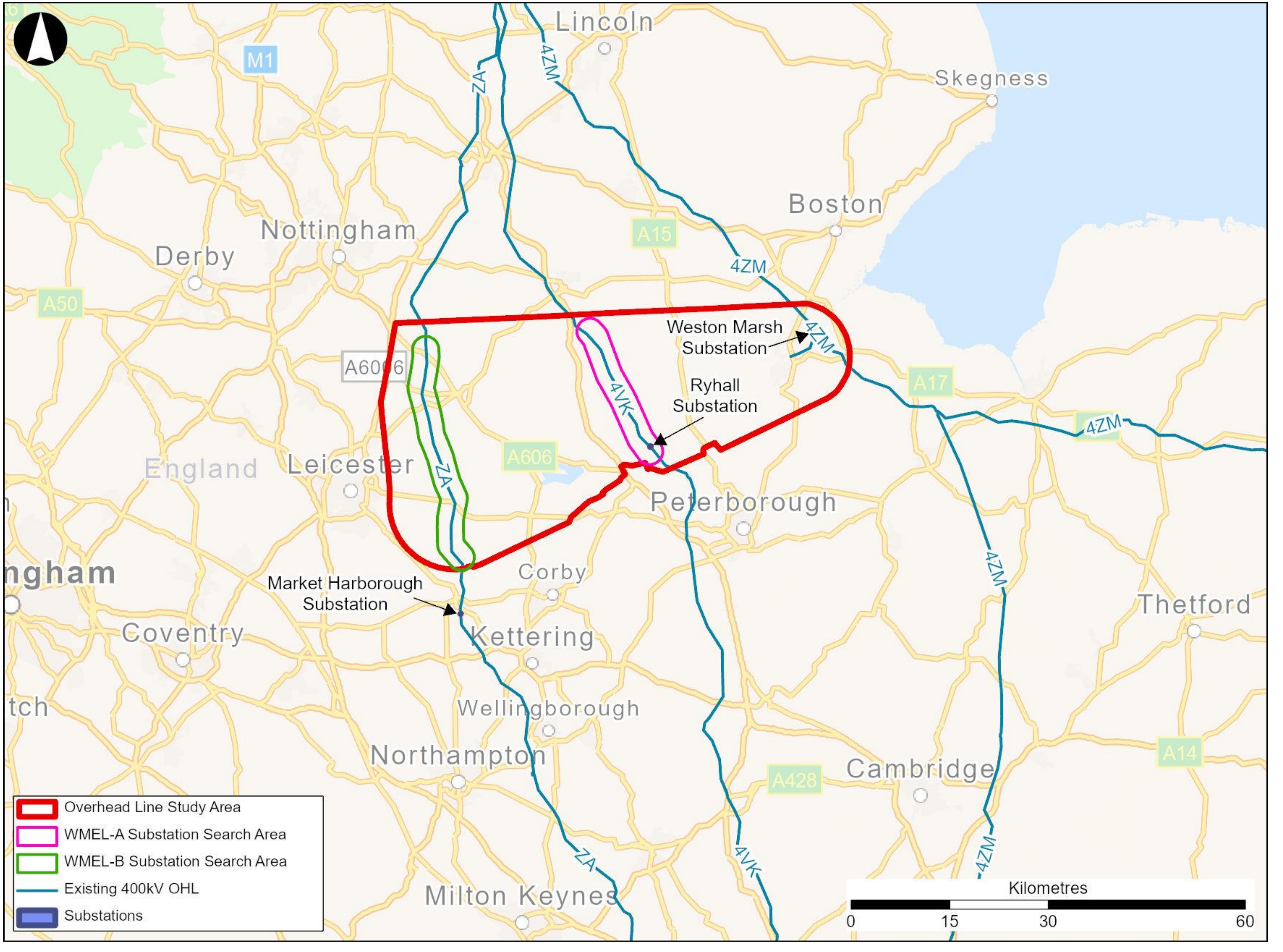
1.1.4 Example images of NGET's transmission system are shown in **Figure 1-1.**

[5] Energy Act (2023) Part 5 Independent System Operator and Planner Section (3) (a). [online] Available at: https://www.legislation.gov.uk/ukpga/2023/52 (Accessed: 30 October 2024).

Figure 1-1 – Example Images of NGET's Transmission System

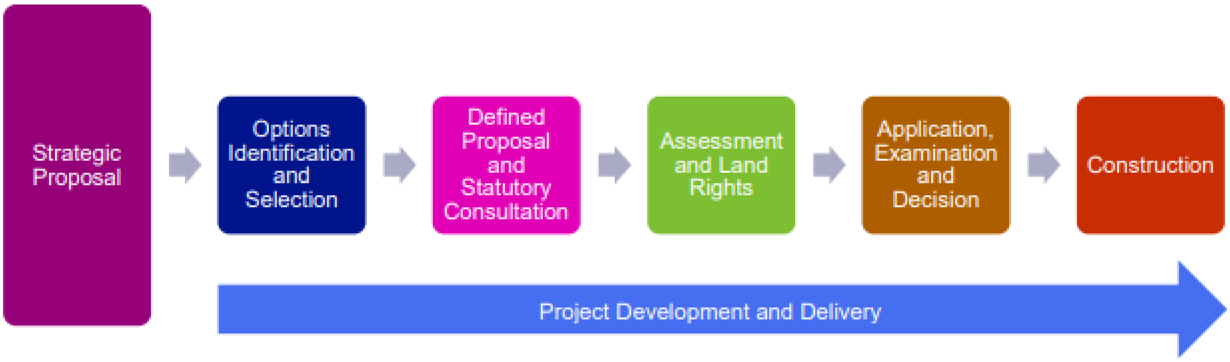
1.1.5 The Weston Marsh to East Leicestershire overhead electricity transmission line project (WMEL) referred to as 'the Project' throughout this document, is being developed by NGET. The Project, located in the East Midlands, England is required to reinforce the electricity transmission system to help deliver the UK Government's Net Zero targets. It forms part of a major programme of reinforcement of the electricity transmission system which will help provide much-needed additional capacity between the North of England and the Midlands. As part of The Great Grid Upgrade, the Project will help the country meet future energy demands. The Project location is shown in **Figure 1-2**.

Figure 1-2 – Project Location



1.1.6 NGET's Approach to Consenting[6] outlines the Project development and delivery process, divided into six stages, for major infrastructure projects. **Figure 1-3** presents an overview of NGET's Approach to these consenting stages, which is explained in more detail in **Chapter 3** of this CPRSS.

Figure 1-3 – NGET's Approach to Project Development and Delivery



Background

1.1.7 The UK Government has set targets of 50 GW of offshore wind generation by 2030[7] and up to 140 GW by 2050[8]. There is particular growth forecast in offshore wind capacity in Scotland and the northeast of England, as well as interconnectors to and from European power grids. This will put pressure on the existing network such that reinforcement of the network in the Yorkshire and Humber and Lincolnshire areas has been identified as necessary to ensure optimal operation of the transmission system and reliable economic long-term supply.

1.1.8 The need for the Project was first identified by the NESO. NGET then undertook a Strategic Options Appraisal at the Strategic Proposal Stage (Stage 1) which identified the preferred strategic option to bring forward to address the identified need. The Strategic Options Appraisal is reported in the LRN6 Strategic Options Report (the SOR). As detailed in the SOR the Project is needed to:

- Enable future customer connections and offshore transmission connections along the East Coast (between the Humber and the East Coast regions);
- Ensure Security and Quality of Supply Standards (SQSS) compliance; and

[6] National Grid develops projects through a six-stage process set out in the Approach to Consenting (April 2022) guidance available at https://www.nationalgrid.com/electricity-transmission/network-and-infrastructure/planning-and-development. Accessed 18 September 2024. The process is detailed further in Chapter 3 of this report.

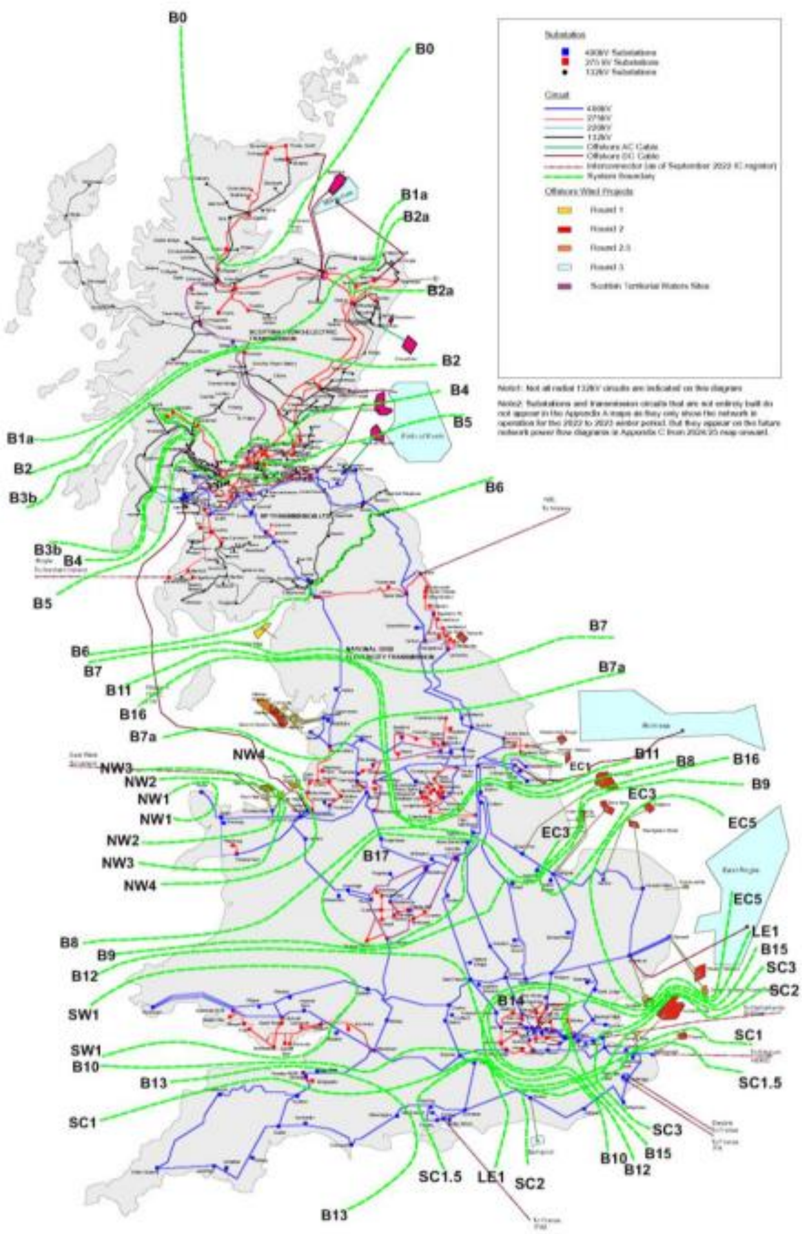
[7] UK Government, (2022), British Energy Security Strategy. Available at https://www.gov.uk/government/publications/british-energy-security-strategy/british-energy-security-strategy. Accessed 18 September 2024.

[8] Committee on Climate Change, (2020), The Sixth Carbon Budget. Available at https://www.theccc.org.uk/wp-content/uploads/2020/12/The-Sixth-Carbon-Budget-The-UKs-path-to-Net-Zero.pdf. Accessed 18 September 2024.

- Provide a cost-beneficial level of boundary uplift across network transmission Boundary 9[9] in order to improve transfer capability facilitating north to south power flows and reduce generation constraints on renewable energy sources resulting from insufficient capacity of the NETS.

1.1.9 The network transmission boundaries across the Great Britain are shown in **Figure 1-4**[10].

Figure 1-4 – Network Transmission Boundaries



1.1.10 The SOR considered a range of options for providing the necessary north-south power flows identified as being needed to accommodate the amount of generation being

[9] National Grid, Strategic Options Report, LRN6, Section 4.4. Published as part of Non-statutory Consultation documentation, 2025

[10] National Grid, (2017), Electricity Ten Year Statement 2017. Available at https://www.nationalgrid.com/sites/default/files/documents/ETYS%202017%20Appendix%20A.pdf. Accessed 18 September 2024.

proposed off the East Coast of the UK. It concluded that establishment of two new transmission connections (referred to in this report as the WMEL-A and WMEL-B substations), and the reconductoring of the existing line south to Grendon to represented the most appropriate solution.

1.1.11 The Project will establish a new 400kV transmission connection of approximately 60km of OHL between the Weston Marsh substation (to be constructed under the Grimsby to Walpole project) and the WMEL-B substation via the WMEL-A substation. This Project also includes around 55km reconductoring of existing OHL from the WMEL-B substation to Grendon substation, east of Northampton. The further reconductoring of 41km of the existing OHL from Grendon to the existing Sundon substation to the south (known as 'SGRE') is also required as part of future capacity upgrades and has been identified by Beyond 2030[11] with a 'Proceed - Critical' signal required to be in service by 2029. That further reconductoring will therefore be delivered as part of a separate project in advance of the Project.

1.2 Purpose

1.2.1 This report is the CPRSS, which has been undertaken to facilitate the gathering of feedback on the Project from all interested parties as part of the non-statutory consultation. The CPRSS reports the process undertaken as part of the Options Identification and Selection Stage (Stage 2) shown in **Figure 1-3**, to identify an emerging preferred corridor and emerging preferred Siting Zones or Siting Areas within which the required infrastructure for the Project may be located. A description of the proposed Project infrastructure within the scope of this CPRSS is set out in **Chapter 5**.

1.2.2 This CPRSS sets out the routeing and siting activities undertaken to date, including the identification, refinement and assessment of Preliminary Corridors for new OHL, preliminary Siting Zones and preliminary Siting Areas for substations, and Route Options. This report explains NGET's emerging preferences for the broad location of new infrastructure to meet the need case for the Project, as set out below. These emerging preferences are presented as a 'graduated swathe.'

1.2.3 The graduated swathe is a way of showing the areas within the emerging preferred corridors, Siting Zones and Siting Areas where the required Project infrastructure is considered more or less likely to be located. The emerging preferred corridor, Siting Zones, and Siting Areas are shown with a colour shading, with the depth of shading indicating NGET's emerging view of where infrastructure would be better located based on the work undertaken to date. Darker shading indicates more likely locations, while lighter shading indicates less likely locations, as shown by the example (not forming part of the Project) in **Figure 1-5**.

1.2.4 The use of the graduated swathe is intended to emphasise the preliminary nature of judgements made to date in respect of infrastructure locations within the emerging preferred corridor, Siting Zones and Siting Areas. The feedback received from the non-statutory consultation will be taken into account in the detailed routeing and siting work for the Defined Proposal and Statutory Consultation Stage (Stage 3). This feedback may also lead to modification of the emerging preferred corridor, Siting Zones and Siting Areas.

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[11] National Grid NESO (2024) Beyond 2030. [online] Available at: https://www.neso.energy/publications/beyond-2030 (Accessed 8 January 2024).

Figure 1-5 – Example annotated graduated swathe taken from a recent NGET project, showing the key elements to aid interpretation

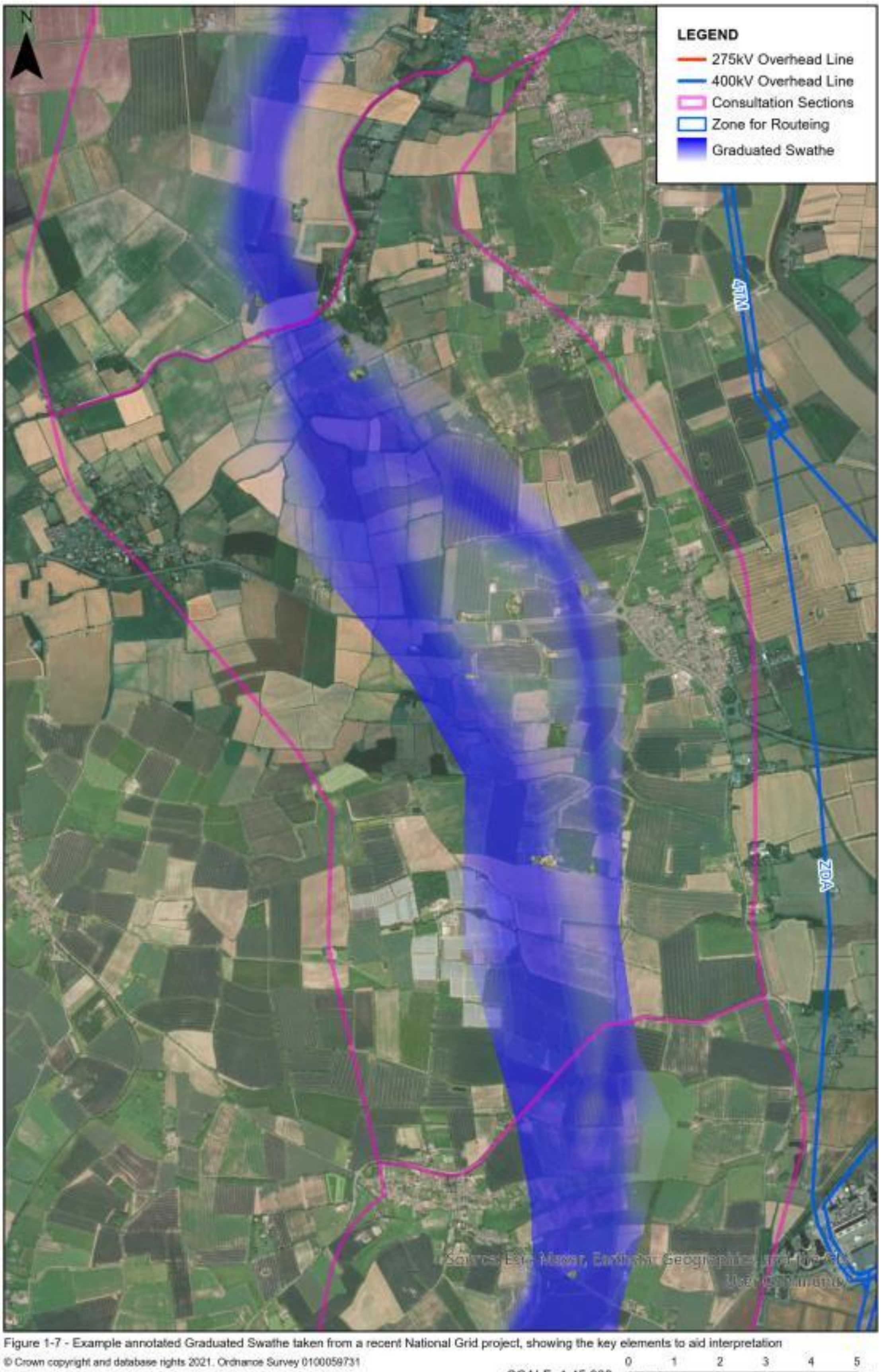


Figure 1-7 - Example annotated Graduated Swathe taken from a recent National Grid project, showing the key elements to aid interpretation

SCALE: 1:45,000 0 1 2 3 4 5 km

1.3 Structure of this Report

1.3.1 The report is structured as follows:

- **Chapter 2: Aspects of the WMEL Project** – Summarises the key components of the Project.
- **Chapter 3: NGET's Approach to Routeing and Siting** – an overview of NGET's guidance, its statutory duties and relevant policy.
- **Chapter 4: Option Identification and Selection Process** – sets out the process used to identify, appraise, and select corridors and Siting Zones (or Siting Areas), following NGET's guidance and in line with relevant policy.
- **Chapter 5: Study Area, Corridor and Siting Zone Definition** – details the steps undertaken to identify the Study area for the Project and to define the corridors and Siting Zones (or Siting Areas) for appraisal (including Segments and Links).
- **Chapter 6: Preliminary Corridor and Siting Appraisal** - provides the key environmental and technical constraints for each corridor between Weston Marsh and the existing ZA OHL.
- **Chapter 7: Route Option Appraisal -** provides comparative analysis of the Route Options, Siting Zones and Siting Areas identified to those emerging as preferred.
- **Chapter 8: Cost and Programme** – shows the range of the best and worst performing cost and programme estimates.
- **Chapter 9: Option Selection** - presents a summary of the factors considered to influence the decision-making process for determining the emerging preferred Route Option.
- **Chapter 10: Development of Graduated Swathe** – summarises the approach to taken to developing the graduated swathe for the Project and its intended use.
- **Chapter 11: Summary and Next Steps** - presents the conclusions of the CPRSS and outlines the next steps in the Project.

2. Aspects of the WMEL Project

2.1 Introduction

2.1.1 This chapter provides information regarding the new 400kV transmission connection, including the two transmission substations, and other improvements needed to facilitate the construction of the Project. Such improvements will be to the transmission system and electricity distribution networks operated by NGET, NPG, NGED and UKPN.

2.1.2 To underpin its 2050 net zero ambitions, the UK Government has committed to fully decarbonising the power system by 2035. To fulfil this commitment and meet energy objectives, the Government has concluded that there is a critical national priority (CNP) for the provision of nationally significant low carbon infrastructure. As stated within the Overarching National Policy Statement (NPS) for Energy (EN-1, see **Chapter 3** for further details)

of EN-1).

2.1.3 The Project, a CNP, directly supports the delivery of the UK Government's energy objectives, by reinforcing the electricity transmission system and connecting low carbon infrastructure to the National Electricity Grid. It forms part of a major programme of reinforcement of the electricity transmission system to accommodate major increases in north-south power flows, helping take power generated from low-carbon sources (especially from offshore wind) to areas of consumer demand across the UK.

2.1.4 The Project will establish a new 400kV transmission connection between the following new 400kV transmission substations, described from east to west to south:

- new 400kV substation infrastructure at Weston Marsh on the existing 4ZM (Bicker Fen-Walpole) (see **Sections 1.1.1** and **2.1.5**
- a new 400kV substation at WMEL-A on the existing 4VK (Cottam – Wymondley); and
- a new 400kV substation at WMEL-B on the existing ZA (Cottam – Sundon).

2.1.5 The new Weston Marsh substation infrastructure is being developed by another NGET project, Grimsby to Walpole. That substation infrastructure will be consented and constructed by that project and will provide the most easterly connection point for this Project. The WMEL-A and WMEL-B substations will be consented and built as part of this Project. The new Weston Marsh substation infrastructure will connect to the new 400kV transmission line from the new Lincolnshire Connection Substation (LCS-B) and the new 400kV transmission line to the new Walpole substation. In addition, the new Weston Marsh substation infrastructure will connect to the 400kV 4ZM transmission line that runs southeast of Sleaford towards King's Lynn, and the 400kV 2WS transmission line that runs east of Spalding towards a Tee-Point with the 400kV transmission line between Sleaford and King's Lynn.

2.1.6 The Grimsby to Walpole Project is at a later design stage compared to this Project. The Weston Marsh substation infrastructure Siting Zone comprises less design information compared to other sections described as part of the statutory consultation exercise for that project, taking place during summer 2025. Since the Grimsby to Walpole Project non-statutory consultation in 2024 there have been changes to the connections required at Weston Marsh as well as identification of additional network reinforcement. As a result, further design work is being undertaken including consideration of whether there is a need for up to two new substations. NGET will undertake further targeted statutory consultation on Section 5 of that Grimsby to Walpole Project (including publication of preliminary environmental information) at a future date when that design work has been completed. For the purposes of this report, an appraisal has been undertaken of corridors and routes with the flexibility to connect into the Weston Marsh Siting Zone allowing for the potential to connect into one of the substations wherever they may be located in that Siting Zone.

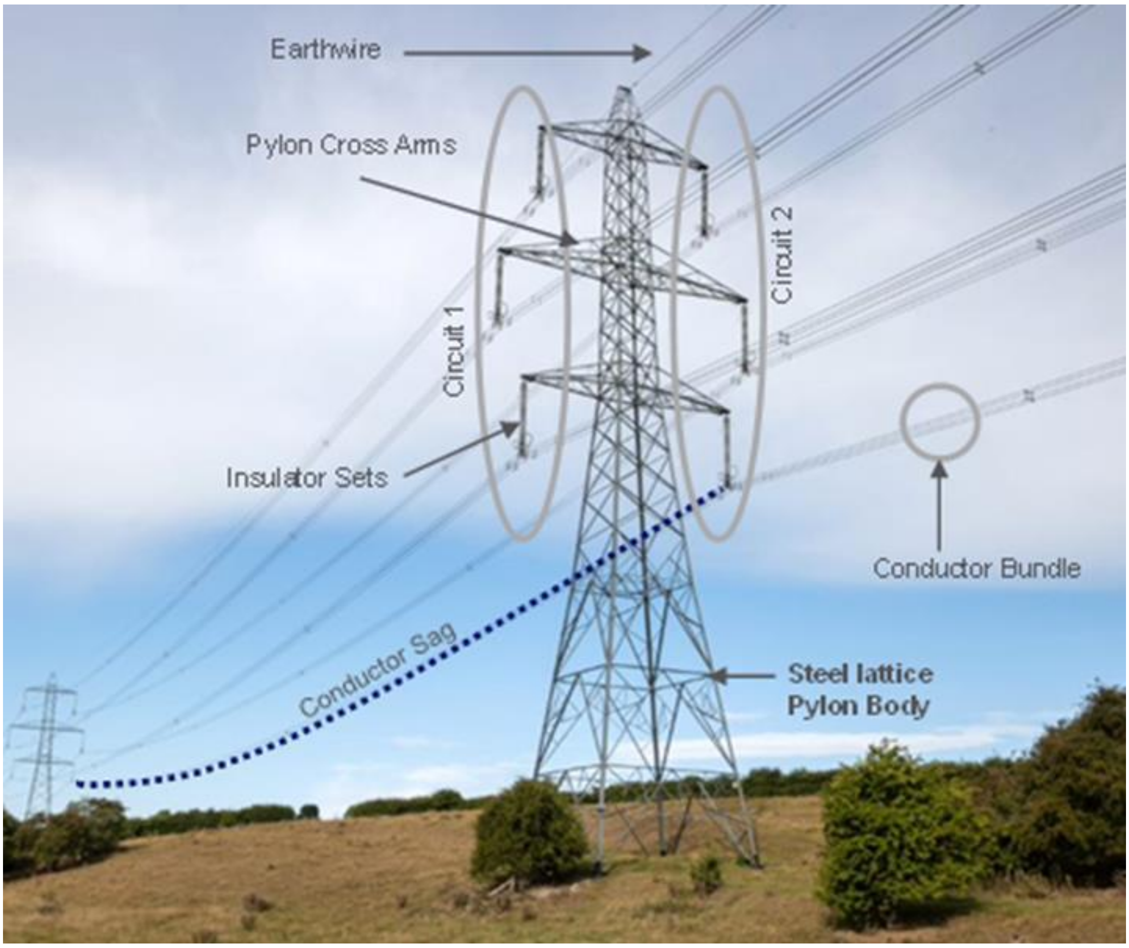
2.2 Overhead Lines

Pylons and Conductors

2.2.1 Pylons are OHL structures which carry overhead electrical conductors, insulators and fittings. The main components of an OHL are shown in **Figure 2-1** below. **Figure 2-1** shows a typical steel lattice pylon, other pylon types are discussed further in this section.

2.2.2 Like most OHLs owned and maintained by NGET, the Project will carry a voltage of 400kV. The OHL for the Project will carry two discrete electrical circuits on either side of the pylons, which can be operated independently of one another, increasing the resilience of the transmission system.

Figure 2-1 – Components of a Typical Transmission Connection



2.2.3 Electrical power will be transmitted through conductors (often referred to as ‘wires’). The conductors are attached to the end of a set of insulators that hang from the pylon cross arms and electrically isolate the conductors from the main structure. On a typical pylon, as shown in **Figure 2-1**, three pylon cross arms are stacked above each other, and each supports a bundle of phase conductors which together form a single electrical circuit which is operated as a three-phase system. Two circuits are therefore carried, with one on either side of the pylon (indicated by ‘Circuit 1 and Circuit 2’ in **Figure 2-1**). The top of the pylons supports a single smaller earthwire/fibre optic cable combined that carries data between substations and provides shielding from lightning strikes for the conductors below. The Project is likely to comprise a maximum of three conductors per bundle, a total of 18 conductors per pylon together with the earthwire/fibre optic cable.

2.2.4 The conductors will be a minimum height above the ground. The height will be maintained by pylons spaced intermittently along the route.

2.2.5 The minimum heights[12] between the conductors, the ground and various other features must be maintained, to ensure safe operation. The minimum clearance between the conductors and the ground is 7.8m at the maximum sag, shown in **Figure 2-1**. To maintain these sags, pylons need to be a minimum height at the point that the lowest conductor is attached to the pylon arms. This height is dependent upon a range of factors including the distance between pylons, planned operating temperature and conductor wire composition, the intervening topography and the use of the land being crossed.

2.2.6 To a lesser extent, the overall pylon height will also be influenced by pylon types. The pylon illustrated in **Figure 2-1** above is a suspension pylon, with the conductors hanging on insulator sets beneath the pylon arms. Where the route of the OHL changes direction the use of such a pylon would see the conductors deviate in vertical arrangement. Where this occurs, larger, more bulky angle pylons are required to accommodate the additional sideways strains with the insulators tensioning the conductors horizontally to keep conductors aligned. **Figure 2-2** below illustrates the difference between these two main pylon types. At the end of OHLs where they connect with substations or underground cables it is necessary to use terminal pylons (see **Figure 2-6**), they are also of greater bulk to ensure stability.

2.2.7 A typical pylon operating at 400kV is approximately 50m in height. A typical span distance between pylons is approximately 350m. In broad terms there are typically three pylons for every kilometre of OHL.

2.2.8 During the construction of OHLs, activities tend to be focussed at the base of each pylon and to either side of tension pylons from where the conductors are winched into position. The most noticeable effects of OHLs are generally considered to be visual, due to the height of the pylons in relation to most buildings and trees.

[12] Electrical Networks Association TS 43-8 details the legal clearances for NGET owned and maintained OHLs. Third party guidance for working near OHLs is available at: https://www.nationalgrid.com/electricity-transmission/network-and-infrastructure/working-near-our-assets. Accessed 18 September 2024.

Figure 2-2 – Suspension Pylon (Left) and Angle Pylon (Right)

Pylon Type and Design

2.2.9 Most transmission lines in Great Britain use lattice steel pylons with three sets of cross arms (as shown first in **Figure 2-2** and **Figure 2-3**). Alternative pylon types have been approved for use on the NGET network which may achieve the technical performance required for the Project[13]. These two alternative types of pylon (low height steel lattice and t-pylon suspension) are illustrated in **Figure 2-3**.

2.2.10 At this stage of the Project it is assumed that all OHL electricity infrastructure will comprise of steel lattice OHLs by default.

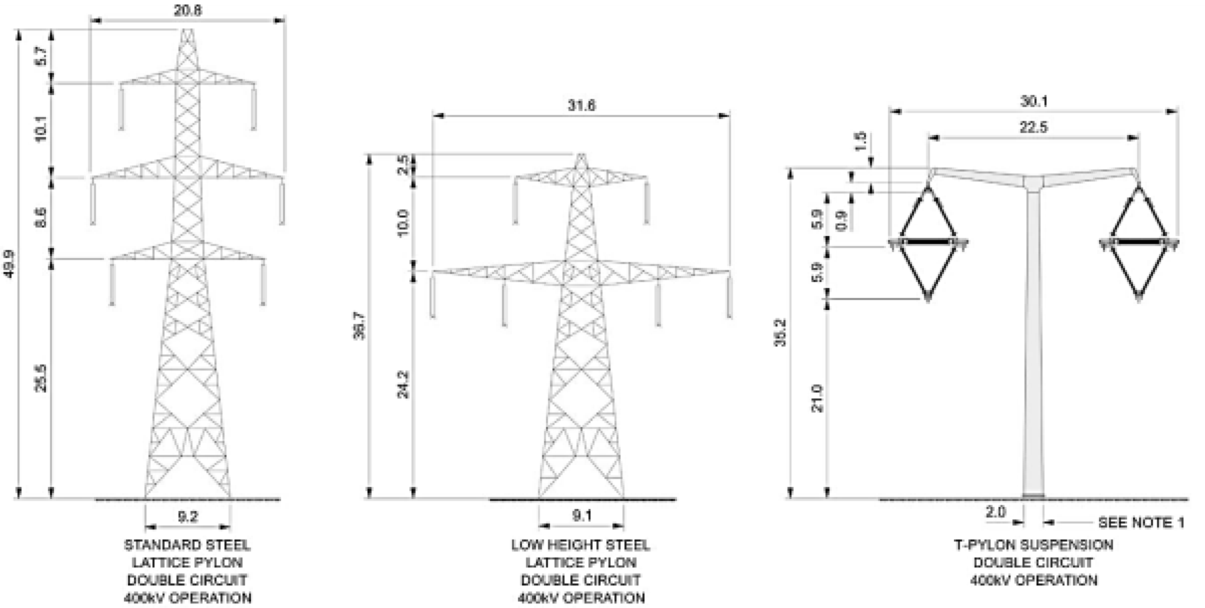
2.2.11 The first alternative pylon type is a lower height form of lattice steel pylon. This removes the top cross arm, with two bundles of conductors supported on the lowest cross arm. This requires the widening of the lowest cross arm resulting in a shorter but wider pylon when compared to the standard lattice steel pylons. The overall height of this type of pylon is approximately 37 m. This pylon type has tended to be used in proximity to airports and airfields, to avoid flight paths, to reduce landscape impacts and also where bird strike is a risk. This pylon type can also help to reduce the extent of affected views, especially in rolling or wooded landscapes.

2.2.12 The second alternative pylon type is the 'T-pylon.' Rather than being of lattice steel construction the 'T-pylon' is formed from a single steel monopole (similar to a modern wind turbine) supporting a single cast cross arm at the top, which together form a 'T' shape. The conductors are hung from this cross arm in two larger groups of three bundles, kept apart by solid insulating rods that together form a diamond configuration. These pylon types are also lower in height than the standard lattice steel pylons, at

[13] With the potential exception of localised requirements, such as major river crossings.

approximately 35 m. The monopole is a solid structure, approximately 2m in diameter, in contrast to the less striking and more open lattice form of the two lattice steel pylons.

Figure 2-3 ─ Alternative Pylon Types



CHARACTERISTIC	PYLON TYPE: STANDARD LATTICE PYLON	LOW HEIGHT LATTICE PYLON	T-PYLON
STANDARD HEIGHT	49.9m	36.7m	35.2m
STANDARD PYLON DESIGN WIDTH	20.8m	31.6m	30.1m
STANDARD BASE DIMENSIONS	9.2m SQUARE	9.1m SQUARE	2m DIAMETER ← SEE NOTE 1
MIN & MAX PYLON HEIGHTS	43.9m - 67.9m	32.23m - 45.73m	32.2m - 38.2m
MIN & MAX PYLON BASE WIDTHS	7.96m - 13.32 SQUARE	7.93m - 11.26m SQUARE	APPROX 2m MIN to MAX ← SEE NOTE 1

NOTE 1

1. FOR T-PYLON SUSPENSION, 2m IS MEASURED ABOVE BASEPLATE. EXACT DIMENSION AT GROUND LEVEL MAY VARY.

2.2.13 In previous projects the visual benefits of utilising standard lattice steel pylons, as opposed to low height steel lattice pylons or T-pylons, has been recognised, especially when siting a new OHL close to existing lines that use a similar pylon type. The standard lattice steel pylon also has slightly lower construction costs when compared to the other two pylon types.

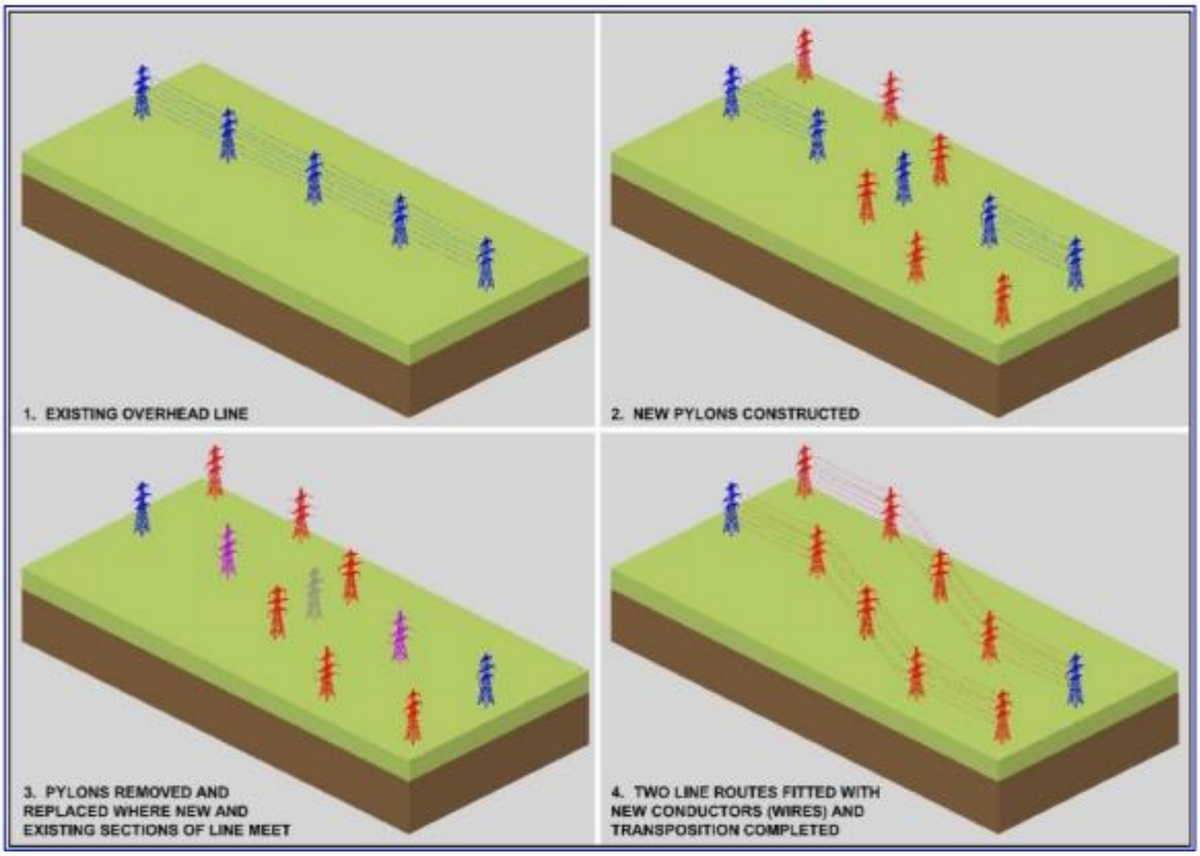
2.2.14 The type of pylons proposed for the Project will be determined through feedback from non-statutory consultation, information from surveys and ongoing design studies but the starting presumption (in line with the NPS and NGET’s Approach to Consenting) will be a standard lattice pylon.

Line Swap-Overs

2.2.15 Where two OHL routes must cross, a number of specific design considerations arise. This need might arise where an existing OHL crosses the route of a new OHL, including where local constraints to the routeing of an OHL preclude its construction on the same side of an existing line throughout its entire length.

2.2.16 Where the design of existing pylons is compatible and the direction of power flows across the electricity system allow it, a ‘line swap-over' can be considered. This is done through the removal of a length of the existing OHL, allowing the two newly formed 'ends' of existing OHL to be connected to two lengths of new route located on different sides of the existing line. The two resultant routes would then both comprise lengths of newly built and original OHL. This is illustrated schematically in **Figure 2-4** below.

Figure 2-4 – Sequence of Works to Achieve Line Swap-Over of New and Existing Overhead Lines



2.2.17 Where the existing and new OHLs connect to different points of the transmission system it may be necessary to swap the route back before the destination substation is reached to maintain the same start and end points.

2.2.18 The line swap-over of the route of a new OHL from one side of an existing OHL to the other can be achieved on adjacent pylons, resulting in up to four angle pylons being located in close proximity. Alternatively, it may be possible to utilise existing angle pylons on the current OHL to partly form the line swap-over, or to extend the distance over which a line swap-over is achieved. In this way the change of route direction would be more gradual, with greater separation between the angle pylons.

2.2.19 Where NGET must maintain electricity supplies through the existing OHL whilst line swap-over works are being undertaken it may be necessary to locally install one or more temporary OHLs. These lines would act as a by-pass route for the power whilst the permanent OHL arrangement is constructed. The temporary lines would be removed, and the land reinstated upon completion.

2.2.20 Any line swap-over would increase the technical complexity, cost and potential duration of any new OHL build but may introduce greater opportunities to reduce environmental and socio-economic effects.

2.3 Underground Cables

2.3.1 Whilst it is currently assumed that the Project will be developed as an OHL, electricity can be transmitted through buried cables as well as through overhead conductors. However, at the alternating current (AC) transmission voltage of 400kV, the use of buried cables represents a significant technical complexity. The size, number and complexity of the underground cables required is far greater than those that operate at lower voltages or direct current (DC) cables[14]. As a result, direct buried transmission cables at the capacity required for the Project are materially more expensive compared to an equivalent OHL. Moreover, and as noted within NPS EN-5 which relates to transmission routes supports (described in more detail in **Chapter 3**), underground cables typically bear a significantly higher lifetime cost of repair and later uprating. For these reasons, NPS EN-5 supports, in most instances, the starting presumption for the development of OHLs rather than underground cables[15].

Underground Cable Installation Methods

2.3.2 If required, there are a number of different underground cable installation methods available including direct buried, ducted, surface troughs and trenchless crossings. The most appropriate for a given project, or location within a project, is subject to environmental, land use, cost and technical factors.

2.3.3 Where conditions allow, cables are normally installed in excavated trenches. A cement-bound sand mix is used as backfill to protect the cables and help dissipate any heat generated by the cables in operation.

2.3.4 For a new 400kV transmission circuit installed underground, the working width of the land required for construction is typically between 40m and 100m, subject to a range of factors such as the number of circuits being installed, and the number and size of cables needed. For a low-capacity single circuit this could require only three cables. For a high capacity double circuit route up to 18 individual cables would be required. An example of a cable construction is shown at **Figure 2-5** below.

[14] More information can be found in National Grid's publication 'Undergrounding high voltage electricity transmission lines. The technical issues'.

[15] The National Policy Statement for Electricity Networks Infrastructure (EN-5) (2023) states at paragraphs 2.9.20 and 2.9.21 that
presumption for electricity networks developments in general, this presumption is reversed when proposed developments will cross part of a nationally designated landscape (i.e. National Park, The Broads, or Area of

beauty of these areas cannot feasibly be avoided by rerouteing overhead lines, the strong starting presumption will

Figure 2-5 – Example Underground Cable Construction

2.3.5 Due to the weight and size of underground cables needed to operate at 400kV, the maximum single cable length that can be transported to a Project location by road is typically between 800m and 1,000m. To achieve cable routes in excess of these lengths individual cables must be joined together on site. This necessitates joint bays at intervals along the route. Where joint bays are located the working width may need to be wider than 120m.

2.3.6 Works to install underground cables would take considerably longer than the works associated with installing an equivalent length of OHL. In addition, and as noted within NPS EN-5 (paragraph 2.9.25), the installation of underground cables is potentially very disruptive on local communities, habitats, archaeological and heritage assets, soil (including peat soils), hydrology, geology, and for a substantial time after construction, landscape and visual amenity. However, effective restoration of the underground cable route following construction can result in fewer long-term landscape and visual effects in comparison with an OHL.

2.3.7 Where specific environmental or infrastructure features preclude the use of underground cables, as described above, it may be practicable to install ducts using a trenchless installation technique such as horizontal directional drilling (HDD). In this instance cables are pulled into pre-installed ducts. The maximum length of HDD installed ducts is limited by the weight of the cables to be installed. Where trenchless techniques are required, the working width may need to be wider than 120m.

2.3.8 Where HDD is not technically viable, then a tunnelled solution for underground cables can be considered. Tunnels can be constructed using a variety of techniques, but all involve major civil engineering activities, which result in substantial additional costs, increased construction risks and extended programme durations. Typically, permanent buildings are required at either end of the tunnel section to support operation, including access to and potential ventilation of the tunnel and for cooling of the underground cables.

Sealing End Compound

2.3.9 A sealing end compound (SEC) is needed at either end of a section of underground cable, where it commences its burial from an OHL and where it subsequently resurfaces to connect back onto an OHL. Within these secure compounds, the buried cables are brought to the surface through vertical sealing end structures. These are connected horizontally at a height of approximately 10m with a set of solid bars (referred to as 'busbars'). The conductor wires from the OHL drop down to connect onto the solid bars within the secure compound. A similar arrangement occurs where the cables are reconnected to an OHL. To accommodate the one-way tension of the conductor wires where an OHL ends, a heavier pylon is needed. Alternatively, the conductors may enter the compound at a slacker angle, connecting onto lower height gantries.

2.3.10 SECs typically extend to around 30m by 80m for a double circuit 400kV transmission, but this will vary dependent upon local considerations. Examples of SECs are shown in **Figure 2-6** below.

Figure 2-6 – Example 400kV sealing end compounds with terminal pylons

2.4 Other Technical Considerations

2.4.1 To construct the two new transmission substations a range of other temporary and permanent improvement works will need to be carried out to facilitate the construction of the Project. Such improvements will be to the electricity transmission and distribution networks operated by NGET and NGED respectively.

2.4.2 A number of the more significant elements of these improvement works are detailed below.

Crossings of Existing Transmission Overhead Lines

2.4.3 Where two OHL routes must cross but a line swap-over, as described above, is not possible or applicable (for example the design of existing pylons is not compatible or the direction of power flows across the electricity system do not allow it) then other design considerations require consideration. The Project route may need to cross one or more existing 400kV OHLs. Whilst it is practicable to cross one OHL with another using technical solutions such as cable duck unders where one line is routed underneath another, this results in significantly taller pylons on the higher line and introduces operational and safety concerns. As a result, it is typically considered more appropriate to leave an existing OHL in place and underground a section of a new OHL. In this way operational and safety concerns are substantially reduced, and taller pylons which may have increased visual effects can be avoided.

Managing interfaces with Existing NGET Overhead Lines

2.4.4 The route and any line swap-overs required by the Project may result in interactions with other NGET OHLs. For example, a line swap-over is likely to mean that the new end-to-end connection for the Project is carried in part on existing pylons through existing conductor wires. If this is the case, subject to information from surveys and ongoing design studies, it may be necessary to replace these sections of existing conductor wire as part of the Project to align with the new OHL. Managing interfaces with existing NGET OHLs will form part of this Project.

Managing interfaces with Other Utility Companies' Overhead Lines

2.4.5 In addition to NGET transmission lines, it will be necessary for the new OHL to cross OHLs of a lower voltage owned and operated by the local electricity DNOs. The transmission system and electricity distribution networks in the vicinity of the Project are operated by NPG, NGED and UKPN.

2.4.6 When crossing lower voltage OHLs it will be necessary to deploy a range of mitigation measures whilst maintaining supplies. It is likely that the Project will need to cross the routes of existing 11kV, 33kV and 132kV OHLs in multiple locations dependent upon the final route. As the Project design evolves the mitigation measures will be developed and assessed on a case-by-case basis.

2.4.7 NGET will work with the DNOs to design and undertake the replacement or rationalisation of any affected low voltage OHLs with underground cables wherever this would be technically practicable and not prohibitively expensive.

2.5 New Transmission Substations

Substations

2.5.1 Substations are an essential component in the energy network, connecting sources of generation, such as wind farms and power stations. They connect overhead and underground circuits and can connect nearby utility systems. Substations manage electricity flows within the network, which can include connection and disconnection of circuits to direct the flow, transform voltages to higher or lower ratings (step-up or step-down – for example 132kV stepping-up to 400kV), manage the frequency of the electricity and increase efficiency and reliability of the power supply.

2.5.2 Substations are critical in maintaining an efficient and healthy energy network, as they monitor and report back to operators on statistics and events to provide live information on the network. This allows for the following functions:

- Fault monitoring and identification which allows for isolation to protect the network and allow repairs.
- Allow for redirection and disconnection of energy to allow for demand/maintenance.
- Provide data such as voltage, current and power flow to allow for efficient running and future predictions.

Types of substations

2.5.3 There are two main types of substations; Air Insulated Switchgear (AIS) substations and Gas Insulated Switchgear (GIS) substations.

2.5.4 An AIS substation is constructed with switchgear which relies on open air components, which can require large clearance areas for operation and safety, which takes up a larger area of land compared to a GIS substation. AIS substations are typically lower cost and typically involve less construction time, with fewer components required and easier maintenance. However, they require a larger area of land and, as they are exposed to the elements, are not recommended for certain environments such as coastal areas.

2.5.5 A GIS substation is constructed with switchgear using gas filled components, which allows operation and safety clearances to be reduced when compared to an AIS substation. GIS substations typically require less space, and this may have a reduced visual impact as a result. However, they tend to be more costly, require specialised operation and maintenance, have longer outage repair times and typically require the use of sulphur hexafluoride (SF_6) - a greenhouse gas that has a global warming impact 22,800 times that of carbon dioxide.

2.5.6 As noted within NPS EN-5 (paragraph 2.9.61), it should be considered carefully whether the Project could be reconceived during the design phase to avoid the use of SF6-reliant assets. NGET policy generally precludes the use of gas insulated technologies due to the negative environmental impacts of SF_6-based insulation gases, the reduced operational maintainability of the technology when compared to AIS, and the significantly increased cost of gas insulated equipment. There may also be additional benefits in using gas insulated technology as they generally require less land, and in some instances may be less visually intrusive to the surrounding landscape. SF_6-free alternatives are also currently in development and may be type-registered by the time the Project enters the construction phase; this would reduce the environmental risk of GIS equipment although not to a level comparable to AIS as current alternatives use fluorinated gases which present another set of environmental challenges. The use of gas insulated solutions is being monitored at this stage and has not been discounted completely. As AIS is currently considered the preferred option within NGET policy, for the purposes of the current stage of the Project and to inform the siting work, the use of AIS has been assumed.

2.5.7 This Project considers the infrastructure required to connect the new transmission OHL to the proposed Weston Marsh substation and the new substations required as part of this Project to connect to the existing OHLs, ZA via the WMEL-B substation, and 4VK by the WMEL-A substation. There are currently no known customer connections required to be accounted for in these new substations, however, at this early stage of design, flexibility for potential connections is retained.

2.5.8 The size and scale requirements for a new substation are typically determined by the following:

- Connections to the transmission system to allow large powerflows across the network;
- Distribution network connections to facilitate electricity supply to the end consumers;
- Large generation and demand customer connections;
- Equipment to support the operation of the transmission system;
- Spare bays or expansion room to allow efficient long term development of the site;
- Ancillary infrastructure to support the operation of the substation such as control buildings;
- Site-specific constraints such as orientation with respect to OHL connections, access arrangements, security and site geometry.

2.5.9 Based on the above, both the WMEL-A and WMEL-B AIS substation footprint was assumed to be 720m x 400m to allow for the appraisal of potential sites. The tallest elements of any AIS substation are usually entry gantries which facilitate OHL connection to the substation. The height of such gantries is typically up to approximately 18m with all other apparatus within the substation being substantially lower. An example illustrative image of a typical AIS substation of the type assumed is provided in **Figure 2-7** (for illustrative purposes only, the final footprint, height, and configuration of the substations will be determined at later Project stages).

Figure 2-7 – Illustrative Example of Typical AIS substation

2.6 Reconductoring

2.6.1 Reconductoring involves upgrading existing electricity transmission lines by replacing old conductors with new, more efficient ones. This process is crucial for enhancing the capacity and reliability of the existing ZA OHL to which the Project will connect. Reconductoring aims to increase the amount of electricity that can be transmitted over existing lines by using efficient conductors that generally operate at higher temperatures and carry more power.

2.6.2 The process involves replacing the existing conductors strung between transmission towers with new ones that can transfer higher electrical loads. This will require careful planning and coordination to minimise disruptions to the power supply, however, as the works replace existing conductors, there is no horizontal, and limited vertical realignment proposed that requires the detailed option considerations that the new OHL aspect of this Project are subject to in this report.

2.6.3 The reconductoring is part of a broader project to modernise the 4VA OHL (known as ‘SGRE’) to ensure it is capable of meeting future energy demands and supporting the transition to a cleaner energy system. The reconductoring of the existing ZA OHL in this Project would extend from the WMEL-B substation to the existing Grendon substation near Northampton. The works would comprise replacement of existing conductors and associated fittings, possibly strengthening of pylon steelwork and potential limited tower replacement if the requirement is identified by proposed condition surveys. Any replacement pylons would be in similar locations in close proximity to existing pylons and of similar heights and appearance to the pylons that they would replace. Therefore the changes associated with this are not likely to have the potential for significant landscape and visual effects relative to the baseline. This will be kept under review as the Project progresses and if required, the scope reviewed.

3. NGET's Approach to Routeing and Siting

3.1 Overview

3.1.1 This chapter provides an overview of the key legislation, policy, and guidance applicable to NGET's routeing and siting (implemented by NGET), a summary of NGET's approach to routeing and siting, and the technology options considered for this Project.

3.2 NGET's Statutory Duties (Electricity Act 1989)

3.2.1 NGET has duties placed upon it by the Electricity Act 1989 ('the Electricity Act') and operates under the terms of its transmission licence. Those duties and terms of particular relevance to the development of the proposed connection described in this report are set out below. Where NGET develops new infrastructure, it is required to have regard to these following statutory duties under the Electricity Act:

- Section 9 (General duties of licence holders) of the Electricity Act states that:

  transmission of electricity:

  (a) to develop and maintain an efficient, co-ordinated and economical system of electricity transmission;

- Electricity Act – Schedule 9 (preservation of amenity including: considering impacts upon communities, landscape, visual amenity, cultural heritage, and ecological resources); and
- Section 38 and Schedule 9 of the Electricity Act state that:

  exemption to generate, distribute, supply or participate in the transmission of electricity:

  (a) shall have regard to the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features of special interest and of protecting sites, buildings and objects of architectural, historic or archaeological interest; and

  (b) shall do what he reasonably can to mitigate any effect which the proposals would have on the natural beauty of the countryside or on any such flora, fauna, features,

3.2.2 NGET have also had due regard to other statutory obligations and requirements, where relevant, in the undertaking of Options Identification and Selection Stage (Stage 2).

3.3 British Energy Security Strategy (2022)

3.3.1 In response to concerns over the security, affordability, and sustainability of the UK's energy supply the UK Government published its British Energy Security Strategy in July 2022.

3.3.2 The British Energy Security Strategy proposes to accelerate the UK towards a low-carbon and energy independent future. It has a focus on expanding domestic UK energy supply and accelerating the connecting network infrastructure to support an expansion in domestic UK energy supply whilst also working with international partners to maintain stable energy markets and prices.

3.3.3 Regarding offshore wind, the British Energy Security Strategy states that:

ting wind.

3.3.4 The British Energy Security Strategy recognises that:

accelerating the connecting network infrastructure to support it. Within this decade, our modern system will prioritise two key features: anticipating need because planning ahead minimises cost and public disruption; and hyper-flexibility in matching supply and demand so that minimal energy is wasted. This more efficient, locally-responsive

3.3.5 To support this the British Energy Security Strategy includes several aims including, to:

- set out a *Design (HND) and Centralised Strategic Network Plan (CSNP). The HND will* This was delivered in the Beyond 2030 report[11] published in March 2024*;* and
- *infrastructure by around three years. We will work with Ofgem, network operators and the supply chain to find further savings, for example in the procurement, manufacture and construction stages. Overall, we aspire to halve the end-to-end process by the mid-*

3.3.6 The Powering Up Britain paper[16] was published in March 2023 by the UK Government. This document provides an update of the strategy for secure, clean and affordable British energy for the long-term future.

3.3.7 When considering new electricity infrastructure, NGET have had regard to the British Energy Security Strategy and Powering Up Britain paper.

[16] UK Government (2023) Powering Up Britain: Energy Security Plan [online] Available at: https://www.gov.uk/government/publications/powering-up-britain/powering-up-britain-energy-security-plan (Accessed 30 October 2024).

3.4 Transmission Acceleration Action Plan (2023)

3.4.1 The UK Government published the Transmission Acceleration Action Plan[17] in response to the Electricity Networks Commissioner's report[18] on accelerating the transmission network build.

3.4.2 The Action Plan describes "*the most radical modernisation of the grid since the 1950s*", seeking to halve the end-to-end build time of electricity transmission network infrastructure, from 14 to 7 years.

3.4.3 The foreword of the Transmission Acceleration Action Plan states that:

- *Although we are investing hundreds of billions as a nation in clean energy projects,*

  transmit that energy to households and businesses. As we increase electrification and decarbonise heat, transport and industry in our transition to net zero, we expect a doubling in demand for electricity by 2050[19]. This underlines just how important the grid will continue to be to our way of life, and we will need around four times as much new transmission network in the next seven years as we have built since 1990[20].

3.4.4 The Action Plan accepts the Commissioner's recommendations in all areas, spanning across eight themes: strategic spatial planning, design standards, regulatory approval, planning approval, supply chain and skills, communities and engagement, outage planning, and the end-to-end process and next steps. The resulting process is seven years in duration, from the point at which the need for new infrastructure is recognised, to construction, and final commissioning.

3.4.5 The Connections Action Plan[21] was published by the Department for Energy Security and Net Zero (Defra) and Ofgem alongside the Transmission Acceleration Action Plan.

3.4.6 Within The Connections Action Plan, the Ofgem Chief Executive Officer describes the Plan as:

3.4.7 a call for network companies, the system operator, and the sector as a whole to deliver a major step change in the pace of connections; strengthening incentives, obligations

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[17] Department for Energy Security and Net Zero (2023) Transmission Acceleration Action Plan. [Online] Available at: https://www.gov.uk/government/publications/electricity-networks-transmission-acceleration-action-plan (Accessed: 9 January 2025).

[18] Department for Energy Security and Net Zero (2023) Accelerating electricity transmission network deployment: Electricity Networks Commissioner's recommendations. [Online] Available at: https://www.gov.uk/government/publications/accelerating-electricity-transmission-network-deployment-electricity-network-commissioners-recommendations (Accessed: 9 January 2025).

[19] Department for Energy Security and Net Zero (2022) Electricity Networks Strategic Framework: Enabling a secure, net zero energy system. [Online] Available at: https://assets.publishing.service.gov.uk/media/6690f4220808eaf43b50ce41/electricity-networks-strategic-framework-report.pdf (Accessed: 9 January 2025).

[20] Calculated using data held by the Department on the length of historic and future transmission networks.

[21] Department for Energy Security and Net Zero and Ofgem (2023) Connections Action Plan: Speeding up connections to the electricity network across Great Britain. [Online] Available at: https://www.gov.uk/government/publications/electricity-networks-connections-action-plan (Accessed: 9 January 2024).

3.5 National Policy Statements (NPS)

3.5.1 National Policy Statements EN-1 and EN-5 set the policy context within which the routeing and siting for electricity infrastructure networks is undertaken. Taken together these NPSs provide the primary national policy context for decisions on applications for electricity transmission projects classified as Nationally Significant Infrastructure Projects (NSIPs).

3.5.2 The process undertaken as part of the Options Identification and Selection Stage (Stage 2) and reported within this CPRSS was primarily undertaken in late 2024 to early 2025 and based on the 2023 NPSs (adopted January 2024) which comprised the designated NPSs at the time. It is acknowledged that draft updates to these energy NPSs have been published for consultation in April 2025. Any updates to the 2023 NPSs which come into force will be considered appropriately in later stages of this Project.

Overarching National Policy Statement for Energy – EN-1 (2023)

3.5.3 EN-1 sets out the need for new nationally significant infrastructure to be brought forward at pace to meet our energy objectives. This includes meeting energy security and carbon reduction strategies, the need for more electricity capacity to support increased supply from renewables, and the need to meet future increases in electricity demand. EN-1 paragraph 3.3.70 states that all new grid projects have a role in efficiently constructing, operating, and connecting low carbon infrastructure to the National Electricity Grid.

3.5.4 EN-1 sets out the CNP for low carbon infrastructure. The Government's energy security and net zero ambitions will only be delivered if the UK can enable the development of new low carbon sources of energy at speed and scale. Paragraph 4.2.5 of EN-1 specifically notes that all power lines in scope of EN-5 (as described in paragraph 3.4.15) including network reinforcement and upgrade works, and associated infrastructure such as substations are considered to be critical low carbon infrastructure. These works do not have to be associated with a specific generation technology, as it is considered that new grid projects will contribute towards greater efficiency in constructing, operating and connecting low carbon infrastructure to the existing electricity transmission system.

3.5.5 EN-1 sets out the generic impacts and means of mitigation that are anticipated to arise most frequently from energy infrastructure developments. However, EN-1 (paragraph 3.1.1 and 3.1.2) recognises that due to the significant amounts of new large-scale energy infrastructure required to meet the UK's energy objectives, it will not be possible to develop the necessary amounts of such infrastructure without some significant residual adverse effects. The application of policies set out in Parts 4 and 5 of EN-1 seek to minimise these effects.

3.5.6 In line with Part 5 of EN-1, this CPRSS considers the following topics (listed in the order used in NGET's Approach to Consenting[4]):

- Landscape (covering the 'landscape' impacts described in EN-1);
- Visual (as described in EN-1);
- Ecology (covering the 'biodiversity' impacts described in EN-1);
- Historic environment (as described in EN-1);

- Air quality (covering the ‘air quality and emissions’ and ‘dust’ impacts described in EN-1);
- Noise and vibration (as described in EN-1);
- Geology and soils (covering the ‘geological conservation’ impacts described in EN1);
- Water (covering the ‘flood risk’ and ‘water quality and resources’ impacts described in EN-1);
- Economic activity (covering the ‘socio-economic’ impacts and ‘land use including open space, green infrastructure and green belt’ impacts described in EN-1);
- Aviation and defence (covering the ‘civil military aviation and defence interests’ impacts described in EN-1); and
- Traffic and transport (as described in EN-1).

3.5.7 Greenhouse gases, coastal change, odour, artificial light, smoke, steam, insect infestation and waste management impacts, as described in EN-1, would not have a significant impact on the determination of the preferred routeing and siting for this Project. Where relevant these topics will be considered as the Project development progresses into the Defined Proposal and Statutory Consultation Stage (Stage 3).

3.5.8 Electromagnetic fields will be considered as the Project development progresses into the Defined Proposal and Statutory Consultation stage (Stage 3). However, NGET designs all of its infrastructure to be compliant with current regulations and guidance[22] on such matters.

3.5.9 EN-1 explains that in terms of:

- Biodiversity (paragraph 4.6.6) – applicants, such as NGET, should seek opportunities to contribute to and enhance the natural environment by providing net gains for biodiversity;
- Historic Environment (paragraph 5.9.25) – there is a desirability to sustaining and where appropriate enhancing the significance of heritage assets, their setting, and the positive contribution they can make to communities. paragraph 5.9.30 of EN-1 also makes clear that substantial harm to or loss of designated assets of the highest significance, including scheduled monuments; registered battlefields; Grade I and II* listed buildings; Grade I and II* RPGs; and world heritage sites, should be wholly exceptional;
- Landscape and Visual (paragraph 5.10.6) – projects need to be designed carefully, taking account of the potential impact on the landscape and on sensitive visual receptors. The aim should be to minimise harm to the landscape and sensitive visual receptors, providing reasonable mitigation where possible and appropriate. Paragraph 5.10.32 of EN-1 confirms that National Parks and National Landscapes have been confirmed by the Government as having the highest status of protection in relation to landscape and scenic beauty. It makes clear that development consent in these areas can be granted in exceptional circumstances. In such instances, the development should be demonstrated to be in the public interest and consideration of such applications should include an assessment of:

[22] Energy Networks Association (2017) Electric and magnetic fields: the facts. London, Energy Networks Association. Present on the dedicated National Grid EMFs website www.emfs.info

-
    - *the impact of consenting or not consenting it upon the local economy;*
    - *the cost of, and scope for, developing elsewhere outside the designated area or meeting the need for it in some other way, taking account of the policy on alternatives; and*
    - *any detrimental effect on the environment, the landscape and recreational*

- Socio-economics – applicants for a given project should identify the impacts of new energy infrastructure and potential mitigation measures.
- Flood Risk – The relevant policy on flood risk for energy transmission NSIPs is set out in Section 5.8 of EN-1. This requires that, when making a decision on an application for an energy NSIP, the Secretary of State must be satisfied of the following:
    -
    - *the Sequential Test has been applied and satisfied as part of site selection [discussed further below].*
    - *a sequential approach has been applied at the site level to minimise risk by directing the most vulnerable uses to areas of lowest flood risk.*
    - *the proposal is in line with any relevant national and local flood risk management strategy.*
    - *Sustainable Drainage Systems (SuDS) have been used unless there is clear evidence that their use would be inappropriate.*
    - *in flood risk areas, the project is designed and constructed to remain safe and operational during its lifetime, without increasing flood risk elsewhere (subject to the exceptions set out in paragraph 5.8.42).*
    - *the project includes safe access and escape routes where required, and that any residual risk can be safely managed over the lifetime of the development.*
    - *land that is likely to be needed for present or future flood risk management infrastructure has been appropriately safeguarded from development to the extent that development would not hinder its construction, operation or maintenance*

Sequential Test

3.5.10 The Sequential Test is set out in Planning Practice Guidance[23] and is explained within EN-1 at paragraph 5.8.21. The Sequential Test ensures that a systematic, risk-based approach is followed to guide new development to areas with the lowest risk of flooding. It applies to all types of development and is used to assess the flood risk associated with potential sites[23].

3.5.11 In summary, the Sequential Test requires the following steps:

[23] UK Government (2014) Flood risk and coastal change [online] Available at: https://www.gov.uk/guidance/flood-risk-and-coastal-change (Accessed: 25 October 2024)

- Initially, the focus is on locating development in low-risk areas (i.e. Flood Zone 1). Paragraph 5.8.21 of EN-1 states that preference should be given to locating new development to areas with the lowest risk of flooding.
- If it is not possible to locate development in low-risk areas, the test moves on to compare reasonably available sites[24] within medium risk areas (i.e. Flood Zone 2). If there is no reasonably available site in Flood Zone 1, then projects can be located in Flood Zone 2 provided that the Secretary of State is satisfied that the Sequential Test is met.
- Only where there are no reasonably available sites in low and medium risk areas, the test considers high-risk areas (i.e. Flood Zone 3a[25]). In these circumstances, energy NSIPs can be located in Flood Zone 3 provided that Secretary of State is satisfied that the requirements of the Sequential Test and Exception Test (discussed further below) are met.

3.5.12 Therefore, the Sequential Test must be applied both during the site selection process and at the site level when a site has been selected. In other words, as well as applying the Sequential Test when selecting a site, development should take place on the area(s) of the selected site(s) with the lowest flood risk. Note that implicitly the application of the test at the site level will inform site selection – sites best able to accommodate development will perform better against the site selection test.

The Exception Test

3.5.13 If, following application of the Sequential Test, it is not possible for the Project to be located in zones of lower probability of flooding than Flood Zone 3 the Exception Test can be applied. The test is intended to provide a method of managing flood risk while still allowing necessary development to occur. EN-1 is clear that the Exception Test is only appropriate for use where the Sequential Test alone cannot deliver an acceptable site. Given the sheer extent of Flood Zone 3 across the Study Area this is likely to apply to the Project.

3.5.14 The Exception Test is explained in paragraphs 5.8.9, 5.8.10 and 5.8.11 of EN-1. For the Test to be passed:

- it must be demonstrated that the Project provides wider sustainability benefits to the community[26] that outweigh flood risk; and
- it must be demonstrated that the Project will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere and, where possible, will reduce flood risk overall[27].

[24] 'Reasonably available sites' are defined in the PPG as those in a suitable location for the type of development with a reasonable prospect that the site is available to be developed at the point in time envisaged for the development.

[25] Note that the Flood Zone 3 category also contains Flood Zone 3b, which is 'functional floodplain'. EN-1 provides that, energy projects proposed in Flood Zone 3b should only be permitted if the development will not result in a net loss of floodplain storage and will not impede water flows.

[26] This includes the wider benefits of the infrastructure project, including the national need for it as set out in the NPS.

[27] Exceptionally, where an increase in flood risk elsewhere cannot be avoided or wholly mitigated, the SoS may grant consent if it is satisfied that the increase in present and future flood risk can be mitigated to an acceptable level and taking account of the benefits of, including the need for, the nationally significant energy infrastructure.

National Policy Statement for Electricity Networks Infrastructure – EN-5 (2023)

3.5.15 EN-5 sets out the factors influencing routeing and siting selection and the impacts and other matters which are specific to electricity networks infrastructure. In summary:

- Paragraph 1.1.2 of EN-5 states that a significant amount of new network infrastructure is required in the near term to directly support the Government's ambition to deploy up to 50 GW of offshore wind capacity by 2030.
- Biodiversity (paragraph 2.9.6) – particular consideration should be given to the effects on large birds, including feeding and hunting grounds, migration corridors and breeding grounds.
- Landscape and Visual – paragraphs 2.9.7 to 2.9.9 of EN-5 state that:

> *Electricity Act 1989, to have regard to visual and landscape amenity and to reasonably mitigate possible impacts thereon, in practice new overhead lines can give rise to adverse landscape and visual impacts.*
>
> *These impacts depend on the type (for example, whether lines are supported by towers or monopole structures), scale, siting, and degree of screening of the lines, as well as the characteristics of the landscape and local environment through which they are routed.*
>
> *New substations, sealing end compounds (including terminal towers), and other above-ground installations that serve as connection, switching, and voltage transformation points on the electricity network may also give rise to adverse landscape and visual im*

3.5.16 EN-5 makes clear that the Horlock Rules should be followed by developers when designing their proposals for substations, and EN-5 also makes clear that the Holford Rules should be followed by developers when designing their proposals for OHLs. Paragraphs 2.9.20 to 2.9.21 state that,
overhead lines should be the strong starting presumption for electricity networks developments in general, this presumption is reversed when proposed developments will cross part of a nationally designated landscape (i.e., National Park, The Broads, or National Landscape). In these areas, and where harm to the landscape, visual amenity and natural beauty of these areas cannot feasibly be avoided by rerouteing overhead lines, the strong starting presumption will be that the applicant should underground the

3.5.17 However, EN-5 paragraph 2.9.22 goes on to state that
required where it is infeasible in engineering terms, or
not outweighed by its corresponding landscape, visual amenity and natural beauty benefits. Regardless of the option, the scheme through its design, delivery, and operation, should seek to further the statutory purposes of the designated landscape. These enhancements may go beyond the mitigation measures needed to minimise the adverse e

3.6 The Holford and Horlock Rules

3.6.1 NGET consistently employs two sets of rules/guidelines for the routeing and siting of new energy transmission infrastructure:

- Holford Rules – guidelines for the routeing of new OHLs; and
- Horlock Rules – guidelines for the design and siting of substations, converter stations and SECs)[28].

3.6.2 When considering new electricity infrastructure, NGET have regard to the degree to which routeing and siting options comply or deviate from these rules.

Holford Rules

3.6.3 Paragraph 2.9.16 of NPS EN-5 makes clear that the Holford Rules are - and . In summary, the Holford Rules state that routeing of high voltage OHL should where practicable:

- Avoid altogether the major areas of the highest amenity value;
- Choose the most direct line with no sharp changes in direction;
- Be positioned against tree and hill backgrounds as far as possible;
- Prefer moderately open valleys with tree cover;
- Be kept as far as possible independent from smaller lines, converging routes and other poles, masts, wires, and cables to avoid a concentration of lines or ‘wirescape’[29]; and
- Approach urban areas through industrial zones, where they exist; and when residential and recreational land intervenes between the approach line and the substations, carefully assess the comparative costs of undergrounding.

3.6.4 Whilst the guidelines were initially developed in 1959, they have been reviewed on a number of occasions by NGET and by the other UK transmission licence holders. One of the reviews was against the Electricity Act 1989. The guidelines have stood the test of time and have become accepted industry best practice in OHL routeing.

3.6.5 The general principles underlying the Holford Rules – the avoidance of adverse impacts by careful routeing – are to a degree also relevant to the routeing of underground cables, although the balance of impacts and constraints will often be different.

[28] The National Policy Statement for Electricity Networks Infrastructure EN-5 NPS has incorporated the Horlock Rules. At Paragraph 2.9.18 it states “The Horlock Rules – guidelines for the design and siting of substations – were established by National Grid in 2009 in pursuance of its duties under Schedule 9 to the Electricity Act 1989. These principles should be embodied in applicants’ proposals for the infrastructure associated with new OHLs”.

[29] Caused by multiple OHLs running in different angles or the proximity of multiple OHLs.

Horlock Rules

3.6.6 Paragraph 2.9.18 of NPS EN-5 makes clear that the Horlock Rules (guidelines for designing and siting substations) . The Horlock Rules state that[30]:

- In the development of system options, consideration must be given to environmental issues from the earliest stage to balance the technical benefits and capital cost requirements of new developments against the consequential environmental effects, in order to keep adverse effects to a reasonably practicable minimum;
- Siting should seek to avoid areas of the highest amenity, cultural or scientific value by the overall planning of the system connections;
- Areas of local amenity value, important existing habitats and landscape features should be protected as far as reasonably practicable;
- Siting should take advantage of the screening provided by landform and existing features and the potential use of site layout and levels;
- Proposals should keep visual, noise and other environmental effects to a minimum;
- Land use impacts of the proposal should be considered when planning siting;
- Early consideration should be given to the options available for pylons and ancillary development appropriate to individual locations;
- Space should be used effectively to limit the area required consistent with appropriate mitigation measures and to minimise the adverse impacts on existing land use and rights of way, whilst also having regard to the potential for any future extension;
- The design of access roads, perimeter fencing, earth shaping, planting and ancillary development should form an integral part of the site layout and design to fit in with the surroundings;
- In open landscape especially, high voltage line entries should be kept, as far as possible, visually separate from low voltage lines and other OHLs so as to avoid a confusing appearance; and
- The inter-relationship between pylons, ancillary structures and background and foreground features should be studied to reduce the prominence of structures from main viewpoints. Where practicable the exposure of pylons on prominent ridges should be minimised by siting pylons against a background of trees rather than open skylines.

3.6.7 The Horlock Rules predominately apply to the siting of substations and line approaches. The general principles underlying the Horlock Rules ─ the avoidance of areas of high amenity ─ apply equally to the siting of SECs, although the balance of impacts and constraints will often be different.

3.6.8 As detailed above, EN-5 in paragraph 2.9.18 confirms that the Horlock Rules

[30] https://www.nationalgrid.com/sites/default/files/documents/13796-The%20Horlock%20Rules.pdf (nationalgrid.com)

3.7 National Planning Policy Framework (NPPF)

3.7.1 The National Planning Policy Framework (NPPF)[31] sets out the Government's economic, environmental and social planning policies for England. The policies set out in this framework apply to the preparation of local and neighbourhood plans and to decisions on planning applications.

3.7.2 Paragraph 5 of NPPF states that the:

projects. These are determined in accordance with the decision-making framework in the Planning Act 2008 (as amended) and relevant national policy statements for major infrastructure, as well as any other matters that are relevant (which may include the National Planning Policy Framework). National policy statements form part of the overall framework of national planning policy, and may be a material consideration in preparing

3.7.3 When considering new electricity infrastructure, NGET has regard to the NPPF as well as local planning policy. Both emerging and adopted policy will be considered in relation to development plans and land allocations.

3.8 NGET's Approach to Consenting

3.8.1 NGET's Approach to Consenting[6] outlines the Project development process for major infrastructure projects, from initial inception to consent and construction. NGET's Approach to Consenting is divided into six stages:

- Stage 1: Strategic Proposal;
- Stage 2: Options Identification and Selection;
- Stage 3: Defined Proposal and Statutory Consultation;
- Stage 4: Assessment and Land Rights;
- Stage 5: Application; and
- Stage 6: Examination, Decision Construction.

3.8.2 A stepped approach (within Stage 2) has been adopted to identify potential routeing and siting options for the Project. This considered the potential impacts on the environment, the local community, relevant planning policy, other existing and proposed developments as well as technical and engineering design information.

3.8.3 The aim of the approach is to balance consideration of these factors and identify an emerging preferred corridor, emerging preferred Siting Zones within which the OHLs, underground cables (if required), substations and upgrade works to existing transmission infrastructure could be routed and sited.

3.8.4 **Figure 3-1** presents an overview of NGET's Approach to Consenting; a summary of the main objectives of this stage of the consenting process can be seen below each stage. The Project is at the Options Identification and Selection Stage (Stage 2).

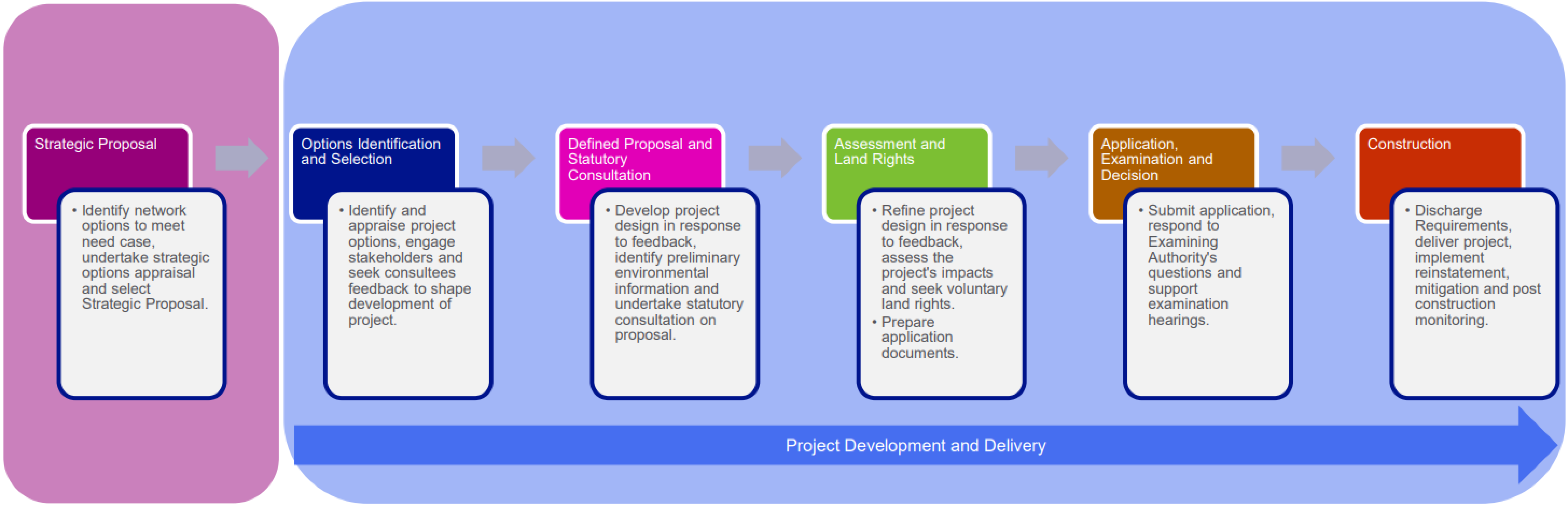
[31] Ministry of Housing, Communities & Local Government (2024) National Planning Policy Framework [online] Available at: https://www.gov.uk/government/publications/national-planning-policy-framework--2 (Accessed: 9 January 2025).

3.8.5 This CPRSS has been undertaken as part of the Stage 2. For the Project, the activities identified in NGET's Approach to Consenting as being required at Stage 2 were broken down into the following nine steps (as detailed in **Chapter 4**):

- Step 1 – Definition of the Study area/s and data gathering;
- Step 2 – Scoping of environmental topics and baseline data-gathering;
- Step 3 – Ascribe weight to, confirm, and heat map features;
- Step 4 – Identifying and defining Siting Zones, Siting Areas and corridors;
- Step 5 – Confirm Siting Zones, Siting Areas and end-to-end corridors for appraisal;
- Step 6 – Undertake site visits and refinement of Siting Zones, Siting Areas and corridors;
- Step 7 – Options appraisal of Siting Zones, Siting Areas and corridors;
- Step 8 – Confirm emerging preferred Siting Zone, Siting Areas and corridor and develop graduated swathe for non-statutory consultation; and
- Step 9 – Undertake non-statutory consultation.

3.8.6 This CPRSS sets out the findings of the first eight steps of Stage 2 for the Project. This CPRSS will inform subsequent non-statutory consultation, Step 9.

Figure 3-1 — NGET'S Approach to Project Development and Delivery



4. Options Identification and Selection Process (Stage 2)

4.1 Introduction

4.1.1 The Strategic Proposal[32] Stage (Stage 1) was completed in 2024 and a Strategic Proposal was selected, as described in **Section 1.1** This CPRSS presents the findings of the Options Identification and Selection Stage (Stage 2) and identifies the corridors, Siting Zones and/or Siting Areas which are emerging as preferred for the Project. This CPRSS has been published as part of the non-statutory consultation for the Project. The feedback received on the Project during non-statutory consultation will be used to inform the development of the design and alignment of the Project. Following non-statutory consultation, the Project will progress to the Defined Proposal and Statutory Consultation Stage (Stage 3).

4.1.2 The methodologies employed for the nine steps, as defined for this Project, of the Options Identification and Selection Stage (Stage 2) are summarised in **Figure 4-1** and are described below.

4.1.3 The following key terms are used throughout this CPRSS:

- **Indicative Study Area** – the indicative area of the preferred strategic option identified at the Strategic Options Appraisal at the Strategic Proposal Stage (Stage 1).
- **Study Area** – the broad areas within which infrastructure corridors and Siting Zones required for the Project could be located and within which detailed environmental and socio-economic data is gathered to inform the Stage 2 Options Appraisal.
- **Corridor** – a broad area within the Study area, which new transmission infrastructure (OHLs, underground cables and SECs) could be routed. The Study Area will contain a number of 'corridors.'
- **Siting Zone** – an area of land within which multiple Siting Areas (described below) could be located.
- **Siting Area** – an area of land within a study area, within which a new substation or SEC could be sited.
- **Preliminary Corridor** – a broad area within which the OHL and/or underground cable infrastructure for the Project may be located.
- **Emerging Preferred Corridor** – a broad area within which the OHL and/or underground cable infrastructure for the Project may be located, which is preferred following the appraisal of potential options, based on the findings of Stage 2.
- **Route Option** – an end-to-end route of OHL using one or more corridor in which infrastructure for the Project may be located, based on the findings of Stage 2.

[32] The Strategic Proposal is defined by the Strategic Options Report, summarised in Section 1.1.

- **Emerging Preferred Siting Zone** – a broad area within which the Emerging Preferred Siting Area may be located, based on the findings of Stage 2.
- **Emerging Preferred Siting Area** – a broad area within which the substation infrastructure for the Project may be located, based on the findings of Stage 2.
- **Graduated Swathe** – shaded areas within the emerging preferred corridor, Siting Zones and Siting Areas within which Project infrastructure is considered more or less likely to be located, shown by the varying levels of shading. Darker shaded areas represent where infrastructure is likely to be better located, in NGET's emerging view at this stage, within the corridor, Siting Zone and Siting Areas.
- **Non-statutory consultation** – an engagement process which will be undertaken to capture public, stakeholder and landowner feedback on the emerging preferred corridor, Siting Zone and Siting Areas, and the graduated swathe. The feedback received will inform the further development of the Project.

Figure 4-1 — CPRSS Methodology

Step 1
- Definition of the study areas/data gathering.

Step 2
- Scope environmental topics.
- Baseline data-gathering.

Step 3
- Ascribe a weight to, confirm and agree features.
- Develop heat maps for OHLs, underground cables and substations.

Step 4
- Define Siting Zones and where applicable Siting Areas.
- Define corridors.
- Consider likely policy compliance of an OHL within the corridors.

Step 5
- Review corridors and Siting Zones.
- Identify siting areas where applicable.

Step 6
- Undertake site visits for field obervations at selected locations.
- Refine and confirm corridors, siitng zones and siting areas.

Step 7
- Undertake options apprasial of corridors, Siting Zones and Siting Areas.

Step 8
- Identify the corridor, Siting Zone and Siting Areas emerging as preferred.
- Develop graduated swathe for non-statutory consultation.

Step 9
- Undertake non-statutory consultation with stakeholders.

4.2 Step 1 – Define Study Areas

4.2.1 The Study Areas are the broad areas within which transmission infrastructure required for the Project will be located and the areas within which detailed environmental and socio-economic data will be gathered to inform the Stage 2 Option Appraisal.

4.2.2 Given the large geographical extent of the Project, distinct, but interrelated study areas have been defined for the new OHL, the WMEL-A substation, the WMEL-B substation, and the reconductoring.

4.2.3 The Study Areas that have been developed are informed by:

- The straight line connection between start and end points from the Weston Marsh substation infrastructure (proposed as part of the Grimsby to Walpole project) to the ZA line north of Market Harborough, as identified by the Strategic Options Report (Stage 1);
- The potential range of other direct routes from the proposed Weston Marsh substation infrastructure to the ZA Line whilst maintaining a similar distance of new OHL (around 60km);
- The distribution of areas of the highest amenity value or environmental features (for example internationally designated sites);
- The nature of the physical and human geography. The presence of major geographical features and major settlements that may represent a natural boundary to a study area or dictate a need for a study area to extend to support routes around such features;
- Consideration of the likely balance of environmental impact between direct and indirect transmission routes; and
- Consideration of the Holford Rules (for routeing of an OHL) and Horlock Rules (for siting of a substation, OHL entries and SECs).

4.2.4 Based on these factors, the Study areas developed should encompass the maximum extent within which a Project design which satisfies the statutory duties and obligations of NGET and meets the Project objectives (as detailed in the SOR for the Project) is likely to be located.

4.2.5 An indicative study area was defined as part of the Strategic Proposal Stage (Stage 1) undertaken in 2024 however this was based on a straight line to appraise the feasibility of the strategic solution. That indicative study area informed the initial search area. The Study Area was then developed as part of this Stage 2 options appraisal to identify potential options to deliver the strategic solution.

4.2.6 The Study areas developed must encompass the area within which corridors and Siting Zones may be identified but exclude areas where these are unlikely to be feasible. They are defined in part by Holford Rule 1 and allow for the application of the principles of the Holford and Horlock Rules as described in **Chapter 3**. The Study areas, described in **Chapter 5**, therefore encompass an area within which the identification and assessment of corridors and Siting Zones could be completed.

4.2.7 The Study areas and factors that have influenced their definition are described in **Chapter 5**.

4.3 Step 2 – Scope Environmental Topics and Baseline Data-gathering

Scoping of Environmental Topics

4.3.1 NGET's approach to the appraisal of design options considers the following topics and sub-topics:

- **Environmental:** Landscape and Visual Amenity; Ecology; Historic Environment; Air Quality; Noise and Vibration; Soils and Geology; Water; Greenhouse Gas Emissions;
- **Socio-economic:** Economic Activity (including planning); Traffic and Transport; Aviation and Defence;
- **Technical:** Technical Complexity; Construction / Delivery issues; Technology issues (which includes sustainability issues); Capacity issues; Network efficiency / benefits (which includes energy efficiency); and
- **Cost:** Capital cost; Lifetime cost; and Constraint costs (where applicable).

4.3.2 The environment and socio-economic topics are aligned with applicable requirements of Section 5 of EN-1 and Section 2 of EN-5.

4.3.3 NGET acknowledges that sub-topics (and potentially whole topics), may be scoped-out if it is likely that there would be no material impact because of the nature of the Project, or it will not be a differentiating factor between any of the options identified.

4.3.4 To identify the data-gathering required to contribute to the effective evaluation of options, and ultimately help inform decision-making, a review of the environmental topics and their constituent sub-topics was undertaken. The review considered the presence of features for a particular topic or sub-topic within the Study Areas, and whether the Project could have a material impact on the features. If there were either no features, or no risk of a material impact, the topic or sub-topic was scoped-out of the appraisal process. This ensured that the CPRSS and appraisal process only addressed those sub-topics that are potentially material to the decision-making process.

4.3.5 It should be noted that scoping out a sub-topic simply reflected the fact that either: (i) there are no features for that sub-topic in the vicinity of a study area or option that could be affected; or (ii) the different options could not be distinguished based on that sub-topic. It does not mean that the topic or sub-topic is not important, nor does it mean that it would necessarily be scoped out during subsequent stages.

4.3.6 At this early development stage of the Project coastal change, odour, artificial light, smoke, steam, insect infestation and waste management impacts were scoped out on the basis that with the other topics applied, these topics would not be differentiating factors in the identification and selection of corridors and Siting Zones. Furthermore, NGET designs all its infrastructure to be compliant with current regulations and guidance on electromagnetic fields and therefore this was scoped out.

4.3.7 The environmental and socio-economic topics scoped into the appraisal of this Project at Stage 2 included landscape and visual amenity, ecology, historic environment, water environment, economic activity (including planning), traffic and transport, and aviation and defence.

4.3.8 At this stage of the Project, air quality and emissions and noise and vibration are accounted for by considering proximity to settlements, residential and other sensitive features. Climate change with regards to flood risk is accounted for within the water topic, and geology is considered as part of the technical appraisal. Soils, waste management, electric and magnetic fields and climate change related to transmission losses are not considered material to the decision-making process at this stage and will be considered as the Project development progresses into the Defined Proposal and Statutory Consultation Stage (Stage 3).

Data Gathering

4.3.9 To identify connection options which best satisfy NGET's statutory duties and obligations and meet the need case for the Project, it is necessary to understand the presence, and distribution of, environmental, socio-economic, and technical constraints and opportunities within the Study areas. As part of this process, geographical information system (GIS)[33] web mapping was developed comprising available environmental, socio-economic, and technical data within the Study areas.

4.3.10 Data for each topic was gathered through a desk-based review of information on potentially international, national, regional and locally important features. This data was collated to inform the scoping and the comparative environmental, socio-economic and technical appraisal of options. This included the following:

- Identification of designated sites and other features from the British Geological Survey, Civil Aviation Authority, Environment Agency, Forestry Commission, Ministry of Defence (MoD), Natural England, Office for National Statistics, Ordnance Survey (OS), Sustrans, and relevant local authorities.
- Identification of archaeological designations and other recorded sites, using GIS datasets available from Historic England.
- Review of the Local Development Plans and planning applications (for Charnwood Borough Council, Leicestershire County Council, Harborough District Council, Lincolnshire County Council, Melton Borough Council, North Kesteven District Council, North Northamptonshire Council, Nottinghamshire County Council, Boston Borough Council, Rushcliffe Borough Council, Rutland County Council, South Holland District Council, South Kesteven District Council and West Northamptonshire Council) to identify further environmental features and opportunities, such as county and regional level designations or other locations considered important to the public.
- Review of the Landscape Character Assessments of relevance to the Study areas.
- Review of OS mapping (1:50,000 mapping and terrain data) and aerial photography (where available) to identify other potential features such as settlements, properties, walking routes, cycling routes, etc.
- Extrapolation of OS OpenData to identify further environmental features, including the locations of watercourses and waterbodies.
- Review of other local information through online and published media, such as tourism sites and walking routes.

4.4 Step 3 – Ascribe a weight to, confirm and agree 'Heat Map' features

4.4.1 To allow for the identification of corridors and Siting Zones, the various elements within the scoped-in sub-topics which may constrain routeing and siting were mapped.

4.4.2 Once mapped, the data sets were assigned a classification or "sensitivity weighting" based on their sensitivity to the technology likely to be required for the Project. This classification was determined using professional judgement, whilst having regard to

[33] GIS is a system that enables the creation, management, analysis and mapping of all types of data.

relevant environmental legislation, policy and best practice. A six-point scale was used to determine the sensitivity weighting, as shown in **Table 4-1.**

Table 4-1 – Description Associated with Sensitivity Weighting

Classification Value	Classification Value Description
0	Areas with no identified constraint.
1	Very low potential to constrain the Project
2	Low potential to constrain the Project.
3	Intermediate potential to constrain the Project.
4	High potential to constrain the Project.
5	Very High potential for the Project to be constrained.

4.4.3 The weighting of the different features varies between the potential technologies of the Project (for example the different technologies for substations or OHL equipment). For example, some habitats could be weighted intermediate for underground cables due to the increased risk to terrestrial species caused by the cable excavation works (which is also noted in paragraph 2.9.25 of EN-5) but lower for OHLs as excavation works would be limited to the area required for the pylons.

4.4.4 The sensitivity weighting effectively formed a robust scoping exercise to ensure a focus on features that materially inform decision making. This gave the highest weight to features of national or international value, whilst not excluding features of more local importance in accordance with the Holford and Horlock Rules.

4.4.5 Sensitivity weightings associated with these features were reviewed and confirmed between NGET and the Front-end engineering design (FEED) team and were then combined to produce separate composite 'heat maps'[34], showing the highest 'weight' for each cell[35] of the map. These composite heat maps reflect the relative importance of different features and help to visualise the constraints to developing infrastructures for the Project and, when combined with professional judgement, informed the identification of corridors and Siting Zones, as described in **Chapter 5** and shown in **Figure 5-7** to **Figure 5-9**.

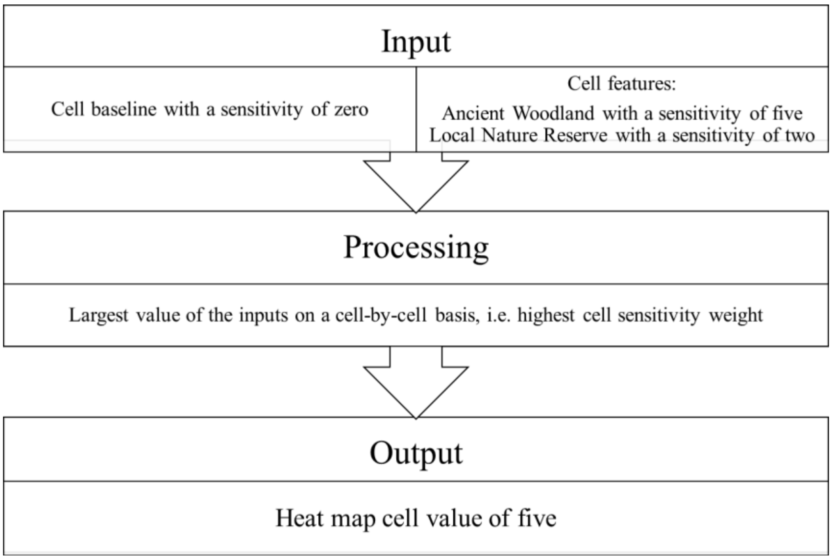
[34] A heat map is a graphical representation of data where values are depicted by colour. In the context of the Project the data is the environmental features which are weighted and the colour will be determined by the sensitivity weighting allocated to each feature.

[35] The map was divided into 10m-by-10m square cells based on the OS National Grid.

4.4.6 The Study Area was broken down into 20m square ‘cells’ based on the OS grid. Within each of these cells the sensitivity weighting of a feature is considered using the classification values associated with the relevant description as per **Table 4-1**. The heat map therefore shows numerical weightings of zero to five.

4.4.7 To avoid the risk of double-counting, the composite heat map shows the highest individual ’weight’ identified in each cell, not the combined total of different weights identified. For example, if a cell has a baseline of zero, contains an ancient woodland with a weight of five and is located within a local nature reserve area with a weight of two, then the cell would have a weight of five (the largest value of the inputs cell, i.e. the ancient woodland). This process is shown in **Figure 4-2**.

Figure 4-2 – Example of how sensitivity weighting is incorporated into heat mapping



4.4.8 The sensitivity weighting enabled the exercise to focus on features that materially inform decision making. This gave the highest weight to features of national or international value, whilst not excluding features of more local value. Features of the highest weight primarily informed the development of corridors and Siting Zones whilst the lower weighted features (small areas of high weight) informed the development of the routes and Siting Areas, once the larger areas of higher weight had been avoided where practicable.

4.4.9 The sensitivity weightings were reviewed prior to the development of indicative corridors and Siting Zones, particularly to allow the refinement of buffer zones and to test the weighting assumptions. This heat mapping exercise is a visual aid only and prior to the development of the corridors and Siting Zones, the assets within a corridor and Siting Zones were preliminarily reviewed by discipline specialists to identify site or asset specific considerations that would not be picked up by assigning a weight to an entire constraint or buffer zone. For example a listed building with a designed outlook would have a more extensive setting along the line of that outlook than in other directions.

4.4.10 The heat maps reflected the relative importance of different features and helped to visualise the constraints to developing infrastructure for the Project and informed the identification of corridors, as described in **Chapter 5**.

4.5 Step 4 – Identifying and Defining Corridors, Siting Zones and Siting Areas

4.5.1 At this stage of the Project, identification of preliminary routeing and siting options involves little detailed engineering design. It is led by landscape and other environmental specialists who have due regard to the environmental and socio-economic considerations alongside the required technical parameters. The aim of identifying Preliminary Corridors, Siting Zones and Siting Areas is balancing high-level mitigation with engineering requirements; routeing and siting to avoid designated sites and other large-scale features, to minimise impacts upon the environment and local population as far as practicable, whilst ensuring options identified meet the Project engineering requirements. In this respect, and as noted in EN-5 (paragraph 2.2.7) *connection between the initiating and terminating points of a proposed new electricity line* . Instead, as outlined above, "…*siting constraints, such as engineering, environmental or community considerations will be important in determining a feasible route*" and/or site. This approach is in accordance with the standard assumptions and approach taken by NGET to avoid areas of highest value and amenity through option definition, if practicable.

Identifying and Defining Corridors

4.5.2 A Web based GIS constraints mapping tool comprising available environmental, socio-economic and technical data within the Study Area and the heat maps generated as part of Step 3 were used to identify initial Preliminary Corridors in a collaborative workshop including environmental specialists and FEED engineers. The corridors generated provided a starting point for the Project team landscape and environmental specialists, working with the wider Project team as appropriate, and employing professional judgement and their understanding of routeing considerations, to identify technically feasible Preliminary Corridors. Corridors that were identified respond to the geographical features that have been identified, in some places this resulted in a narrow corridor being available, whereas in areas with fewer features, the width is considerably wider. This has resulted in a variety of widths for the Preliminary Corridors ranging between 500m and 8km. Corridors included aspects which cannot be mapped but are no less important considerations to the routeing of a transmission connection. For the OHL options this included for example, avoiding the use of too many angle pylons (Holford Rule 3), finding the best 'landscape fit' i.e. how an OHL would sit in the landscape (Holford Rules 4 and 5) and how it would affect visual amenity (Holford Rule 6).

4.5.3 The options identified were then subject to review by the key environmental disciplines, FEED engineers and the Project team who used their professional judgement to recommend amendments (i.e. refine or expand) to the corridors. Where practicable, these recommendations were reviewed and implemented by the landscape and environmental specialists to ensure that changes were made in a manner consistent with landscape and environmental considerations.

4.5.4 As part of this exercise, the distribution and density of constraints (environmental, technical and socio-economic) were examined to identify areas where it might be particularly challenging to identify a technically feasible and/or environmentally acceptable OHL connection (subject to further analysis). The starting assumption in accordance with national planning policy (NPS EN-5, paragraph 2.9.20) is that new transmission connections comprise OHLs, except in nationally designated landscapes.

As no such receptors were identified in the Study Area no underground cable corridors have been considered.

4.5.5 To enable a clear comparative analysis and understanding of the Preliminary Corridors, the Corridors were divided into 'Segments' and 'Links' at key locations along the Preliminary Corridors where the OHL could continue along one corridor or cross into a different corridor. This allowed Segments of corridors containing key risks or constraints to be avoided or discontinued from the appraisal without eliminating other Segments of corridors which may offer a preferred route. An emerging preference for Segments and Links allowed 'end-to-end' Route Options to be identified, taking account of the siting of substations. The Preliminary Corridors, Route Options and Links are described in **Chapters 6, 7 and 8.**

4.5.6 The outcome of Step 4 was a set of Preliminary Corridors, Links, Siting Zones and Siting Areas to be subject to further analysis and informed by field observations at Steps 5 and 6. This approach allowed for the continued appraisal of multiple and interrelated options.

Identifying and Defining Siting Zones and Siting Areas

4.5.7 A Siting Area is an area which has the capacity to accommodate the siting of a single substation. A Siting Zone is an area which has the capacity to accommodate multiple Siting Areas.

4.5.8 Siting Zones were identified in locations where the Preliminary Corridors intersect with existing OHL. Therefore, the new substation locations could provide a connection between the new OHL proposed as part of the Project and the existing OHL. The identification of Siting Areas within the Siting Zones was led by the environmental specialists from the Project team. Identification took into consideration the key drivers for each substation (as set out below), the technical parameters (detailed in **Chapter 2**) and the relevant environmental and technical constraints identified from Step 2.

4.5.9 In siting substations (and where applicable SECs) areas that benefit from the below factors were identified:

- Appropriate topography;
- The availability of existing screening elements and the potential to introduce additional screening elements;
- Proximity to major roads, to minimise the extent of required new access roads; and
- Outside of Flood Zones of a medium risk (Flood Zone 2) and high risk (Flood Zone 3), in line with the policy tests (sequential and exception tests) as set out in Section 5 of NPS EN-1.

4.5.10 Key drivers for the location of the new substations include:

- Seek to minimise the length of connections between the new WMEL-B substation, the existing ZA for the WMEL-B transmission route, the WMEL-A substation, and the existing 4VK. This will reduce the quantity of diversion towers.
- Seek to maximise system flexibility and mitigate the overloading of the Ryhall-Eaton Socon circuit under fault conditions.

- Requirement for the new substation at WMEL-A to connect with the new 60km OHL along with the 4VK existing route. The footprint can be optimised based on the way the transmission line will terminate at the substation.

4.6 Step 5 – Confirm Corridors, Siting Zones and Siting Areas for Appraisal

4.6.1 The corridors, Siting Zones and Siting Areas were then further reviewed by NGET and the FEED Engineers to confirm the technical feasibility and ensure that key issues, and the interaction of constraints, had been fully considered.

4.6.2 At this point the corridors, Siting Zones and Siting Areas were also reviewed to ensure that all had the potential to form ‘end-to-end’ solutions.

4.6.3 Prior to progressing to Step 6, the corridors, Siting Zones and Siting Areas were confirmed by the Project team.

4.7 Step 6 – Site Visits and Refinement of Corridors, Siting Zones and Siting Areas

4.7.1 Following the identification of the corridors, Siting Zones and Siting Areas (Steps 4 and 5), site visits were undertaken by landscape, heritage and ecology specialists, the FEED Engineers and NGET. The purpose of these visits was to ground truth the key landscape, environment, community and technical features, to allow closer consideration of particularly constrained areas identified during the desk studies and to identify further construction and design hazards that might mean Preliminary Corridors, Links, Siting Zones or Siting Areas would not be feasible.

4.7.2 Once the site visits were complete, a further review was undertaken of the corridors, Siting Zones and Siting Areas by the Project team to identify any options which are less preferred, any new options identified or amendments to existing options where applicable. Where agreed, these changes were incorporated into the evolving routeing and siting process before progressing to Options Appraisal (Step 7).

4.8 Step 7 – Options Appraisal of Corridors, Siting Zones or Siting Areas

4.8.1 In Step 7, the corridors, Siting Zones and Siting Areas agreed at Step 6 are subject to Options Appraisal in accordance with NGET’s Approach to Consenting. NGET’s guidance provides a thorough and consistent framework to inform the appraisal of project options and decision making. Its aim is to ensure that decisions regarding the location or technology of a given project are based on a full understanding of the technical, socio-economic, environmental, and cost implications of identified options. It also enables NGET to document in a transparent manner the information on which judgements have been based.

4.8.2 NGET’s Approach to Consenting notes that the analysis at the Options Identification and Selection Stage (Stage 2) is largely desk based. However, as described in Step 6, the Options Appraisal for this Project has also been informed by observations from site visits undertaken by the Project team. These observations have provided additional information to inform the Options Appraisal, which, in conjunction with that drawn from the desk-based studies, has provided an evidence-base appropriate to inform this stage of the Project. As the Project progresses to subsequent stages of more detailed design and assessment, additional surveys and analysis will add further information to the evidence base, which will be used to review the findings of this study.

4.8.3 The overall objective throughout the Options Appraisal was to take full consideration of all known environmental factors to minimise the risk of significant adverse impacts on the environment and communities whilst also considering engineering and economic considerations.

4.8.4 For each of the relevant environmental and socio-economic sub-topics (outlined in Step 2) the appraisal considered the potential impacts on relevant features, and whether such impacts could be avoided or mitigated through careful routeing or siting, in accordance with NGET's mitigation hierarchy[4]. Where impacts cannot be avoided or mitigated by careful routeing, other forms of mitigation were considered, including:

- Reduction of wirescape through distribution network rationalisation;
- Reduction of wirescape through transmission network rationalisation; and
- Alternative transmission technology (such as undergrounding).

4.8.5 Once such mitigation measures were considered, a judgement was made as to the potential for residual impacts. The residual impacts considered in the Options Appraisal do not take account of further Project-specific environmental, socio-economic or technical mitigation measures which are likely to be included as part of the Environmental Impact Assessment (EIA) process undertaken at the Defined Proposal and Statutory Consultation Stage (Stage 3).

4.8.6 The findings of the Options Appraisal for the relevant sub-topics are detailed within **Chapters 6 and 7** of this report, as during the appraisal two distinct sub-steps were identified. **Chapter 6** reports the appraisal of the Preliminary Corridors and Siting Areas identified in Step 4, to determine which segments should be discontinued and which were preferred and should continue to be considered in defining end-to-end Route Options. **Chapter 7** reports the appraisal of the end-to-end Route Options identified using the preferred segments from the conclusions of **Chapter 6**.

4.9 Step 8 – Confirm Emerging Preferred Siting Zone, Siting Areas and Corridor and Develop Graduated Swathe for Non-Statutory Consultation

4.9.1 Following completion of Step 7, a 'challenge and review' workshop was held in February 2025 and attended by NGET, FEED, landscape, and environmental teams. The purpose of the workshop was to review environmental preferences and, in accordance with EN-1 and EN-5, balance these against technical and cost inputs to reach a conclusion on the emerging preferred corridor, Siting Zones and Siting Areas that provides the optimum balance of efficiency and economy, whilst having appropriate regard to environmental and socio-economic impacts.

4.9.2 Further to this workshop, the appraisal findings for the Route Options and their individual Segments were reviewed by the Project team considering environmental and socio-economic aspects, as well as technical aspects, and cost. The factors considered to influence the decision-making process for determining the emerging preferred Route Option were summarised. A comparative evaluation was undertaken of sections of the

Route Options to allow closer scrutiny and appraisal when approached in a sequential manner routeing east to west, and the overall Route Options and substation locations. The emerging preferred corridor, Siting Zone and Siting Areas were confirmed.

4.9.3 The FEED, landscape and environmental teams reviewed the emerging preferred corridor and sought to identify areas within it where Siting Zones and Siting Areas and the infrastructure for the Project might be best located based on the work undertaken to date. In some locations options remain where a preferred alignment was identified but alternative routes, typically around localised constraints, should still be considered as the design develops and further information is gathered. This considered the initial heat mapping, the requirements of sequential and exception tests (as described within NPS EN-1), and Holford and Horlock Rules. Particular regard was given to Holford Rules 1, 2 and 3 to avoid areas of amenity value and while taking this into consideration selecting a direct route and Horlock Rules 2, 3, 4, 5 and 6 to avoid areas of amenity value and minimise landscape, visual, ecological, heritage and land use impacts.

4.9.4 The appraisal process so far, and this detailed review of the potential OHL alignment and substation locations, was used to generate a graphic representation of the likelihood of infrastructure being located in any part of the emerging preferred corridor. Known as the graduated swathe, this shows areas with higher likelihood of having infrastructure located there as a darker blue, with lighter blue areas having lower likelihood. A final workshop attended by the Project team was then undertaken to discuss the outputs of the alignment and graduated swathe review. The outcome of this workshop finalised the graduated swathe.

4.10 Step 9 - Undertake Non-Statutory Consultation

4.10.1 The final step in the CPRSS was to prepare a report to record the entire process for the purpose of non-statutory consultation. The CPRSS process and outcomes are captured in this report. This report is intended to support non-statutory consultation to engage stakeholders, statutory consultees and interested parties, including the public.

5. Study Area, Corridor, Siting Zone and Siting Area Definition

5.1 Introduction

5.1.1 **Figure 1-1** shows the location of the Project, which spans west from Spalding, Lincolnshire and extends west through Rutland in the East Midlands, and into Leicestershire. The reconductoring extends south into Northamptonshire.

5.1.2 This chapter describes how the Study areas for the Project were developed and defined (Step 1 as shown in **Section 5.2**), the baseline data gathered for the Study areas (Step 2 as shown in **Section 5.4**), production of the heat mapping (Step 3 as shown in **Section 5.5**), identifying and defining the corridors, Siting Zones, and Siting Areas (Steps 4 to 6 as shown in **Section 5.6**).

5.2 Defining the Study Areas (Step 1)

5.2.1 The following sections provide an overview of each of the four distinct but interrelated and overlapping study areas[36] for the Project. These Study Areas include the:

- OHL Study Area
- WMEL-B Substation Study Area
- WMEL-A Substation Study Area
- Reconductoring Study Area

5.2.2 The approach to developing the Study Area for the Project was based on balancing NGET's duty to develop an efficient, co-ordinated and economical system of transmission (Section 9 of the Electricity Act 1989), NGET's environmental duties under Section 38 and Schedule 9 of the Electricity Act 1989, Holford Rule 1 (which is to "*avoid altogether, if possible, the major areas of highest amenity value, by so planning the general route of the first line in the first place, even if the total mileage is somewhat increased in consequence*") and Horlock Rule 2 (which is to "*as far as reasonably practicable seek to avoid altogether internationally and nationally designated areas of the highest amenity, cultural or scientific value by the overall planning of the system connections*").

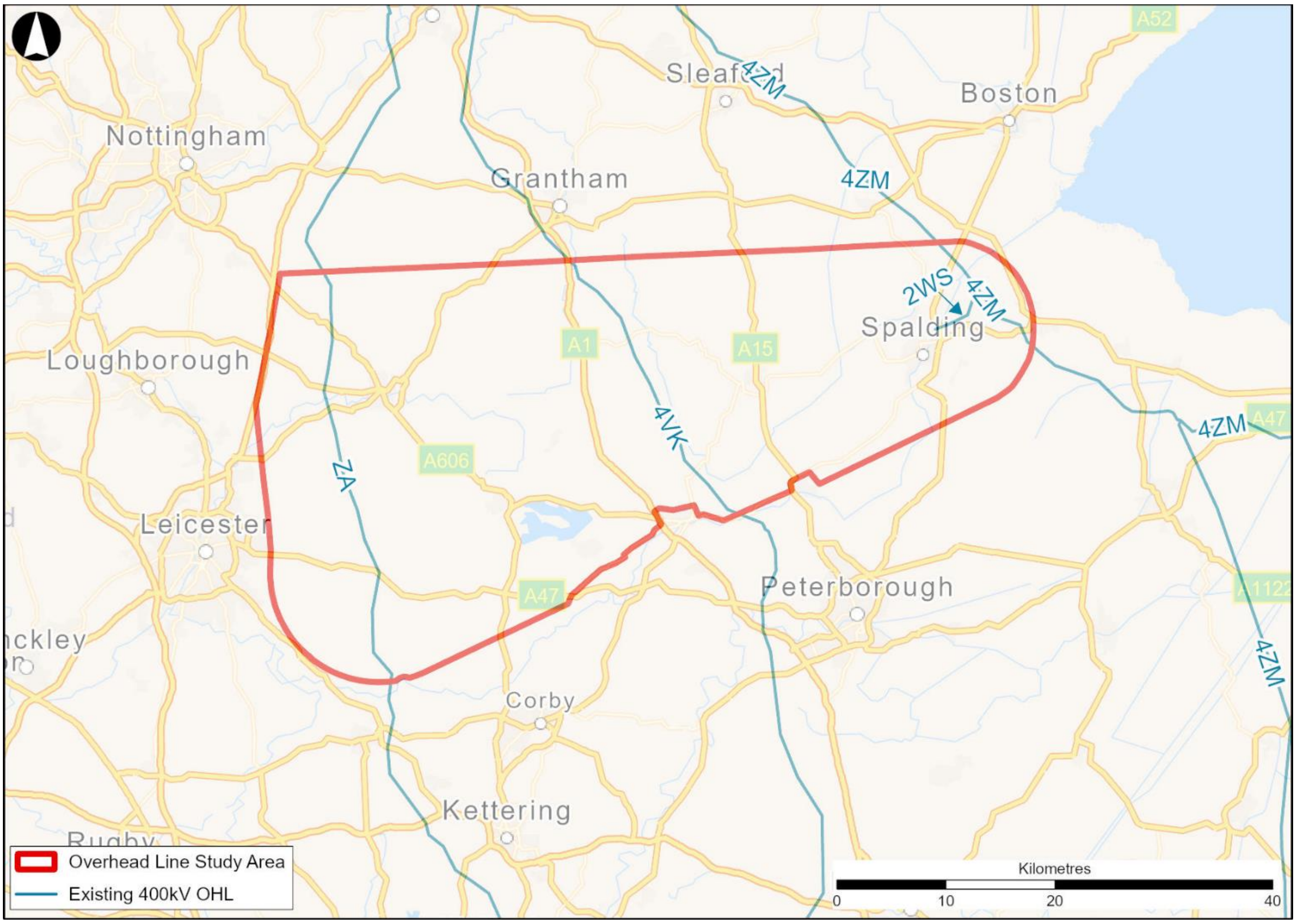
5.2.3 The indicative study area defined as part of the Strategic Proposal Stage, as described in **Chapter 1** was used alongside the connection points as a starting point for the definition of the Study areas for the Project. This indicative study area was simply a 2km buffer area around a straight line connecting the proposed Weston Marsh substation infrastructure to the existing ZA Line for the shortest distance of around 60km.

5.2.4 The refined Study Area which was developed to become the final 'Study Area' is presented in **Figure 5-1.** It begins at the proposed Weston Marsh substation

[36] An area within which a range of potential corridor options, substation Siting Zones or areas for the new infrastructure will be considered.

infrastructure as the eastern connection point for the Project. The Study Area extends west through the Lincolnshire Edge and continues towards Leicester.

Figure 5-1 ─ Overhead Line Study Area



OHL Study Area

5.2.5 The Study Area for the OHL was defined through a five-phase process which is outlined below and shown in **Figure 5-1.**

Phase I: Connection Points

5.2.6 The first phase involved joining the known connection points with the starting point being the Weston Marsh substation infrastructure proposed as part of the Grimsby to Walpole project, approximately 4km northeast of Spalding, Lincolnshire. The new OHL needed to connect to the ZA Line to the north of Market Harborough, and also needed to connect to the 4VK Line in between both. The most economic way to achieve this is the shortest straight line between the closest connection points, which is around 60km. This was the route identified for the preferred option in the Strategic Option Report from Stage 1. All other things being equal, a straight line would be the shortest route and therefore represent both the lowest cost solution and the least amount of new development that would potentially give rise to environmental impacts.

Phase II: High-level Constraints Review

5.2.7 A high-level desk-based review was undertaken of the features representing major potential constraints between each of the connection points: the major areas of highest amenity value, main centres of population and major technical constraints. There is one small internationally designated site, Grimsthorpe Special Area of Conservation (SAC) in the vicinity of the straight line route. There are no Special Protection Areas, Ramsar or World Heritage Sites directly along the route. There are also no nationally designated sites specifically sensitive to OHL, such as National Parks or National Landscapes in the area. However, it would pass directly over Grimsthorpe Castle Registered Park and Garden (RPG), parts of which are designated as Sites of Special Scientific Interest (SSSI), Moor Lane moated site, Whissendine Scheduled Monument, parts of Market Overton including listed buildings, ancient woodlands, and close to the north of Cottesmore Airfield. There are several Scheduled Monument s, SSSIs, ancient woodlands, watercourses and areas within Flood Zone 2 and 3 within 2km of the direct route.

5.2.8 The eastern connection point is fixed at the proposed location for Weston Mash substation infrastructure, however there is no fixed location for the western end to connect the ZA line north of Market Harborough (WMEL-B) or for the WMEL-A substation to connect to the 4VK Line. Therefore, to allow appropriate potential corridors to be identified with the flexibility to avoid and minimise potential impacts to high amenity value areas and environmental constraints a stretch of the existing ZA Line was examined, to the north and south of the initial direct route, whilst maintaining the overall distance of around 60km for new OHL. This provided northern and southern limits over approximately 20km of the ZA Line for a connection within which the new substation could be located and still require around 60km of new OHL infrastructure. These limits, and the original direct route (the middle line), are shown as the three straight lines in **Figure 5-2**. This was considered an appropriate area within which a range of suitable corridors could be developed for consideration in this options appraisal.

Phase III: Initial Search Area

5.2.9 An area within 10km of the straight line limits identified in Phase II above was considered an appropriate initial search area to allow identification, collection and consideration of environmental constraints and data available which could then be used to determine the OHL study area. This was considered sufficient to identify sensitive receptors which could be significantly impacted by proposed OHL so that data could be collected and they could be appropriately considered in the appraisal. This initial search area is shown in **Figure 5-2.**

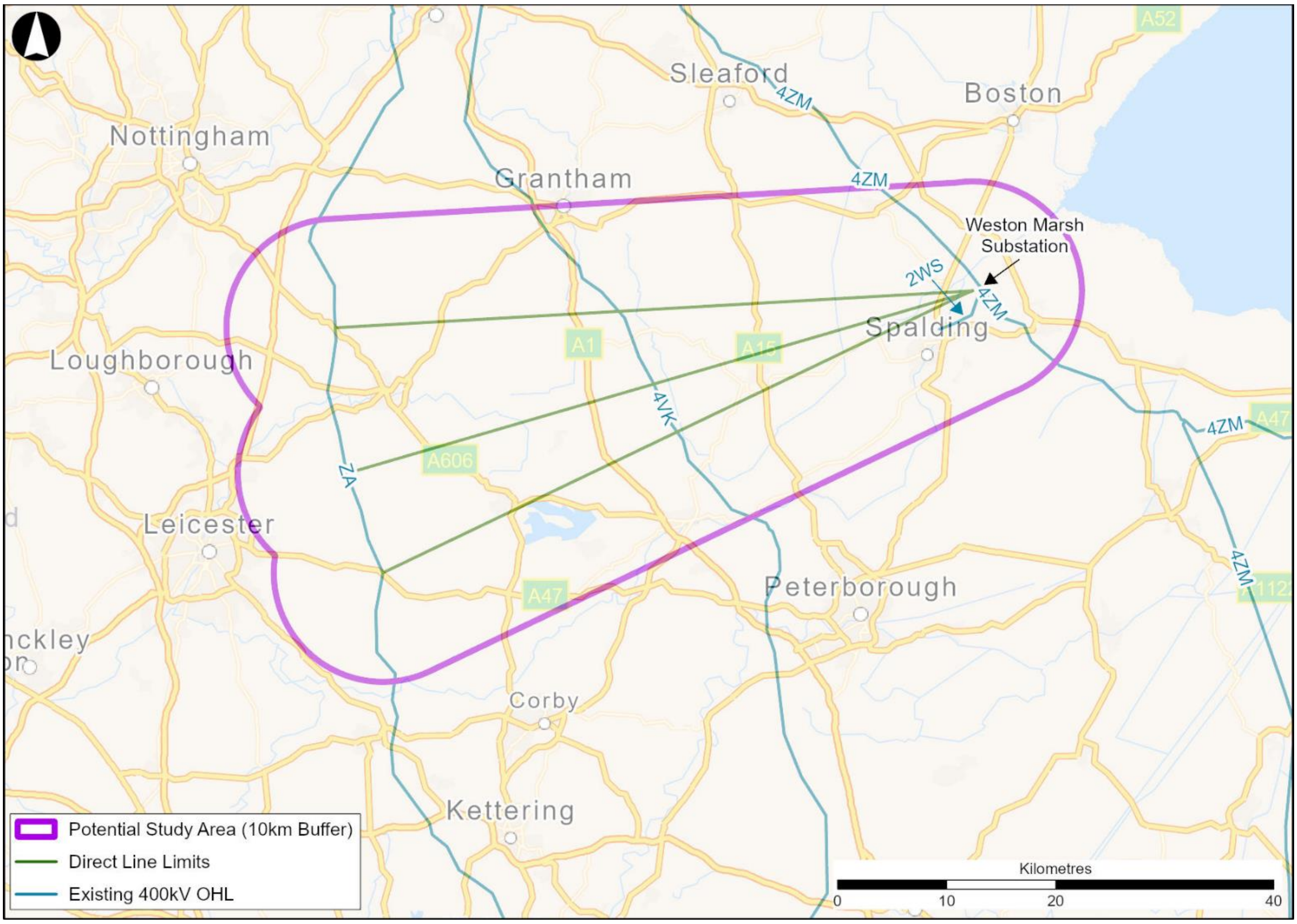
Phase IV: Refinement of Study Area

5.2.10 The initial search area for the new OHL ranges from around 20km wide in the east to over 40km wide in the west. The search area identified limited specific areas of very high amenity or other value in the northern part but a greater density of constraints in the southern part of the search area. As no highly sensitive/valuable receptors have been identified within 10km (e.g. no National Landscapes, National Parks, or World Heritage Sites) to the north, the Study Area in the north was reduced to 5km from northern direct routes. The Study Area was also marginally refined to avoid high density populated areas around Grantham, Leicester and Stamford, while retaining the flexibility to identify potential routes to the north and allow the feasibility of routeing to the south of Rutland Water, a Special Protection Area which should be avoided, to be appraised.

Phase V: Expansion of Search Area

5.2.11 The refinement of the Study Area for the new OHL reduced the initial search area however it remained wide enough to identify potential routeing in the northern part of the search area without further expansion. It was not considered practical to extend the Study Area any further south as this would notably increase the length of new OHL required and would require routeing through further highly constrained areas to the south of Stamford and north of Peterborough. Therefore, no further expansion of the Study areas was taken forward.

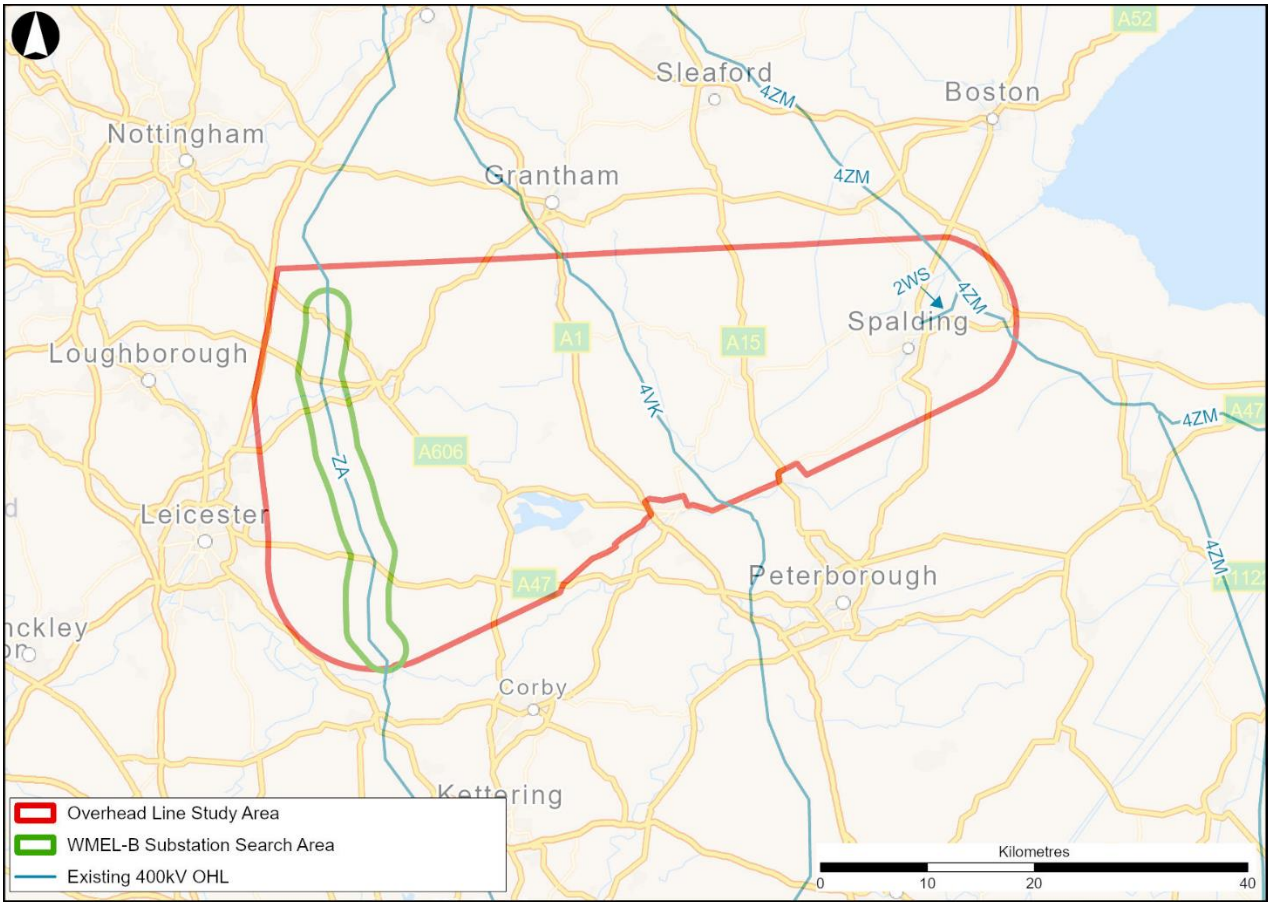
Figure 5-2 – Initial Overhead Line Search Area



WMEL-B Substation Study Area

5.2.12 An area within 2km of the existing OHL up to and between the limits identified in Phase II above was considered appropriate for the initial search areas for the new substation along the ZA Line. This allowed constraints in the potential location of substations to be identified during Preliminary Corridor selection, ensuring these locations are feasible before refining to identify study areas for the substations for specific Route Options. While identifying potential locations for substations, the search area was extended slightly to the north and south, within the OHL Study Area, to ensure all relevant constraints were identified. This substation search area is within the overall revised OHL study area as shown in **Figure 5-3**.

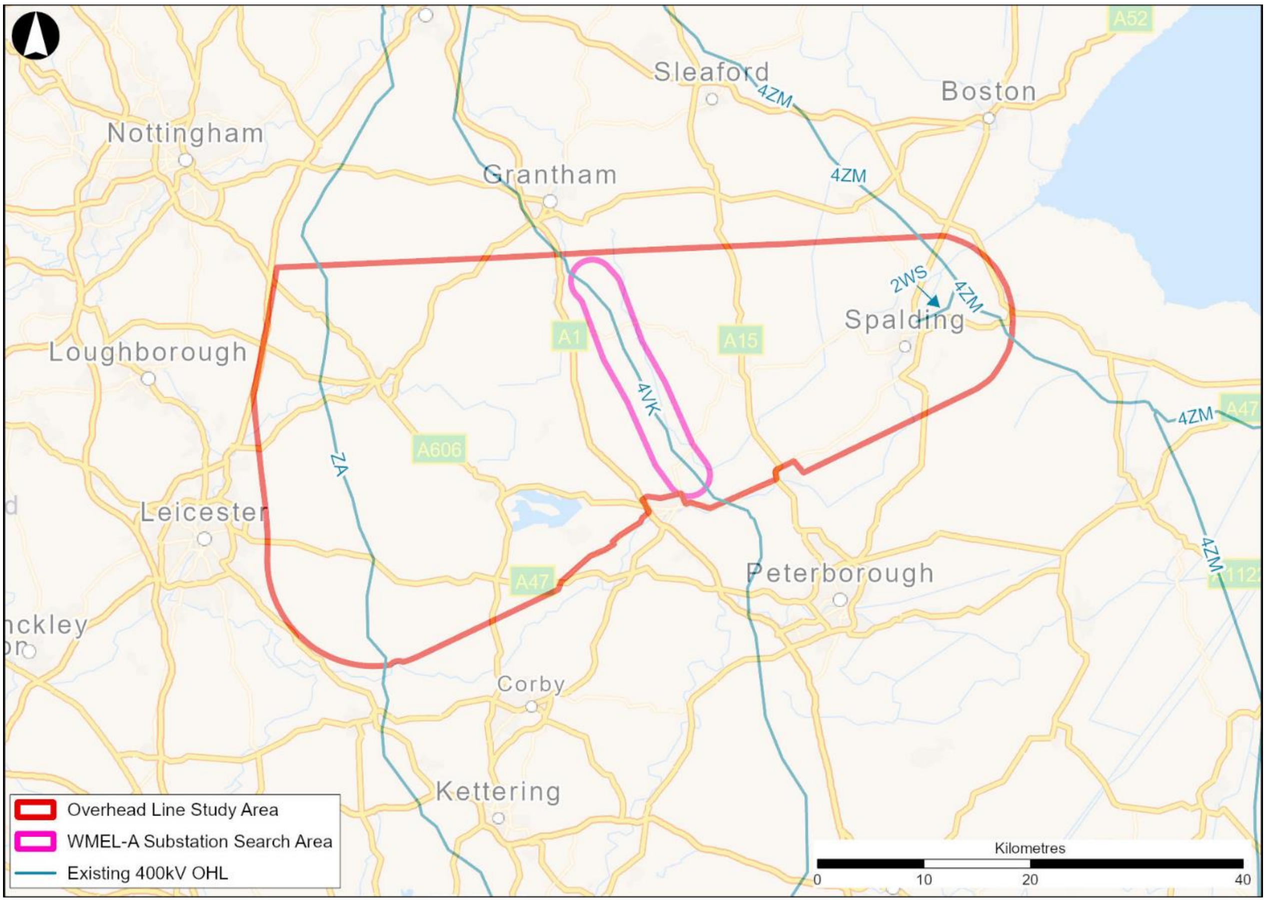
Figure 5-3 – WMEL-B Substation Search Area



WMEL-A Substation Study Area

5.2.13 An area within 2km of the existing 4VK OHL between the limits identified in Phase II above and extending north and south, within the OHL Study Area, to allow for deviation in the alignment to avoid constraints, was considered appropriate for the initial search area for the new substation along the 4VK Line. This allowed constraints in the potential location of substations to be identified during Preliminary Corridor selection, ensuring these are feasible before refining to identify study areas for the substations for specific Route Options. This substation search area is within the overall new OHL search area as shown in **Figure 5-4.**

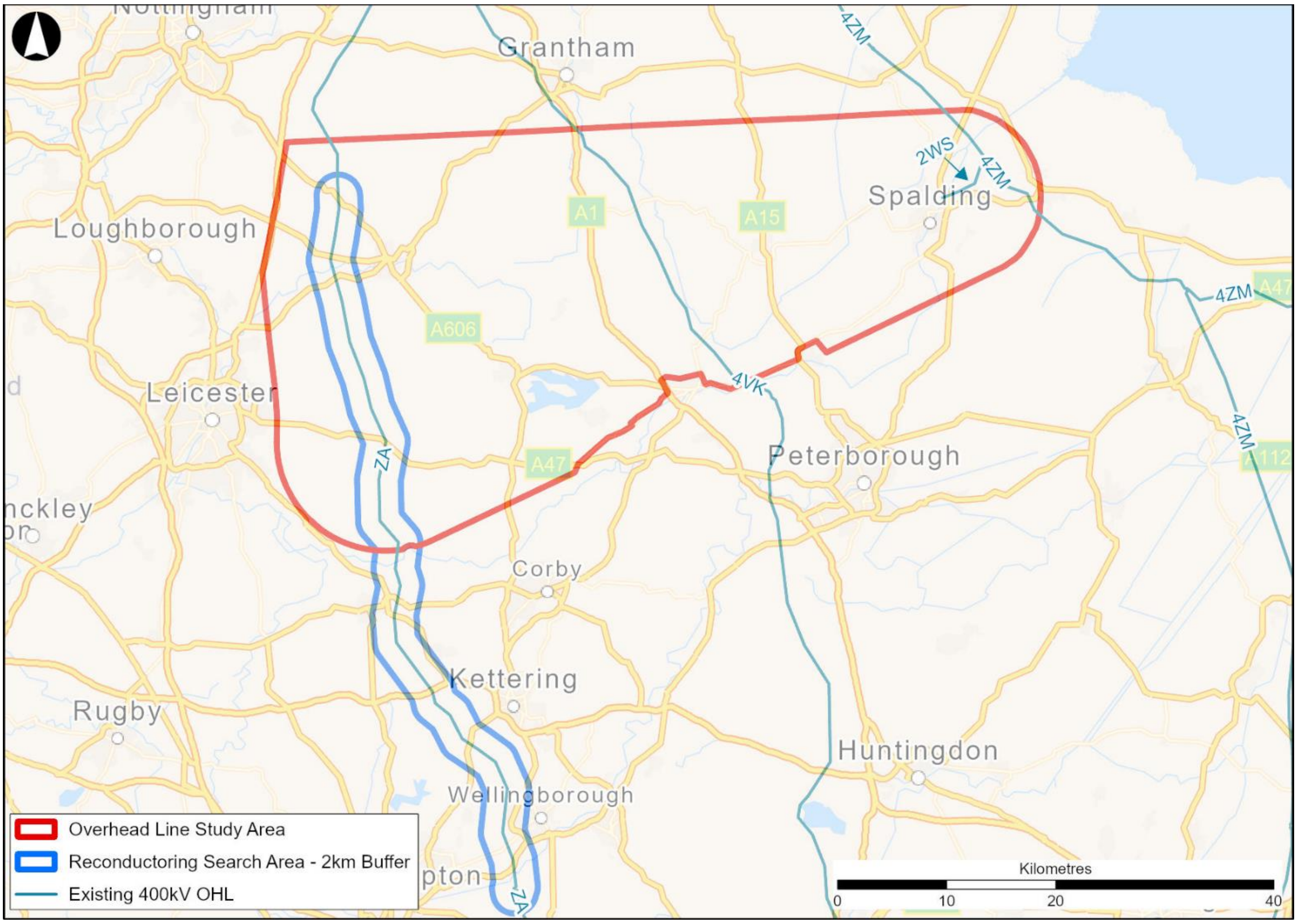
Figure 5-4 – WMEL-A Substation Search Area



Reconductoring Study Area

5.2.14 Although the reconductoring is not expected to deviate from the existing OHL, a search area was developed to identify potential constraints to construction access. An area within 2km of the existing ZA OHL from the most northern limit for the new OHL, to the existing Grendon substation around 11km to the east of Northampton, has been defined as the search area for the reconductoring. This area was considered sufficient to identify potential constraints to construction access for reconductoring as currently the preferable option at this stage for the OHL reconductoring is to use the existing alignment, therefore limiting the potential for wider impacts such as landscape and visual amenity, and the setting of heritage assets.

Figure 5-5 – Reconductoring Search Area



5.3 Description of the Study Area

5.3.1 The Study Area is located between the city of Leicester and The Wash on the east coast at Holbeach St Matthew, just south of the town of Boston. There are various population centres within the Study Area, the largest town, Spalding, is located in the east of the Study Area with a population of 30,556 (2021).

5.3.2 In the east of the Study Area there are smaller population centres include the villages of Bicker, Donington, Fosdyke, Gosberton, Holbeach St Marks, Moulton, Weston, Deeping St Nicolas and Risegate.

5.3.3 Within the central section of the Study Area is the market town of Bourne (population of 17,981 (2021)) located approximately 15km west of Spalding, intersected by the A15. Smaller population centres in the central section of the Study Area include the villages of Folkingham, Aslackby, Kirkby Underwood, Ingoldsby, and Sproxton.

5.3.4 In the west of the Study Area, the largest population centres are the market towns of; Melton Mowbray (population of 27,737 (2021)) intersected by the River Wreake in the northwest corner of the Study Area; Oakham (population of 12,149 (2021)), located northwest of Rutland Water reservoir; and Uppingham (population of 4,745 (2011)) located in the southwest section of the Study Area, northeast of Eyebrook Reservoir. Smaller population centres in the central section of the Study Area include the villages of Eastwell, Saltby, Pickwell, Thorpe Satchville, Little Stretton, and Horninghold.

5.3.5 Several National Character Areas (NCAs) are present within the Study Area, including Trent and Belvoir Vales, Leicestershire and Nottinghamshire Wolds, High Leicestershire, Kesteven Uplands, Southern Lincolnshire Edge and The Fens.

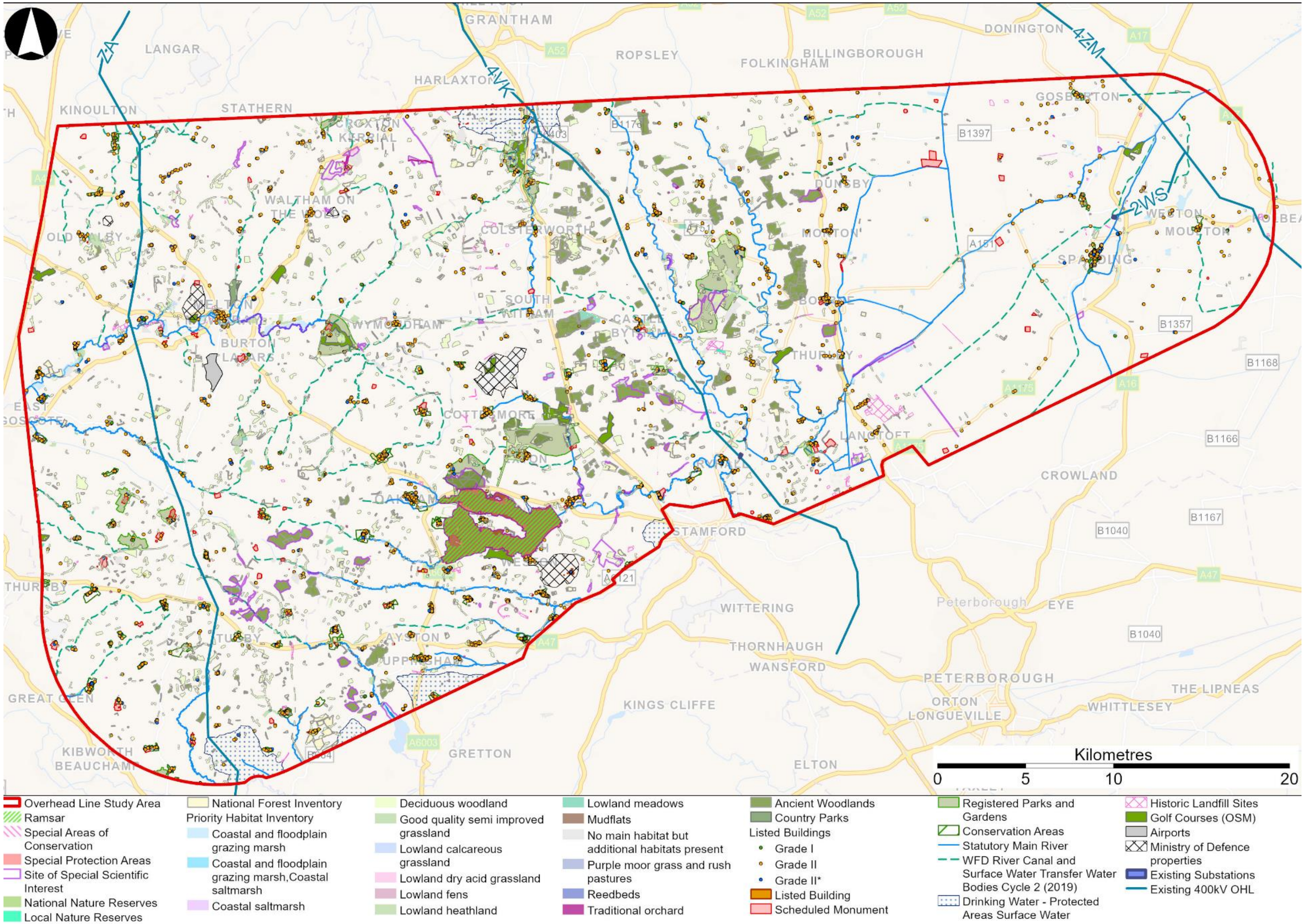
5.3.6 The Grimsthorpe SAC and Baston Fen SAC are present in the central section of the Study Area, west and southeast of the town of Bourne. Rutland Water is a Ramsar site and Special Protection areas (SPA) covering a notable area in the south of the Study Area. There are also several SSSI present within the Study Area, concentrated in the west and southwest. Larger SSSIs include: Leighfield Forest on the southwestern corner of the Study Area, west of Loddington; Owston Woods located in the southwest of the Study Area, north of Withcote Hall; Rutland Water located on the edge of the southwestern boundary, west of Oakham; Clipsham Old Quarry and Pickworth Great Wood located centrally within the Study Area, southeast of Clipsham; and Grimsthorpe Park located centrally within the Study Area, on the Lincolnshire Edge, northeast of Little Bytham.

5.3.7 Several large rivers run through the Study Area, including: the River Weake, which extends from the west of the Study Area at Ratcliffe on the Wreake to Melton Mowbray, the River Eye extends east from the River Weake to Garthorpe; the River Witham, which extends south from Grantham to South Witham; the River Gwash, which extends north from Stamford to Ryhall, and then continues southwest through Rutland Water to the south of Knossington; the River Glen extends west from the River Welland in the east through to Baston where the river splits into the East Glen River and the West Glen River; and the River Welland itself that extends west from The Wash, intersecting the River Glen, and then continues south through Spalding towards Crowland.

5.3.8 The road network comprises major routes, including the A1, A15, A16, A17, A46, A47, A151, A152, A606, A607, and A1175, which connect the settlements of Leicester, Melton Mowbray, Bourne and Spalding.

5.3.9 Key environmental and socio-economic features are shown in **Figure 5-6**.

Figure 5-6 – The Overhead Line Study Area, Environmental and Socio-Economic Features



5.4 Scope Environmental Topics and Data Gathering (Step 2)

5.4.1 To identify connection options which best satisfy NGET's statutory duties and obligations and meet the Project objectives identified in the Strategic Proposal Stage (Stage 1), it is necessary to understand the distribution of environmental and technical constraints (push factors) and opportunities (pull factors) within the Study Area. Data to inform this was gathered for the Study Area, as well as for the immediately surrounding areas for those topic areas where it was considered that there was potential for adverse impacts on a feature outside the Study Area boundary (for example, connected habitats or impacts on migrating birds from a designated site). The extent of this data gathering was based on the professional judgement of the Project environmental and engineering specialists, considering relevant environmental legislation, policy and best practice. Specific mitigation and enhancement measures will be developed as part of the EIA in line with NPS EN-5 (paragraph 2.9.22).

5.4.2 Features representing potential constraints to development were categorised as either 'seek to avoid' or 'seek to minimise' to, respectively, either avoid or minimise impacts whilst achieving the Project objectives for each of the technology options (OHLs, reconductoring and substations). Features were categorised based on the level of constraint that the relevant environmental specialist considered them to represent based on professional judgement and relevant environmental legislation, policy and best practice. The sensitivity of particular sites and features relevant to the Project will be continually reviewed as the Project progresses in response to non-statutory consultation feedback and further site-based assessment.

5.4.3 A list of the data obtained, to inform the onwards steps, is listed in **Table 5-1** for OHLs, and **Table 5-2** for substations.

5.4.4 Buffers were also included for some features representing constraints, where it was considered that potentially significant indirect impacts could occur from beyond the asset itself, for example impacts on the setting of a listed building, to avoid or minimise that impact. In addition, buffers were added to residential properties as all things being equal, avoidance of direct oversail of residential properties during routeing of new infrastructure is the preferred approach. The extent of the buffers was based upon the professional judgement of the relevant project team subject matter expert, taking into account relevant legislation, policy and best practice. The buffers were not intended to be areas where new infrastructure must be avoided but instead are areas where new infrastructure should be minimised. The buffers are shown in **Table 5-1** for OHLs and for substations. Where no buffer value is provided no buffer was considered necessary to consider the constraint appropriately. Where multiple buffer values are provided, the varying buffers were assigned different sensitivity weightings, this is described further in **Section 5.5**.

5.4.5 As well as potential constraints to the Project, the mapping exercise also identified features that might offer potential opportunities and therefore promote the inclusion of certain areas within Preliminary Corridors. The principal opportunities were associated with the potential to route parallel in proximity (referred to as 'close parallel') to existing 400kV OHLs, and thus restrict the geographic extent of environmental impacts associated with such infrastructure in line with NPS EN-5 (paragraph 2.13.16). Further discussion of the close parallel opportunity is provided in **paragraphs 5.6.24** and **5.6.32.**

Table 5-1 — Data Gathering Features (OHL)

Sub-topic	Constraint Name	Buffer
Air Quality	Residential Properties	25m
Ecology	Ancient Woodland	500m
	Ancient Tree	50m
	National Nature Reserve	n/a
	Ramsar	500m and 2km
	Special Area of Conservation (SAC)	500m
	Special Protection Area (SPA)	500m, 1km and 5km
	Site of Special Scientific Interest (SSSI)	500m
	Important Bird Area	500m and 2km
	Local Wildlife Site	250m
	Priority Habitat Inventory	n/a
	Traditional Orchard	n/a
	National Forest Inventory Woodland	n/a
	Important Bird Area	500m and 2km
	Local Nature Reserve (LNR)	n/a
Economic Activity	Buildings (other than residential properties e.g. retail, industrial estates)	n/a
	Existing energy developments (e.g. built solar farms, wind farms, BESS etc)	n/a
	Best Most Versatile (BMV) agricultural land (Agricultural Land Classification (ALC) Grades 1, 2, 3)	n/a
	National Trails	n/a
	National Trust Land	n/a
	Local Plan Allocations	n/a
	Mineral Safeguarding Areas	n/a
	Aggregates and Mineral Resource Areas	n/a
Geology and Soils	Peaty Soils	n/a
	Available Brownfield Land Sites	n/a
	Local Geodiversity Sites	n/a
	Aggregates and Mineral Resource Areas	n/a
	Active Landfill Sites	n/a
	Historic Landfill Sites	n/a
Historic Environment	Listed Buildings	250m

Sub-topic	Constraint Name	Buffer
	Scheduled Monuments	250m
	Registered Parks and Gardens	250m
	Conservation Areas	n/a
	National Trust Properties	n/a
Landscape and Visual	National Landscapes (Previously AONB)	500m
	Landscape Character Area	250m
	Country Park	100m
	Local Landscape Designations	2 km
	Recreational Areas	n/a
	Viewpoints	n/a
	National Cycle Network	n/a
	Outdoor recreational facilities including golf courses, canals and caravan parks	n/a
	Residential settlements and individual dwellings	25m

Sub-topic	Constraint Name	Buffer
Aviation and Defence	Licensed Airfield / Aerodrome	500m
	Unlicensed Airfield / Aerodrome	n/a
	Ministry of Defence properties (including military airfields)	500m
Traffic and Transport	Rail Stations	n/a
	Rail Network	n/a
	National Cycle Network	n/a
Water	River Basin Districts (WFD)	n/a
	Statutory Main Rivers	n/a
	Ground Water Dependant Terrestrial Ecosystems	n/a
	Flood Zones 2 & 3	n/a
	Source Protection Zones	n/a
	Internal Drainage Board Drains	n/a

Table 5-2 — Data Gathering Features (Substations)

Sub-topic	Constraint Name	Buffer
Air Quality	Residential Properties	25m
Ecology	Ancient Woodland	50m
	Ancient Tree	50m
	National Nature Reserve	
	Ramsar	500m and 2km
	Special Area of Conservation (SAC)	500m
	Special Protection Area (SPA)	500m and 1km
	Site of Special Scientific Interest (SSSI)	500m
	Important Bird Area	500m and 2km
	Local Wildlife Site	250 m
	Priority Habitat Inventory	n/a
	Traditional Orchard	n/a
	National Forest Inventory Woodland	n/a
	Important Bird Area	500m and 2km
	Local Nature Reserve (LNR)	n/a
Socio-economics	Buildings (other than residential properties e.g. retail, industrial estates)	n/a
	Existing energy developments (e.g. built solar farms, wind farms, BESS etc).	n/a
	Best Most Versatile (BMV) agricultural land (Agricultural Land Classification (ALC) Grades 1, 2, 3)	n/a
	National Trails	n/a
	National Trust Land	n/a
	Local Plan Allocations	n/a
	Mineral Safeguarding Areas	n/a
	Aggregates and Mineral Resource Areas	n/a
Geology and Soils	Peaty Soils	n/a
	Available Brownfield Land Sites	n/a
	Local Geodiversity Sites	n/a
	Aggregates and Mineral Resource Areas	n/a

Sub-topic	Constraint Name	Buffer
	Active Landfill Sites	n/a
	Historic Landfill Sites	n/a
Historic Environment	Listed Buildings	250m
	Scheduled Monuments	250m
	Registered Parks and Gardens	250m
	Conservation Areas	n/a
	National Trust Properties	n/a
Landscape and Visual	National Landscapes (Previously AONB)	500m
	Landscape Character Area	250m
	Country Park	100m
	Local Landscape Designations	2km
	Recreational Areas	n/a
	Viewpoints	n/a
	National Cycle Network	n/a
	Outdoor recreational facilities including golf courses, canals and caravan parks	n/a

Sub-topic	Constraint Name	Buffer
	Residential settlements and individual dwellings	25m
Aviation and Defence	Licensed Airfield / Aerodrome	500m
	Unlicensed Airfield / Aerodrome	n/a
	Ministry of Defence properties (including military airfields)	500m
Traffic and Transport	Rail Stations	n/a
	Rail Network	n/a
	National Cycle Network	n/a
Water	River Basin Districts (WFD)	n/a
	Statutory Main Rivers	n/a
	Ground Water Dependant Terrestrial Ecosystems	n/a
	Flood Zones 2 & 3	n/a
	Source Protection Zones	n/a
	Internal Drainage Board Drains	n/a

5.5 Ascribe a weight to, confirm, and 'Heat Map' Features (Step 3)

5.5.1 Data gathered for features representing potential constraints to development was attributed a sensitivity weighting as described in **Chapter 4**. Sensitivity weightings were attributed by the relevant landscape and environmental specialist based on professional judgement, considering relevant environmental legislation, policy and best practice and agreed with the Project team. The data, once classified, was then used to create 'heat maps' showing the relative importance of the different features. This assisted in providing a visual representation of the relevant constraints for the Project across the Project Study Area and informed the identification of initial Preliminary Corridors, Siting Zones and Siting Areas.

5.5.2 The heat maps were then reviewed by the Project team to ensure that the sensitivity weightings applied were appropriate in terms of their relative importance in decision-making for the type of infrastructure proposed, and to check whether there were features that were so extensive that they would affect all corridors or Siting Zones or Siting Areas and mask the visual representation of differentiating risks on the heat map and thus not help in distinguishing between options. Following this review several amendments were made, including:

- Removal of BMV[37] Agricultural Land from the heat maps as the entirety of the Study Area is covered by this feature with extensive bands of Grade 1, 2 and 3 agricultural land, so any east to west OHL from Weston Marsh Siting Zone would have to pass though and therefore it would not be a differentiating factor in the identification and assessment of corridors. BMV has been considered at a more local level for Siting Areas.
- Removal of Flood Zone 2 and Flood Zone 3 from the heat maps. The eastern side of the Study Area, including the area from the Weston Marsh Siting Zone to approximately the A15, falls within Flood Zones 2 and 3. Therefore any east to west OHL from Weston Marsh Siting Zone would have to pass though similar extents such that they would not be a differentiating factor in the identification of corridors.
- Reduction in the size of the buffers around residential properties for the OHL heat map as there are a large number of individual or small groups of properties within the Study Area and the initial buffer size overwhelmed the map therefore not providing a differentiating factor in the identification of corridors.
- The review identified the need for several additional datasets for which data was collated into the GIS and added to the heat mapping. This included local airfields and residential properties, data derived from OpenStreetMap.
- Inclusion of planning policy land allocations, set out in relevant development plans that have been sourced directly from Local Planning Authorities.

5.5.3 The heat maps were reviewed again following these changes and used for the identification of initial Preliminary Corridors for OHLs and undergrounding, and

[37] Best Most Versatile' land, which is defined as Agricultural Land Classification (ALC) Grades 1, 2 and 3a agricultural land and is recognised as the most productive and versatile land. The ALC system for grading agricultural land quality is provided in England & Wales (MAFF 1988).

substation Siting Zones and Siting Areas. The heatmaps for each technology type for the Project are shown in **Figure 5-7** to **Figure 5-9**.

Figure 5-7 – OHL Study Area Heat Map

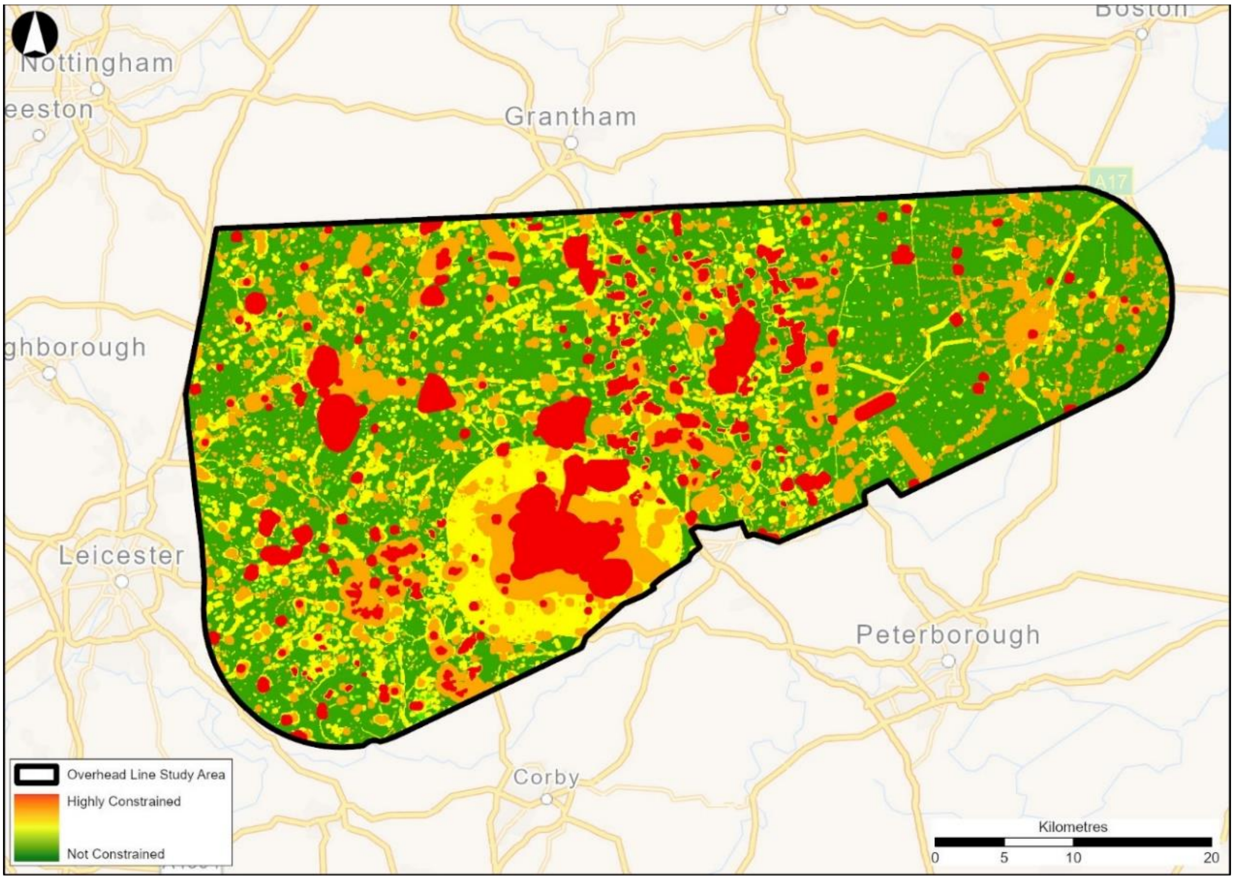


Figure 5-8 – WMEL-B Substation Search Area Heat Map

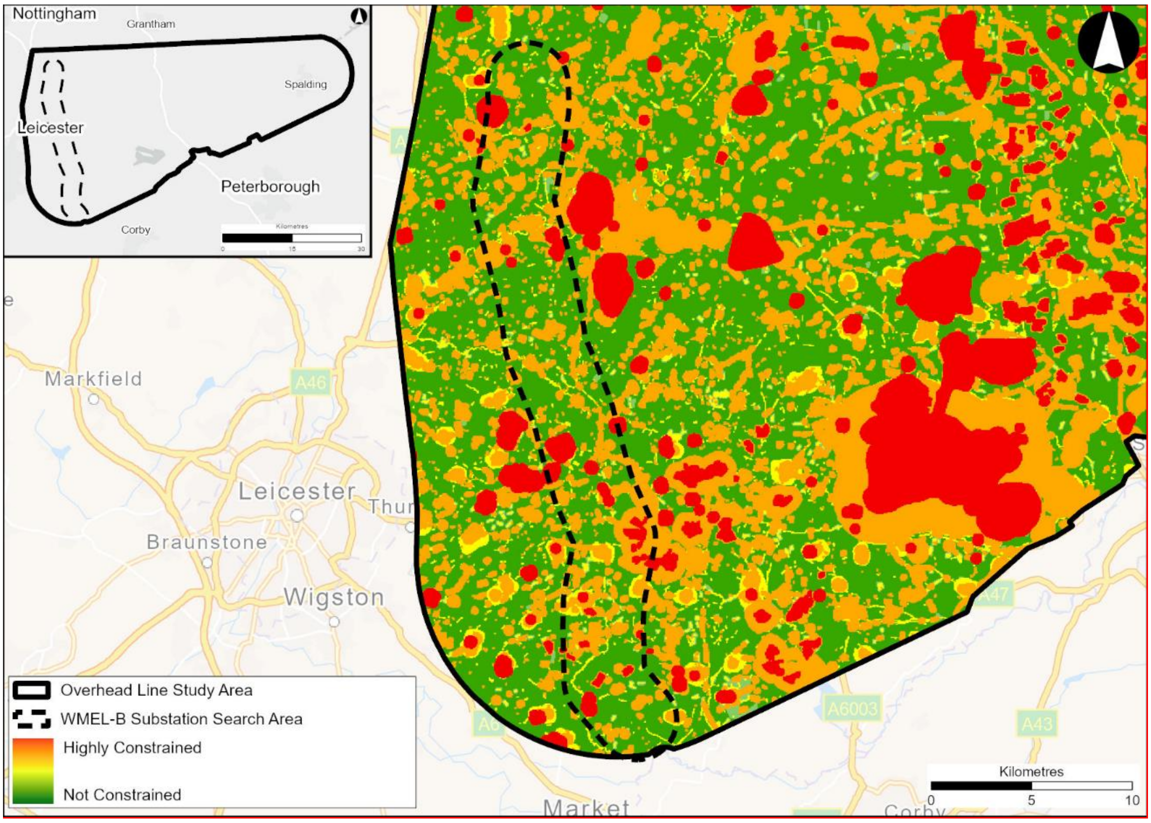
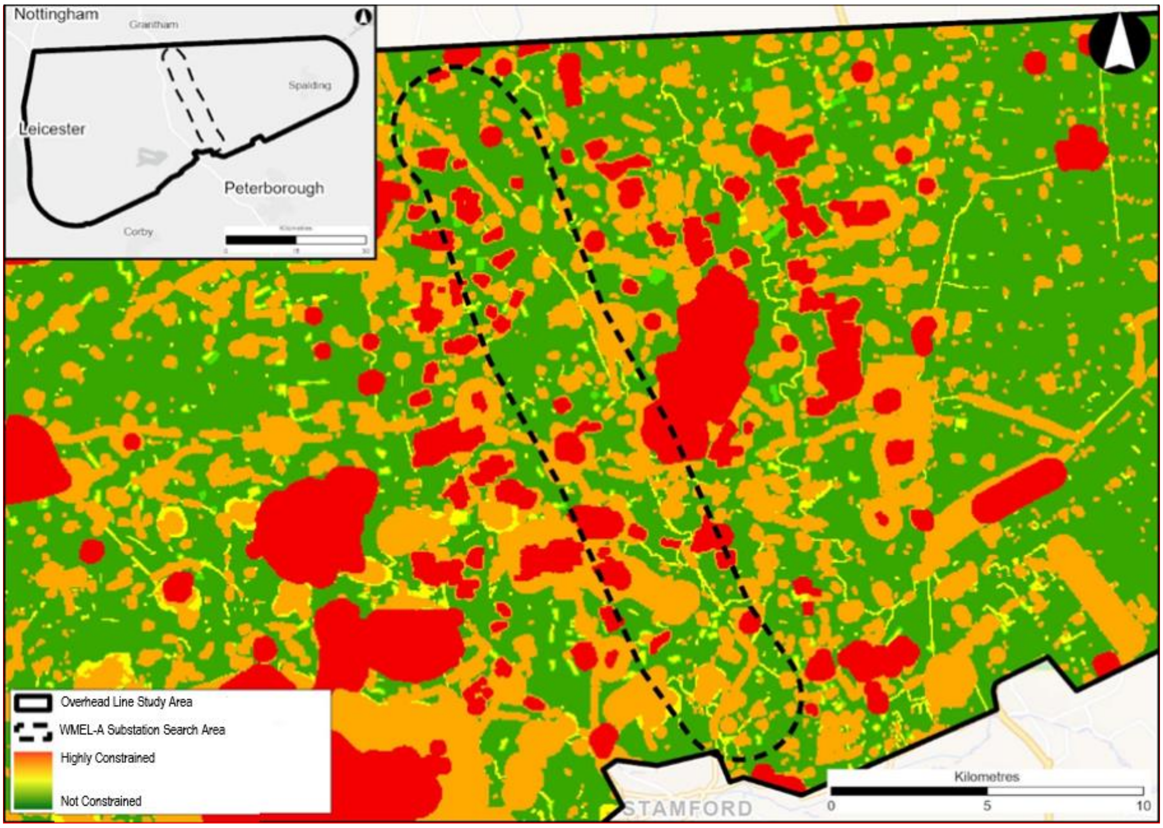


Figure 5-9 – WMEL-A Substation Search Area Heat Map



5.6 Identifying and Defining Siting Zones, Siting Areas and Corridors for Overhead Lines (Steps 4 to 6)

5.6.1 The heat maps derived for each of the Project components informed the identification of options for Preliminary Corridors, Siting Zones and Siting Areas within the Study Area.

Overhead Lines (Steps 4 to 6)

5.6.2 Following the development of the heat maps at Step 3, initial Preliminary Corridors were developed between the potential connection points by key environmental, social and design specialists working collaboratively. The initial Preliminary Corridors were identified by applying professional judgement, and their knowledge of routeing considerations, in particular the Holford Rules, as outlined in **Chapter 3**. This was to ensure that the corridors identified were technically feasible whilst minimising the potential for adverse impacts on the environment, including elements and nuances that cannot be digitised (e.g. Holford Rules 3 to 7, see below).

5.6.3 The GIS analysis using environmental constraints and heat maps was used as a starting point to identify corridors that aimed to:

- Entirely avoid the largest areas of highest amenity and largest settlements;
- Avoid smaller areas of higher amenity and smaller clusters of houses as far as possible;
- Avoid smaller areas of technical constraint as far as possible;
- Allow for enough space to accommodate reasonable lengths of straight alignment at later stages of the Project, in accordance with Holford Rule 3;
- Be broad enough to allow for smaller areas of high amenity and residential properties within the corridor to be avoided at the detailed design stage;
- Likewise, be broad enough for constraints not apparent at this stage (i.e., information arising from non-statutory consultation, not currently known to NGET) to be avoided at the detailed design stage; and
- Provide options to connect from one corridor to another so that constrained sections of an otherwise suitable corridor can be bypassed.

5.6.4 The consideration of the Holford Rules in the development of the initial preliminary corridors was led by environmental specialists, including landscape architects because the underlying aim of the rules is, in effect, to guide the design of OHLs to have the least possible landscape and visual impacts whilst avoiding important constraints. Rules 1 and 2 address the areas of high amenity (i.e. environmental constraints). Rule 1 applies at a broader scale, primarily in setting the Study Area. Rule 2 considers amenity areas at a smaller scale and therefore was the main driver in developing the heat maps, the GIS analysis, and is critical in developing corridors. Rule 3 considers the effect of ‘angle’ pylons and the visual impacts that may be caused by an OHL with frequent changes of direction. Rules 4 and 5 consider ways to ‘best fit’ an OHL in the landscape to reduce the degree to which it may be visible. Rule 6 considers wirescape and Rule 7 considers the approaches to urban areas.

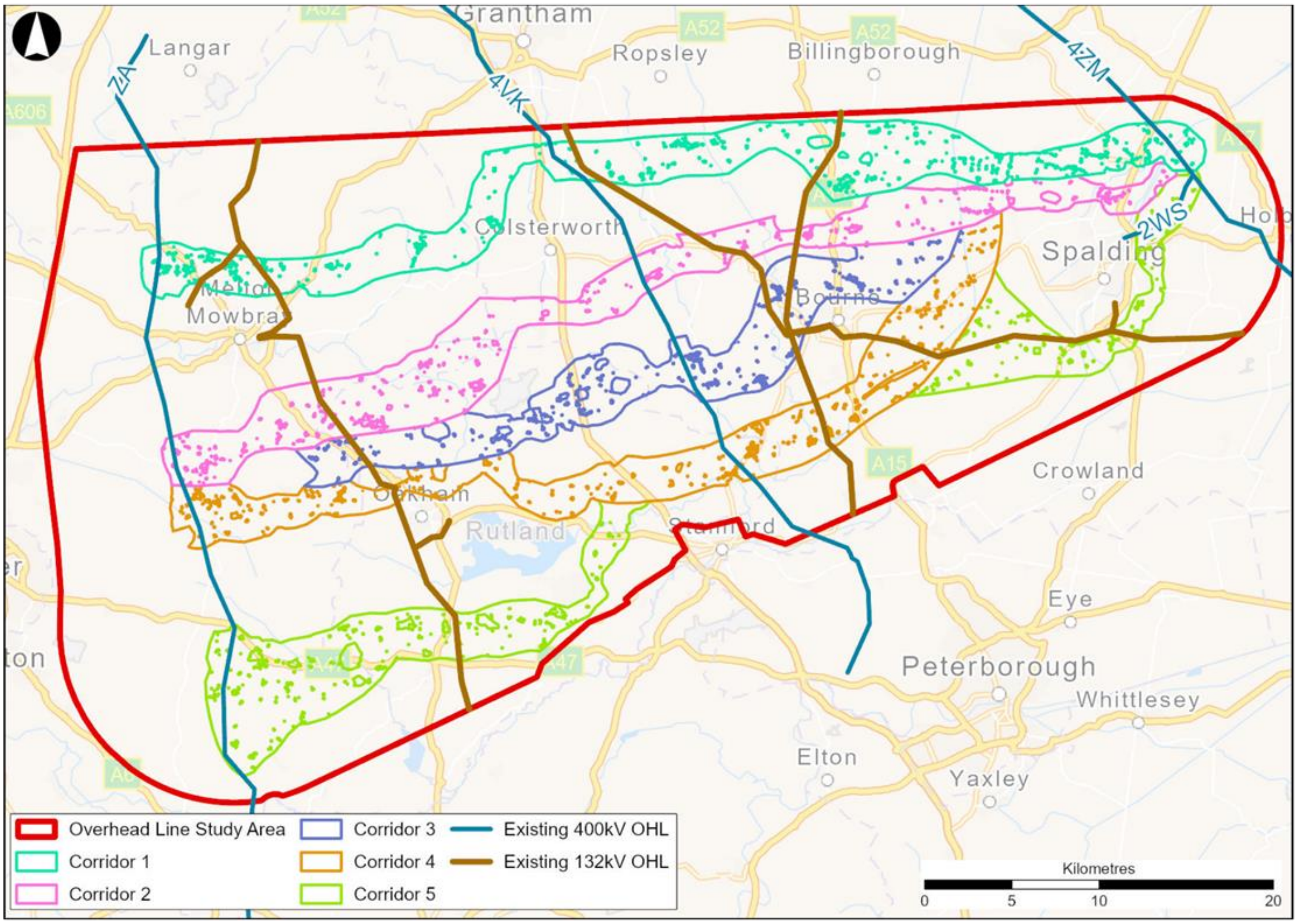
5.6.5 The landscape of the Study Area from Weston Marsh west to Bourne/Dunsby/ Morton/Thurlby is generally flat and open, with long views therefore Rules 4 and 5 which primarily refer to topography are less relevant and harder to accommodate. The development of the Preliminary Corridors in the east of the Study Area was therefore driven by Rules 2 and 3, with technical and socio-economic considerations feeding in alongside environmental constraints. The development of Preliminary Corridors aimed to ensure that areas of constraint are either excluded or where included in the corridor can be avoided in detailed design whilst avoiding unnecessary changes of direction.

5.6.6 Furthermore, the Holford Rules supplementary notes consider routeing close to residential areas, and state that this should be avoided as far as possible on grounds of general amenity. NGET's preferred approach is to avoid direct oversail of residential properties during routeing of new infrastructure as far as practicable. Therefore, residential properties were excluded from the corridors where practicable, as described in **paragraph 5.6.9**.

5.6.7 As well as potential constraints to development, the mapping exercise also identified opportunities to promote the inclusion of certain areas within the corridors. The principal opportunities were associated with the potential to route parallel with and close to the existing 400kV ZM and 2WS OHLs (referred to as 'close parallel', as detailed under the heading 'The Opportunity of a Close Parallel Alignment**'** in **Section 5.6**), and thus restrict the geographic extent of environmental and socio-economic impacts associated with such infrastructure. These opportunities, where relevant, were considered in the development of the corridors.

5.6.8 These initial preliminary corridors are shown in **Figure 5-10**. The identified corridors were then subject to challenge and review and further analysis by the Project team.

Figure 5-10 – Corridors (Overhead Line)



5.6.9 The review considered information gathered from the environment and planning site visits undertaken (ground-truthing key issues and pinch-points identified during the desk studies) and further design and construction issues subsequently identified by the technical teams. Suggested amendments to the corridors were implemented where they were consistent with environmental considerations. The changes implemented include:

- Cutting out sections of corridors where clusters of residential properties were present.
- Narrowing of the corridor between Crabtree Road and Woolsthorpe-by-Colsterwoth, moving the boundary north to avoid a quarry.
- Expansion of corridor to the north of Aslackby and Dowsby, whilst splitting the corridor earlier to the east of Temple Wood to allow a straighter alignment when diverting to the north or south, and provide additional Route Options further north.
- Included an additional corridor between Burton-le-Coggles and Bitchfield allowing for a possible northern route link parallel to the existing 132kV HA OHL.
- Rerouteing corridors around the Scheduled Monument between Long Drove and Dowsby Drain, as the receptor is too large to oversail.
- Cutting out a section of corridor around Chicken sheds at Pinchbeck Farm and expanding the corridor to the south.
- Reviewed properties in the area south of Spalding Golf Club for commercial/industrial use which would be preferable to route OHL near to, rather than residential. The corridor was expanded to the south in the area to allow additional routeing options around a built-up area.
- Corridor expanded to 100m width in the area between Rutland Caravan & Camping and Kendrew Barracks – former RAF Cottesmore to maximise space for a possible Route Option in this area.
- Corridor expanded in the area between Wytchly Warren Spinny and Former RAF North Luffenham to maximise space for a possible Route Option in this area.
- Sections of corridors removed in the area around Somerby and Burrough Hill Country Park, to avoid an area of steep topography prone to mass ground movements.
- Expanded a corridor from the junction of the A1147 and B1172 south of Spalding, northwest towards toward the River Glen. This allows for a parallel route to follow the existing 132kV OHL or to provide access to corridors to the north.
- Included an additional corridor around Manthorpe and the A6121 allowing for a link to the corridor to the north for possible Route Options.
- Narrowed and moved a section of corridor to thread between South and North Witham instead, to avoid crossing the A1 to the south of South Witham.
- Removed sections of corridors on the land west of Langhan due to the siting of a recently consented solar farm.

5.6.10 In addition, an exercise was undertaken to check the extent of potential constraints on both larger scale OS mapping and aerial photography.

5.6.11 The Preliminary Corridors identified for Options Appraisal are presented in **Figure 5-11**.

Preliminary Corridors

5.6.12 The corridor identification and review exercise identified a network of potential corridors and links. To allow for clear, comparative analysis, these were structured and individually named. The links provide several potential routes for the new OHL to follow or cross over to another corridor via a link. Only two of the corridors provide a complete end-to-end solution however but the complexity of the network of corridors and links is such that there are many potential routes across them. Therefore, the corridors were divided into the segments and links at locations where potential routes could follow multiple directions, which allowed parts of different corridors (the Segments) to emerge as a more or less preferred based on the environmental, socio-economic and technical criteria considered in the approval methodology. Following Options Appraisal, the corridor segments emerging as preferred could then be combined to form an end-to-end Route Option.

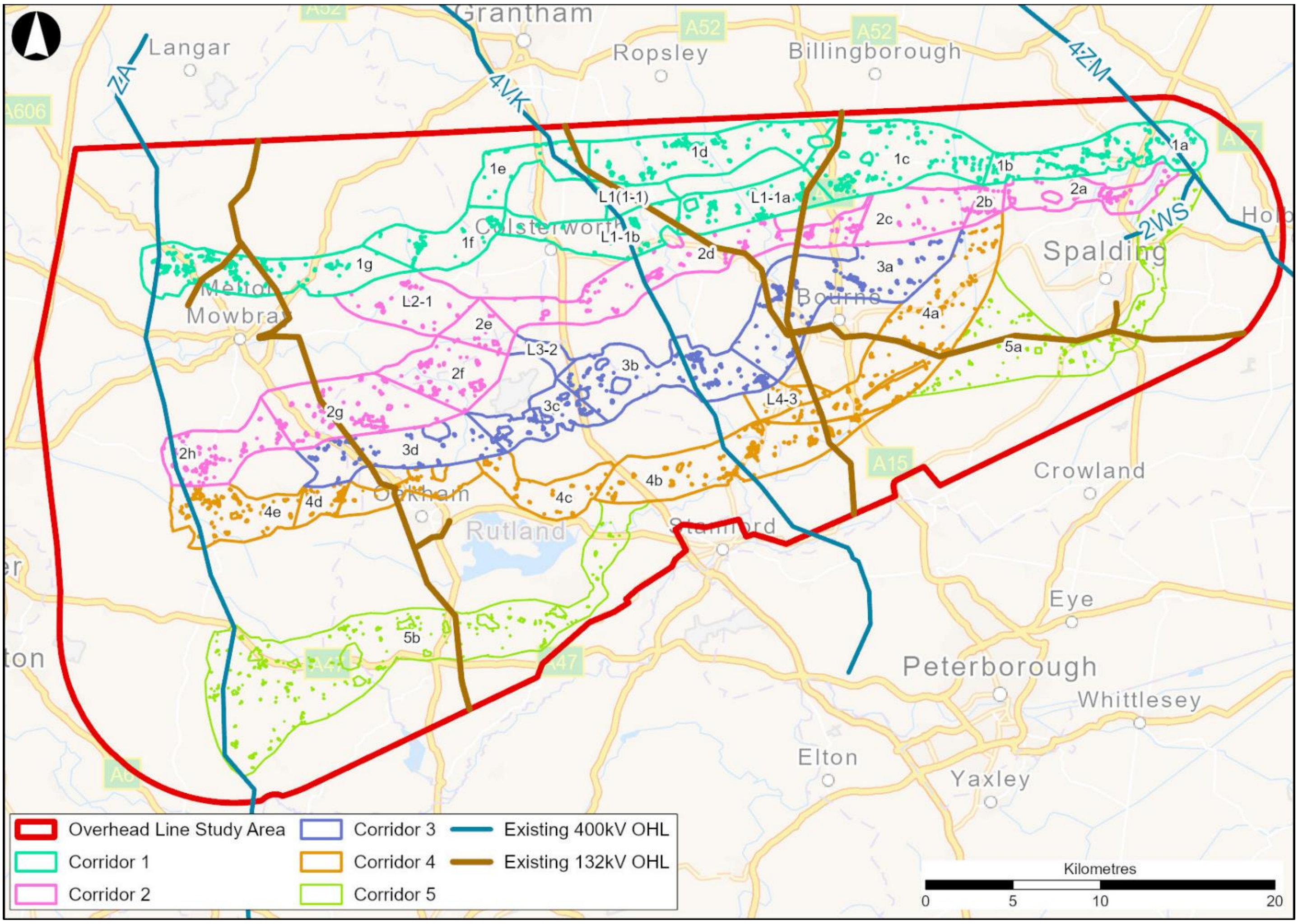
5.6.13 The individual segments of the corridor are referenced with a prefix and segment number, as follows:

- Preliminary Corridor 1 options have a segment suffix letter e.g., Route Corridor 1 segment a is known as Segment 1a.
- Preliminary Corridor 2 options have a segment suffix letter e.g., Route Corridor 2 segment a is known as Segment 2a.
- Preliminary Corridor 3 options have a segment suffix letter e.g., Route Corridor 3 segment a is known as Segment 3a.
- Preliminary Corridor 4 options have a segment suffix letter e.g., Route Corridor 4 segment a is known as Segment 4a.
- Preliminary Corridor 5 options have a segment suffix letter e.g., Route Corridor 5 segment a is known as Segment 5a.

5.6.14 The Links are named according to the corridors they join with the prefix “L”, e.g. L2-1 provides a Link from Preliminary Corridor 2 to Preliminary Corridor 1.

5.6.15 The location and extent of the Preliminary Corridors their associated segments and Links, and how they interact with existing OHL, are shown on **Figure 5-11**.

Figure 5-11 – Preliminary Corridors with Segments and Links (Overhead Line)



5.6.16 The identified corridors between Weston Marsh, through the WMEL-A substation, to the new WMEL-B substation form a complex permutation of options through the middle of the Study Area. The alignment and separation of the corridors was primarily driven by the pattern of settlement and known environmental constraints. Groups of constraints, and in some instances individual constraints, were avoided and cut-out of the corridors leading to the creation of 'cut-outs' or holes that can be seen within the corridors.

5.6.17 Preliminary Corridor 1 would leave Weston Marsh substation Siting Zone northwest following the existing 4ZM 400kV OHL crossing the River Welland before turning west passing north of Surfleet and south of Gosberton. The corridor crosses a rail line and continues south of Gosberton Clough, widening as it heads towards Dowsby, Rippingdale and Aslackby, then crossing the A15. The corridor splits at this point with the northern Segment 1d narrowing as it passes to the north of Temple Wood encompassing Lenton, Ingoldshy, Bitchfield, Westby, Bassingthorpe, Lower Bassingthorpe. Continuing to Segment 1e, the corridor crosses the existing 4VK OHL, ECML and B6403, narrowing as it crosses the A1 highway between Great Ponton and Stoke Rochford, before routeing south to Skillington. The south Link L1-1a heads west from Kirkby Underwood crossing the south extent of Temple Wood and north extent of Callan's Lane, before crossing East Glen River westward towards Irham. Link L1-1b passes Corby Glen and Burton-le-Coggles, where there is a Link L1(1-1) north following the existing 132kV HA OHL to connect with Segment 1d. Link L1-1b continues west crossing the ECML, 4VK OHL, narrowing as it crosses the B6403 and the A1 highways between Easton and Colsterworth, before linking with Segment 1f at Skillington. The singular corridor continues west passing Sproxton, narrowing slightly to cross the A607, passing north of Melton Mowbray, crossing two existing 132kV OHLs (TZ and TZB) then reaching the existing ZA 400kV OHL in proximity to Ab Kettleby and Wartnaby.

5.6.18 Preliminary Corridor 2 would leave Weston Marsh substation Siting Zone southwest crossing the River Welland, before turning west to cross the A16, then narrowing to pass through a commercial residential area along the B1356 between Crossgate and Surfleet. The corridor widens crossing the River Glen and a rail line before following Pinchback North Fen, Dunsby Fen and Hanconby Fen, on to Haconby. The corridor narrows crossing the A15, then routes between Callan’s Lane Wood and Spring Wood. It then widens and crosses the 132 HA OHL and A151, passing south of Corby Glen. Heading southwest the corridor crosses the ECML, passes Swayfield, narrows to cross the A1 highway and pass between North Witham and South Witham. From this point (Segment 2e) the corridor widens and splits. The north route comprises of Link L2-1 which travels northwest to connect with Segment 1g. Segment 2f travels southwest passing Market Overton, transitioning to Segment 2g which crosses a rail line heading west passed Whissendine. From here the corridor crosses the existing 132kv HN OHL and the A606, before narrowing to pass between Great Dalby to the north and Burrough Hill Country Park to the south. The corridor then widens passing Thorpe Satchville and reaching the existing ZA 400kV OHL.

5.6.19 Preliminary Corridor 3, Segment 3a travels southwest from Segment 2c, before turning west to cross the A15 between Morton and Bourne. Crossing Bourne Wood and the A151 the corridor heads southwest, turning west again to cross the ECML and the 4VK OHL at Little Bytham. Continuing west the corridor narrows between Castle Bytham and Holywell Hall, it then widens crosses the A1 and then splits. To the northwest passing between South Witham and Kendrew Barracks – former RAF Cottesmore the narrow Link L3-2 connects Segment 3b with Segment 2e. To the southwest the corridor narrows to a pinch point between Kendrew Barracks – former RAF Cottesmore to the north and Exton Park to the south. This Segment also encompasses Greetham and Cottesmore. Continuing west the corridor widens passing Ashwell and Langham, crossing the A606, ending east of Pickwell. Segment 3d connects with Segment 2g to the north and Segment 4d to the south, which provide possible Route Options to the existing ZA 400kV OHL

5.6.20 Preliminary Corridor 4, Segment 4a travels southwest from Segment 2b passing Bourne to the west, crossing the A161, the 132kV HB OHL, and the River Glen. The corridor narrows as it crosses the A15 between Thurlby and Baston, then splits with Link L4-3 providing a connection to the north with Segment 3b. Segment 4b continues southwest crossing the A6121 and ECML at Essendine. North of Ryhall the corridor crosses the 4VK 400kV OHL and the B1176. Continuing west the corridor crosses the A1 highway then narrows to cross Barnsdale Avenue between Exton to the north and Rutland Water to the south. The corridor continues a narrow route westward and crosses the A606 between Oakham and Langham, then widens encompassing Cold Overton, passing north of Knossington and south of Somery, before reaching the existing ZA 400kV over headline near Twyford.

5.6.21 Preliminary Corridor 5 consists of two Segments. Segment 5a leaves south from Weston Marsh substation following the existing 2WS 400kV OHL before crossing the A161 between Spalding and Weston, at this point the corridor narrows crossing the B1165 east of Low Fulney. Continuing southwest the corridor widens crossing the 132kV HB OHL, the A16, New River and River Welland. From this point south of Spalding the corridor crosses the A1176 and a rail line before widening considerably to the north to connect into Segment 4a. Segment 5b connects from the west end of Segment 4b, west of the A1 highway, with this section of corridor 5 being Segment 4b. The corridor routes south around the east of Rutland Water narrowing to a pinch point south of former RAF North Luffenham. The corridor then turns west widening and crossing two rail lines, widening further and encompassing Ridlington and Belton-in-Rutland, before reaching the existing ZA 400kV OHL in the area surrounding Goadby.

Appraising 'Close Parallel' Opportunities

The Opportunity of a Close Parallel Alignment

5.6.22 In general terms, a close parallel route may have the potential to reduce the overall extent of environmental impacts arising from the Project by intensifying the degree of impact on receptors already affected by existing OHLs, rather that spreading impacts to areas not currently affected.

5.6.23 Whilst the efficacy of close paralleling in reducing environmental impacts would be strongly influenced by local factors (e.g. topography, settlement pattern, woodland cover etc.), the optimum level of benefit is likely to result from lines that, as stated in Holford Rule 6, are planned with pylon types, spans and conductors forming a coherent appearance. In most circumstances, this is likely to be more achievable the closer the OHLs are to each other, as local conditions would be likely to be similar for both OHLs.

5.6.24 The minimum distance between lines is determined by technical and safety constraints and would typically be 80m. The maximum distance at which the benefits of close paralleling might be achieved depends on local factors which are described in more detail below. Whilst this maximum cannot be precisely defined, it is considered to be unlikely to be more than approximately 200m in most circumstances.

Challenges with a Close Parallel Alignment

5.6.25 As mentioned above, the benefit of a close parallel alignment is realised when the pylon types, spans and conductors form a coherent appearance. This is difficult to achieve, as the appearance of the infrastructure can change depending on the direction and level it is being viewed from. It is not always feasible to site pylons adjacent to each other if there are constraints present alongside the existing pylon(s), and this can also result in an inconsistent span length and clearance level for the OHL.

5.6.26 There are technical challenges associated with construction of a close parallel alignment, including difficulties with achieving the required offset from the existing OHL and access where the existing OHL is already within a constrained working area. In some locations, there will be a need to cross the existing OHL where routeing is not continually viable on one side. In these circumstances, a line swap-over, or duck-under would be required and it can be challenging to accommodate these within the existing infrastructure. For instance, existing OHLs may need to be re-routed or require temporary diversions under system outages to accommodate a line swap-over or duck-under.

5.6.27 There are opportunities to have close parallel alignments to the existing 400kV and 132kV lines in the Study Area, as seen in **Figure 5-11**. This has been considered whilst defining corridor options to restrict the environmental and socio-economic impacts of the new line.

5.6.28 The Study Area includes two 400kV routes in the east. These two routes are 4ZM and 2WS. 4ZM routes in a northwest to southeast direction along the east extent of the Study Area. The new OHL could potentially be aligned closely; however this may be limited to a short section as the new OHL would need to be routed to the west.

5.6.29 The 2WS OHL provides a connection from Spalding Power Station located northeast of Spalding, routeing northeast to meet the 4ZM OHL. The new OHL could potentially be aligned closely along a southern route; however, this may be limited to a short section due to the 2WS line terminating at Spalding Power Station.

5.6.30 The HB 132kV OHL extends from Walpole routeing west, south of Spalding to Bourne. The route of this 132kV OHL is mostly through open land, and no major constraints are identified for the close parallel approach. One of the corridor options considers this section within; details can be seen in **Chapter 6**

5.6.31 HA 132kV OHL routes from Bourne in a northwest direction to Grantham. The new OHL could potentially be aligned closely; however, this may be limited to a short section as the new OHL would need to be routed to the west.

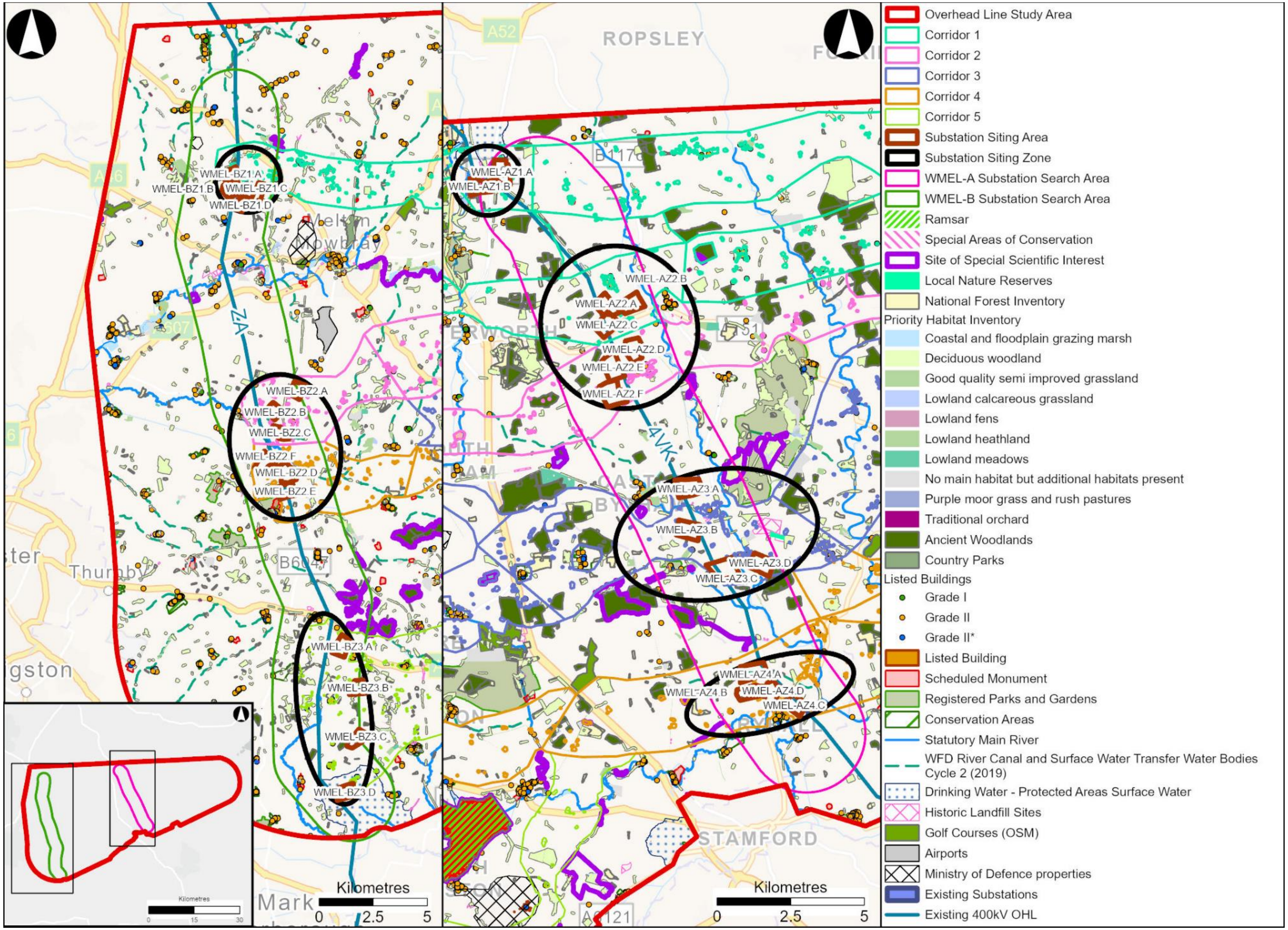
Substation Siting Zones and Siting Areas

WMEL-B Substation

WMEL-B Substation – Steps 4 and 5

5.6.32 Potential Siting Zones were identified where Preliminary Corridors intersected the WMEL-B Study Area. The identification of potential WMEL-B Siting Areas was undertaken taking into consideration the required land take, distribution of environmental, socio-economic and technical constraints (see **Figure 5-12**), and the Horlock Rules as detailed below.

Figure 5-12 – Location of the WMEL-B and WMEL-A Siting Zones and Siting Areas



5.6.33 As outlined in **Chapter 2**, an AIS substation (larger than a GIS substation) for the WMEL-B substation could extend to approximately 720m by 400m (approximately 288,000m^2 or 28.8ha) to allow flexibility in design such as accommodating potential future connections. Based on this broad technical parameter, environment specialists including landscape and visual, ecology and heritage, using GIS mapping and working with other members of the Project team, identified potential Siting Areas within the Siting Zones for each corridor. The Siting Areas identified were sufficient in size for siting of the WMEL-B substation and to allow for any required micro-siting at subsequent stages such that, as far as reasonably possible, they met the following criteria:

- Avoid sites of high amenity, heritage or environmental value;
- Avoid sites close to larger settlements (where reasonably possible);
- Seek to identify an area where the effect on local features (such as mature hedgerows and tree belts) is as low as reasonably practicable;
- Avoid areas that risk affecting surface or ground water sources, and sites at risk of flooding (where reasonably possible);
- Seek areas where local screening (e.g. woodlands) could be used to reduce the degree of intrusion; and
- Seek areas with sufficient space around to allow for mitigation planting and/or landform.

5.6.34 In addition, the following issues which may lead to additional environmental effects were considered:

- Access: where possible seek areas in proximity to A-roads or B-roads or potential to develop access, for large indivisible loads, to minimise the risk of off-site effects from road improvements; and
- Connections: consider the likely OHL or underground cable (if required) connection approaches to Siting Areas, and the potential effects of these (noting that these must be weighed in the balance when selecting a preferred option). These include new connections and potential modifications required to the existing electricity transmission and distribution infrastructure (existing 400kV ZA line).

5.6.35 The presence of brownfield land was considered as NGET seek areas of previously developed land ahead of greenfield sites where possible, particularly to reduce effects on ground conditions and the water environment. However, no areas of vacant or available brownfield land were identified within the Siting Zones.

5.6.36 The definition of the WMEL-B Siting Zones and Siting Areas has avoided most key environmental features. Therefore, the identification of potential Siting Areas was driven by proximity of the potential route corridors in relation to the existing 400kV ZA transmission infrastructure and the presence of more localised constraints and areas with space available. Taking these into consideration, three Siting Zones and fourteen Siting Areas were identified and are described below.

5.6.37 **Siting Zone WMEL-BZ1** – an area, approximately 3km in diameter centred around Wartnaby. It encompasses Ab Kettleby and the A606 routes north to south along the east edge of the Siting Zone. The Siting Zone contains the four Siting Areas shown in **Figure 5-12** and described below:

- WMEL-BZ1.A is an area of approximately 725m by 450m (31.5ha) located immediately west of Wartnaby which encompasses the existing 400kV ZA OHL to the east.
- WMEL-BZ1.B is an area of approximately 960m by 570m (37ha) located southwest of Wartnaby which encompasses the existing 400kV ZA OHL to the east.
- WMEL-BZ1.C is an area of 980m by 420m (33.1ha) located southeast of Wartnaby and immediately northwest of Cant's Thorns wood.
- WMEL-BZ1.D is an area of approximately 780m by 530m (33.3ha) located south of Wartnaby and north of Glebe Farm.

5.6.38 **Siting Zone WMEL-BZ2** – an area, approximately 6.7km by 5.1km centred around Twyford and encompasses John O'Gaunt, and Thorpe Satchville, Lowesby Hall estate located in the southwest of the Siting Zone, and the B6047 which routes north to south. The Siting Zone contains the six Siting Areas shown in **Figure 5-12** and described below:

- WMEL-BZ2.A is an area of approximately 720m by 560m (38.7ha) located north of Thorpe Satchville and immediately west of Thorpe Satchville Road.
- WMEL-BZ2.B is an area of approximately 640m by 580m (35.8ha) located northwest of Thorpe Satchville and immediately west of Hare Spinney wood.
- WMEL-BZ2.C is an area of approximately 920m by 470m (30.2ha) located southwest of Thorpe Satchville, northeast of the B674, west of the B6047.
- WMEL-BZ2.D is an area of approximately 900m by 700m (53.8ha) located immediately south of Twyford and the B6047 and encompasses the existing 400kV ZA OHL to the west.
- WMEL-BZ2.E is an area of approximately 940m by 600m (50ha) located south of Twyford, east of the B6047, and encompasses the existing 400kV ZA OHL to through the centre of the area.
- WMEL-BZ2.F is an area of approximately 910 by 650m (49.2ha) located immediately west of Twyford, northwest of the B6047, and encompasses the existing 400kV ZA OHL to the east.

5.6.39 **Siting Zone WMEL-BZ3** – an area, approximately 8.8km by 3.4km centred around Goadby and encompasses Noseley, Glooston and Cranoe, and partially encompasses Tugby and Skefflington. The Siting Zone contains the four Siting Areas shown in **Figure 5-12** and described below:

- WMEL-BZ3.A is approximately 970m by 610m (49.8ha) located northwest of Tugby and immediately southwest of the A47.
- WMEL-BZ3.B is approximately 750m by 620m (36.5ha) located northeast of Goadby and immediately north of Bassett's Hill Spinney wood.
- WMEL-BZ3.C is approximately 980m by 600m (45.4ha) located northeast of Glooston and immediately northeast of Glooston Wood.
- WMEL-BZ3.D is approximately 820m by 600m (43.7ha) located immediately southwest of Carnoe, and encompasses the existing 400kV ZA OHL to the west.

WMEL-B Substation – Step 6

5.6.40 The identified Siting Areas were subject to a challenge and review and further analysis by the Project team. The review considered information gathered from the environment and planning site visits (ground-truthing key issues during the desk studies) and further design and construction issues identified by the technical teams. The review resulted in the following changes to the Siting Areas:

- The expansion of WMEL-BZ1.C to the north and south to allow for additional area to accommodate substation.
- Reshaping the boundaries of WMEL-BZ1.B to avoid priority habitat woodland and allow for the existing 400kV ZA OHL to run along the east boundary.
- The addition of WMEL-BZ1.D to the south end of WMEL-BZ1 Siting Zone.
- The expansion of WMEL-BZ2.B to the west to allow for additional area to accommodate substation.
- The expansion of WMEL-BZ2.C to the east to allow for additional area. to accommodate substation
- The rotation of WMEL-BZ2.D to align the west boundary of the Siting Area with the existing 400kV ZA OHL
- The relocation of WMEL-BZ2.F to its current position west of Twyford to avoid priority woodland habitat and allow for better access to the area via the B6047.

WMEL-A Substation

WMEL-A Substation – Steps 4 and 5

5.6.41 Potential Siting Zones were identified where Preliminary Corridors intersected the WMEL-A Study Area. The identification of potential WMEL-A Siting Areas was undertaken taking into consideration the required land take, distribution of environmental, socio-economic and technical constraints (see **Figure 5-12**), and the Horlock Rules as detailed below. The definition of Siting Zones and areas followed the same methodology as described above for the WMEL-B Substation.

5.6.42 The definition of the WMEL-A Siting Zones has avoided most key environmental features. Therefore, the identification of potential Siting Areas was driven by proximity to existing transmission infrastructure and the presence of more localised constraints and areas with space available. Taking these into consideration, four Siting Zones and sixteen Siting Areas were identified are described below:

5.6.43 **Siting Zone WMEL-AZ1** – an area approximately 2.3km in diameter southeast of Great Ponton and compasses the ECML routeing northwest to southeast through the Siting Zone. The Siting Zone contains the two Siting Areas shown in **Figure 5-12** and described below:

- WMEL-AZ1.A is approximately 800m by 570m (39ha) is located immediately east of the B6403 and northeast of the ECML.
- WMEL-AZ1.B is approximately 810m by 590m (33.8ha) is located immediately west of the B6403, southwest of the ECML, and encompasses the existing 400kV 4VK OHL to the northeast.

5.6.44 **Siting Zone WMEL-AZ2** – an area approximately 5.5km by 5.3km and encompasses Burton-le-Coggles, Corby Glen and Swayfield. The A151 routes east west through the centre of the Siting Zone. The Siting Zone contains the six Siting Areas shown in **Figure 5-12**and described below:

- WMEL-AZ2.A is approximately 840m by 540m (37.1ha) located south of Burton-le-Coggles, immediately southwest of the ECML, northwest of the A151, and encompasses the existing 400kV 4VK OHL to the west.
- WMEL-AZ2.B is approximately 810m by 570m (37.1ha) located south of southeast of Burton-le-Coggles, west of Corby Glen, immediately northeast of the ECML, and northwest of the A141.
- WMEL-AZ2.C is approximately 970m by 660m (52.7ha) located south of Burton-le-Coggles, immediately northwest of the A141, southwest of the ECML, and encompasses the existing 400kV 4VK OHL through the centre of area.
- WMEL-AZ2.D is approximately 780m by 640m (38.2ha) located northwest of Swayfield, southwest of the ECML, and southeast of the A141.
- WMEL-AZ2.E is approximately 900m by 560m (50ha) located west of Swayfield, southeast of the A141, immediately north of Overgate Road, and encompasses the existing 400kV 4VK OHL to the east.
- WMEL-AZ2.F is approximately 800m 790m (54.9ha) located southwest of Swayfield, and immediately south of Overgate Road.

5.6.45 **Siting Zone WMEL-AZ3** – an area approximately 7km by 4.5km and encompasses Little Bytham, Careby, and partially encompasses Castle Bytham. The B1176 and the ECML routes north south through the centre of the zone. The Siting Zone contains four Siting Areas shown in **Figure 5-12** and described below:

- WMEL-AZ3.A is approximately 860m by 620m (46.1ha) located northwest of Little Bytham, immediately west of the ECML, west of the B1176, and encompasses the existing 400kV 4VK OHL to the west.
- WMEL-AZ3.B is approximately 770m by 560m (40.7ha) located southwest of Little Bytham, west of the ECML, and encompasses the existing 400kV 4VK OHL to the east.
- WMEL-AZ3.C is approximately 910m by 680m (51.3ha) located immediately southwest of Careby, immediately west of the B1176 and ECML, and encompasses the existing 400kV 4VK OHL to the west.
- WMEL-AZ3.D is approximately 770m by 560m (40ha) located southeast of Careby, and immediately northwest of Careby Wood.

5.6.46 **Siting Zone WMEL-AZ4** – an area approximately 5.9km by 2.4km and encompasses Ryhall and Essendine. The ECML rail line routes north south through the east of the zone, and the A6121 approximately routes southwest to northeast through the east of the zone. The Siting Zone contains four Siting Areas shown in **Figure 5-12** and is described below:

- WMEL-AZ4.A is approximately 940m by 530m (42.3ha) located north of Ryhall and immediately west of the B1176, and encompasses the existing 400kV 4VK OHL to the east.

- WMEL-AZ4.B is approximately 1000m by 390m (34.8ha) located northwest of Ryhall, immediately west of the B1176, and northwest of the A6121.
- WMEL-AZ4.C is approximately 730m by 510m (31.6ha) located immediately northeast of Ryhall, immediately southeast of the A6121, and southwest of the ECML.
- WMEL-AZ4.D is approximately 840m by 630m (34.6ha) located immediately north of Ryhall, immediately northwest of the A6121, immediately east of the B1176, and encompasses the existing 400kV 4VK OHL to the east.

WMEL-A Substation – Step 6

5.6.47 The identified Siting Areas were then subject to challenge and review and further analysis by the Project team. The review considered information gathered from the environment and planning site visits (ground-truthing key issues during the desk studies) and further design and construction issues identified by the technical teams. The review resulted in the following changes to the Siting Areas:

- WMEL-AZ1.A was rotated to avoid habitat and provide better road access to the B6403.
- WMEL-AZ4.D was relocated from the east of Essendine to immediately north of Ryhall to allow better access to the existing 400kv 4VK OHL.
- WMEL-AZ2.A was rated and moved south adjacent to WMEL-BZ2.B to allow for better access to the A151. Mitigation of impacts through avoidance

5.6.48 The Study Area, corridors, Siting Zones and Siting Areas defined through the above process are effectively the first two stages of an iterative process looking at features which represent constraints at an increasingly smaller scale. They were designed to comply with Holford Rules 1 and 2 and Horlock Rule 2, avoiding the major areas of highest amenity value altogether, where practicable, and allowing room within the corridors to avoid smaller areas of high amenity value by local deviation. This approach seeks to minimise environmental impacts from the outset. The main constraints which influenced the formation of the corridors, Siting Zones and Siting Areas and whether they have been avoided by this process, are listed in **Table 5-3**.

Table 5-3 – Major Features Representing Constraints within the Study Area

Topic	Constraint Type and Name/No. within Study Area	Avoided by Corridors, Siting Zones, and Siting Areas?
Aviation and Defence	Leicester Airport	Avoided
	Former RAF Station Melton Mowbray	Avoided
	Kendrew Barracks – former RAF Cottesmore	Avoided
	Airstrips	Avoided - except for Decoy Farm Airstrip in Corridor 1 (Segment 1c)
Ecology	Rutland Water Ramsar Site and SPA	Avoided

	Baston Fen and Grimethorpe SACs	Avoided - except for Baston Fen which is partially within Corridor 4 (Segment 4a)
	SSSIs	Avoided - except for Tolethorpe Road Verges, and Baston and Thurlby Fens within Corridor 4 (Segment 4a and 4b)
	NNR	Avoided
	Ancient woodland	Minimised – areas within Corridor 1 (Segments 1d, L1-1a, L1-1b, and 1g), Corridor 2 (Segment 2d), Corridor 3 (Segments 3a, 3b, and 3c), Corridor 4 (Segment 4a, 4b, 4c) and Corridor 5 (Segment 5b)
Economic Activity	Golf Courses	Avoided
	Country Parks	Avoided – except for Burrough Hill (partially within Corridor 2, Segment 2h)
	National Trust Properties	Avoided
	Allocated DCO sites	Minimised - Temple Oaks Renewable Energy Park is intersected by Corridor 1 (Segment 1d) and EN010127 - Mallard Pass Solar Farm is intersected by Corridor 4 (Segment 4b)
Historic Environment	Scheduled Monuments	Minimised - within Corridor 1 (Segment 1d), Corridor 2 (Segment 2g), Corridor 4 (Segment 4a), Corridor 5 (Segment 5a and 5b)
	Registered Parks and Gardens	Avoided – except for Exton Park partially within Corridor 4 (Segment 4c)
	Conservation Areas	Avoided – except for partially within Corridor 2 (Segment 2f) and Corridor 3 (Segment 3b)

Landscape and Visual	Major Urban Areas Including Spalding, Bourne, Oakham and Melton Mowbray	Avoided
Water Environment	Drinking Water Protected Area	Avoided – except for partially within Corridor 1 (Segment 1e), and Siting Zone WMEL-BZ3

5.6.49 All refined corridors that intersect smaller areas of high amenity, such as SSSIs, listed buildings, Scheduled Monuments and RPGs, have been developed to include enough clearance to allow avoidance of the designations without using too many angle towers, in accordance with Holford Rule 2.

5.6.50 Large settlements in the Study Area have been removed from the refined corridors. Refined corridors are considered sufficiently wide to accommodate a range of alternative routes.

5.7 High Level Costs

5.7.1 Costs have been developed using NGET's cost estimating factors consistent with assumptions in the SOR[3]. The route lengths are used with a per km cost factor derived from previous examples. The costs of applying normal industry 'best practice' mitigation measures during construction and operation are inherent within the cost base used. Costs can therefore be compared at Step 7 (Options Appraisal) on a consistent basis noting that they could be higher or lower, but consistent in relative terms. The scope of work for the new substations at WMEL-B and WMEL- A are alike for all Siting Zones or Siting Areas (and their connecting corridors) and therefore the cost of this work has not been included and is not a differentiator between options.

5.7.2 The costs included were estimated based on prices from the financial year 2024/25 and as such would need adjustment for inflation with time. However, they provide a consistent cost point for comparison of options at this stage.

5.8 Next Step - Options Appraisal (Step 7)

5.8.1 As explained in **Chapter 4**, Options Appraisal (Step 7) is a structured process by which the environmental, socio-economic, technical, cost and programme implications are identified, reported and compared. It is a tool to aid objective and justified decision making and it enables NGET to document in a transparent manner the information on which judgements have been based. Options Appraisal is therefore focused on those sub-topics which assist in distinguishing between options.

5.8.2 Through the definition of study areas and preliminary options as areas that seek to comply with Holford Rules 1 and 2 (seeking to minimise environmental effects from the outset), the options identified have already avoided several features such that they no longer represent differentiating factors. The constraints initially considered but found not to be differentiating factors for the Options Appraisal include:

- National Parks and National Landscapes; none are located within the Study area.
- World Heritage Sites. None are located within the Study area.
- Area Quality Management Areas; none are located within the Study area.

- RSPB Reserve Boundaries. None are located within the Study area.

5.8.3 Although landfills (historic and permitted waste sites) are present within the corridors, given their size and the space available within the corridors they can be avoided through careful routeing or can be oversailed. Landfills are absent from the Siting Zones and Siting Areas. Peaty soils are present within the corridor; however, these are not considered as a differentiating factor between options where the small pockets present can be easily avoided or oversailed. The Options Appraisal, undertaken for each Project component, described in **Chapters 6 and 7** account for the environmental and socio-economic sub-topics and constraints shown in **Table 5-4**.

Table 5-4 – Options Appraisal Sub-Topics and Constraints

Sub-topic	Constraint Name
Ecology	Ancient Woodland
	National Nature Reserves
	Ramsar
	SAC
	SPA
	SSSI
	Important Bird Area
	Priority Habitat Inventory
	National Forest Inventory
Historic Environment	Scheduled Monuments
	Listed Buildings
	Registered Parks and Gardens
	Conservation Areas
Landscape and Visual	Residential settlements and individual dwellings
	Recreational areas
	Outdoor recreational facilities including golf courses, canals and caravan parks
Water Environment	Statutory Main Rivers
	WFD surface waters
	Flood Zones 2 & 3
	Groundwater Source Protection Zones – Inner/Zone 1
	Drinking Water Protected Areas
Socio-Economic	Residential areas
	Education establishments (e.g., Schools and Colleges)
	Health care facilities (e.g., hospitals, hospices, clinics)

	Places of worship
	Business parks / Retail and shopping centres / Industrial estates
	Solar Farms
	Wind farms and wind turbines
	Planning Applications/Consents (only for NSIPs registered with the Planning Inspectorate and Large Scale Housing or Infrastructure application registered with the relevant Local Authority)
	Local Plan Allocations
Traffic and Transport	Highways
	Rail lines
	Cycle Routes (Sustrans National)
	Public Rights of Way
Aviation and Defence	Licensed Airfield / Aerodrome
	Unlicensed Airfield / Aerodrome
	Ministry of Defence Sites

5.8.4 For the environmental, socio-economic and technical issues the appraisal considers the potential impacts on relevant receptors, and whether such effects could be avoided or mitigated through careful routeing or siting as the primary form of mitigation. Where impacts cannot be avoided or mitigated by careful routeing or siting, other forms of mitigation have been considered in accordance with NGET's mitigation hierarchy as detailed in **paragraph 4.8.4**. These other forms of mitigation are described as 'other mitigation' in **Chapter 6**. The residual impacts considered in the Options Appraisal do not take account of further project-specific environmental, socio-economic or technical mitigation measures which are likely to be included as part of the EIA process undertaken at the Defined Proposal and Statutory Consultation Stage (Stage 3).

5.8.5 It should be noted that whilst consideration of residential properties is not included within the economic activity sub-topic appraisal, consideration of direct oversails of residential properties was considered as part of the comparative appraisals and as part of the end-to-end solution. Avoidance of direct oversail of residential properties during routeing of new infrastructure is NGET's preferred approach.

5.8.6 The environmental, socio-economic and technical appraisals for the corridors and substation Siting Zones and Siting Areas are described in **Chapter 6**, with the cost and programme implications outlined in **Chapter 8**.

6. Preliminary Corridor and Siting Appraisal

6.1 Introduction

6.1.1 This chapter presents a summary of the options appraisal undertaken for the Preliminary Corridors, substation Siting Zones and Siting Areas. The purpose of this chapter is to document the initial phase of the options appraisal process, which helped to further understand key constraints and subsequently inform the development of potential Route Options from the Preliminary Corridors and substation siting work to go on to end-to-end route solution appraisal in **Chapter 7**.

6.2 Overview of the Corridors

6.2.1 Five Preliminary Corridors were identified within the Study Area as described in **Chapter 5**. The Preliminary Corridors are presented in **Figure 5-11**. The Preliminary Corridors ranged from approximately 500m to 8km wide at various points. The development of the Preliminary Corridors was largely led by environmental topic specialists, representing corridors through the least environmentally constrained and lowest amenity value areas within the Study Area. This chapter outlines the preliminary environmental, socio-economic, and technical appraisals to identify the most and least preferred corridors and segments. This preliminary appraisal then fed into further feasibility work, review and challenge, which led to the least favourable Segments of Preliminary Corridors being discounted, and a smaller number of potential end-to-end Route Options being identified comprised on the more favourable Segments and corridors.

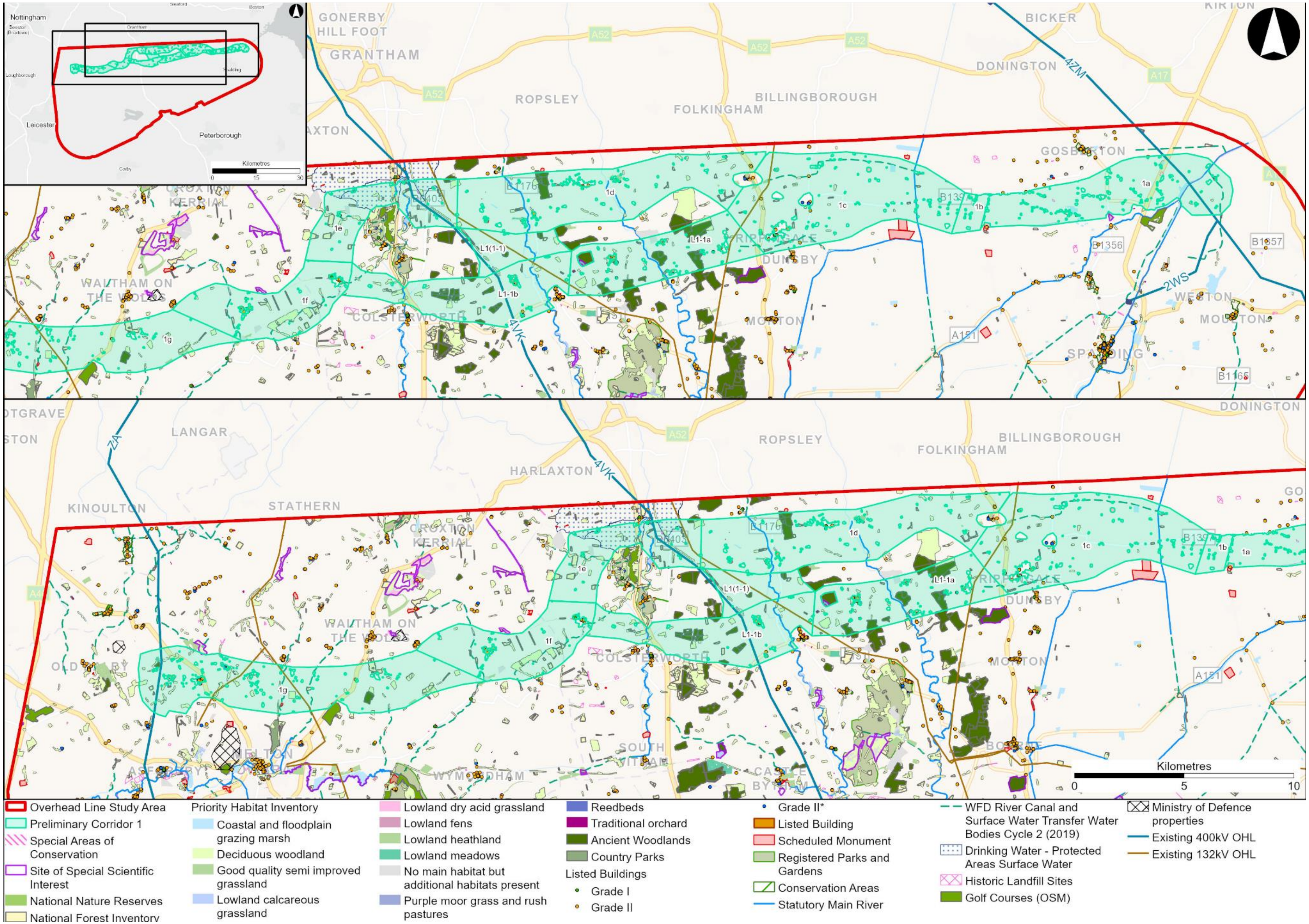
6.3 Preliminary Corridor 1

Introduction

6.3.1 Preliminary Corridor 1 is located furthest north within the Study Area and is comprised of Segments 1a through to 1g and Links L1-1, and L1(1-1). The corridor begins at the proposed Weston Marsh substation Siting Zone, heading northwest Segment 1a follows the route of the existing 400kV 4ZM OHL, crossing the River Welland, then travels west to avoid the more urbanised area of Surfleet to the south. Segment 1a and 1b continue over open flat landscape, after Gosberton Segment 1b transitions into Segment 1c which widens and turns northwest to avoid Scheduled Monuments to the south. From Aslackby, Segment 1d narrows as it travels west, north of Temple Wood. As it transitions into Segment 1e the corridor passes into Siting Zone WMEL-AZ1 and becomes constrained by a number of features. The corridor crosses an existing 132kV HA OHL, the ECML rail line and will need to connect with the existing 400kV 4VK OHL. The corridor narrows to cross the A1 avoiding the Stoke Rochford RPG to the south, then heads south towards Skillington. Segment 1f travels south and west avoiding an airfield and SSSI to the north, passing Sproxton. Segment 1g continues west avoiding the urban area of Melton Mowbray to the south. As Preliminary Corridor 1 approaches the existing 400kV ZA OHL and Siting Zone WMEL-BZ1 it becomes constrained by a number of residential areas including Ab Kettleby and Wartnaby.

6.3.2 Link L1-1 was introduced to provide a more direct route, an alternate crossing point for the A1 road, connects Segments 1c with Segment 1f, and also provides an opportunity to connect with Siting Zone WMEL-AZ2. Link L1-1a passes through the south extent of Temple Wood west toward Corby Glen, and into Link L1-1b. The Segment passes through Siting Zone WMEL-AZ2 crossing the same ECML, and 132kV and 400kV OHLs. Travelling west it narrows to cross the A1 road constrained by Colsterworth to the south and Easton Park RPG to the north. Link L1(1-1) was added to the corridor and connects Link L1-1b with 1d. Preliminary Corridor 1 and the environmental constraints are shown in **Figure 6-1**.

Figure 6-1 – Preliminary Corridor 1, Environmental and Socio-Economic Features



Environmental Preliminary Appraisal Summary

Ecology

6.3.3 There are no internationally designated sites within Preliminary Corridor 1, however Grimesthorpe SAC (4.7km south of Link L1a), The Wash Ramsar and SPA, and The Wash and north Norfolk Coast SAC (5.2km east of the corridor and hydrologically connected via the River Welland, nearest Segment 1a) are within 10km.

6.3.4 Nationally designated sites Holwell Mouth SSSI (Segment 1f) and The Hermitage SSSI (Link L1-1a) fall within the corridor boundary, Sproxton Quarry SSSI is located adjacent to Segment 1f, and Surfleet Lows SSSI (adjacent to Segment 1a) and The Wash National Nature Reserve (approximately 7km northeast of Segment 1a) are hydrologically connected to the corridor.

6.3.5 Irreplaceable ancient woodland sites are found in Segments 1d (one site), 1g (two sites), 1e (one site), L1(1-1) (two sites), and L1-1a and L1-11b (several sites). In addition, there are several woodland priority habitat sites throughout Preliminary Corridor 1, as well as grassland and marshland priority habitats found in the eastern Segments (1a and 1b).

6.3.6 Potential impacts associated with Corridor 1 are mainly due to the presence of priority habitats, predominantly woodland sites. Adverse impacts would include direct habitat loss, habitat fragmentation, or habitat degradation as a result of construction activities. Impacts to woodland are likely to also have adverse impacts on protected species such as bats and dormice if present. The eastern area of the option in Segments 1a and 1b are lower lying with many drainage ditches and streams. The main impact in these areas is likely to be habitat loss and disturbance for wintering birds on functionally linked land to the Wash SPA and Ramsar site as stated above. Due to the presence of watercourses, there may be adverse impacts on otter and water vole. Priority habitat sites should be avoided by design, and particularly ancient woodlands, which are present in all Segments, and which are considered irreplaceable habitat. If loss is unavoidable, with the exception of loss of any ancient woodland, other adverse impacts on habitat or protected species could be mitigated, informed by further ecological survey. A Habitat Regulations Screening Assessment would be required due to the potential hydraulic connection, and early engagement with Natural England would be required.

Historic Environment

6.3.7 Preliminary Corridor 1 contains a number of designated heritage assets (listed buildings, Scheduled Monuments, Registered Parks and Gardens) and the potential for buried archaeological remains of very high value. Assets in, or in proximity to, the corridor include the following: Moated site of monastic grange with adjacent earthworks at Rigbolt House Scheduled Monument (Segment 1a); Grade II* listed building Church of St Bartholomew (Segment 1f); Grade II* listed building and RPG (Segment 1e); The Hermitage moated site, 400m northeast of Corby Pasture Farm Scheduled Monument (Link L1-1a); Grade I listed building Church of All Saints (Link L1-1a); and Grade II listed building and RPG Easton Park (Link L1-1b). Preliminary Corridor 1 has the potential to impact these heritage assets and their settings. Careful routeing and siting may avoid direct impacts and reduce changes to the setting of these heritage assets.

Landscape and Visual

6.3.8 No national or local level landscape designations have been identified within Preliminary Corridor 1. However, Stoke Rochford Park and Easton Park RPGs are located in close proximity to the boundaries of Segment 1e and L1-1b, with potential for adverse visual effects. The corridor passes through a varied landscape, with flat open fenland to the east, transitioning to undulating farmland further west. This is a well settled landscape, with a series of small and medium settlements both within and adjacent to the corridor. In places along the corridor the density and dispersal of residential properties is likely to present a challenge to routeing particularly within Segments 1a, 1b, a localised part of 1f (near Sproxton), in 1g (west of Melton Spinner Road and around Ab Kettleby), L1-1a and L1-1b.

6.3.9 It will also be important to consider the relationship with other existing OHLs to minimise potential for cumulative landscape and visual effects, particularly in Segments 1c, 1e, 1f, 1g and L1-1a and L1-1b. Careful routeing to avoid loss of existing features, related to the landscape pattern and making use of existing trees and topography to provide partial screening would help to reduce potential effects on landscape character. Measures to reduce potential visual effects would include, increasing the distance from receptors, avoiding positioning towers in principal views and making use of existing features to provide screening, where possible.

Water Environment

6.3.10 There are multiple Water Framework Directive waterbodies and other watercourses throughout Preliminary Corridor 1. Several Source Protection Zones are present, with SPZ1 in Segments 1e, 1c, L1(1-1) and L1-1b. There is one Drinking Water Protected Area on the northern edge of Segment 1e. Permanent modifications to flow paths from infrastructure could impact the quantity of water available from the source supplying the public water supply. Flood Zones 2 and 3 are present most notably in the eastern part of the corridor in Segments 1a, 1b, and 1c. Avoidance of these receptors would not be possible in Preliminary Corridor 1; therefore, engagement with the Environment Agency would need to be undertaken in addition to water quality protection measures and drainage systems being needed throughout.

Socio-Economic Preliminary Appraisal Summary

Economic Activity (including Planning)

6.3.11 Preliminary Corridor 1 has the potential for interaction and potential cumulative impacts with other NSIPs at various stages of progress including: EN010130 - Outer Dowsing Offshore Wind (1a), EN020036 - Grimsby to Walpole Electricity Transmission (1a), WA010003 - Lincolnshire Reservoir and pipeline (1d), and EN010126 - Temple Oaks Solar Park (1d). This could include impacts on landscape, visual, and noise. Early engagement with other NSIP developers to consider designs for development that allow both projects to co-exist, align construction programs could reduce cumulative impacts. Segment 1d also contains the committed development South Kesteven - S24/1623 (Change of use of agricultural land to solar panel site containing 40 solar panels).

6.3.12 Segment 1e interfaces with two Lincolnshire County Council Adopted Minerals and Waste Local Plan Policy Areas M11 and M12. Both policies are for the protection of mineral resources with M12 protecting existing mining activities. Segment 1g passes through several neighbourhood plan areas: Broughton and Old Dalby Parish Neighbourhood Plan, Frisby on the Wreake Neighbourhood Plan, Ab Kettleby Parish

Neighbourhood Plan, Scalford Parish Neighbourhood Plan and Wymondham and Edmondthorpe Neighbourhood Plan. Segment 1g also interfaces with Twin Lakes Adventure Park. At a wider route level there are several existing developments and that interface with the entire route. This includes properties with a range of land uses and their associated curtilages (e.g. residential property and garden; commercial premises and parking/external storage area). Careful routeing and siting alongside community engagement may reduce both direct and indirect impacts to these features.

Aviation and Defence

6.3.13 There is a potential impact on Decoy Farm Airstrip, as it is located within Preliminary Corridor 1 (Segment 1c). Approximately 1km outside the corridor there is a potential for impacts to Buckminster Gliding Club (Segment 1f). This club is located at Saltby Airfield, a former military base. Link L1-1b is also located 2.75km from the Black Spring Farm Airstrip. The potential interaction with aviation receptors should be avoided or appropriate mitigation measures need to be implemented.

Traffic and Transport

6.3.14 Preliminary Corridor 1 is crossed by the A1 (Segment 1e and L1-1b), part of the Strategic Road Network. The corridor is crossed by the following A and B roads that are managed by the local highway authorities: A16 and A152 (Segment 1a), A151 (Link L1-1b), A15 (Segments 1c, 1d and L1-1b), A607 and A606 (Segment 1g), B1356 (Segment 1a), B1397 (Segments 1a, 1b and 1c), B1177 (Segment 1c), B1176 (Segments 1d, L1-1b and L1(1-1)) and B6403 (Segments 1e and L1-1b). The Peterborough to Lincoln rail line crosses the corridor with a northwest/southeast orientation near to Spalding (Segment 1a) and the ECML rail line crosses the corridor with a northwest/southeast orientation near to Colsterworth (Segment 1e); a rail possession may be required to cross over the rail line which could cause disruption to rail users. Segment 1g crosses a National Cycle Network route. The River Welland (Segment 1a) and South Forty Foot Drain (Segment 1c) cross the corridor.

6.3.15 At a wider route level there are several existing Public Rights of Way (PRoW) that interface with the corridor. Closure/diversions may be required to cross over, highways, rail lines, navigable waterways and PRoW across the corridor which could cause disruption to users.

Engineering and System Preliminary Appraisal Summary

6.3.16 Leaving Weston Marsh substation Siting Zone in Segment 1a there are multiple challenging constraints that could impact heavily on routeing through the area. These include the existing 400kV 4ZM OHL which is 1.5km inside Segment 1a boundary, the crossing of the River Well and, crossing the A16, and crossing the existing rail line running from Werrington to Sleaford. Due to the nature of connection arrangement (east to west), it is unlikely that major road or railway crossing going from (north to south) could be avoided, therefore, the design would need to consider and mitigate the risk associated with critical traction power line and major road crossing. Segment 1a and 1b are also constrained by residential properties clustered along linear features which would impact Route Options. Other constraints in Segment 1a include NSIPs EN010130 - Outer Dowsing Offshore Wind and Grimsby to Walpole Electricity Transmission.

6.3.17 Segment 1c widens and becomes less constrained by residential properties. Heading west the corridor requires crossing the A15 near Aslackby then heads north of Temple

Wood into Segment 1d narrows in this area where it then could potentially interface with EN010126 - Temple Oaks Solar Park NSIP, and the WA010003 - Lincolnshire Reservoir and pipeline NSIP. Segment 1e requires the crossing of the existing NGED 132kV OHL passing from “Ponton Rd” to “Westby Rd”, the electrified ECML rail line, interfacing with the existing 400kV 4VK OHL, crossing the A1 before turning southeast. The Buckminster Gliding Club (Saltby Airfield) is located approximately 1.3km northwest of Segment 1f. There are International Civil Aviation Organization (ICAO) safeguarding rules which define a set of obstacle limitation surfaces (OLS). Generally a distance of 15-20km should be considered from any proposed tall structures such as a transmission tower, this is to note that issues may arise within this distance not exclude locating infrastructure within this distance. Avoidance is preferred as potential alternate solution results in cost and engineering challenges. It is generally recommended to avoid locating infrastructure within 1km to 4km, depending on the sensitivity of the site. For example 1km distance for an unlicensed airfield and 4km distance for large passenger or military airports/airfields. Possible mitigation techniques which can be used include undergrounding, using low height transmission tower and changing the conductor arrangement and geometry, and usage of long gas insulated lines for the section affected. Segment 1g heading west requires crossing the A607, two 132kV OHL, and the A608 before terminating at the existing 400kV ZA OHL.

6.3.18 The geotechnical hazards associated with Preliminary Corridor 1 are largely influenced by artificial deposits (found east and west of Crabtree Road, northwest of Colsterworth, south of Cringle Brook, northeast of Sproxton, and west of Garthorpe Lane); historic landfill (around The Reservoir and Surfleet Bank); and artificial deposits and mass movement deposits (artificial deposits in areas north and south of Main Street, Sixhills Lane, north of Ab Kettleby and Holwell, with Mass Movement Deposits to the north of Six Hills Lane and south of Main Street).

6.3.19 The approximate total length of Preliminary Corridor 1 is 63km with a high-level estimate of 17 possible line diversions required. In aggregate the corridor could require five ‘A’ type road crossings, two rail line crossings and eight river crossings.

Holford Rules

6.3.20 Preliminary Corridor 1 has been defined to exclude larger areas of the highest amenity value and interest in accordance with Holford Rule 1.

6.3.21 Sections have generally avoided smaller areas of high amenity value through areas specifically excluded from the Corridor. The smaller areas of high amenity value which exist within the boundaries of the Corridor comprise individual listed buildings, ancient woodland and priority habitats. Where there are smaller areas of high amenity value, sufficient space has been included within the Corridor to enable routeing to avoid them, potentially by local deviation, in accordance with Holford Rule 2.

6.3.22 Preliminary Corridor 1 was specifically developed to provide a northern route from the new Weston Marsh substation infrastructure. There are a number of direction changes within the route (and therefore is less optimal against Holford Rule 3) as additional OHL is required (compared to other Corridors).

6.3.23 Preliminary Corridor 1 was developed to avoid highly constrained areas, and specific constraints including settlements, and specific constraints including settlements such as Spalding, Surfleet, Rippingdale, Dowsby, Aslackby, Great Ponton, Skillington, Sproxton and Melton Mowbray (Holford Rule Supplementary Note 1). The width of the Corridor reflects the constraints in each area, with narrow sections particularly because of areas specifically excluded.

6.3.24 The Preliminary Corridor 1 includes more land than is needed for construction of an OHL which provides flexibility and options when considering more detailed routeing, following non-statutory consultation feedback, at later project development stages. This also provides the opportunity to implement the most direct route (avoiding constraints) and reduce the need for sharp angles or changes in direction of the OHL in accordance with Holford Rule 3.

6.3.25 Given the generally very flat and open landscape in the east, with long views, Holford Rules 4 and 5 which primarily refer to topography were only relevant in the central and western parts of the Corridor, except in respect of woodland blocks, where the width of the Corridor is generally sufficient to provide opportunities for them to be skirted in the detailed design at a later stage of the Project.

6.3.26 Preliminary Corridor 1 would require the crossing of existing 132kV OHL (Holford Rule 6), and this could result in adverse landscape and visual impacts unless the mitigation (re-routeing, removal or undergrounding) is undertaken.

6.3.27 No residential or industrial zones are within Preliminary Corridor 3, therefore Holford Rule 7 is not applicable.

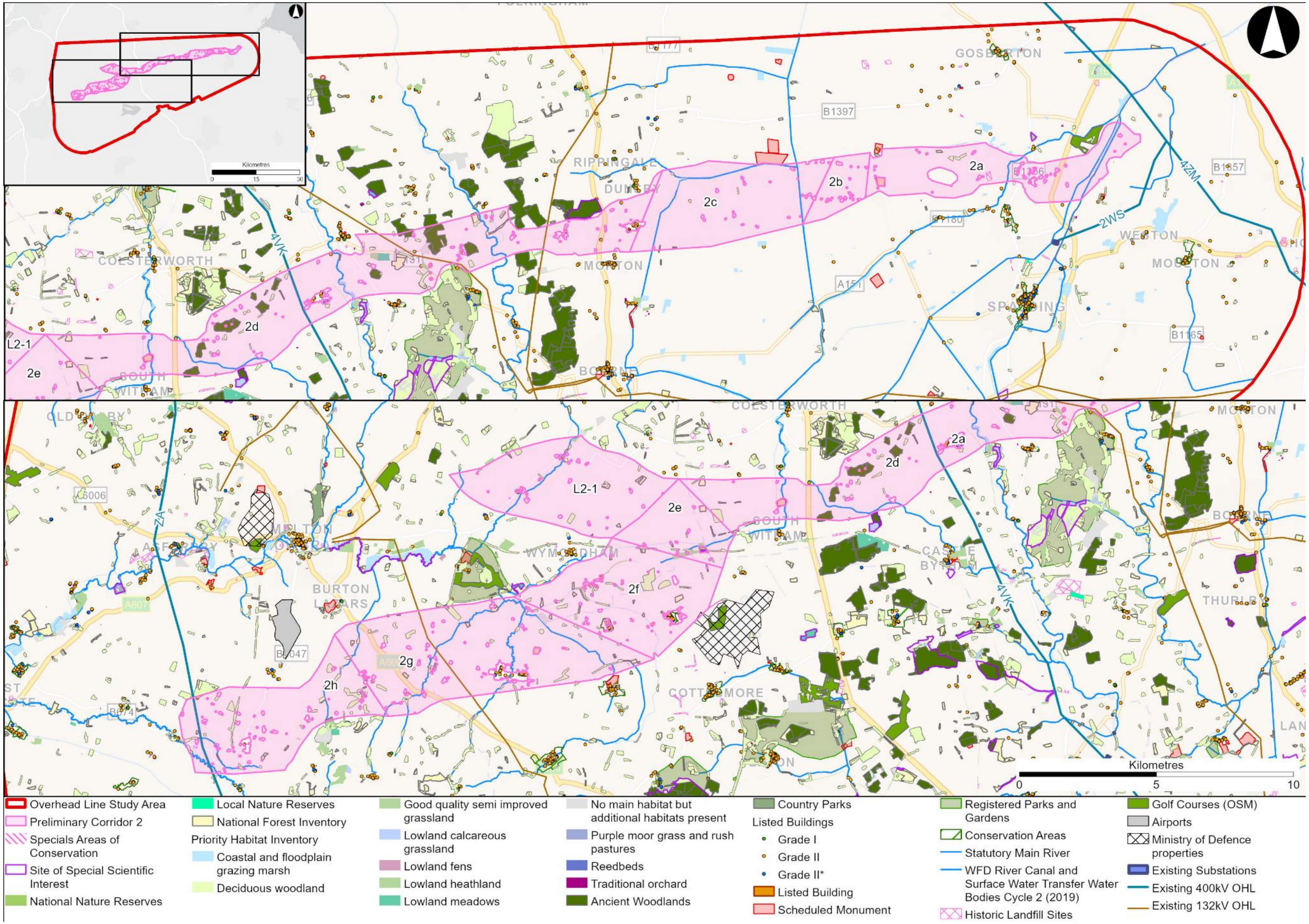
6.4 Preliminary Corridor 2

Introduction

6.4.1 Preliminary Corridor 2 is located north within the Study Area and is comprised of Segments 2a through to 2h and Link L2-1. Leaving Weston Marsh substation Siting Zone, Segment 2a heads west before narrowing to pass through a constrained area between Surfleet and Crossgate which contains a number of residential and commercial buildings. Continuing west Segment 2a widens and travels through open flat land adjacent to Segment 1a to the north, passing between Scheduled Monuments before transitioning into Segment 2b and then Segment 2c. Segment 2c avoids a Scheduled Monument to the north and head west towards Haconby, the corridor then narrows and Segment 2d passes south of Dubsby Wood and north of Hanthorpe avoiding where possible a number of areas of woodland and Grimsthope RPG to the south. Segment 2d routes west into Siting Zone WMEL-AZ2 crossing an existing 132kV OHL, the ECML rail line and would need to connect with the existing 400kV 4VK OHL. Leaving Siting Zone WMEL-AZ2, Segment 2d passes south of Twyford Forest crossing the A1 between North and South Witham. The corridor travels southwest with Segments 2e and 2f avoiding Kendrew Barracks – former RAF Cottesmore to the south and then Stapeford Hall to the north. Segments 2g and 2f continue towards Siting Zone WMEL-BZ2 with the corridor narrowing pass between Former RAF Melton Mowbray to the north and Burrough Hill Country Park to the south.

6.4.2 Link L2-1 has constraints limited to the small residential areas of Coston and Garthorpe. The Segment was introduced to provide connection Segments 2e with 1g and have an option to terminate the route in Siting Zone WMEL-BZ1. An overview of Preliminary Corridor 2 and constraints identified is shown in **Figure 6-2**.

Figure 6-2 – Preliminary Corridor 2, Environmental and Socio-Economic Features



Environmental Preliminary Appraisal Summary

Ecology

6.4.3 There are no internationally designated sites within Preliminary Corridor 2 however Grimesthorpe SAC is located 2.4km south of Segment 2d; The Wash Ramsar and SPA and The Wash and north Norfolk Coast SAC is 7.6km northeast of the corridor and is hydrologically connected via the River Welland and Vernatt's drain in Segment 2a; and Baston Fen SAC is 7.6km south and hydrologically connected via the South Forty Foot drain and River Glen in Segment 2c.

6.4.4 There is one nationally designated site within the Preliminary Corridor 2, Cribbs Lodge Meadows (lowland meadows) SSSI within Segment 2e. Several other SSSIs that are in close proximity include: Dunsby Wood SSSI 50m north of Segment 2d; Swinstead Valley SSSI 230m south (but linked via connecting priority grassland habitat that extends into Segment 2d); Tortoiseshell Wood SSSI is 30m south of Segment 2d; Wymondham Rough SSSI adjacent to the boundary of 2f; and Cribbs Meadow National Nature Reserve is within Segment 2e and is the same site as Cribbs Lodge Meadow SSSI.

6.4.5 Irreplaceable ancient woodland sites are found in Segment 2d (ten sites). In addition, there are several woodland priority habitat sites throughout the corridor predominately in Segments 2d to 2h, as well as grassland and marshland priority habitats found in the eastern Segment 2a. Potential impacts as a result of the presence of ancient woodland and priority habitats, predominantly woodland sites, could include direct habitat loss, habitat fragmentation, or habitat degradation as a result of construction activities. Impacts to woodland are likely to also have adverse impacts on protected species such as bats and dormice if present. The eastern area of Preliminary Corridor 2, Segments 2a and 2b, are lower lying with many drainage ditches and streams. The main impact in these areas is likely to be habitat loss and disturbance for wintering birds on functionally linked land to the Wash SPA and Ramsar site as stated above. Due to the presence of watercourses, there may be adverse impacts on otter and water vole. Priority habitat sites should be avoided by design, particularly ancient woodlands, which are present in all Segments, and are considered irreplaceable habitat. If loss is unavoidable, with the exception of loss of any ancient woodland, other adverse impacts on habitat or protected species could be mitigated, informed by further ecological survey. A Habitat Regulations Screening Assessment would be required due to the potential hydraulic connection to international sites and early engagement with Natural England would be required.

Historic Environment

6.4.6 Preliminary Corridor 2 contains designated heritage assets (listed buildings, Scheduled Monuments, RPGs) and the potential for buried archaeological remains of very high value. Assets in or in proximity to the corridor include the following: Moated site of monastic grange with adjacent earthworks at Rigbolt House, and Moated site of Newhall Grange Scheduled Monuments (Segment 2a); Remains of Knights Templar preceptory, watermill and fishponds Scheduled Monument (Segment 2d); Moor Lane moated site, Whissendine, Ashwell medieval settlement remains, watermill and gardens at Old Hall, Moated grange Scheduled Monuments (Segment 2g); Burrough Iron Age hill fort Scheduled Monument, listed buildings: Grade II* Church of St James, Grade I Grimsthorpe Castle and RPG (Segment 2h); and Grade II listed building Stapleford Hall

Segment 2g. Preliminary Corridor 2 has the potential to impact these heritage assets and their settings. Careful routeing and siting may avoid direct impacts and reduce impacts to the setting of these heritage assets.

Landscape and Visual

6.4.7 No national or local level landscape designations have been identified within Preliminary Corridor 2. However, two RPGs are located immediately adjacent to this corridor, with Grimsthorpe Castle RPG immediately south of Segment 2d and Stapleford Park RPG immediately north of Segment 2g with potential for adverse effects. This option passes through a varied landscape, with flat open fenland to the east, transitioning to undulating and more elevated rolling farmland further west. This is a well settled landscape, with a series of small and medium settlements both within and adjacent to the corridor. In places along this option the density and dispersal of residential properties is likely to present a challenge to routeing.

6.4.8 Key concentrations of receptors and/or pinch points where it is likely to be difficult to avoid significant effects include: between Surfleet and Crossgate (Segment 2a) where a number of properties are dispersed across the width of corridor 2; scattered residential dwellings along the North Gate, Cowbit Drove and Parson Drove (Segment 2b) limit opportunity to link to Segment 4a; scattered properties to the northeast of Leesthorpe (Segment 2g) limit opportunity to connect to Segment 3d and 2h; scattered properties around Thorpe Satchville (Segment 2h) limit opportunity to link to the substation zone. Link L2-1 is sparsely populated and contains two small settlements (Coston and Garthorpe) with several isolated residential dwellings. It will also be important to consider the relationship with other existing OHLs to minimise potential for cumulative landscape and visual effects, particularly in parts of Segments 2d through to 2h. Careful routeing to avoid loss of existing features, relate to the landscape pattern and making use of existing trees and topography to provide partial screening would help to reduce potential effects on landscape character. Measures to reduce potential visual effects would include increasing the distance from receptors, avoiding positioning towers in principal views and making use of existing features to provide screening, where possible.

Water Environment

6.4.9 There are multiple Water Framework Directive waterbodies and other watercourses throughout Preliminary Corridor 2. Several Source Protection Zones are within the site boundary, with an SPZ1 in Segment 2a. Flood Zones 2 and 3 are present most notably in the eastern part of the corridor in Segments 2a, 2b, and 2c. Avoidance of these receptors would not be possible in Preliminary Corridor 2 therefore, engagement with the Environment Agency would need to be undertaken in addition to water quality protection measures and drainage systems being needed throughout.

Socio-Economic Preliminary Appraisal Summary

Economic Activity (including planning)

6.4.10 The corridor has the potential for interaction and cumulative impacts with other NSIPs at various stages of progress including EN020036 - Grimsby to Walpole Electricity Transmission (Segment 2a) and WA010003 - Lincolnshire Reservoir and pipeline (Segment 2d) - such effects could include impacts on landscape, visual, and noise. Early engagement with other NSIP developers to consider designs for development that allow both projects to co-exist would further reduce cumulative impacts. Segment 2d also contains the committed development South Kesteven S21/1841 (Erection of 199 dwellings with associated infrastructure, access and open space).

6.4.11 Along with the interfaces with two Lincolnshire County Council Adopted Minerals and Waste Local Plan Policy Areas M11 and M12. Both policies are for the protection of mineral resources with M12 protecting existing mining activities. Segment 2e interfaces with two Lincolnshire County Council Adopted Minerals and Waste Local Plan Policy Areas M11 and M12. Both policies are for the protection of mineral resources with M12 protecting existing mining activities. Throughout Segment 2g there is potential to interface with neighbourhood plan area of Somerby Parish Neighbourhood Plan. In addition, there are several Neighbourhood Plan designations that the route could impact such as local green space designations. There are also some minor developments in the corridor, however all committed developments are expected to be avoidable through careful routeing and siting.

Aviation and Defence

6.4.12 Preliminary Corridor 2 overlaps with the Black Spring Farm Airstrip in Segment 2d and could possibly interact with airspace for the former RAF Station Melton Mowbray ((Segment 2f, 2g, and 2h) although this appears to be disused), Eye Kettleby Airstrip (Segment 2g and 2h) and to Ranksborough Farm Airstrip (Segment 2g), and the Buckminster Gliding Club (Segment 2d, 2e, 2f, and L2-1). A small part of the corridor overlaps with Kendrew Barracks – former RAF Cottesmore (Segment 2f), the site of a former Royal Air Force Station. There are also potential issues with Segments 2d, 2e, L2-1, and 2g being within the 10km buffer related to the possible issues caused by an aviation receptor during the operation stage. The potential interaction with aviation receptors should be avoided or appropriate mitigation measures need to be implemented.

Traffic and Transport

6.4.13 Preliminary Corridor 2 is crossed by the A1 (Segment 2d) part of the Strategic Road Network. The corridor is crossed by the following A and B roads that are managed by the local highway authorities: A16 (Segment 2a), A15 (Segment 2d), A151 (Segment 2d) and A606 (Segment 2g), B1172 (Segment 2a), B1177 (Segment 2d), B1176 (Segment 2d) and B6047 (Segment 2h). In addition the B676 crosses Link L2-1. The Peterborough to Lincoln rail line crosses the corridor with a northwest/southeast orientation near to Spalding (Segment 2a), the ECML crosses the corridor with a northwest/southeast orientation near to Colsterworth (Segment 2d), and the Melton Mowbray to Stamford rail line crosses the corridor with a northwest/southeast orientation between Oakham and Melton Mowbray (Segments 2f and 2g). The River Welland and River Glen (Segment 2a) and South Forty Foot Drain (Segment 2c) cross the corridor. A closure may be required to cross over the navigable waterways which could cause disruption to waterway users. At a wider route level there are several existing PRoW that interface with the corridor. Closure/diversions may be required to cross over highways, railways, navigable waterways and PRoW across the corridor which could cause disruption to users.

Engineering and System Preliminary Appraisal Summary

6.4.14 Segment 2a leaves Weston Marsh substation Siting Zone southwest where it crosses the River Welland and moves towards the A16. After crossing the A16 the Segment enters a constrained area in between cross gate, the B1356 road and Surfleet Street, where a number of commercial and residential properties constrain routeing options. Segment 2a and 2b interfaces with the same constraints highlighted in Segments 1a and 1b (rail line running from Werrington to Sleaford, residential properties clustered along linear features, and NSIPs). Segment 2c widens and has limited constraints before transitioning into Segment 2d at Haconby. Here the corridor becomes constrained by woodland and narrows crossing the A15 the East Glen River, the A151, the West Glen River, and the ECML rail line, before interfacing with the 400kV 4VK OHL west of Swayfield. Continuing west the corridor crosses the A1 and River Witham between South Witham and North Witham before heading southwest. Segment 2d widens into 2e and 2f which passes 5-6km from the airstrip near Buckminster Gliding Club (Saltby Airfield) to the north. The same ICAO safeguarding rules and potential mitigation noted in Preliminary Corridor 1 will apply to this corridor. Kendrew Barracks – former RAF Cottesmore is located to the southeast. In December 2009, it was announced that the station would close in 2013 as part of defence spending cuts. Confirmation from the relevant authority needs to be taken to check the operation status of this airport. Segment 2f continues west crossing the Melton Mowbray to Oakham rail line and the A606, transitioning into Segment 2g which terminates at the existing 400kV ZA OHL west of Thorpe Satchville.

6.4.15 In addition to the existing 400kV OHLs there are multiple interfaces with existing NGED assets throughout Segments 2c to 2g: 132kV OHL near Hangman's Lane and Stainfield; 132kV OHL line near A151 and Corby Glen; 33kV distribution line near south Forty Foot drain and Dunsby Drove; distribution line parallel to the east of A15 route; distribution in the WMEL-AZ2 substation location; distribution that crosses Wooleys Lane and Honeypot Lane; distribution line parallel to the west of North Witham; distribution line parallel to the west of Foose lane and Cribbs Meadow; distribution line parallel to the west of The Drift road and crossing The Moor Lane; distribution line to the west of Market Overton; distribution line parallel to the Cuckoo Lane; existing distribution line to the east of A606; and the distribution line to parallel to Melton Lane.

6.4.16 In total Preliminary Corridor 2 has three 132kV crossings/interfaces, nine 33kV crossings/interfaces, and three 11kV crossings/interfaces.

6.4.17 The geotechnical hazards associated with Preliminary Corridor 2 are largely influenced by artificial deposits (east of West Marsh Road, north and south of Flints Farm, west and east of The Drift (road) south of Sewston, west of Fosse Lane and in and around Market Overton, around Melton Lane and east of Bakers Lane, and southeast of Thorpe Satchville); historic landfill (south of Burtey Fen Lane); and historic landfill and artificial deposits (around Ashby Road).

6.4.18 The approximate total length of Preliminary Corridor 2 is 67km with a high-level estimate of 20 possible line diversions required. In aggregate the corridor could require five 'A' type road crossings, three rail line crossings and eleven river crossings.

Holford Rules

6.4.19 Preliminary Corridor 2 has been defined to exclude larger areas of the highest amenity value and interest in accordance with Holford Rule 1.

6.4.20 Sections have generally avoided smaller areas of high amenity value through specifically excluding areas from the Corridor. The smaller areas of high amenity value which exist within the boundaries of the Corridor comprise individual listed buildings, ancient woodland and priority habitats. Where there are smaller areas of high amenity value, sufficient space has been included within the Corridor to enable routeing to avoid them, potentially by local deviation, in accordance with Holford Rule 2.

6.4.21 Preliminary Corridor 2 was specifically developed to provide a central route from the new Weston Marsh substation infrastructure which follows a largely direct route (in line with Holford Rule 3) and is shorter as a result (compared to other Corridors).

6.4.22 Preliminary Corridor 2 was developed to avoid highly constrained areas, and specific constraints including settlements such as Spalding, Surfleet, Crossgate, Haconby, Morton, Corby Glen, North and South Witham, Market Overton, Whissendine and Melton Mowbray (Holford Rule Supplementary Note 1). The width of the Corridor reflects the constraints in each area, with narrow sections particularly because of areas specifically excluded.

6.4.23 The Preliminary Corridor 2 includes more land than is needed for construction of an OHL which provides flexibility and options when considering more detailed routeing, following non-statutory consultation feedback, at later project development stages. This also provides the opportunity to implement the most direct route (avoiding constraints) and reduce the need for sharp angles or changes in direction of the OHL in accordance with Holford Rule 3.

6.4.24 Given the generally very flat and open landscape in the east, with long views, Holford Rules 4 and 5 which primarily refer to topography were only relevant in the central and western parts of the Corridor, except in respect of woodland blocks, where the width of the Corridor is generally sufficient to provide opportunities for them to be skirted in the detailed design at a later stage of the Project.

6.4.25 Preliminary Corridor 2 would require the crossing of existing 132kV OHL (Holford Rule 6), and this could result in adverse landscape and visual impacts unless the mitigation (re-routeing, removal or undergrounding) is undertaken.

6.4.26 No residential or industrial zones exist within the Preliminary Corridor 2 and therefore Holford Rule 7 is not applicable.

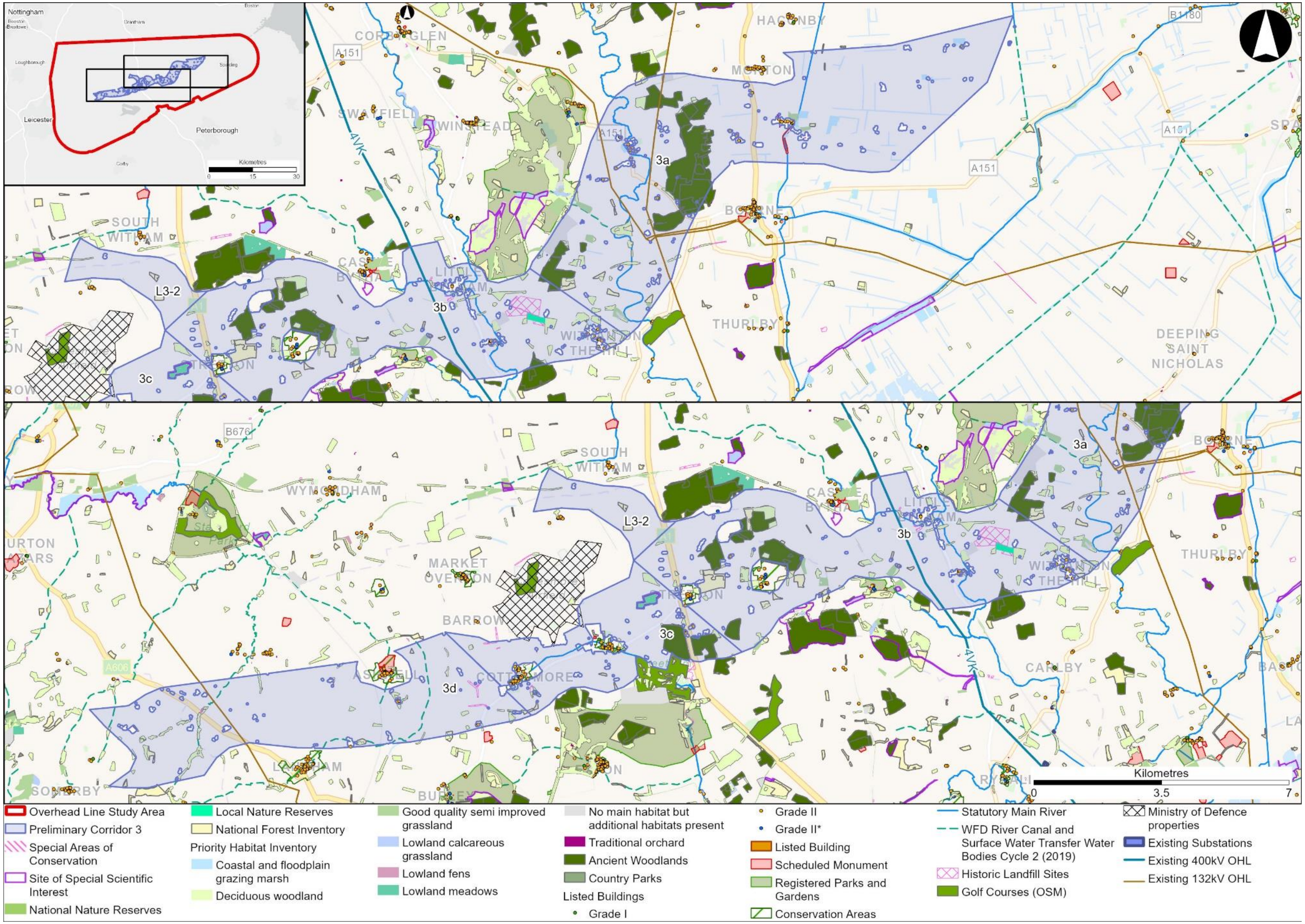
6.5 Preliminary Corridor 3

Introduction

6.5.1 Preliminary Corridor 3 is located centrally within the Study Area and is comprised of Segments 3a through to 3d and Link L3-2. This corridor was introduced to provide a southern option to avoid Grimsthorpe Castle RPG and the Kendrew Barracks – former RAF Cottesmore which are major constraints in the centre of the Study Area. The corridor connects with Segment 2c to the north, heading south then west before narrowing to pass between the urban areas of Bourne to the south and Morton to the north. Continuing southwest the Segment becomes heavily constrained with Bourne to the east, Grimsthorpe Castle RPG to the west, and Bourne/Fox/Pillow Woods extending across the width of the corridor. South of the RPG Segment 2b heads west into Siting Zone WMEL-AZ3 crossing the ECML rail line and would need to connect with the existing 400kV 4VK OHL. Leaving the Siting Zone, the corridor narrows to avoid Holywell Hall Park RPG and Castle Bytham Quarry SSSI. Segments 3b and 3c are heavily constrained with Kendrew Barracks – former RAF Cottesmore to the north, Exton Park RPG to the south and a number of residential areas within the corridor boundary. Passing Cottesmore village the corridor widens in Segment 3d avoiding Ashwell and Langham and connects with Segments 2g to the north and 4d to the south, before terminating at a geotechnically constrained area east of Pickwell.

6.5.2 Link L3-2 is a narrow corridor constrained by Morkey Wood and South Witham to the north, and by Kendrew Barracks – former RAF Cottesmore to the south. The Link was introduced to connect Segments 3b with 2e and provide a possible route through Preliminary Corridor 2 into Preliminary Corridor 1 to terminate in Siting Zone WMEL-BZ1. An overview of Preliminary Corridor 3 and constraints identified is shown in **Figure 6-3**.

Figure 6-3 – Preliminary Corridor 3, Environmental and Socio-Economic Features



Environmental Preliminary Appraisal Summary

Ecology

6.5.3 There are no internationally designated sites within Preliminary Corridor 3 however Grimesthorpe SAC is located 1.2km northwest of Segment 3a, and Rutland Water SPA and Ramsar site is 3km south of Segment 3d. Baston Fen SAC is 4km south of Segment 3a but not directly hydrologically connected.

6.5.4 There is one nationally designated site within Preliminary Corridor 3, Cribbs Greetham Meadows SSSI within Segment 3c. Several other SSSIs that are in close proximity include: Clipsham Old Quarry and Pickworth Great Wood SSSI, adjacent to the southern boundary of Segment 3b; Castle Bytham Quarry SSSI (Geological) within 170m to the north of Segment 3b; and Rutland Water SSSI 3km south of Segment 3d. Locally designated Stanton's Pit Local Nature Reserve has ornithological interest and is within Segment 3b.

6.5.5 There are several large ancient woodland sites in Segment 3a, 3b and 3c, with Bourne Fox Pillow Woods spanning most of Segment 3a from north to south, which may make it difficult to avoid. There are no ancient woodland sites listed on the inventory within Segment 3d and only one, that is fragmented by a road, in Segment 3c. Priority habitats are present throughout Preliminary Corridor 3 and many are also ancient woodland sites. The largest sites are woodland habitat within Segments 3a, b and c. Due to the scattered nature of these priority habitats, it may be difficult to avoid them completely. Segment 3d contains only very small pockets of priority woodland that could easily be avoided. Adverse impacts would include direct habitat loss, habitat fragmentation, or habitat degradation as a result of construction activities. Impacts to woodland are likely to also have adverse impacts on protected species such as bats and dormice if present. Watercourses are present in all Segments, but main rivers only present in Segments 3a, b and c. Adverse impacts may include habitat degradation through pollution or spread of invasive species, disturbance or mortality to species such as otter and water vole, wetland birds, aquatic invertebrates or fish. Priority habitat sites should be avoided by design, and particularly ancient woodlands, which are present in all Segments, and which are considered irreplaceable habitat. If loss is unavoidable, with the exception of loss of any ancient woodland, other adverse impacts on habitat or protected species could be mitigated, informed by further ecological survey. A Habitat Regulations Screening Assessment may be required due to the proximity of international sites, and early engagement with Natural England would be required.

Historic Environment

6.5.6 Preliminary Corridor 3 contains a number of designated heritage assets (listed buildings, Scheduled Monuments, Registered Parks and Gardens) and the potential for buried archaeological remains of very high value. Assets in or in proximity to the corridor include the following: Car Dyke, S of Car Dyke and Moated site of Newhall Grange Scheduled Monuments (Segment 3a); Careby Wood camp, Castle Bytham Castle, associated town defences and ponds Scheduled Monuments (Segment 3b); and, Alstoe Moot and part of Alsthorpe deserted medieval village, Ashwell medieval settlement remains, watermill and gardens at Old Hall Scheduled Monuments (Segment 3d); Grade II* listed building Stocken Hall falls within Segment 3b, and Grade I listed building and RPG Grimsthorpe Castle (Segment 3a and 3b), GII Holywell Hall Park (Segment 3b); and Grade II listed building Exton Park (Segment 3c). Preliminary

Corridor 3 has the potential to impact these heritage assets and their settings. Careful routeing and siting may avoid direct impacts and reduce setting changes to these heritage assets.

Landscape and Visual

6.5.7 No national or local level landscape designations have been identified within Preliminary Corridor 3. However, three RPGs are located immediately adjacent to this corridor, with Grimsthorpe Castle RPG immediately north of Segments 3a and 3b, Holywell Hall Park RPG immediately south and west of Segment 3b, and Exton Park RPG immediately south of Segment 3c. Preliminary Corridor 3 passes through a varied landscape, with flat open fenland to the east, transitioning to undulating farmland further west. This is a well settled landscape, with a series of small and medium settlements both within and adjacent to the corridor.

6.5.8 Key concentrations of receptors and/or pinch points where it is likely to be difficult to avoid significant effects include: between the linear settlements of Morton and Dyke, and between Dyke and Bourne (Segment 3a); settlements of Little Bytham and Careby and adjacent clustered and scattered properties (Segment 3b). Distribution of residential receptors within and around Witham-on-The-Hill (Segment 3b) also limit the opportunity to connect to L4-3 to the south; scattered residential dwellings along the A1 south of village of Stretton in combination with woodland blocks narrowing the available corridor (Segment 3b and 3c); and the pinch point between Cottesmore, Greetham, and Exton Park (RPG) and Greetham Valley Golf Club (Segment 3c). It will also be important to consider the relationship with other existing OHLs to minimise potential for cumulative landscape and visual effects, particularly in parts of Segments 3a, 3b and 3d.

6.5.9 Careful routeing would prevent loss of existing features and allow the corridor to adhere to the local landscape pattern. The existing trees and topography can provide partial screening to further reduce potential effects to the landscape character. Measures to reduce potential visual effects could include increasing the distance of the routing from receptors and avoiding positioning towers in principal views.

Water Environment

6.5.10 There are multiple Water Framework Directive waterbodies and other watercourses throughout Preliminary Corridor 3. Several Source Protection Zones are within the site boundary, with an SPZ 1 in Segment 3a and another in Segment 3c. Portions of the corridor intersect Flood Zones 2 and 3, posing potential flood risks near Holbeach and requiring consideration of flood flow conveyance and drainage patterns. Avoidance of these receptors would not be possible in Preliminary Corridor 3 therefore, engagement with the Environment Agency would need to be undertaken in addition to water quality protection measures and drainage systems being needed throughout.

Socio-Economic Preliminary Appraisal Summary

Economic Activity (including Planning)

6.5.11 There is potential for interaction and cumulative impacts with the WA010003 - Lincolnshire Reservoir and pipeline (DCO at Pre-application Stage) NSIP in Segment 3a. Such effects could include construction noise and operational impacts on landscape, visual, and noise. Early engagement with other NSIP developers to consider designs for development that allow both projects to co-exist, and co-ordinate should construction programs interact could reduce cumulative impacts.

6.5.12 Segments 3a, 3b and L3-2 include three Lincolnshire County Council Adopted Minerals and Waste Local Plan Policy Areas M11, M12 and W8. M11 and M12 policies are for the protection of mineral resources with M12 protecting existing mining activities. W8 is a waste allocation site. Larger committed developments in the corridor include: one large planning application for a solar farm and battery storage (Segment 3a); Extension to existing travelling showpersons site, and three developments associated with Greetham Quarry (Segment 3c); and two solar farms (Segment 3d). Careful routing and siting can avoid adverse effects to the identified receptors.

Aviation and Defence

6.5.13 Preliminary Corridor 3 overlaps with Ranksborough Farm Airstrip (Segment 3d) and is within the 1km buffer zone of the Black Spring Farm Airstrip (Segment 2d), RAF Station Melton Mowbray (Segment 3d), St George Barracks (Segments 3b, 3c and 3d), and Buckminster Gliding Club (Link L3-2). The corridor minorly overlaps with Kendrew Barracks - former RAF Cottesmore (Segment 3c), a Ministry of Defence property. Preliminary Corridor 3 is likely to have potential effects on aviation receptors, particularly in Segment 3c and 3d. As the aviation receptors cannot be avoided in those Segments, stringent measures will need to be in place to avoid potential conflicts during the operation stage, and actions to appropriately mitigate impacts during the construction stage.

Traffic and Transport

6.5.14 Preliminary Corridor 3 is crossed by the A1 (Segments 3b and 3c) part of the Strategic Road Network. The corridor is crossed by the following A and B roads that are managed by the local highway authorities: the A15 and A151 (Segment 3a), A606 (Segment 3d); B1176 (Segment 3b), and B668 (Segments 3b, 3c and 3d). The ECML crosses the corridor with a northwest/southeast orientation near to Colsterworth (Segment 3b), and the Melton Mowbray to Stamford rail line crosses the corridor with a north/south orientation between Oakham and Melton Mowbray (Segment 3d). At a wider route level there are several existing PRoW that interface with the entire route. Closure/diversions may be required to cross over, highways, railways, navigable waterways and PRoW across the corridor which could cause disruption to users.

Engineering and System Preliminary Appraisal Summary

6.5.15 When routeing out of the Weston Marsh substation Siting Zone, Preliminary Corridor 3 could follow the same route as Preliminary Corridor 1 or 2 and so would be subject to the same technical constraints as previously described within the appraisal for those segments in **Sections 6.3** and **6.4**.

6.5.16 Segment 3a is relatively unconstrained at the east end, as it heads west it narrows crossing the A15 between Bourne and Morton. Turning southwest the corridor becomes heavily constrained by Bourne Wood which spans the width of the corridor. Continuing southwest the corridor crosses the A151 and the East Glen River. A number of woodland blocks are scattered throughout, constraining Route Options. Within Segment 3b the settlements of Careby and Little Bytham constrain the corridor as it crosses the West Glen River, the ECML rail line, and as it interfaces with 400kV 4VK OHL. As Segment 3b continues west woodland blocks, HMP Stocken, and the settlements of Clipsam and Stretton limit Route Options as the corridor crosses the A1 road.

Continuing, the corridor is bounded by Kendrew Barracks – former RAF Cottesmore to the north, with Greetham and Cottesmore encompassed spanning large widths of the Segment. The same aviation constraints as described in Preliminary Corridors 1 and 2 also apply in this instance. Segment 3d crosses the Melton Mowbray to Oakham rail line and the A606 before arriving east of Pickwell. Here Preliminary Corridor 3 either can follow same route as Preliminary Corridor 2 to the north or Preliminary Corridor 4 to the south, where it would be subject to the same technical constraints Segments 2f, 2g, or 4d and 4e.

6.5.17 In addition to the existing 400kV OHLs, there are multiple interfaces with existing NGED assets throughout Segments 2a, 3a, 3b, 3c, 3d, and 4e, these include: a 132kV OHL to the Northwest of Bourne Wood Park and near A151; a 132kV OHL near East Glen river and to south of Scottlethorpe; a 132kV OHL to east of A606; a 33kV distribution line east of the River Welland; a distribution line parallel to the “W marsh road” route; a distribution line parallel to Cuckoo Lane; a distribution line in the west of proposed WMEL-A substation location; a distribution line parallel to Beck Bank; a distribution line west of South Forty-Foot Drain; a distribution line west of South Forty-Foot Drain; a distribution line Southwest of The Granary at French's Farm; a distribution line parallel to Hancoby Drove to the west of PAP Barford Joinery; a distribution line to the northwest of Dyke village; a distribution line to the west of A151 and Bourne wood; a distribution line to the Southwest of Grimsthorpe Park; a distribution line to the north of Stantons Pit Nature Reserve and east of proposed WMEL-A substation location; a distribution line parallel to Hollywell Road and in the west of the proposed WMEL-A substation location; two existing distribution lines East of Clipsham road and west of the proposed WMEL-A substation location; a distribution line west of Clipsham and north of Stretton road; a distribution line parallel to Wood lane and west of the A1; two existing distribution lines to the south of Greetham road; two existing distribution lines to the west of B668 road; two existing distribution lines south of Ashwell road; a distribution line north of Hoermann Equine; a distribution line west of A606 road; an existing distribution line west of Somerby road; a distribution line east of Dawsons lane; and the line east of Twyford Road.

6.5.18 In total Preliminary Corridor 3 has three 132kV crossings/interfaces, twenty-eight 33kV crossings/interfaces, and two 11kV crossings/interfaces.

6.5.19 The geotechnical hazards associated with this corridor are largely influenced by artificial deposits (around Bidwell Lane, south of Clipsham); historic landfill (around Little Bytham, and between Witham on the Hill and Little Bytham); and artificial deposits and historic landfill (Similar extents in area adjacent to A606 near Whissendine Lane, and artificial deposits in area west of Cottesmore with more localised areas of historic landfill).The approximate total length of Preliminary Corridor 3 is 67km with a high-level assessment of 20 possible line diversions required. In aggregate the corridor could require five ‘A’ type road crossings, three rail line crossings and ten river crossings.

Holford Rules

6.5.20 Preliminary Corridor 3 has been defined to exclude larger areas of the highest amenity value and interest in accordance with Holford Rule 1.

6.5.21 Sections have generally avoided smaller areas of high amenity value through areas specifically excluded from the Corridor. The smaller areas of high amenity value which exist within the boundaries of the Corridor comprise individual listed buildings, ancient woodland and priority habitats. Where there are smaller areas of high amenity value, sufficient space has been included within the Corridor to enable routeing to avoid them, potentially by local deviation, in accordance with Holford Rule 2, with the exception of Bourne Wood which may be impacted.

6.5.22 Preliminary Corridor 3 was specifically developed to provide a central route from the new Weston Marsh substation Siting Zone which follows a largely direct route however some direction changes are required in the central section to avoid constraints which result it performing less well against Holford Rule 3 than shorter, more direct corridors.

6.5.23 Preliminary Corridor 3 was developed to avoid highly constrained areas, and specific constraints including settlements, and specific constraints including settlements such as Spalding, Bourne, Greetham, Cottesmore, Ashwell and Langham (Holford Rule Supplementary Note 1). The width of the Corridor reflects the constraints in each area, with narrow sections, being particularly constrained around Cottesmore, Greetham and Kendre Barracks where larger residential areas are specifically excluded.

6.5.24 The Preliminary Corridor 3 includes more land than is needed for construction of an OHL which provides flexibility and options when considering more detailed routeing, following non-statutory consultation feedback, at later project development stages. This also provides the opportunity to implement the most direct route (avoiding constraints) and reduce the need for sharp angles or changes in direction of the OHL in accordance with Holford Rule 3.

6.5.25 Given the generally very flat and open landscape in the east, with long views, Holford Rules 4 and 5 which primarily refer to topography were only relevant in the central and western parts of the Corridor, except in respect of woodland blocks, where the width of the Corridor is generally sufficient to provide opportunities for them to be skirted in the detailed design at a later stage of the Project.

6.5.26 Preliminary Corridor 3 would require the crossing of existing 132kV OHL (Holford Rule 6), and this could result in adverse landscape and visual impacts unless the mitigation (re-routeing, removal or undergrounding) is undertaken.

6.5.27 No residential or industrial zones are included in Preliminary Corridor 3 and therefore Holford Rule 7 is not applicable.

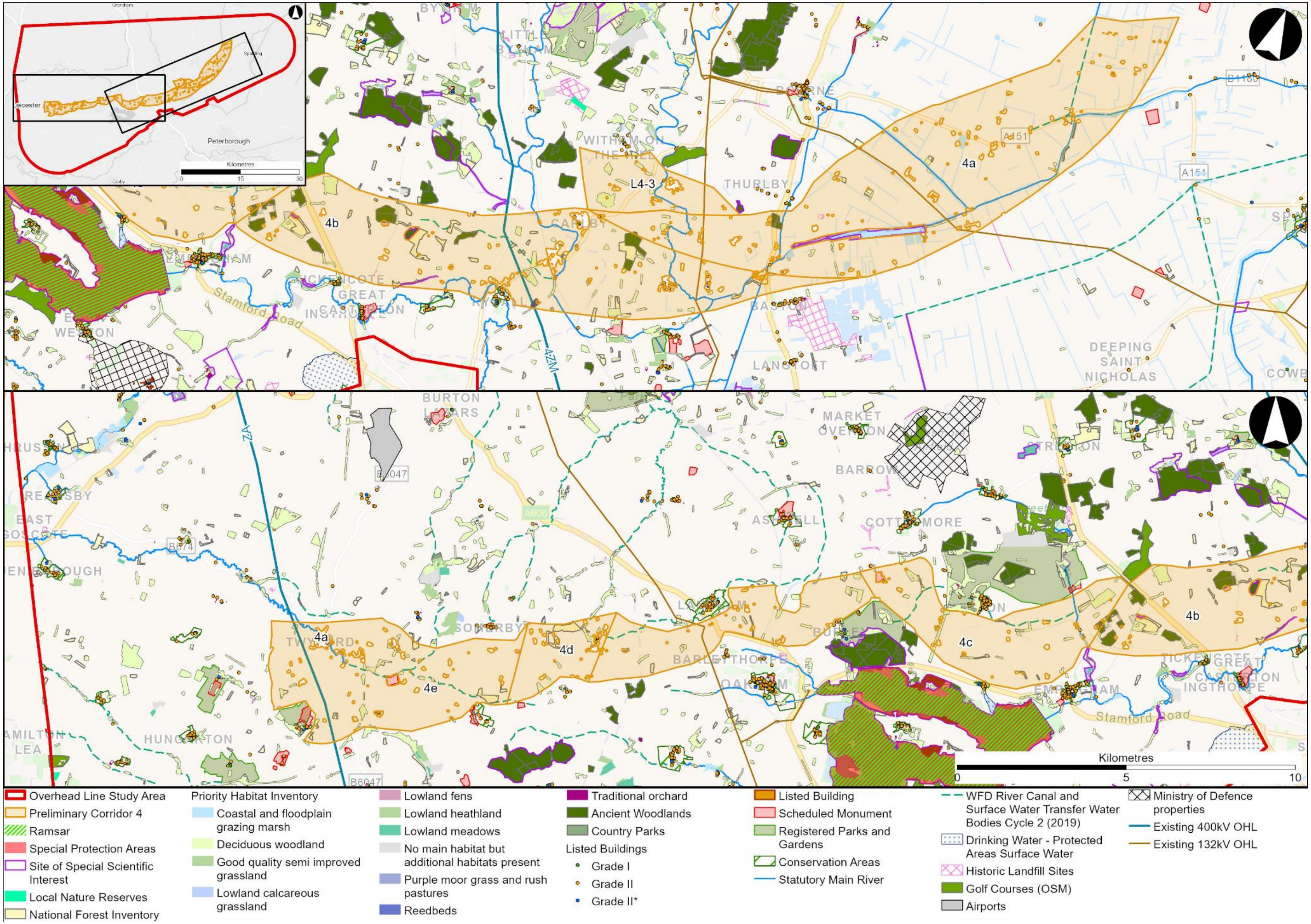
6.6 Preliminary Corridor 4

Introduction

6.6.1 Preliminary Corridor 4 is located in the south of the Study Area and is comprised of Segments 4a to 4e and Link L4-3. The corridor begins in the east with Segment 4a connecting with Segment 2b to the north. Heading southwest adjacent to Segment 3a, the corridor routes south to avoid Bourne and Thurley to the north, and is constrained by an airfield, Baston SAC and Baston and Thurlby Fens SSSI Continuing into Segment 4b the corridor intercepts Siting Zone WMEL-AZ4 and the proposed EN010127 - Mallard Pass Solar Farm which spans the width of the corridor. As with the other Preliminary Corridors, Segment 4d crosses the ECML rail line and connects with existing 400kV 4KV OHL, before heading west. The corridor becomes heavily constrained with a number of woodland blocks and SSSIs within its boundary, with Segment 4c passing north of Rutland Water Ramsar/SPA crossing Barnsdale Avenue (part of the Exton Park RPG to the north), passing north of Burley on the Hill RPG, and encompassing a Scheduled Monument . Segment 4d heads west running adjacent to Segment 3d and is predominantly constrained by a number of urban areas such as Langham, Oakham, Cold Overton, before widening into Segment 4e which terminates at Siting Zone WMEL-BZ3.

6.6.2 Link L4-3 was included to connect Segments 4a and 3b to provide routeing options into northern corridors if needed. An overview of Preliminary Corridor 4 and constraints identified is shown in **Figure 6-4**.

Figure 6-4 – Preliminary Corridor 4, Environmental and Socio-Economic Features



Environmental Preliminary Appraisal Summary

Ecology

6.6.3 There is one internationally designated site within Preliminary Corridor 4, the Baston Fens SAC in Segment 4a. Rutland Water SPA and Ramsar is approximately 400m south of Segment 4c and approximately 1.2km south of Segment 4d.

6.6.4 Nationally designated sites Baston and Thurlby Fens SSSI (Segment 4a) East Wood, Great Casterton SSSI (Segment 4b), and Bloody Oaks Quarry SSSI (Segment 4b) fall within the corridor boundary, with Rutland Water SSSI 400m south of Segment 4c, Burley and Rushpit Woods SSSI 400m south of Segment 4c, and Empingham Marshy Meadows SSSI adjacent to the south of Segment 4b and 4c.

6.6.5 There is one ancient woodland within Segment 4a, and many located in Segment 4b with a cluster at the western extent of 4b that may be difficult to avoid. In addition priority habitats are present throughout Preliminary Corridor 4 and L4-3, many are also ancient woodland sites. The largest and most clustered sites are woodland habitat within Segments 4b which may be difficult to avoid. There are several coastal floodplain grazing marsh sites in the Segment 4a which would be possible route around. Main watercourses are present in all Segments where impacts may include habitat degradation through pollution or spread of invasive species, disturbance or mortality to species such as otter and water vole, wetland birds, aquatic invertebrates or fish. There is potential for adverse impacts relating to disturbance or habitat loss on internationally and nationally designated sites where qualifying species such as wintering birds associated with Rutland Water SPA, Ramsar and SSSI, use functionally linked land that could be present within Segment 4c and 4d. There are three SSSIs within the site, though it is anticipated that direct impacts resulting from habitat loss, fragmentation or degradation will be avoided on these woodland, grassland and fen habitat sites. If loss is unavoidable, with the exception of loss of any ancient woodland, other adverse impacts on habitat or protected species could be mitigated, informed by further ecological survey. A Habitat Regulations Screening Assessment and early engagement with Natural England would be required.

Historic Environment

6.6.6 Preliminary Corridor 4 contains a number of designated heritage assets (listed buildings, Scheduled Monuments, RPGs) and the potential for buried archaeological remains of very high value. Assets in or in proximity to the corridor include one Scheduled Monument in Segment 4a, three Scheduled Monuments in Segment 4b, 4c and 4e, and one Scheduled Monument in Link L4-3. Multiple listed buildings are found in Segments 4a, 4b and 4c. Adjacent to the corridor is the Grade II listed building and RPG Greatford Hall (Segment 4b), Grade II listed building and RPG Burley on the Hill RPG (Segment 4c and 4d), and the Grade II listed building and RPG Lowesby Hall. One RPG, the Listed Grade II Exton Park lies within Segment 4c where any OHL corridor would unavoidably cross the Barnsdale Avenue that extends southwards from the main part of the parkland.

6.6.7 Preliminary Corridor 4 would potentially result in adverse effects on designated and non-designated heritage assets, however the corridor provides sufficient scope to avoid or reduce many of these effects through design. There are no heritage assets within Preliminary Corridor 4 that would intrinsically prevent the Preliminary Corridor being taken forward, however potential setting impacts at Exton Park RPG could require complex/costly measures such as undergrounding to achieve.

Landscape and Visual

6.6.8 There is potential for localised direct landscape and visual effects to an important feature (Barnsdale Avenue) of the Exton Park RPG (Segment 4c). There is also potential for limited and localised indirect effects on the Greatford Hall RPG, with potential for increased indirect visual effects on Burley on the Hill and Lowesby Hall RPG due to the open and elevated nature of outward views. Adverse direct and indirect effects on landscape character are also anticipated, particularly where the landscape is open with expansive views, has a complex topography and/or increased scenic quality.

6.6.9 There is potential for a range of adverse and significant effects on residential receptors within this Preliminary Corridor, particularly within Segments 4a, 4b and 4d. This is a result of the concentration of receptors in these areas and/or limited separation distance between properties. There is also potential for localised adverse effects on recreational receptors using long distance routes, the local path network, and other identified facilities, particularly in Segment 4a, but also in parts of the other Segments of this Preliminary Corridor. Careful routeing to avoid loss of existing features (including to Barnsdale Avenue), relate to the landscape pattern and making use of existing trees and topography to provide partial screening would help to reduce potential effects on landscape character. Measures to reduce potential visual effects would include, increasing the distance from receptors, avoiding positioning towers in principal views and making use of existing features to provide screening, where possible. It will also be important to consider the relationship with other existing OHLs to minimise potential for cumulative landscape and visual effects, particularly in Segments 4a, 4b, 4d and 4e.

Water Environment

6.6.10 There are multiple Water Framework Directive waterbodies and other watercourses throughout Preliminary Corridor 4. Several SPZs are within the Preliminary Corridor, with an SPZ 1 in Segments 4a, 4b and L4-3. The eastern edge of the site is in Flood Zone 2 and 3 near Holbeach, with a small area in Flood Zone 2 and 3 near Langham. Development in flood inundation areas may disrupt flood flow conveyance. Avoidance of these receptors would not be possible in Preliminary Corridor 4 therefore, engagement with the Environment Agency would need to be undertaken in addition to water quality protection measures and drainage systems being needed throughout.

Socio-economic Preliminary Appraisal Summary

Economic Activity (including Planning)

6.6.11 There are two NSIPs within Preliminary Corridor 4. These include the Rail Freight Interchange ((PINS reference: TR050005) ((Segment 4e)) (withdrawn) and the EN010127 - Mallard Pass Solar Farm ((PINS reference: EN010127) (Segment 4b)). There is also an application for an NSIP for Lincolnshire Reservoir and pipeline, which has the potential for interaction during the construction of the underground pipelines. Due to the withdrawal of the Rail Freight Interchange this is no longer a constraint but should be acknowledged, however there is a significant interface with EN010127 - Mallard Pass Solar Farm that crosses the entire width of Segment 4b. Significant engagement would need to be undertaken to secure an agreement, e.g. colocation and/or construction program coordination, and potential cumulative effects with the solar development in the area. If no agreement or negotiation can be secured, this poses a risk to the delivery of the Project.

6.6.12 There are a number of committed developments located throughout the Preliminary Corridor (Segments 4c, 4d and 4e) consisting of both large and minor applications. It is anticipated that these developments could be avoided, however potential impacts during construction should be considered.

6.6.13 There are a number of adopted local plan policies and strategic land allocations that the route intercepts. These include: mineral and sand safeguarding area M11 and M12 (Segments 4a, 4b and L4-3); sand gravel area of search W8 (Segments 4a, 4b and L4-3); the Melton LPA housing allocation; the Melton LPA employment land; and the South Kesteven LPA housing allocation LV-H5 and LV-H12. At a wider route level there are several existing developments and that interface throughout the Preliminary Corridor. This includes properties with a range of land uses and their associated curtilages (e.g. residential property and garden; commercial premises and parking/external storage area etc.). Careful routeing and siting alongside community engagement may reduce both direct and indirect impacts to these receptors.

Aviation and Defence

6.6.14 Preliminary Corridor 4 overlaps with the Northrope Fen Airstrip in Segment 4a (possible issues for Segment 4b) and Ranksborough Farm Airstrip in Segment 4d. The Preliminary Corridor is more than 2km distance from Shacklewell Lodge Farm (Segment 4b and 4c), more than 4km distance from Former RAF Station Melton Mowbray (Segment 4d and 4e), and more than 8km distance from Leicester Airport (Segment 4e). The Preliminary Corridor is within the buffer zone for the St George Barracks in Segment 4c and is more than 3km from Segment 4b and 4d. Preliminary Corridor 4 is likely to have potential effects on aviation receptors, particularly in Segment 4a and 4d. As the aviation receptors cannot be avoided in those Segments, stringent measures will need to be in place to avoid potential conflicts and to appropriately mitigate impacts during the construction stage.

Traffic and Transport

6.6.15 Preliminary Corridor 4 (Segment 4b) is crossed by the A1, part of the Strategic Road Network. The Preliminary Corridor is also crossed by the following A and B roads that are managed by the local highway authorities: A151 (Segment 4a), A15 (Segment 4a and 4b), A6121 (Segment 4a and 4b), A606 (Segment 4d); B1176 (Segment 4b), B668 (Segment 4c and 4d), B6047 (Segment 4e). The ECML crosses the Preliminary Corridor with a northwest/southeast orientation near to Colsterworth (Segment 4b), and the Melton Mowbray to Stamford rail line crosses the Preliminary Corridor with a north/south orientation between Oakham and Melton Mowbray (Segment 4d). The River Welland and River Glen (Segment 4a) and South Forty Foot Drain (Segment 4a) cross the Preliminary Corridor. At a wider route level there are several existing PRoW that interface with the Preliminary Corridor. Closure/diversions may be required to cross over, highways, railways, navigable waterways and PRoW across the Preliminary Corridor which could cause disruption to users.

Engineering and System Preliminary Appraisal Summary

6.6.16 When routeing out of Weston Marsh substation Siting Zone, Preliminary Corridor 4 would follow the same route as Preliminary Corridor 2 and so would be subject to the same technical constraints as previously described for Segments 2a and 2b within the appraisal for that Preliminary Corridor.

6.6.17 Segment 4a leads south from Black Hole Drove; the land is predominantly flat and open, however there are several residential properties clustered along linear features which constrain the Preliminary Corridor. The Preliminary Corridor crosses the A151, follows the River Glen, and crosses Bourne Eau. The Preliminary Corridor narrows as it crosses the A15 between Thurby and Baston then transitions into Segment 4b where it crosses the East Glen River. As the Preliminary Corridor heads towards Ryhall it continues to be constrained by clusters of small urban areas, with woodland blocks also becoming a constraining feature. It then crosses the West Glen River, the A6121 and the ECML as it then interfaces with the 400kV 4VK OHL. Woodland continues to be a constraining feature as the Preliminary Corridor heads west into Segment 4c crossing the A1 road, North Brook, and Barnsdale Avenue (Exton Park RPG), turning north towards Cottesmore. The same aviation constraints as described in Preliminary Corridors 1, 2 and 3 also apply in this instance. Segment 4d crosses the Melton Mowbray to Oakham rail line and narrows to cross the A606 between Langham and Oakham. The Preliminary Corridor transitions through Segment 4e and terminates at the 400kV ZA OHL.

6.6.18 In addition to the existing 400kV OHLs there are multiple interfaces with existing NGED assets throughout Segments 2a, 3b, 4a, 4b, 4c, 4d and 4e: 33kV distribution line east of River Welland; two 33kV distribution lines west of River Welland; 33kV distribution line north of Green Lane; 33kV distribution line on the edge of Beck Bank; one 33kV and one 11 kV distribution line on the north of Star Lode Drove; 33kV distribution line on the west of Four Winds Equestrian Centre; 33kV distribution line on the south of Glen River; 33kV distribution line on the edge of South Fen Road; 33kV distribution line on the edge of Long Drove; 33kV distribution line on the west of the A15; 33kV distribution line on the east and west of East Glen River; 33kV distribution line on the west of Exton Road; one 33kV and one 11kV distribution line on the east of Burley Water Tower; 33kV distribution lines on the north of Cottesmore Road; 33kV distribution line on the south of Langham signal box and parallel to the rail track; 33kV distribution line on the east of the A606; 33kV distribution line on the east of The Glebe; 33kV distribution line on the south of Seven Cities Recycling LTD; and a 33kV distribution line on the East of Dawson’s Lane.

6.6.19 In total Preliminary Corridor 4 has three 132kV crossings/interfaces, twenty-two 33kV crossings/interfaces, and two 11kV crossings/interfaces.

6.6.20 The geotechnical hazards associated with this Preliminary Corridor are largely influenced by artificial deposits (around River Glen/A151/South Forty Foot Drain, area east of Exton, area west of Cottesmore Road, area south of Marefield Lane, and the area southeast of Lowesby); historic landfill (area east of Peterborough Road, south of Long Drove, area adjacent to Pickworth Road, and area adjacent to Knossington Road); and mass movement deposits (between Manor Lane and Cold Overton Road, northwest of Barleythorpe, north of Cold Overton Road, and between Newbold Lane and Owston Road, southwest of Somerby).

6.6.21 The approximate total length of Preliminary Corridor 4 is 71km with a high level assessment of 27 possible line diversions required. In aggregate the Preliminary Corridor could require: four ‘A’ type road crossings, three rail line crossings and seven river crossings.

Holford Rules

6.6.22 Preliminary Corridor 4 has been defined to exclude larger areas of the highest amenity value and interest in accordance with Holford Rule 1.

6.6.23 Sections have generally avoided smaller areas of high amenity value through areas specifically excluded from the Preliminary Corridor, with the exception of Exton RPG where the OHL would unavoidably cross the avenue which is the southern part of the RPG. Preliminary Corridor 4 also passes close to the north of Rutland Water SPA and Ramsar site, and although avoiding the site itself, the site is designated for value to birds and therefore requires further consideration to minimise potential impacts in accordance with Holford Rule 2. The other smaller areas of high amenity value which exist within the boundaries of the Preliminary Corridor comprise individual listed buildings, ancient woodland and priority habitats. Where there are smaller areas of high amenity value, sufficient space has been included within the Preliminary Corridor to enable routeing to avoid them, potentially by local deviation, in accordance with Holford Rule 2.

6.6.24 Preliminary Corridor 4 was specifically developed to provide a southern route from the new Weston Marsh substation Siting Zone, which requires direction changes in the OHL (and therefore the route performs less well against Holford Rule 3) and requires additional OHL compared to other Preliminary Corridors.

6.6.25 Preliminary Corridor 4 was developed to avoid highly constrained areas, and specific constraints including settlements such as Spalding, Bourne, Oakham and Langham (Holford Rule Supplementary Note 1). The width of the Preliminary Corridor reflects the constraints in each area, with narrow sections particularly because of areas specifically excluded.

6.6.26 The Preliminary Corridor 4 includes more land than is needed for construction of an OHL which provides flexibility and options when considering more detailed routeing, following non-statutory consultation feedback, at later project development stages. This also provides the opportunity to implement the most direct route (avoiding constraints) and reduce the need for sharp angles or changes in direction of the OHL in accordance with Holford Rule 3.

6.6.27 Given the generally very flat and open landscape in the east, with long views, Holford Rules 4 and 5 which primarily refer to topography were only relevant in the central and western parts of the Preliminary Corridor, except in respect of woodland blocks, where the width of the Preliminary Corridor is generally sufficient to provide opportunities for them to be skirted in the detailed design at a later stage of the Project.

6.6.28 Preliminary Corridor 4 would require the crossing of the existing 132kV OHLs (Holford Rule 6), and this could result in adverse landscape and visual impacts unless the mitigation (re-routeing, removal or undergrounding) is undertaken.

6.6.29 No residential or industrial zones are present within the Preliminary Corridor 4 and therefore Holford Rule 7 is not applicable.

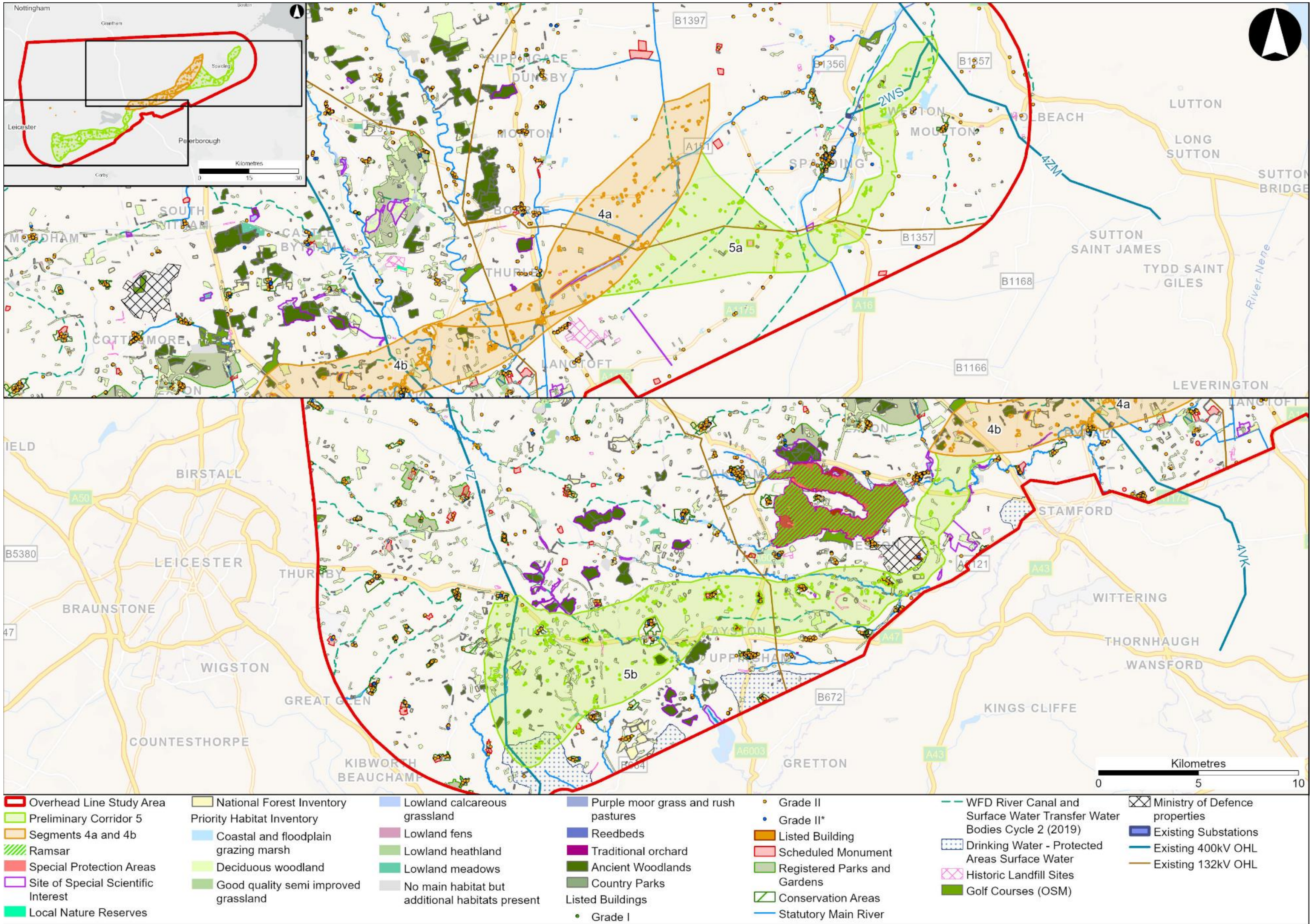
6.7 Preliminary Corridor 5

Introduction

6.7.1 Preliminary Corridor 5 is located the furthest south within the Study Area. It is comprised of two Segments 5a in the east and 5b in the west, with Segments 4a and 4b connecting them. Segment 5a was introduced to provide an alternative route south of Spalding. The Preliminary Corridor leaves the Weston Marsh substation Siting Zone heading south following the existing 400kV 2WS OHL, then narrows constrained by Spalding to the west and Weston in conjunction with other residential areas to the east. From Blenham Ho the Preliminary Corridor heads southwest, widening as it follows the existing 132kV OHL across the River Welland. Here with limited constraints the Preliminary Corridor fans out to the northeast and southwest and connects to Segment 4a.

6.7.2 Segment 5b connects from Segment 4b east of Emphingham. The Preliminary Corridor then heads south increasingly narrowing due to a number of SSSIs to the east, with Rutland Water Ramsar/SPA and MoD land to the west. In addition there are a number of woodland blocks heavily constraining this section of Preliminary Corridor. The Preliminary Corridor turns west at North Luffenham widening as is approaches and terminates at Siting Zone WMEL-BZ3. This part of the Preliminary Corridor has a number of constraints, predominantly residential areas, SSSIs, and heritage designations. An overview of Preliminary Corridor 5 and constraints identified is shown in **Figure 6-5**.

Figure 6-5 ─ Preliminary Corridor 5, Environmental and Socio-Economic Features



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6.7.3 Preliminary Corridor 5 comprises of two separate additional sections that connect to Preliminary Corridor 4 Segments 4a and 4b which therefore form the central part of Preliminary Corridor 5. This Preliminary Corridor is also characterised by flatter arable land with watercourses and drainage ditches to the east. It remains arable throughout but becomes more diverse in habitat and topography towards the west. Segment 5b is only 500m away from internationally designated Rutland Water Ramsar, SPA, and SSSI site and Segment 5a is 6.4km away from The Wash SPA and Ramsar site.

6.7.4 There are no SSSI within Segment 5a and two SSSI (Wing Water Waste Treatment Works SSSI and Allexton Wood SSSI) within Segment 5b. There are several ancient woodland sites within Segment 5b, the largest being Allexton Wood SSSI. Other ancient woodlands are small, located at the western end of the Segment and could likely be avoided. Priority habitats are present throughout Segments 5a and 5b.

6.7.5 There are very few priority woodlands in Segment 5a which are also woodland inventory sites. There are many small priority woodlands within Segment 5b which due to their clustered nature in some places, may be difficult to avoid. There are several coastal floodplain grazing marsh (GCGM) sites in the Segment 5a which it would be possible to avoid, or OHL can span over the top of them without substantial impact unless the habitat supports wintering birds associated with designated sites. The area of most constraint would be crossing of the River Welland and associated coastal floodplain grazing marsh. Potential adverse impacts include: habitat loss, fragmentation, habitat degradation from airborne or water pollution. Main watercourses are present in all Segments. Adverse impacts may include habitat degradation through pollution or spread of invasive species, disturbance or mortality to species such as otter and water vole, wetland birds, aquatic invertebrates or fish. It is anticipated that direct impacts resulting from habitat loss, fragmentation or degradation would be avoided on these woodland, grassland and fen habitat sites. If loss is unavoidable, with the exception of loss of any ancient woodland, other adverse impacts on habitat or protected species could be mitigated, informed by further ecological survey. A Habitat Regulations Screening Assessment and early engagement with Natural England would be required, Appropriate Assessment may be required due the proximity of Rutland Water Ramsar and SPA.

Historic Environment

6.7.6 The majority of the Scheduled Monuments within or immediately adjacent to Preliminary Corridor 5 are upstanding, and as a result have a greater sensitivity to changes to their settings. There is one Scheduled Monument in or adjacent to Segment 5a: Wykeham Chapel. Segment 5b has the following Scheduled Monuments in or adjacent: Moated site at North Luffenham, Earthwork in Morcott Spinney, Castle Hill motte and bailey, Beaumont Chase, Moated site at Allexton, and Hallaton motte and bailey castle. Listed buildings of note in Segment 5a include the Grade I The Wykeham Chapel of St Nicholas and Grade II Chapel Farmhouse. In addition, Segment 5b contains or is adjacent to listed building Grade I Noseley Chapel, and Grade II* Noseley Hall. Preliminary Corridor 5 has the potential to impact these heritage assets and their settings. Careful routeing and siting may avoid direct impacts and reduce setting changes to these heritage assets.

Landscape and Visual

6.7.7 No national or local level landscape designations have been identified within or in close proximity to Preliminary Corridor 5. This is a well settled landscape, with a series of small and medium settlements both within and adjacent to the Preliminary Corridor. Key concentrations of receptors and/or pinch points where it is likely to be difficult to avoid significant effects include: Segment 5a – between Spalding and Weston (along Holbeach Road) and Weston Hills, and northwest of Cowbit; Segment 5b – west of Ketton Quarry, between North Luffenham and South Luffenham and along Pilton Road, north of Belton-In-Rutland and between Tugby and East Norton.

6.7.8 In places along this option the density and dispersal of residential properties is likely to present a challenge to routeing. Potential effects on other sensitive visual receptors, including those using long distance and local recreational routes and visitors to other key viewpoints or designated recreational areas will also be important considerations. Careful routeing to avoid loss of existing features, relate to the landscape pattern and making use of existing trees and topography to provide partial screening would help to reduce potential effects on landscape character. Measures to reduce potential visual effects would include, increasing the distance from receptors, avoiding positioning towers in principal views and making use of existing features to provide screening, where possible. It will also be important to consider the relationship with other existing OHLs to minimise potential for cumulative landscape and visual effects, particularly in Segment 5a and central and eastern parts of Segment 5b.

Water Environment

6.7.9 There are multiple Water Framework Directive waterbodies and other watercourses throughout the Preliminary Corridor. There are no SPZ1 within the Preliminary Corridor. The eastern edge of the Preliminary Corridor is in Flood Zone 2 and 3 near Holbeach and a small section in Segment 5b near Edith Western. Development in flood inundation areas may disrupt flood flow conveyance. Avoidance of these receptors would not be possible in Preliminary Corridor 5 therefore, engagement with the Environment Agency would need to be undertaken in addition to water quality protection measures and drainage systems being needed throughout.

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Economic Activity (including Planning)

6.7.10 Segment 5a interacts with two NSIPs: the EN010130 - Outer Dowsing Offshore WindProject (Notice of DCO application acceptance) and the Grimsby to Walpole Swathe (DCO at Pre Application Stage). There is the potential for cumulative impacts to the environment and communities (e.g. through construction noise, traffic). In particular, the Grimsby to Walpole swathe runs directly through the 5a Preliminary Corridor which could lead to significant cumulative impacts for local communities. There is an opportunity to collaborate with other developers seeking to minimise impacts and maximise benefits, this will help to reduce cumulative impacts. However, if collaboration and alignment is not possible between NSIP projects during the design phase, there may be potential for significant adverse effects on each project.

6.7.11 Segment 5a interfaces with two Lincolnshire County Council Adopted Minerals and Waste Local Plan Policy Areas M11 and M12. There are also a number of planning applications within this Segment. Segment 5b interfaces with a number of Neighbourhood Plans; key themes throughout these plans include the preservation of biodiversity, historical significance and protection of landscape character within the local area. At a wider route level there are several existing developments that interface with the Preliminary Corridor. This includes properties with a range of land uses and their associated curtilages (e.g. residential property and garden; commercial premises and parking /external storage area). Careful routeing and siting alongside community engagement may reduce both direct and indirect impacts to these features.

Aviation and Defence

6.7.12 Preliminary Corridor 5 overlaps with the Shacklewell Lodge Farm and Manor Farm Airstrip in Segment 5b and is more than 2km from Northrope Fen Airstrip (segment 5a) and Leister Airport (Segment 5b). The Preliminary Corridor overlaps with St George Barracks in segment 5b and is more than 7km from Kendrew Barracks Airfield (segment 5b). Corridor 5 is likely to have potential effects on aviation receptors, particularly in Segment 5b. As the aviation receptors cannot be avoided in those Segments, stringent measures will need to be in place to avoid potential conflicts during the operation stage, and actions to appropriately mitigate impacts during the construction stage.

Traffic and Transport

6.7.13 The Preliminary Corridor is crossed by the following A and B roads that are managed by the local highway authorities: A151, A16 and A1176 (Segment 5a), A606, A6003, A47 (Segment 5b), and B1165 (Segment 5a). The Peterborough to Sleaford rail line crosses the Preliminary Corridor with a northwest/southeast orientation near to Spalding (Segment 5a). Melton Mowbray to Peterborough rail line crosses the Preliminary Corridor with an east/west orientation between Stamford and Oakham (Segment 5b). The Melton Mowbray to Corby rail line crosses the Preliminary Corridor with a north/south orientation between Corby and Oakham (Segment 5b). The River Welland (Segment 5a) crosses the Preliminary Corridor. At a wider route level there are several existing PRoW that interface with the entire route. Closure/diversions may be required to cross over, highways, railways, navigable waterways and PRoW across the Preliminary Corridor which could cause disruption to users.

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6.7.14 Leaving south from Weston Marsh substation Siting Zone, Preliminary Corridor 5 follows then crosses the existing 400kV 2WS OHL. The Preliminary Corridor narrows crossing the A151 between Weston and Spalding and continues to narrow further to cross the B1165. Routeing southwest the Preliminary Corridor widens but becomes heavily constrained by powerlines connecting to the Spalding substation, requiring five crossings and/or interfaces through this area. The Preliminary Corridor crosses the 132kV HB OHL and the A16 where is turns west following the existing 132kV HB OHL route. It crosses the River Welland, the Peterborough to Sleaford rail line and the A1175, before widening and connecting to Preliminary Corridor 4 around the Counter Drain Drove area. Segment 5a also includes the Grimsby and Walpole Electricity Transmission NSIP which could potentially constrain any new OHL in this area.

6.7.15 When routeing from the area around Counter Drain Drove to the area west of the A1 road Preliminary Corridor 5 would follow the same route as Preliminary Corridor 4 and would be subject to the same technical constraints as Segments 4a and 4b previously described within the appraisal for that Preliminary Corridor.

6.7.16 Segment 5b leaves Segment 4b just west of the A1. The Preliminary Corridor turns south crossing the River Gwash and the A606, narrowing to pass between MoD land to the west and a quarry to the east and constrained by several woodland blocks. Heading southwest the Preliminary Corridor is constrained by the settlement of North Luffenham as it crosses the River Chater and the Melton Mowbray to Peterborough rail line before widening and turning west. Crossing the Melton Mowbray to Corby rail line the Preliminary Corridor continues west, it then crosses the 132kV HN OHL, two 33kV powerlines, and the A47 before interfacing finally with the 400kV ZA OHL. The other main constraints through the area continue to be several woodlands and scattered settlements.

6.7.17 In addition to the existing 400kV OHLs there are multiple interfaces with existing NGED assets throughout Segments 5a, 4a, 4b, and 5b.

6.7.18 In total Preliminary Corridor 5 has five 132kV crossings/interfaces, six 33kV crossings/interfaces, and thirteen 11kV crossings/interfaces.

6.7.19 The geotechnical hazards associated with this Preliminary Corridor are largely influenced by artificial deposits (within and north of Belton-in-Rutland); historic landfill area around Uppingham Road, east of East Norton); artificial deposits and historic landfill (area south of Pilton and east of Wing with more local areas of historic landfill); and mass movement deposits (North of Preston, between Ridlington and Allexton / Belton-in-Rutland, area to south between Allexton and East Norton, and in the area of Medbourne Brook). Overall, this Preliminary Corridor passes through a greater extent of Peat / Alluvial Soils (relative to percentage of area) compared to the other Preliminary Corridors.

6.7.20 The approximate total length of Preliminary Corridor 5 is 69km with a high-level assessment of twenty-two possible line diversions required. In aggregate the Preliminary Corridor could require: nine 'A' type road crossings, four rail line crossings and nine river crossings.

Holford Rules

6.7.21 Preliminary Corridor 5 has been defined to exclude larger areas of the highest amenity value and interest in accordance with Holford Rule 1.

6.7.22 Sections have generally avoided smaller areas of high amenity value through areas specifically excluded from the Preliminary Corridor. Preliminary Corridor 5 passes close to the east and south of Rutland Water SPA and Ramsar site, although avoiding the site itself, the site is designated for value to birds and therefore requires further consideration to minimise potential impacts in accordance with Holford Rule 2.The smaller areas of high amenity value which exist within the boundaries of the Preliminary Corridor comprise individual listed buildings, ancient woodland and priority habitats. Where there are smaller areas of high amenity value, sufficient space has been included within the Preliminary Corridor to enable routeing to avoid them, potentially by local deviation, in accordance with Holford Rule 2.

6.7.23 Preliminary Corridor 5 was specifically developed to provide a southern route from the new Weston Marsh substation Siting Zone which requires direction changes in the OHL including going south around Spalding before returning north to Preliminary Corridor 4 and south again to avoid Rutland Water, therefore the route performs less well against Holford Rule 3, and requires additional OHL (compared to other Preliminary Corridors).

6.7.24 Preliminary Corridor 5 was developed to avoid highly constrained areas, and specific constraints including settlements, and specific constraints including settlements such as Spalding, Empingham, and Edith Weston (Holford Rule Supplementary Note 1). The width of the Preliminary Corridor reflects the constraints in each area, with narrow sections particularly because of areas specifically excluded.

6.7.25 The Preliminary Corridor 5 includes more land than is needed for construction of an OHL which provides flexibility and options when considering more detailed routeing, following non-statutory consultation feedback, at later project development stages. This also provides the opportunity to implement the most direct route (avoiding constraints) and reduce the need for sharp angles or changes in direction of the OHL in accordance with Holford Rule 3.

6.7.26 Given the generally very flat and open landscape in the east, with long views, Holford Rules 4 and 5 which primarily refer to topography were only relevant in the central and western parts of the Preliminary Corridor, except in respect of woodland blocks, where the width of the Preliminary Corridor is generally sufficient to provide opportunities for them to be skirted in the detailed design at a later stage of the Project.

6.7.27 Preliminary Corridor 5 would require the crossing of the existing 400kV and 132kV OHLs (Holford Rule 6), and this could result in adverse landscape and visual impacts unless the mitigation (re-routeing, removal or undergrounding) is undertaken.

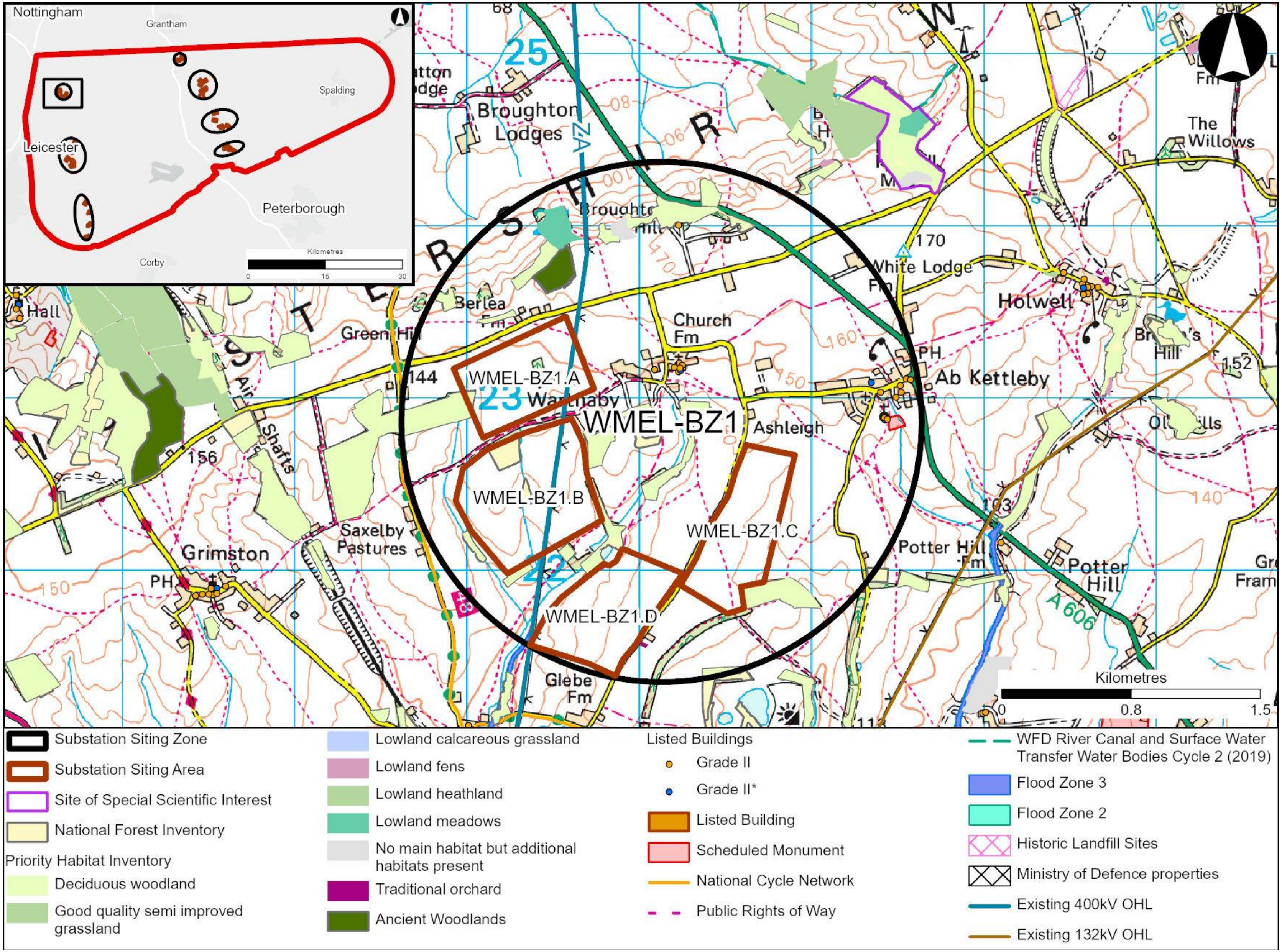
6.7.28 No residential or industrial zones are within Preliminary Corridor 5 and therefore Holford Rule 7 is not applicable.

6.8 Preliminary WMEL-B Substation Siting Zone 1

Introduction

6.8.1 WMEL-BZ1 is approximately 3km in diameter centred around Wartnaby. It encompasses Ab Kettleby and the A606 routes north south along the east edge of the Siting Zone. Key considerations and constraints in this Siting Zone include residential properties, areas of woodland (a single area of ancient woodland), localised areas of Flood Zone 2, a Scheduled Monument and listed building. The Siting Zone, Siting Areas, and environmental constraints are shown in **Figure 6-6**.

Figure 6-6 – WMEL-BZ1 Siting Areas, Key Environmental and Socio-Economic Features



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6.8.2 There are no SACs, SPAs or Ramsar sites within 10km of WMEL-BZ1. The nearest SSSI is Holwell Mouth approximately 1.7km northeast of WMEL-BZ1.C. Due to the distance of the Siting Areas from the Holwell Mouth SSSI, potential impacts in relation to substation infrastructure are limited to pollution during construction of functionally connected habitats.

6.8.3 There is priority broadleaved woodland is found within the boundary of WMEL-BZ1.A, and adjacent to all the other Siting Areas. National Forest inventory present within WMEL-BZ1.B. Two small ditches or watercourses are partially located within WMEL-BZ1.A, with watercourses located adjacent to WMEL-BZ1.B, WMEL-BZ1.C, and WMEL-BZ1.D which also has a pond adjacent to the north.

6.8.4 There is potential for adverse effects resulting from direct impact of habitat loss and/or fragmentation of priority woodland, hedgerow, trees, arable field margins. Other adverse effects may arise from impacts relating to habitat degradation from airborne or waterborne pollution, disturbance to species from noise, lighting, vibration and also mortality or injury. Given the ecological performance of the different options presented, Siting Area WMEL-BZ1.C would be preferable with regard to Ecology, given that other options impact woodland or have more sensitive habitat adjacent such as woodland watercourses and ponds.

Historic Environment

6.8.5 There is one Scheduled Monument in the Siting Zone - Moated site at Ab Kettleby approximately 500m east of WMEL-BZ1.C. Listed buildings with the potential to experience adverse impact to their settings due to their proximity to WMEL-BZ1.C include the Grade II* Church of St. Michael and Grade II* Church of St James the Greater. Other listed buildings within the Siting Zone would be unlikely to experience adverse impacts due to their location within the villages of Ab Kettleby and Wartnaby. In addition, all Siting Areas could have adverse effects on buried archaeological remains as a result of direct impacts. Given the historic amenity associated with the area, Siting Areas WMEL-BZ1.A, WMEL-BZ1.B WMEL-BZ1.D would be preferable with regard to the Historic Environment, as WMEL-BZ1.C presents potential adverse effects on listed buildings and a Scheduled Monument.

Landscape and Visual

6.8.6 There are no landscape designations within the Siting Zone. WMEL-BZ1 contains two small, nucleated villages Wartnaby and Ab Kettleby, each of which have Conservation Areas at their core. Wartnaby has higher levels of containment whereas Ab Kettleby is more open with potential view to the southwest. Belvoir Scarp is an elevated open ridge located to the north, which is likely to be visible from long distance views from the north. The topography is influenced by numerous small watercourses and associated valleys and slopes down from the ridge to the south.

6.8.7 There are numerous PRoW within WMEL-BZ1, radiating out from Wartnaby and Ab Kettleby and connecting the villages. The A606, Nottingham Road is located to the northeast of the Siting Zone and Six Hills Lane runs from east to west across the north. Woodland blocks and linear vegetation are characteristic features of the landscape of the Siting Zone, providing opportunities for screening of a carefully siting substation. Small areas of open access/recreational grounds are located within the Siting Zone, although outward views are largely limited and are not central to the users' experience.

6.8.8 Given the effects associated with the different options presented, WMEL-BZ1.B would be slightly preferable with regard to landscape character and visual amenity, provided that some or all of the existing woodland can be retained, robust mitigation planting and careful configuration of the substation can be achieved. The remaining options are likely to result in greater adverse effects, including from nearby residential properties and PRoW, with WMEL-BZ1.C and WMEL-BZ1.D the least favourable options.

Water Environment

6.8.9 There are no SPZ1s in the Siting Areas. The southwestern corner of WMEL-BZ1.D is close to Flood Zones 2 and 3, which extends along the western boundary as mapped surface water flooding. There is also a pond to the north of the site. There is a narrow route of surface water flooding on the western side of WMEL-BZ1.A associated with a minor watercourse. There are narrow routes of surface water flooding on the western boundary and through the centre of WMEL-BZ1.B which is associated with minor watercourses, and there is a narrow route of surface water flooding along the eastern boundary of WMEL-BZ1.C associated with a minor watercourse.

6.8.10 Construction may temporarily and permanently alter flood risk and drainage patterns due to earthworks, excavation, and drainage installation, potentially increasing runoff and localized flooding, that needs to be taken into account by the Siting Area layouts and may also affect third party land and property. The addition of impermeable surfaces from the substation may increase surface runoff and pluvial flooding risk. At all Siting Areas a Construction Environmental Management Plan (CEMP) would detail good practice pollution prevention measures for all phases of work, including preliminary investigations/enabling works. The Siting Areas should be set out to avoid areas of surface water flooding and to implement a suitable Drainage Strategy that provides adequate attenuation and treatment of surface water runoff and containment of any spillage risk. A Drainage Strategy should then be maintained for the life of the development. Culverting of watercourses for access should also be avoided in preference for clear span options.

6.8.11 At all of the Siting Areas it is expected that the majority, if not all, effects could be avoided or reduced.

6.8.12 Options WMEL-BZ1.A, WMEL-BZ1.B, and WMEL-BZ1.C would be preferable with regard to Water Environment, given that WMEL-BZ1.D is closer to Flood Zones 2 and 3 and has a pond adjacent.

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Economic Activity (including Planning)

6.8.13 There are no NSIPs in proximity to the Siting Zone. There are no neighbourhood plans within or in proximity to WMEL-BZ1.C and WMEL-BZ1.D. Both WMEL-BZ1.A and WMEL-BZ1.B are within the Ab Kettleby Neighbourhood Plan area. WMEL-BZ1.B is located within ENV2: Protection of Site and Features of Environmental Significance. WMEL-BZ1.A does not contain ENV2 within its boundary, however it is in close proximity. Siting areas WMEL-BZ1.A and WMEL-BZ1.B both have the EN13 conservation area to the east. Overall, it is expected that the majority of effects could be avoided or reduced. To comply with the identified neighbourhood plans mitigation should be carefully considered in relation to biodiversity, historical importance, and landscape and visual impacts. Early engagement must be sought with the community. However, due to the location of the ENV2 site within the boundary of WMEL-BZ1.B, it is unknown if adverse impacts could be reduced or avoided without further assessment.

6.8.14 The majority of the land within this Siting Zone is designated as ALC Grade 3, with two areas of Grade 2. All of WMEL-BZ1.C and WMEL-BZ1.D are Grade 3 however around half of WMEL-BZ1.A and the southern corner of WMEL-BZ1.B are shown as Grade 2. Further analysis at later project stages would be required to determine the potential loss of BMV (Grade 2 and 3a).

Aviation and Defence

6.8.15 There are no known aviation or defence constraints relevant to substations in this Siting Zone.

Traffic and Transport

6.8.16 Vehicular access to WMEL-BZ1.A could potentially be from Six Hills Lane to the north of the site which connects to the A606, A6006 and A46. Access to Six Hills Lane from WMEL-BZ1.B would require a 300m long access road, and access to Option WMEL-BZ1.C and WMEL-BZ1.D would be off a road that is unsuitable for regular construction HGV movements and would require highway mitigation and potentially additional land. All the Siting Areas have PRoW that cross them (WMEL-BZ1.A, WMEL-BZ1.B and WMEL-BZ1.C) and/or are adjacent to them. Located to the west of the Siting Zone is National Cycle Network 48 which follows a north south road and crosses Six Hills Lane. There are no airports, airfields, aerodromes, or MoD sites in proximity to the Siting Zone. Siting area WMEL-BZ1.A would be preferable with regard to Traffic and Transport.

Engineering and System Preliminary Appraisal Summary

6.8.17 The key factors when considering a best performing Siting Area for the WMEL-B substation include the proximity to the existing 400kV ZA OHL and the minimisation of system outages required to facilitate construction.

6.8.18 For all Siting Areas, construction sequencing will be rationalised to reduce the potential for system outages. The WMEL-B substation and the 400kV transmission connection could be built offline as far as practicable with the final 400kV transmission turn-ins and connections to be completed under outages for all Siting Areas.

6.8.19 Existing infrastructure located in Siting Area WMEL-BZ1.C are HV (11kV) OHL from the northeast and cables from the northwest join along the middle sector of site and continue as a single cable towards the south and off site. The same OHL passes to the east of WMEL-BZ1.D along Saxelby road. Cadent Gas, 90mm pipeline is located north of WMEL-BZ1.A running west to the northeast along the path of Six Hills Lane Road.

6.8.20 The Project would require the existing 400kV ZA OHL circuits to be diverted and terminated at the WMEL-B substation. Siting Areas WMEL-BZ1.A and WMEL-BZ1.B encompass a portion of the existing 400kV ZA OHL, with WMEL-BZ1.D located immediately to the east, and therefore offer comparatively better locations for the required connections to occur. However, this would require some outages and potentially phased construction works. Due to the distance from the existing 400kV ZA

OHL, 850m from the Siting Area, WMEL-BZ1.C would result in increased OHL connection works.

6.8.21 Due to various environmental and geographical constraints none of the Siting Areas cover the standard dimensions of 720m by 400m, however, all are greater in area than the required 28.8ha. WMEL-BZ1.A and WMEL-BZ1.D are slightly short in length, WMEL-BZ1.C is narrow, and WMEL-BZ1.B has an irregular shape. All sites would require some form of optimisation.

6.8.22 The presence of a notable area of mapped infilled ground, paired with a mining legacy, means ground conditions at WMEL-BZ1.A would likely require substantial further consideration in design and construction. This would include deep foundations in the east of the Siting Area and remedial works. Significant earthworks and/or retaining structures are anticipated to be required at WMEL-BZ1.B to manage notable level changes, which could require deep foundation solutions in areas of fill. Relatively small amounts of earthworks and low height retaining structures are anticipated to be required to manage level changes at WMEL-BZ1.C, although this could increase in the south around the encroaching surface water feature. However, due to the presence of mapped buried river channel, paired with low potential of mining legacy (including an on-site circular feature that could be related to mining e.g. a shaft), ground conditions are likely to require substantial further consideration in design and construction. Similar issue arise in WMEL-BZ1.D, however, it should be relatively easy to mitigate these risks during investigation and design phase.

Holford and Horlock Rules

6.8.23 The following paragraphs provide commentary of the extent to which the appraised options for siting the WMEL-B substation accord with the Horlock Rules, and with regards to line entries, the Holford Rules. These are NGET’s guiding principles for the routeing/siting of new energy transmission infrastructure and a primary mechanism by which compliance with national policy is determined.

6.8.24 At this early stage of development Horlock Rules 7, 9, 10 and 11 are not considered applicable as they are primarily concerned with the detailed design of substations following site selection.

6.8.25 When reviewed against the applicable Horlock and Holford Rules:

- The definition of Siting Areas has taken into consideration environmental features and potential impacts upon identified features (Horlock Rule 1).
- All Siting Areas have been defined to exclude areas of highest amenity value and interest in the area (Horlock Rules 2 and 3, and Holford Rules 1 and 2).
- Sufficient space is available within the Siting Areas to enable micro-siting to avoid identified socio-economic constraints and further reduce impacts on environmental features present (Horlock Rules 4 and 5).
- All Siting Areas offer the opportunity to utilise screening provided by existing features to reduce intrusion into surrounding areas (Horlock Rule 4); with the greatest opportunity offered by siting area WMEL-BZ1.B.
- All Siting Areas are predominantly located on agricultural land Grade 3 (Horlock Rule 6 - reducing effect on agricultural land and drainage), however some areas of Grade 2 and may be impacted to achieve the area required whilst avoiding other constraints. The impact on BMV agricultural land is considered using publicly

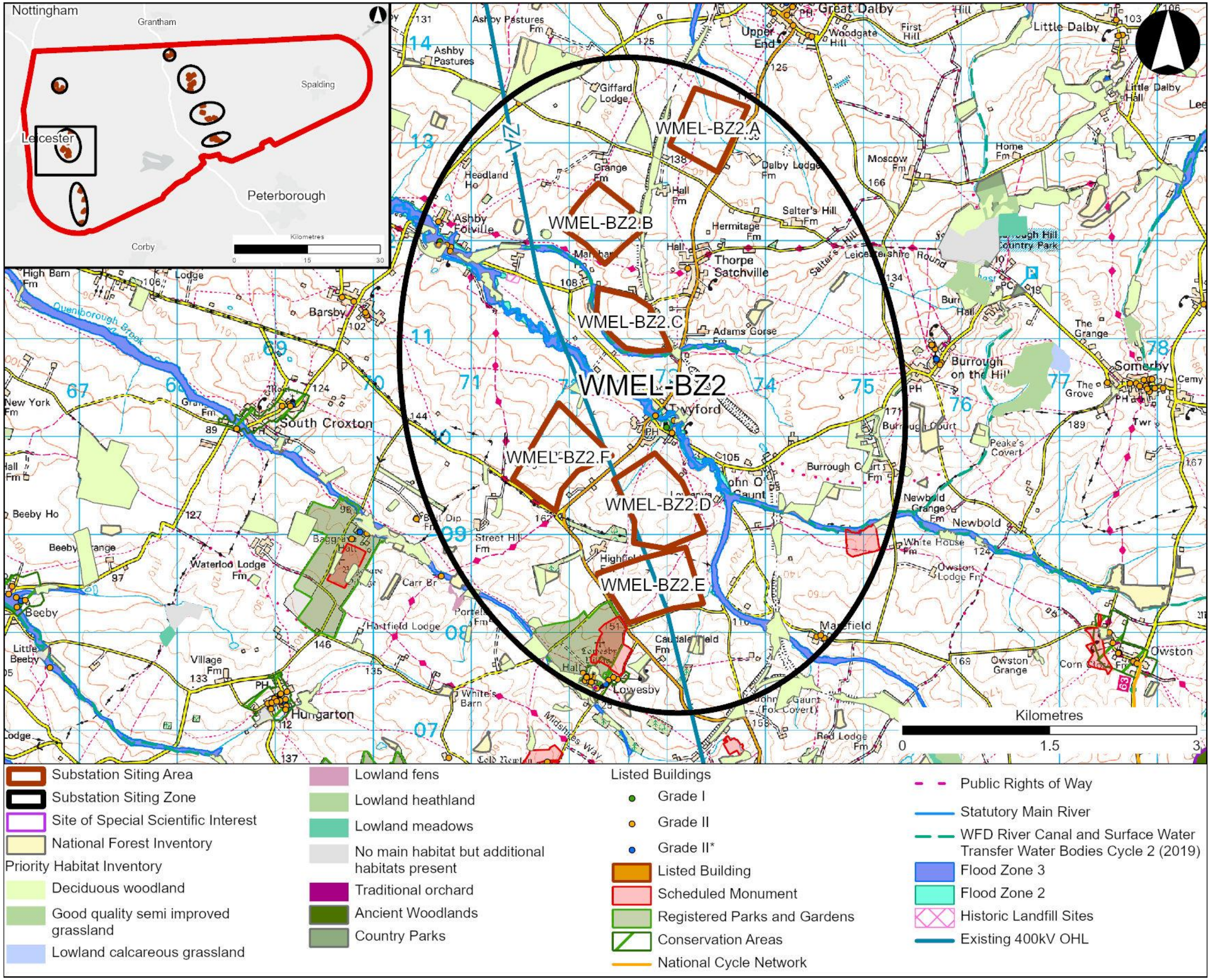
available provisional data on ALC (no subgrades or survey data) only, and will be assessed at later project stages.

6.9 Preliminary WMEL-B Substation Siting Zone 2

Introduction

6.9.1 WMEL-BZ2 is an area of approximately 6.7km by 5.1km centred around Twyford and encompasses John O'Gaunt, Thorpe Satchville, Lowesby Hall estate located in the southwest of the Siting Zone, and the B6047 which routes north south. Key environmental considerations include villages and scattered residential properties, watercourses and narrow associated Flood Zone 2, two Scheduled Monuments, and a RPG. The Siting Zone, Siting Areas, and environmental constraints are shown in **Figure 6-7**.

Figure 6-7 – WMEL-BZ2 Siting Areas, Key Environmental and Socio-Economic Features



Environmental Preliminary Appraisal Summary

Ecology

6.9.2 There are no SACs, SPAs or Ramsar sites within 10km of WMEL-BZ2, and there are no SSSIs or NNRs within 2km of WMEL-BZ2. There are no priority broadleaved woodland or National Forest inventory habitats within any of the Siting Areas, however there are sections adjacent to areas WMEL-BZ2.B and WMEL-BZ2.C. Undesignated woodland blocks are found in WMEL-BZ2.E and WMEL-BZ2.F. Watercourses are found in WMEL-BZ2.A, D, E and F with watercourses immediately adjacent to WMEL-BZ2.B and WMEL-BZ2.C.

6.9.3 There is potential for adverse effects resulting from direct impact of habitat loss and/or fragmentation of priority woodland, hedgerow, trees, arable field margins. Other adverse effects may arise from impacts relating to habitat degradation from airborne or waterborne pollution, disturbance to species from noise, lighting, vibration and also mortality or injury.

6.9.4 Given the ecological performance of the different options presented, WMEL-BZ2.D would be preferable with regard to Ecology, if the watercourse and tree line can be avoided, given that other options have more impacts on watercourses, more hedgerows with trees throughout their sites and priority woodland adjacent.

Historic Environment

6.9.5 Lowesby deserted medieval village with three fishponds Scheduled Monument and Listed Grade II Lowesby Hall RPG are adjacent to the southwest of WMEL-BZ2.E. Adverse impacts on these designated sites are likely to result from changes to their setting. Other designated assets are present within the Siting Zone, however these are considered unlikely to experience adverse effects as a result of changes to their settings from OHL; for instance, listed buildings within towns and villages, the significance of which would not be impacted by the presence of OHL or pylons at a distance. In addition, all Siting Areas could have adverse effects on buried archaeological remains as a result of direct impacts.

6.9.6 Siting areas WMEL-BZ2.A, B, C, D and F would be preferable with regard to the Historic Environment, given that Option WMEL-BZ2.E presents potential adverse effects on a RPG and a Scheduled Monument .

Landscape and Visual

6.9.7 WMEL-BZ2 contains one landscape designation Lowesby Hall RPG, and supports a parkland character outside the designation through avenues of trees along local roads. The Siting Zone contains several small settlements, including Thorpe Satchville, Twyford, John O’Gaunt, and Ashby Folville. The slightly larger settlement of Great Dalby is located around 700m northeast outside of the Siting Zone. The topography is steeply sloping in places and influenced by watercourses, the main one being Gaddesby Brook, and associated valleys.

6.9.8 There are numerous PRoW within the Siting Zone, including the Long Distance Routes of the Midshires Way and the Leicestershire Round. Several small areas of open access/ recreational grounds are located within the Siting Zone, although outward views from the majority are limited. Potential visibility from a recognised viewpoint at Burrough

Hill Country Park (Fort) with expansive views over the surrounding countryside to the west. Occasional small blocks of woodland are present, providing some context against which mitigation planting could relate if carefully designed.

6.9.9 Siting area WMEL-BZ2.C would be slightly preferable with regard to landscape character and visual amenity, provided that existing trees and woodland can be retained, robust mitigation planting and careful configuration of the substation can be achieved. The remaining options are likely to result in greater adverse effects, including to local landscape character and from nearby residential properties and PRoW, with WMEL-BZ2.D and WMEL-BZ2.E the least favourable options.

Water Environment

6.9.10 There are no SPZ1s in the Siting Areas. Waterbody Queniborough Brook Catchment (trib of Wreake) and its Flood Zone 2 and 3 is immediately adjacent to Siting Area WMEL-BZ2.C, and runs southeast to northwest through the center of WMEL-BZ2.

6.9.11 There are areas of surface water flood risk through the centre of WMEL-BZ2.A and including three prominent branches associated with a watercourse. There is a tributary of the Gaddesby Brook running along the western edge of WMEL-BZ2.B draining to the Gaddesby Brook in the south. This is associated with a narrow zone of surface water flooding. There are two other notable surface water flow paths associated with topographical depressions draining the site to the south. There is surface water flood risk along a minor watercourse cutting through the northern part of WMEL-BZ2.D, and a smaller watercourse running along the edge of the southern boundary. There are multiple surface water flow paths in the northeast corner of WMEL-BZ2.E northern boundary, as well as along Marefield Lane. WMEL-BZ2.F has multiple surface water flow paths draining topographical depressions towards Gaddesby Brook, and although more numerous than other sites they appear more confined.

6.9.12 Construction may temporarily and permanently alter flood risk and drainage patterns due to earthworks, excavation, and drainage installation, potentially increasing runoff and localised flooding, that needs to be taken into account by the Siting Area layouts and may also affect third party land and property. The addition of impermeable surfaces from the substation may increase surface runoff and pluvial flooding risk.

6.9.13 At all Siting Areas a CEMP would detail good practice pollution prevention measures for all phases of work, including preliminary investigations/enabling works. The Siting Areas should be set out to avoid areas of surface water flooding and to implement a suitable Drainage Strategy that provides adequate attenuation and treatment of surface water runoff and containment of any spillage risk. The Drainage Strategy should then be maintained for the life of the development. Culverting of watercourses for access should also be avoided in preference for clear span options.

6.9.14 Options WMEL-BZ2.A would be preferable with regard to Water Environment, given that Options WMEL-BZ2.B, WMEL-BZ2.C, WMEL-BZ2.D, WMEL-BZ2.E, and WMEL-BZ2.F are closer to the watercourse and Flood Zones 2 and 3.

Socio-Economic Preliminary Appraisal Summary

Economic Activity (including Planning)

6.9.15 There are no NSIPs, neighbourhood plans, Conservation Areas, or committed developments within the Siting Zone.

6.9.16 All Siting Areas within WMEL-BZ2 are located in ALC Grade 3, the extent of BMV (Grade 3a) is not known at this stage and ALC or BMV are therefore not key differentiating factors.

Aviation and Defence

6.9.17 There are no known aviation or defence constraints relevant to substations in this Siting Zone.

Traffic and Transport

6.9.18 Vehicle access to WMEL-BZ2.A would be from the B6047, which connects to the A607 and A47 to the north and south respectively. However, the B6047 is not wide, having steep gradients and bends which may limit visibility at the access point, passing through villages and being some distance from the A roads. The nearest highways to WMEL-BZ2.B and WMEL-BZ2.C are the B6047, Ashby Road and Gated Road. An access road would be required across additional land to connect the Siting Areas to the B6047. In addition a short access road would be required across additional land to connect WMEL-BZ2.D to the B6047 (Thimble Hall Road). Access to the B6047 is via Marefield Lane for WMEL-BZ2.E and via Twyford Road for WMEL-BZ2.F. There are no airports, airfields, aerodromes, or MoD sites in proximity to the Siting Zone. All the Siting Areas have PRoW that either cross them (including WMEL-BZ2.B, WMEL-BZ2.D and WMEL-BZ2.E) and/or are adjacent to them. Given the transport constraints and receptors associated with the different Siting Areas, WMEL-BZ2.A and WMEL-BZ2.D would be slightly preferable with regard to Traffic and Transport. This is because access to Siting Areas WMEL-BZ2.C, WMEL-BZ2.E and WMEL-BZ2.F could be difficult as a result of the horizontal and vertical alignment of the B6047 in the vicinity of the Siting Areas, and WMEL-BZ2.B would require a lengthy access road needing additional land.

Engineering and System Preliminary Appraisal Summary

6.9.19 Existing infrastructure located in Siting Area WMEL-BZ2.A includes a National Grid Distribution 11kV OHL southwest approximately 20m offsite and a LV OHL offsite to the southeast. WMEL-BZ2.B has National Grid Distribution HV (11kV) OHLs located in the southwest and north areas onsite. LV underground National Grid Distribution cables are located in the south of the Siting Area and also offsite to the southwest. In addition the existing ZA (400kV) NGET OHL is located 150m to the west, underground private cables are located approximately 100m northeast (possibly related to solar power at Hall Farm Generation), a network of underground LV cables is located approximately 200m southeast, and a 90mm Cadent Gas asset is located approximately 200m southeast. WMEL-BZ2.C has 11kV underground cables cutting across the east of the site running northwest to southeast. A 90mm Cadent Gas main assets cross north of the site along Gated Road and also 100m southwest along Ashby road. LV Underground cables are also located immediately offsite to the southeast. WMEL-BZ2.D has the NGET Transmission ZA 400kV) OHL which cuts across site in the west of the Siting Area (northwest-southeast), and a National Grid Distribution (11kV) OHL in the southeast area of the site. WMEL-BZ2.E has underground cables along the west and north of the Siting Area. WMEL-BZ2.F has Freezeland Lodge Pole mounted transformer south of site which is connected to an underground HV (11kV) cable from the south diverting to a LV underground cable. There is also a HV (11kV) cable from the southwest across site and offsite to the southeast, private cables immediately offsite in the south connected to LV underground cable network which diverges from LV OHL and

HV (11kV) OHL at a ground mounted transformer, and a National Grid Transmission 132kV OHL 20m east of the site.

6.9.20 The Project will require the existing 400kV ZA OHL circuits to be diverted and terminated at the WMEL-B substation. Siting areas WMEL-BZ2.D, WMEL-BZ2.E and WMEL-BZ2.F encompass a portion of the existing 400kV ZA OHL and therefore offer comparatively better locations for the required connections to occur. However, this would require some outages and potentially phased construction works. Due to the distance from the existing 400kV ZA OHL Siting Areas WMEL-BZ2.A (1.6km), WMEL-BZ2.B (350m), and WMEL-BZ2.C (850m) would require increased OHL connection works.

6.9.21 Siting Areas WMEL-BZ2.D, WMEL-BZ2.E and WMEL-BZ2.F are all large enough to accommodate the required 720m by 400m (28.8ha) substation footprint. Siting Areas WMEL-BZ2.A, WMEL-BZ2.B and WMEL-BZ2.C are greater than the 28.8ha required however due to various environmental and geographical constraints these sites would require some form of optimisation.

6.9.22 Both WMEL-BZ2.E and WMEL-BZ2.F require high amounts of earthworks and potentially significant retaining structures are anticipated to be required to manage level changes, which could require deep foundation solutions in areas of fill. WMEL-BZ2.A has the potential for medium to high amounts of earthworks and low to high height retaining structures, and has potential issues with shallow groundwater and requirement for groundwater management. At WMEL-BZ2.A, WMEL-BZ2.E and WMEL-BZ2.F consideration would also need to be given to the culverting or diversion of surface water features if they cannot be avoided. WMEL-BZ2.D requires a medium to high amounts of earthworks and medium height retaining structures are anticipated to be required to manage level changes, which could require deep foundation solutions in areas of fill. The requirement for high height retaining structures can’t be discounted towards the northern water feature. Consideration would also need to be given to the culverting or diversion of the central surface water feature if it cannot be avoided by developments and possibly, slope instability issues within its banks. WMEL-BZ2.B has the potential for medium to high amounts of earthworks and medium height retaining structures. Potential issues with shallow groundwater and requirement for groundwater management. Presence of several depressions on site, possibly ponds, potentially associated with localised historical surface mineral extraction. WMEL-BZ2.C will require low to medium amounts of earthworks and relatively low height retaining structures are anticipated to be required to manage level changes, which could require deep foundations solutions in areas of fill. Careful consideration would also need to be given to any works adjacent to the notable cutting associated with dismantled railway in the east.

Holford and Horlock Rules

6.9.23 At this early stage of development Horlock Rules 7, 9, 10 and 11 are not considered applicable as they are primarily concerned with the detailed design of substations following site selection.

6.9.24 When reviewed against the applicable Horlock and Holford Rules:

- The definition of Siting Areas has taken into consideration environmental features and potential impacts upon identified features (Horlock Rule 1).
- All Siting Areas have been defined to exclude areas of highest amenity value and interest in the area (Horlock Rules 2 and 3, and Holford Rules 1 and 2).

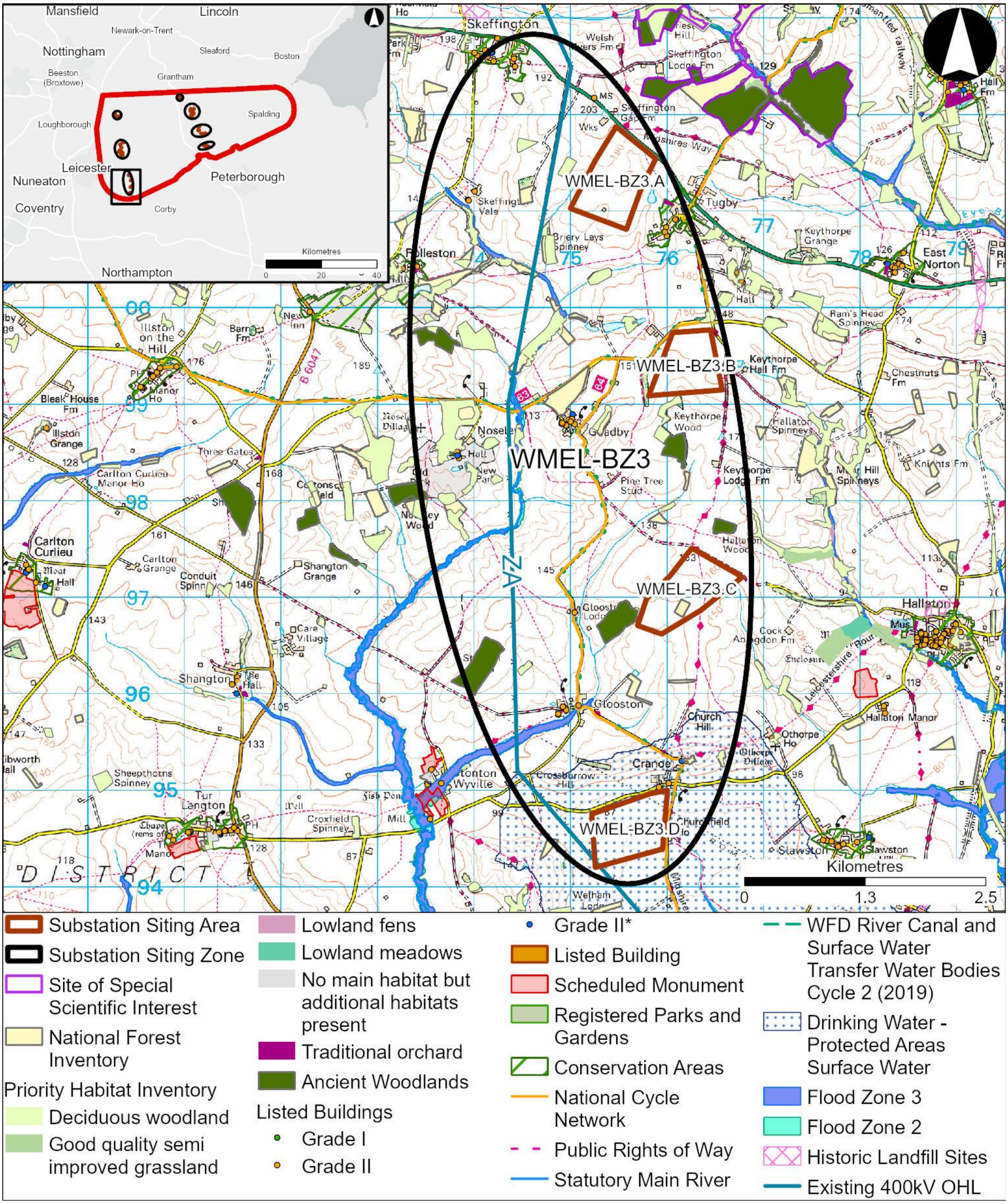
- Sufficient space is available within the Siting Areas to enable micro-siting to avoid identified socio-economic constraints and further reduce impacts on environmental features present (Horlock Rules 4 and 5).
- All Siting Areas offer the opportunity to utilise screening provided by existing features to reduce intrusion into surrounding areas (Horlock Rule 4); with the greatest opportunity offered by siting area WMEL-BZ2.C.
- All Siting Areas are predominantly located on agricultural land (Horlock Rule 6 - reducing effect on agricultural land and drainage) and all land is ALC Grade 3. The impact on BMV agricultural land is considered using publicly available provisional data on ALC (no subgrades or survey data) only, and will be assessed at later project stages.

6.10 Preliminary WMEL-B Substation Siting Zone 3

Introduction

6.10.1 WMEL-BZ3 is an area of approximately 8.8km by 3.4km centred around Goadby and encompasses Noseley, Glooston and Cranoe, and partially encompasses Tugby and Skefflington. Key environmental considerations include the small villages identified above, ancient woodland, topography, a watercourse and associated narrow Flood Zone 2. The Siting Zone, Siting Areas, and environmental constraints are shown in **Figure 6-8**.

Figure 6-8 – WMEL-BZ3 Siting Areas, Key Environmental and Socio-Economic Features



Environmental Preliminary Appraisal Summary

Ecology

6.10.2 There are no SACs, SPAs or Ramsar sites within 10km of WMEL-BZ3. Leighfield Forest SSSI is 500m northeast of WMEL-BZ3.A.

6.10.3 There are no priority broadleaved woodland within any of the Siting Areas, however there are priority woodland copses adjacent to WMEL-BZ3.B and WMEL-BZ3.C. An ancient woodland is situated approximately 50m to the west of WMEL-BZ3.C which is connected via hedgerow habitat. WMEL-BZ3.C also contains a block of National Forest inventory.

6.10.4 Watercourses/bodies are located adjacent to WMEL-BZ3.A, WMEL-BZ3.B and WMEL-BZ3.D, including a network of ponds present within woodland on an adjacent property approximately 50m east of WMEL-BZ3.B. Potential impacts include pollution to hydrologically connected sites and habitat degradation of nearby SSSIs, designated for grassland habitats through potential flow pathway. There is potential for adverse effects resulting from direct impact of habitat loss and/or fragmentation of priority woodland, hedgerow, trees, arable field margins. Other adverse effects may arise from impacts relating to habitat degradation from airborne or waterborne pollution, disturbance to species from noise, lighting, vibration and also mortality or injury.

6.10.5 Siting Areas WMEL-BZ3.A and WMEL-BZ3.D would be preferable with regard to ecology if impacts to watercourses are avoided, given that WMEL-BZ3.B impacts more grassland and WMEL-BZ3.C contains woodland.

Historic Environment

6.10.6 There are no Scheduled Monuments or RPGs in proximity to the Siting Areas. WMEL-BZ3.D could potentially cause adverse impacts to the Grade II listed buildings Pump (50m north), and The Old School House and Master's Cottage (75m north) resulting from changes to their settings. Other designated assets are present within the Siting Zone, however these are considered unlikely to experience adverse effects as a result of changes to their settings resulting from OHL; for instance, listed buildings within towns and villages, the significance of which would not be impacted by the presence of OHL or pylons at a distance. In addition, all Siting Areas could have adverse effects on buried archaeological remains as a result of direct impacts.

6.10.7 Siting Areas WMEL-BZ3.A, WMEL-BZ3.B, and WMEL-BZ3.C would be preferable with regard to the historic environment, given that WMEL-BZ3.D presents potential adverse effects on listed buildings.

Landscape and Visual

6.10.8 There are no landscape designations located within this Siting Zone. WMEL-BZ3 contains several small settlements, including Skeffington, Tugby, Goadby, Glooston and Cranoe, with a number of others just outside the zone. The villages of Skeffington and Tugby to the north of the Siting Zone have conservation areas at their core. The topography is varied and rolling, often with steep slopes forming elevated ridges and more enclosed valleys along watercourses. The highest ground tends to be in the north and east, lower to the west and in the south.

6.10.9 There are numerous PRoW within the Siting Zone, including the Long Distance Routes of the Midshires Way, Macmillan Way and the Leicestershire Round. The Midshires Way runs north to south through the centre of the Siting Zone from Tugby in the north to Cranoe in the south along an elevated ridge. The Siting Zone contains part of the National Cycle Network (NCN) Route 63 and a small part of NCN Route 64. The A47, Uppingham Road is located to the north of the Siting Zone, with several local roads connecting between settlements. Existing OHLs, largely along lower slopes and valleys, provide some context of electrical infrastructure. Small woodlands and linear tree belts, particularly along valleys and within estates, provide some context against which mitigation planting could relate, if carefully designed.

6.10.10 WMEL-BZ3.C would be slightly preferable with regard to landscape character and visual amenity, provided that existing trees and woodland can be retained, robust mitigation planting and careful configuration of the substation can be achieved. WMEL-BZ3.A and WMEL-BZ3.D are considered the next best options, although with slightly greater potential for adverse effects than WMEL-BZ3.C. The least preferred Siting Area is WMEL-BZ3.B due to greater potential to result in landscape and visual effects and greater difficulty of mitigation.

Water Environment

6.10.11 There are no SPZ1s in the Siting Areas, and none of the Siting Areas are located in Flood Zones 2 and 3.

6.10.12 There is a notable surface water flow path in the northeast corner of WMEL-BZ3.A flowing south with some lesser areas elsewhere across the site. There is a large pond within close proximity to WMEL-BZ3.A that may be hydrologically connected with the surface water flow path. A surface water flow path exists in the northeast corner of WMEL-BZ3.B that is connected to an area of surface water flooding along Hallaton Road. There is another narrow zone of surface water flood risk in the centre of WMEL-BZ3.B that appears to flow east towards Hallaton Road. A series of ponds are located at Keythorpe Hall Farm, into which these surface water flow paths may flow. There are multiple surface water flow paths in the southwest of WMEL-BZ3.C and along the eastern boundary. There are extensive surface water flow paths covering much of WMEL-BZ3.D which is also located within a Drinking Water Protected Area.

6.10.13 Construction may temporarily and permanently alter flood risk and drainage patterns due to earthworks, excavation, and drainage installation, potentially increasing runoff and localised flooding, that needs to be taken into account by the Siting Area layouts and may also affect third party land and property. The addition of impermeable surfaces from the substation may increase surface runoff and pluvial flooding risk.

6.10.14 At all Siting Areas a CEMP would detail good practice pollution prevention measures for all phases of work, including preliminary investigations/enabling works. The Siting Areas should be set out to avoid areas of surface water flooding and to implement a suitable Drainage Strategy that provides adequate attenuation and treatment of surface water runoff and containment of any spillage risk. A Drainage Strategy should then be maintained for the life of the development. Culverting of watercourses for access should also be avoided in preference for clear span options.

6.10.15 WMEL-BZ3.A and WMEL-BZ3.B WMEL-BZ3.C would be preferable with regard to water environment, as WMEL-BZ3.D sits within a Drinking Water Protected Area and although mitigation could likely be provided for construction and operation runoff, it would be better to avoid.

Socio-Economic Preliminary Appraisal Summary

Economic Activity (including Planning)

6.10.16 There are no NSIPs, neighbourhood plans, or committed developments within the Siting Zone.

6.10.17 Siting Areas WMEL-BZ3.A, WMEL-BZ3.C, and WMEL-BZ3.D are on land designated as ALC Grade 3; a large proportion of WMEL-BZ3.B is ALC Grade 2 which is BMV. The proportion of the Grade 3 land that is Grade 3a, which is BMV, is not known at this stage and would be determined at later project stages.

Aviation and Defence

6.10.18 There are no known aviation or defence constraints relevant to substations in this Siting Zone.

Traffic and Transport

6.10.19 The A47 is the nearest highway to WMEL-BZ3.A. The road is 3 lanes wide along the site frontage with a crawler lane for westbound traffic, which suggests an uphill gradient that slows large vehicles. The nearest highway to access WMEL-BZ3.B is Palmers Lane on the north boundary. Palmers Lane can be accessed from the A47 via the B6047 (4.5km away), however the lane is not suitable for HGV access without mitigation. WMEL-BZ3.C is accessed via Goadby Road, which is 2.5m wide with tight bends and is not suitable for HGV access; it passes through the village of Hallaton to the south and joins Horse Hill, another rural road, to the north. The roads through Hallaton are not suitable for HGV access, and Horse Hill (3m wide) is not suitable for HGVs and is also part of NCN 64. Horse Hill connects with Palmers Lane (NCN 63) to the north and passes over a series of cattle grids to the south before reaching Glooston. The nearest highways to WMEL-BZ3.D are Welham Lane accessed from Langton Road. Langton Road is not suitable for HGV access without mitigation. The most suitable route to an A road would be using Langton Road (mitigated) and the B6047 north to the A47. The A47 is however 13km from the Siting Zone. Siting Areas WMEL-BZ3.A and WMEL-BZ3.C have PRoW that cross them and others have PRoW are adjacent to them. There are no airports, airfields, aerodromes, or MoD sites in proximity to the Siting Zone.

6.10.20 Siting Area WMEL-BZ3.A would be preferable with regard to Traffic and Transport, given that access to Option WMEL-BZ3.B would be off a road which is part of the NCN (with no obvious alternative for diversion) and is unsuitable for HGVs, access to WMEL-BZ3.C would be off a road network that is unsuitable for HGVs and would include part of the NCN, and access to Option WMEL-BZ3.D would require highway mitigation and the most suitable route to an A road would be some 17km.

Engineering and System Preliminary Appraisal Summary

6.10.21 Existing infrastructure located in Siting Area WMEL-BZ3.A include HV (11kV) OHL running north to south exiting site in the southeast. A Neos Network communications underground route is present along the A47 adjacent to the north, and a National Grid Transmission line located approximately 150m to the west. WMEL-BZ3.B has a HV (11kV) OHL located in proximity to the southeast boundary. In the north end of WMEL-BZ3.C a National Gas Transmission NHP Mains line crosses the Siting Area from east to west. At WMEL-BZ3.D OHL and underground LV cables are found approximately 50m offsite in the northeast at Manor Farm and along Welham Lane. The ZA 400kV OHL transmission along the west side of the Siting Area, with a HV (11kV) OHL and underground LV cables connecting to Farm buildings at Welham Lane are adjacent to the southeast.

6.10.22 The Project would require the existing 400kV ZA OHL circuits to be diverted and terminated at the WMEL-B substation. Siting Area WMEL-BZ3.D encompasses a portion of the existing 400kV ZA OHL and therefore offers a comparatively better location for the required connections to occur. However, this would require some outages and potentially phased construction works. Due to the distance from the existing 400kV ZA OHL, Siting Areas WMEL-BZ3.A (1.6km), WMEL-BZ3.B (1.4km), and WMEL-BZ3.C (1.3km) would require increased OHL connection works.

6.10.23 Siting Areas WMEL-BZ3.A, WMEL-BZ3.C and WMEL-BZ3.D are all large enough to accommodate the required 720m by 400m (28.8ha) substation footprint. Siting Area WMEL-BZ3.B is greater than the 28.8ha required however due to various environmental and geographical constraints the sites would require some form of optimisation.

6.10.24 Siting Area WMEL-BZ3.B would require medium amounts of earthworks/retaining structures manage level changes, which could be more significant if the main substation area encroaches on the southern section of the site. The potential presence of shallow bedrock could constrain earthworks and cut works at foot of hill and would require careful consideration. WMEL-BZ3.A would require significant earthworks/retaining structures to manage notable level changes, which could require deep foundation solutions in areas of fill. Siting Area WMEL-BZ3.C would require low to medium amounts of earthworks/retaining structures to manage level changes, which could require deep foundation solutions in areas of fill. WMEL-BZ3.D would require only minor earthworks/retaining structures to manage level changes.

Holford and Horlock Rules

6.10.25 At this early stage of development Horlock Rules 7, 9, 10 and 11 are not considered applicable as they are primarily concerned with the detailed design of substations following site selection.

6.10.26 When reviewed against the applicable Horlock and Holford Rules:

¶ The definition of Siting Areas has taken into consideration environmental features and potential impacts upon identified features (Horlock Rule 1).

¶ All Siting Areas have been defined to exclude areas of highest amenity value and interest in the area (Horlock Rules 2 and 3, and Holford Rules 1 and 2).

¶ Sufficient space is available within the Siting Areas to enable micro-siting to avoid identified socio-economic constraints and further reduce impacts on environmental features present (Horlock Rules 4 and 5).

¶ All Siting Areas offer the opportunity to utilise screening provided by existing features to reduce intrusion into surrounding areas (Horlock Rule 4); with the greatest opportunity offered by Siting Area WMEL-BZ3.C

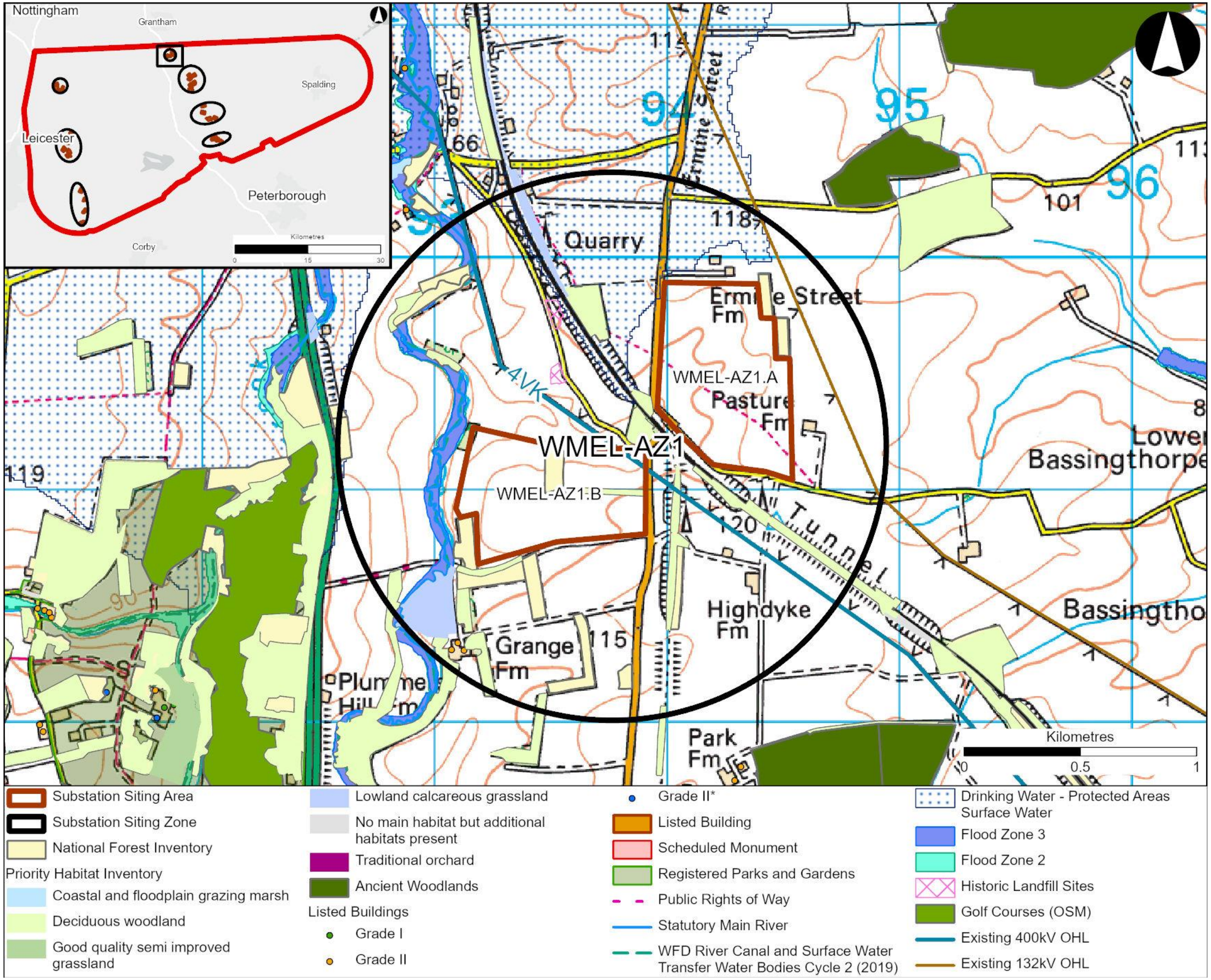
¶ All Siting Areas are predominantly located on agricultural land (Horlock Rule 6 - reducing effect on agricultural land and drainage), only WMEL-BZ3.B impacts known BMV (Grade 2) at this stage. The impact on BMV agricultural land is considered using publicly available provisional data on ALC (no subgrades or survey data) only, and will be assessed at later project stages.

6.11 Preliminary WMEL-A Substation Siting Zone 1

Introduction

6.11.1 WMEL-AZ1 is an area approximately 2.3km in diameter southeast of Great Ponton and compasses the ECML rail line routeing northwest to southeast through the Siting Zone. Key considerations and constraints in this Siting Zone include a Drinking Water Protected Area in the north, a few residential properties, areas of woodland, a watercourse and associated areas of Flood Zone 2, the ECML. The Siting Zone, Siting Areas, and environmental constraints are shown in **Figure 6-9**.

Figure 6-9 – WMEL-AZ1 Siting Areas, Key Environmental and Socio-Economic Features



Environmental Preliminary Appraisal Summary

Ecology

6.11.2 There are no SACs, SPAs or Ramsar sites within 10km of WMEL-AZ1. There are no NNRs or SSSIs within 2km. There is priority broadleaved woodland within WMEL-AZ1.B, and National Forest inventory woodland is present within WMEL-AZ1.B and adjacent to WMEL-AZ1.A. A watercourse/drainage ditch is present within WMEL-AZ1.A that may be impacted by pollution causing habitat degradation, though there does not appear to be direct connectivity to the River Witham which is over 800m west of the site. There is potential for adverse effects resulting from direct impact of habitat loss and/or fragmentation of priority woodland, hedgerow, trees, arable field margins and grassland under existing pylons. Other adverse effects may arise from impacts relating to habitat degradation from airborne or waterborne pollution, disturbance to species from noise, lighting, vibration and also mortality or injury. Option WMEL-AZ1.A would be preferable with regard to ecology, given that Option WMEL-AZ1.B would result in the likely loss of priority woodland, forest inventory woodland, and more mature hedgerows and trees.

Historic Environment

6.11.3 There are no scheduled monuments, RPGs or listed buildings in proximity to any of the Siting Areas. Other designated assets are present within the Siting Zone, however these are considered unlikely to experience adverse effects as a result of changes to their settings resulting from OHL; for instance, listed buildings within towns and villages, the significance of which would not be impacted by the presence of OHL or pylons at a distance. In addition, all Siting Areas could have adverse effects on buried archaeological remains as a result of direct impacts.

Landscape and Visual

6.11.4 There are no landscape designations within WMEL-AZ1. However, Stoke Rochford RPG is located immediately to the west and Easton Park RPG in relatively close proximity to the southwest. Settlement within Siting Zone limited to a few isolated properties. The small village of Great Ponton is located in close proximity to the northwest, representing the main cluster of potential visual receptors.

6.11.5 There is one PRoW within the Siting Zone, and several located just outside, radiating from Great Ponton to the northwest. No designated open space, open access land or recreation facilities have been identified within the Siting Zone, although some areas are present outside the zone at Stoke Rochford RPG and north of Great Ponton. The A1 (Great North Road) is located immediately to the west of the Siting Zone, with the B6403 and two minor roads and the ECML passing through the zone. Two OHLs on steel lattice towers pass through the Siting Zone, with a smaller wood pole line located at the southeast fringe. Topography of the Siting Zone is undulating, with the valley along the River Witham the low point and the northeastern edge being more elevated. Regular blocks of woodland and linear tree belts along the river, railway and A1 provide local containment of views and provide a context for potential mitigation measures.

6.11.6 WMEL-AZ1.B would be slightly preferable with regard to landscape character and visual amenity, provided that some or all of the existing woodland can be retained, robust mitigation planting and careful configuration of the substation can be achieved. WMEL-AZ1.A is considered to have potential for slightly greater and/or more extensive adverse effects due to the increased elevation and proximity to a residential and recreational receptor.

Water Environment

6.11.7 There are no SPZ1s in the Siting Areas. WMEL-AZ1.A is immediately adjacent to a Drinking Water Protection Area and WMEL-AZ1.B is also in close proximity. Permanent modifications to flow paths from infrastructure could impact the quantity of water available from the source supplying the public water supply.

6.11.8 Furthermore, development within the floodplain could alter flood flow conveyance, increasing flood risks to third-party land, properties, and aquatic environments. The addition of impermeable surfaces from the substation may increase surface runoff and pluvial flooding risk. Siting Area WMEL-AZ1.A would be preferable with regard to the water environment, given that WMEL-AZ1.B is closer to the WFD Waterbody and Flood Zones 2 and 3. WMEL-AZ1.B is located just east of the River Witham (c. 60 m) but is separated by existing vegetation that will provide a reasonable buffer and is beyond the relatively narrow indicative areas of Flood Zone 2 and 3 present on either side of the channel. While there are multiple surface water flow paths through the centre of WMEL-AZ1.A, there are no significant surface water flood risks directly affecting WMEL-AZ1.B. Given that WMEL-AZ1.B itself does not lie within Flood Zones 2 or 3, standard mitigation should be able to manage any risks from construction and operation, any potential significant impact on the watercourse should be effectively mitigated.

6.11.9 Construction may temporarily and permanently alter flood risk and drainage patterns due to earthworks, excavation, and drainage installation, potentially increasing runoff and localized flooding, that needs to be taken into account by the sites layout and may also affect third party land and property. The addition of impermeable surfaces from the substation may increase surface runoff and pluvial flooding risk.

6.11.10 At all Siting Areas a CEMP would detail good practice pollution prevention measures for all phases of work, including preliminary investigations/enabling works. The Siting Areas should be set out to avoid areas of surface water flooding and to implement a suitable Drainage Strategy that provides adequate attenuation and treatment of surface water runoff and containment of any spillage risk. A Drainage Strategy should then be maintained for the life of the development. Culverting of watercourses for access should also be avoided in preference for clear span options.

6.11.11 Siting Area WMEL-AZ1.A would be preferable with regard to the water environment, given that WMEL-AZ1.B is closer to the WFD Waterbody and Flood Zones 2 and 3.

Socio-Economic Preliminary Appraisal Summary

Economic Activity (including Planning)

6.11.12 There are no major planning constraints associated with WMEL-AZ1.B, however, WMEL-AZ1.A interfaces with two Lincolnshire County Council Adopted Minerals and Waste Local Plan Policy Areas M11 and M12. To comply with policies M11 and M12 the land allocation should be avoided where possible. If unavoidable (no suitable alternative options), then land should be restored following construction and geodiversity enhancements delivered as compensation. There are no other constraints associated with NSIPs, committed developments, plan allocations, or existing developments.

6.11.13 All Siting Areas within WMEL-AZ1 are located in ALC Grade 3, the extent of BMV (Grade 3a) is not know at this stage and ALC or BMV are therefore not key differentiating factors.

Aviation and Defence

6.11.14 There are no known aviation or defence constraints relevant to substations in this Siting Zone.

Traffic and Transport

6.11.15 The two Siting Areas are separated by the ECML rail line, and there is a low bridge with headroom restriction of 4.1m along the B6403 that connects the two sites which is a potential restriction. The B6403 offers a potential access route to WMEL-AZ1.A which connects to the A51 to the north. However, the north access route connecting to the A1 via Great Ponton was found not feasible due to the narrow road section within the built-up area. This could not be mitigated due to the nearby residential frontage. In addition, the route to the south of the site is not ideal due to the headroom restriction (4.1m) at the overhead railway bridge at B6403 High Dike. The route to the south via B6403 High Dike is suitable given that no sensitivity receptors are identified along the route. There is one PRoW which crosses WMEL-AZ1.A.

6.11.16 Siting Area WMEL-AZ1.B would be preferable with regard to Traffic and Transport, given that the potential access to WMEL-AZ1.A is a greater distance (4.7km) from the A road.

Engineering and System Preliminary Appraisal Summary

6.11.17 As with the WMEL-B substation, the key factors when considering a best performing Siting Area for the WMEL-A substation include the proximity to the existing 400kV 4VK OHL and the minimisation of system outages required to facilitate construction.

6.11.18 For all Siting Areas, construction sequencing will be rationalised to reduce the potential for system outages. The WMEL-A substation and the 400kV transmission connection would be built offline as far as practicable with the final 400kV transmission turn ins and connections to be completed under outages for all Siting Areas.

6.11.19 Existing infrastructure located in Siting Area WMEL-AZ1.A include a HV (11kV) OHL that cuts across the site from the south to northeast where they connect to LV OH cables at a pole mounted transformer near Ermine Street Farm, Great Ponton. In addition, LV underground cables are found in the southwest and southeast of the Siting Area. The National Grid HA (132kV) OHL is approximately 120m to the east of the Siting Area boundary. WMEL-AZ1.B has HV (11kV) OHL from the south towards the northeast, which connects to LV underground cable at a pole mounted transformer adjacent to road junction linking B6043 to Pit Lane.

6.11.20 The Project would require the existing 400kV 4VK OHL circuits to be diverted and terminated at the WMEL-A substation. WMEL-AZ1.A is located 180m northeast of the 400kV 4VK OHL and is separated by the ECML railway. To terminate the circuits of 4VK transmission line a minimum of two crossings over the traction power supply line would be required. This would require additional measures to be taken for permit application, outage planning, and coordination with the railways. Siting Area WMEL-AZ1.B is located to the west of the ECML and encompasses a portion of the existing 400kV 4VK OHL, therefore WMEL-AZ1.B offers a comparatively better location for the required connections to occur and only requires one crossing of the rail line for the new OHL connection.

6.11.21 Both Siting Areas WMEL-AZ1.A and WMEL-AZ1.B are impacted by various environmental and geographical constraints, and are shorter in length than the required 720m by 400m substation footprint. However, they both are greater than the required 28.8ha in area and could be feasible as Siting Areas provided some form of optimisation is undertaken.

6.11.22 WMEL-AZ1.A requires medium to high amounts of earthworks, and low to medium height retaining structures are anticipated to manage level changes, which could also require deeper foundation solutions in areas of fill and may be constrained by the rail line to the southwest. Due to the presence of limestone with potential for karst features, paired with possible mining legacy, with spring (or possible mining feature) mapped on site, the likelihood for difficult ground conditions requiring more significant consideration in design and construction is likely. WMEL-AZ1.B requires medium amounts of earthworks and low to high height retaining structures are anticipated to be required to manage level changes, which could also require deeper foundation solutions in areas of fill. The potential presence of shallow bedrock could constrain earthworks and cut works. Due to the presence of limestone with potential for karst features, possible mining legacy, the evidence of depression on site in LiDAR, the likelihood for difficult ground conditions requiring more significant investigation, design and construction is considered to be possible.

Holford and Horlock Rules

6.11.23 At this early stage of development Horlock Rules 7, 9, 10 and 11 are not considered applicable as they are primarily concerned with the detailed design of substations following site selection.

6.11.24 When reviewed against the applicable Horlock and Holford Rules:

¶ The definition of Siting Areas has taken into consideration environmental features and potential impacts upon identified features (Horlock Rule 1).

¶ All Siting Areas have been defined to exclude areas of highest amenity value and interest in the area (Horlock Rules 2 and 3, and Holford Rules 1 and 2).

¶ Sufficient space is available within the Siting Areas to enable micro-siting to avoid identified socio-economic constraints and further reduce impacts on environmental features present (Horlock Rules 4 and 5).

¶ All Siting Areas offer the opportunity to utilise screening provided by existing features to reduce intrusion into surrounding areas (Horlock Rule 4); with the greatest opportunity offered by siting area WMEL-AZ1.B.

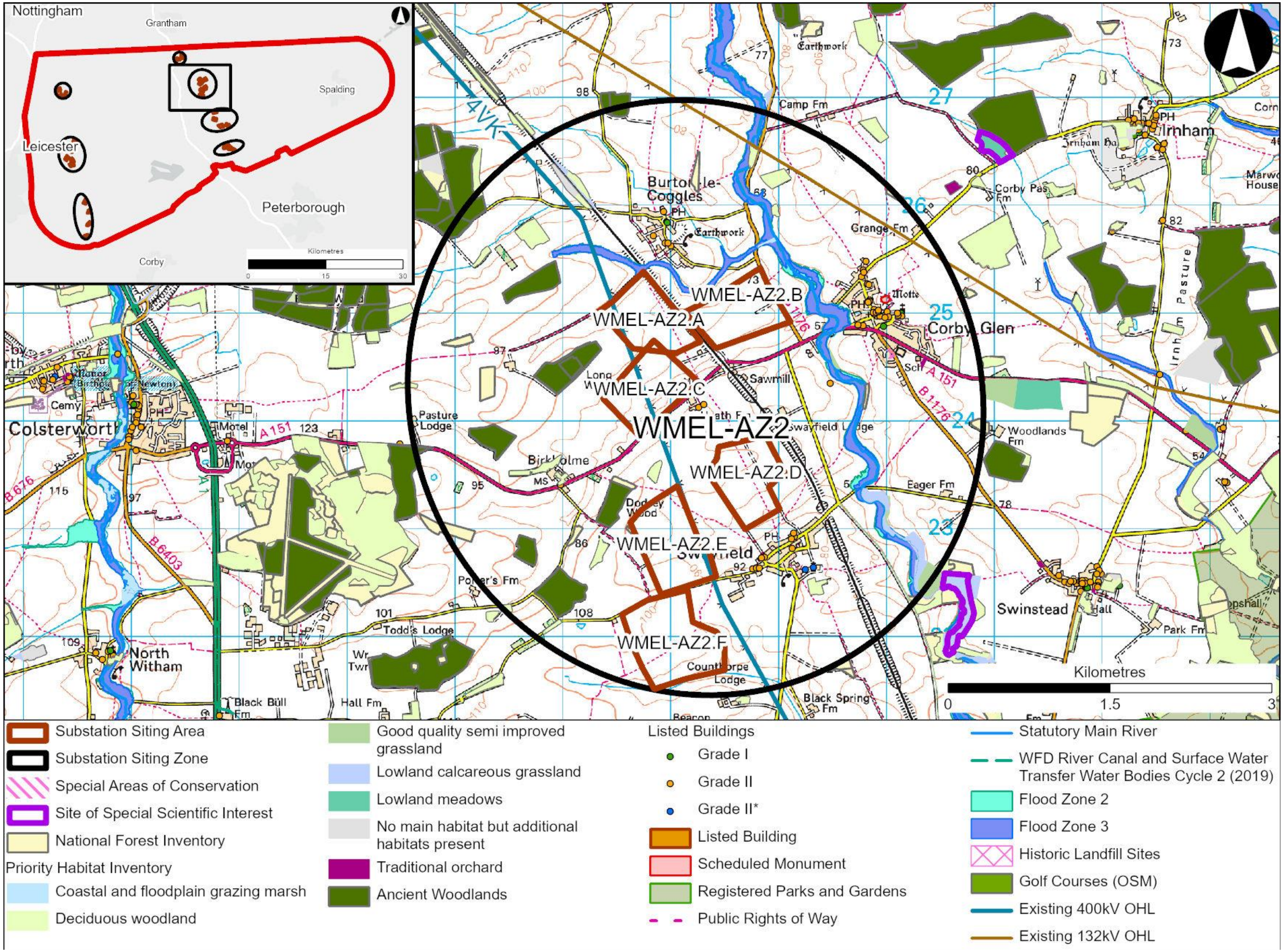
¶ All Siting Areas are predominantly located on agricultural land (Horlock Rule 6 - reducing effect on agricultural land and drainage), all land impacted is ALC Grade 3. The impact on BMV agricultural land is considered using publicly available provisional data on Agricultural Land Classification (no subgrades or survey data) only and will be assessed at later project stages.

6.12 Preliminary WMEL-A Substation Siting Zone 2

Introduction

6.12.1 WMEL-AZ2 is an area approximately 5.5km by 5.3km and encompasses Burton-le-Coggles, Corby Glen and Swayfield. The A151 routes east west through the centre of the Siting Zone. Key considerations and constraints in this Siting Zone include the villages identified above and residential properties, areas of woodland and ancient woodland, watercourses and localised areas of Flood Zone 2, listed buildings, and the ECML. The Siting Zone, Siting Areas, and environmental constraints are shown in **Figure 6-10**.

Figure 6-10 – WMEL-AZ2 Siting Areas, Key Environmental and Socio-Economic Features



Environmental Preliminary Appraisal Summary

Ecology

6.12.2 There are no nationally designated sites within the Siting Zone, however, Swinstead Valley SSSI is approximately 1.6km south of WMEL-AZ2.D and Grimsthorpe SAC is located 4.8km southeast of WMEL-AZ2.F. There are no priority broadleaved woodland within or adjacent to the Siting Areas, however National Forest inventory is adjacent to site WMEL-AZ2.E. Potential watercourses are located in or adjacent to WMEL-AZ2.C, WMEL-AZ2.D, WMEL-AZ2.E and WMEL-AZ2.F, there is potential for adverse effects resulting from direct impact of habitat loss and/or fragmentation of priority woodland, hedgerow, trees, arable field margins. Other adverse effects may arise from impacts relating to habitat degradation from airborne or waterborne pollution, disturbance to species from noise, lighting, vibration and also mortality or injury.

6.12.3 Siting Areas WMEL-AZ2.F, WMEL-AZ2.D and WMEL-AZ2.C would be preferable with regard to ecology, due to the presence of more hedgerows and trees or larger watercourses within WMEL-AZ2.A, WMEL-AZ2.B and WMEL-AZ2.E.

Historic Environment

6.12.4 There are no Scheduled Monuments or RPGs in proximity to any of the Siting Areas in WMEL-AZ2. There is the potential for adverse impacts from WMEL-AZ2.C and WMEL-AZ2.D on the Grade II listed buildings: Milestone on north side of B676 near Heath Farm, Forge, waggon hovel and loose boxes at Heath Farm, and Heath Farmhouse resulting from changes to their setting. Other designated assets are present within the Siting Zone, however these are considered unlikely to experience adverse effects as a result of changes to their settings resulting from OHL; for instance, the listed buildings within towns and villages, the significance of which would not be impacted by the presence of OHL or pylons at a distance.

6.12.5 WMEL-AZ2.C and WMEL-AZ2.D are least preferred due to their proximity to the listed buildings highlighted above. Although some effects could potentially be reduced by design, the scale of development would make it unlikely that adverse effects could be eliminated completely.

Landscape and Visual

6.12.6 There are no landscape designations located within the Siting Zone. There are several small to medium sized settlements within including Corby Glen, Burton-Le-Coggles and Swayfield. A number of scattered properties are also present, largely concentrated along the A151.

6.12.7 There are numerous PRoW, many of which radiate from and/or connect between the main settlements. The A151 Bourne Road runs through the centre of the Siting Zone from east to west, with the ECML railway running through the centre from north to south. A number of local roads are also present connecting between the main settlements. An OHL line runs north – south roughly parallel to the rail line, with some smaller wood pole lines also present. The topography of the Siting Zone is variable, with the West Glen River valley defining the eastern half, with a series of smaller shallow valleys separated by low ridges to the west. Woodland and tree cover is generally low, except for several small geometric woodland blocks in the west of WMEL-AZ2.

6.12.8 WMEL-AZ2.C and WMEL-AZ2.F would be slightly preferable with regard to landscape character and visual amenity, provided that existing boundary vegetation can be retained, robust mitigation planting is included, and careful configuration of the substation can be achieved. The remaining options are likely to result in greater adverse effects, including to nearby residential properties and PRoW, with WMEL-AZ2.B and WMEL-AZ2.D the least favourable options.

Water Environment

6.12.9 There are no SPZ1s in the Siting Areas, and none of the Siting Areas are located in Flood Zones 2 and 3.

6.12.10 There are no surface water flow paths in WMEL-AZ2.B, however WMEL-AZ2.B is the closest to the West Glen River (Upper Water Body (GB105031055510)) approximately 250m east, with areas of Flood Zone 2 and 3 on either side of the channel. None of the Siting Areas are within indicative Flood Zones. There is a surface water flow path along the northern boundary of WMEL-AZ2.A, the southern portion of WMEL-AZ2.C, along the southern boundary adjacent to WMEL-AZ2.D, the centre and another across the northwest of WMEL-AZ2.E. There are surface water flow paths associated with minor watercourses along the southern and eastern boundaries as well as areas in the centre of WMEL-AZ2.F.

6.12.11 Construction may temporarily and permanently alter flood risk and drainage patterns due to earthworks, excavation, and drainage installation, potentially increasing runoff and localized flooding, that needs to be taken into account by the sites layout and may also affect third party land and property. The addition of impermeable surfaces from the substation may increase surface runoff and pluvial flooding risk.

6.12.12 At all Siting Areas a CEMP would detail good practice pollution prevention measures for all phases of work, including preliminary investigations/enabling works. The Siting Areas should be set out to avoid areas of surface water flooding and to implement a suitable Drainage Strategy that provides adequate attenuation and treatment of surface water runoff and containment of any spillage risk. A Drainage Strategy should then be maintained for the life of the development. Culverting of watercourses for access should also be avoided in preference for clear span options.

6.12.13 By avoiding the protected surface water areas, most potential impacts are expected to be avoidable or easily mitigated. WMEL-AZ2.C would be preferable with regard to the water environment, given that the other options are closer to Flood Zones 2 and 3.

Socio-Economic Preliminary Appraisal Summary

Economic Activity (including Planning)

6.12.14 There are no NSIPs, neighbourhood plans, or committed developments within the Siting Zone.

6.12.15 All Siting Areas are located in ALC Grade 3, the extent of BMV (Grade 3a) is not known at this stage and ALC or BMV are therefore not key differentiating factors.

Aviation and Defence

6.12.16 Unlicenced Black Spring Farm Airfield (1986-present) is located just outside of the Siting Zone, within 1km of Siting Area WMEL-AZ2.F.

Traffic and Transport

6.12.17 The nearest highway is the A151, which is immediately adjacent to the south of WMEL-AZ2.C. A restricted byway runs along the northwest boundary of WMEL-AZ2.A, this byway is a single lane track and is not suitable for HGV access. An access road would be required to connect the Siting Area to the A151. In addition, WMEL-AZ2.D would also require an access road to connect it north to the A151. WMEL-AZ2.B vehicular access would be from the B1176, which connects to the A151 to the south. However, this road is not optimal due to the approximate minimum width of 5.5m with a headroom restriction of 4.6m to the west on the A151. A steep gradient is observed on the B1176 at the junction with the A151. For WMEL-AZ2.E and WMEL-AZ2.F, Overgate Road and Ling Lane are single lane width and unsuitable for HGVs. Overgate Road connects to the A1 via Wooley's Lane to the west. However, this route is not ideal as both Overgate Road and Wooley's Lane are narrow (c. 3.7m) and some distance from the A road. Therefore, an access road would be required to connect the Siting Area to the A151. Siting Areas WMEL-AZ2.A, WMEL-AZ2.D, WMEL-AZ2.E and WMEL-AZ2.F are crossed by various PRoW, the remaining Siting Areas have PRoW adjacent to them.

6.12.18 Siting Area WMEL-AZ2.C would be preferable with regard to Traffic and Transport, given that access to WMEL-AZ2.D, WMEL-AZ2.E and WMEL-AZ2.A would require an access road (c.400m, c. 700m and 1.3km, respectively) needing additional land. WMEL-AZ2.B would require improvements along the B1176 needing additional land as well as a headroom restriction (4.6m) to the west on the A151. WMEL-AZ2.F would also require improvements along single lane width local roads needing additional land and being some distance (c.4km) to the nearest A road. Therefore even if an access road (c. 700m) could be provided to link with the A151, it would cross Overgate Road which is not optimal.

Engineering and System Preliminary Appraisal Summary

6.12.19 Existing infrastructure located in Siting Area WMEL-AZ2.A, WMEL-AZ2.B and WMEL-AZ2.C include NG Distribution (11kV) OHLs. WMEL-AZ2.A and WMEL-AZ2.C have a British Pipeline Agency high pressure fuel pipeline running north to south along the western corner of each Siting Area, and the NG Transmission 400kV 4VK OHL running northwest to southwest across the Siting Areas. WMEL-AZ2.D, WMEL-AZ2.F do not have existing infrastructure within the Siting Areas, and WMEL-AZ2.E has a NG Transmission 400kV OHL running northwest to southwest across the Siting Areas.

6.12.20 The Project would require the existing 400kV 4VK OHL circuits to be diverted and terminated at the WMEL-A substation. WMEL-AZ2.B is located 600m northeast of the 400kV 4VK OHL and is separated by the ECML railway. To terminate the circuit of the 4VK transmission line, a minimum of one crossing over the traction power supply line would be required in addition to the new OHL crossing. This would require additional measures to be taken for permit application, such as outage planning and coordination with the railway service. Siting Areas WMEL-AZ2.A, WMEL-AZ2.C, WMEL-AZ2.D, WMEL-AZ2.E and WMEL-AZ2.F are located to the west of the ECML and only require one crossing of the rail line for the new OHL connection. WMEL-AZ2.A, WMEL-AZ2.C, and WMEL-AZ2.E encompass a portion of the existing 400kV 4VK OHL therefore offer comparatively better locations for the required connections to occur, however this would require some outages and potentially phased construction works. Due to their distance from the existing 400kV 4KV OHL both WMEL-AZ2.D (300m) and WMEL-AZ2.F (190m) would require additional connection works.

6.12.21 All Siting Areas within WMEL-AZ2 are large enough to accommodate the required 28.8ha substation however WMEL-AZ2.A and WMEL-AZ2.D would require some reconfiguration of the standard substation design as the 720m length would not fit in the areas.

6.12.22 For WMEL-AZ2.C and WMEL-AZ2.D low to medium amounts of earthworks are anticipated to be required to manage level changes, with WMEL-AZ2.C potentially requiring deeper foundation solutions in areas of fill, and WMEL-AZ2.D requiring medium height retaining structures. Both Siting Areas have the potential presence of shallow bedrock which could also constrain earthworks and cut works. The likelihood for site wide difficult ground conditions at WMEL-AZ2.E and WMEL-AZ2.F is considered relatively low with some earthworks and retaining features required. WMEL-AZ2.E has a watercourse in the centre of the site which would need culverting or diverting. A mapped decoy site is in proximity to WMEL-AZ2.F, therefore UXO mitigation measures may be required to mitigate associated risks during investigation and construction works. Limestone is present at all the Siting Areas in WMEL-AZ2 which has the potential for karst features. Despite the likelihood for difficult ground conditions which would require more significant consideration, design and construction is considered possible.

Holford and Horlock Rules

6.12.23 At this early stage of development Horlock Rules 7, 9, 10 and 11 are not considered applicable as they are primarily concerned with the detailed design of substations following site selection.

6.12.24 When reviewed against the applicable Horlock and Holford Rules:

- The definition of Siting Areas has taken into consideration environmental features and potential impacts upon identified features (Horlock Rule 1).
- All Siting Areas have been defined to exclude areas of highest amenity value and interest in the area (Horlock Rules 2 and 3, and Holford Rules 1 and 2).
- Sufficient space is available within the Siting Areas to enable micro-siting to avoid identified socio-economic constraints and further reduce impacts on environmental features present (Horlock Rules 4 and 5).
- All Siting Areas offer the opportunity to utilise screening provided by existing features to reduce intrusion into surrounding areas (Horlock Rule 4); with the greatest opportunity offered by Siting Area WMEL-AZ2.C and WMEL-AZ2.F

6.12.25 All Siting Areas are predominantly located on agricultural land (Horlock Rule 6 - reducing effect on agricultural land and drainage), all land impacted is ALC Grade 3. The impact on BMV agricultural land is considered using publicly available provisional data on ALC (no subgrades or survey data) only and will be assessed at later project stages.

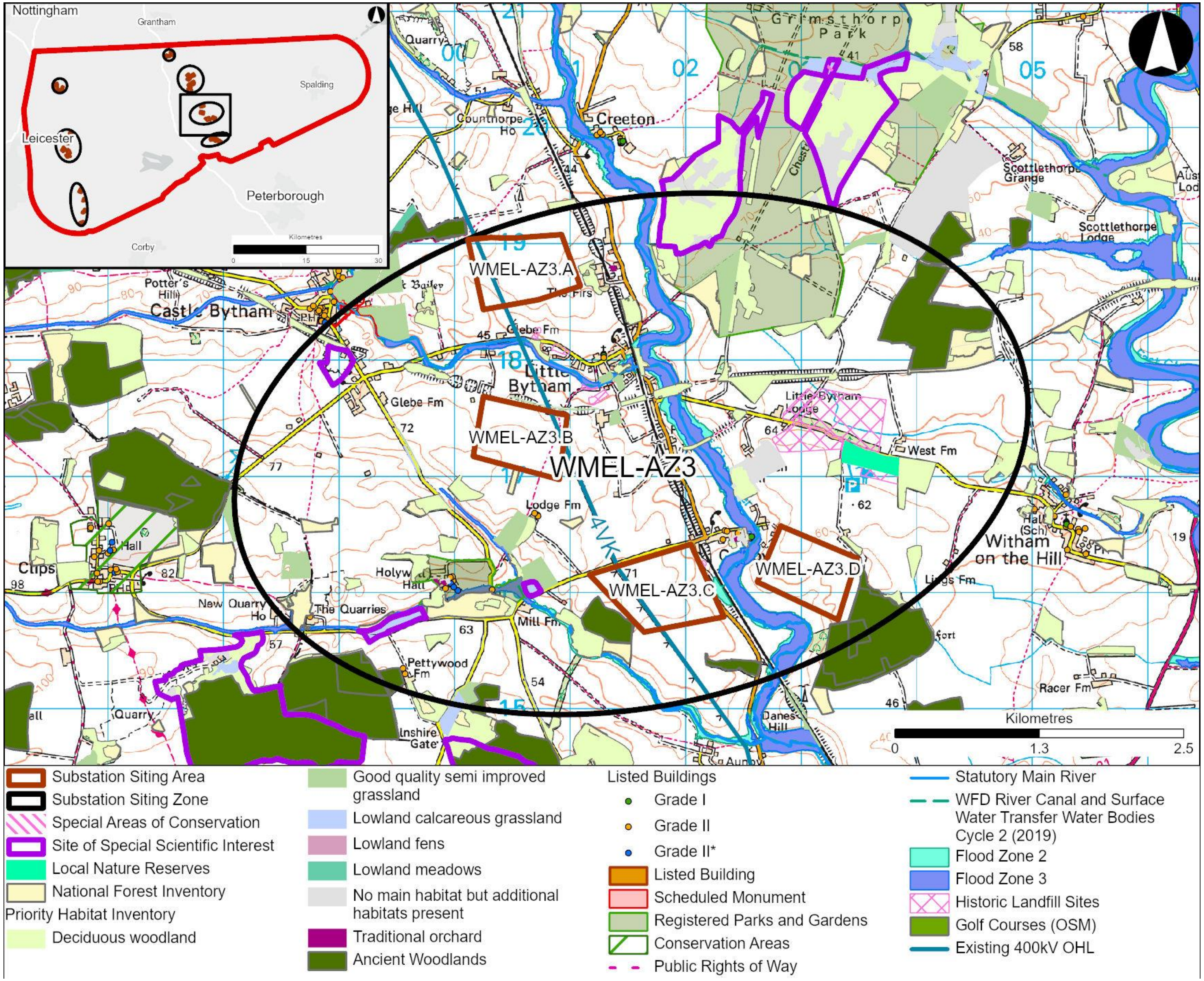
6.13 Preliminary WMEL-A Substation Siting Zone 3

Introduction

6.13.1 WMEL-AZ3 is an area approximately 7km by 4.5km and encompasses Little Bytham, Careby, and partially encompasses Castle Bytham. The B1176 and the ECML routes north south through the centre of the zone. Key considerations and constraints in this Siting Zone include residential properties, areas of woodland (including ancient woodland), SSSIs, watercourses and associated areas of Flood Zone 2, a Scheduled

Monument , two RPGs, listed buildings, the ECML and local road network. The Siting Zone, Siting Areas, and environmental constraints are shown in **Figure 6-11**.

Figure 6-11 – WMEL-AZ3 Siting Areas, Key Environmental and Socio-Economic Features



Environmental Preliminary Appraisal Summary

Ecology

6.13.2 The Siting Zone has three nationally designated sites in proximity: Grimsthorpe Park SSSI 780m west of WMEL-AZ3.A; Castle Bytham Quarry SSSI 1.2km northwest of WMEL-AZ3.B; and Holywell Banks SSSI 440m west of WMEL-AZ3.C.

6.13.3 There is priority broadleaved woodland adjacent to Siting Areas WMEL-AZ3.A, WMEL-AZ3.C and WMEL-AZ3.D, National Forest inventory woodland is present adjacent to all Siting Areas within WMEL-AZ3. There is no ancient woodland within any of the Siting Areas however WMEL-AZ3.A, WMEL-AZ3.C and WMEL-AZ3.D have blocks adjacent to their boundaries. In addition, WMEL-AZ3.C and WMEL-AZ3.D have watercourses present within them, with WMEL-AZ3.B also having a small waterbody situated within the southeast corner. The Siting Areas within WMEL-AZ3 therefore have the potential to cause adverse effects from the direct impact of habitat loss and/or fragmentation of ancient and priority woodland, hedgerow, trees, and arable field margins. Other adverse effects may arise from impacts relating to habitat degradation from airborne or waterborne pollution, disturbance to species from noise, lighting, vibration and also mortality or injury.

6.13.4 WMEL-AZ3.B and WMEL-AZ3.A would be preferable with regard to ecology, given that WMEL-AZ3.C and WMEL-AZ3.D each present potential risks to watercourses, adjacent ancient woodland and the species they support.

Historic Environment

6.13.5 There are various listed buildings within proximity to WMEL-AZ3.A, WMEL-AZ3.B and WMEL-AZ3.D which could experience adverse effects due to setting changes as a result of development within WMEL-AZ3. These include; Grimsthorpe Castle (Grade I listed building and RPG) situated 700m east of WMEL-AZ3.A, Barn and stable at Holywell Lodge Farm and The Lodge Farmhouse (Grade II listed buildings) situated 350m south of WMEL-AZ3.B, and Church of St Stephen (Grade I listed building) situated 200m west of WMEL-AZ3.D. Other designated assets are present within the Siting Zone, however these are considered unlikely to experience adverse effects as a result of changes to their settings resulting from OHL; for instance, the listed buildings within towns and villages, the significance of which would not be impacted by the presence of OHL or pylons at a distance.

6.13.6 Given the various designated assets in WMEL-AZ3, WMEL-AZ3.C is preferable with regard to the historic environment. However, all Siting Areas could potentially cause direct impact to buried archaeological remains.

Landscape and Visual

6.13.7 Two landscape designations are located within WMEL-AZ3, Grimsthorpe Castle RPG to the northeast and Holywell Hall Park RPG towards the southwest. There are a series of small to medium sized settlements within or immediately adjacent to WMEL-AZ3, including Castle Bytham to the northwest, Little Bytham and Careby towards the centre and Witham on the Hill to the southeast. A series of scattered individual and clusters of properties are also present throughout the Siting Zone.

6.13.8 There are numerous PRoW throughout WMEL-AZ3, many of which radiate from the main settlements, and particularly Castle Bytham and Little Bytham in the north. Several small recreational areas are present, although largely within settlements with limited or no outward views. The B1176 and the adjacent ECML are the principal transport routes within this Siting Zone, with a network of local roads also present, connecting between the main settlements. An OHL line runs north to south roughly parallel to the rail line and B1176, with a smaller wood pole line running east from Little Bytham. The topography is gently undulating with several high points within the landscape and valleys associated with the Glen Brook and West Glen River. There are several medium sized blocks and linear belts of woodland associated with the disused rail line within the Siting Zone, indicating some capacity to accept woodland planting as mitigation.

6.13.9 WMEL-AZ3.C and WMEL-AZ3.D would be slightly preferable with regard to landscape character and visual amenity, provided that existing boundary vegetation can be retained, robust mitigation planting included and careful configuration of the substation can be achieved. It may also be desirable to reposition these areas slightly to help reduce effects. All of the identified options present challenges, WMEL-AZ3.A and WMEL-AZ3.B would be less favourable due to likelihood of greater adverse effects to nearby residential properties and PRoW, with slightly less scope for mitigation.

Water Environment

6.13.10 There are no SPZ1s in the Siting Areas, and none of the Siting Areas are located in Flood Zones 2 and 3.

6.13.11 The West Glen (conf West Glen trib to conf East Glen River (GB105031050770)) River is 130m west of WMEL-AZ3.C and 140m northeast (at its closest point) to WMEL-AZ3.D. WMEL-AZ3.D also has areas of surface water flood risk through the centre of the site, whereas the other Siting Areas do not.

6.13.12 Construction may temporarily and permanently alter flood risk and drainage patterns due to earthworks, excavation, and drainage installation, potentially increasing runoff and localised flooding, that needs to be taken into account by the Siting Area layouts and may also affect third party land and property. The addition of impermeable surfaces from the substation may increase surface runoff and pluvial flooding risk.

6.13.13 At all Siting Areas a CEMP would detail good practice pollution prevention measures for all phases of work, including preliminary investigations/enabling works. The Siting Areas should be set out to avoid areas of surface water flooding and to implement a suitable Drainage Strategy that provides adequate attenuation and treatment of surface water runoff and containment of any spillage risk. A Drainage Strategy should then be maintained for the life of the development. Culverting of watercourses for access should also be avoided in preference for clear span options.

6.13.14 Due to proximity to the West Glen River, WMEL-AZ3.C and WMEL-AZ3.D are least preferred from a Water Environment perspective, when compared with WMEL-AZ3.A and WMEL-AZ3.B. Site WMEL-AZ3.D also has some additional surface water flood risk issues and therefore is the least preferred option overall.

Socio-Economic Preliminary Appraisal Summary

Economic Activity (including Planning)

6.13.15 There are no NSIPs, neighbourhood plans, or committed developments within the Siting Zone.

6.13.16 All Siting Areas are located in ALC Grade 3, the extent of BMV (Grade 3a) is not known at this stage and ALC or BMV are therefore not key differentiating factors.

Aviation and Defence

6.13.17 There are no known aviation or defence constraints relevant to substations in this Siting Zone.

Traffic and Transport

6.13.18 WMEL-AZ3.A is not next to a public highway, an access road would be required to connect the Siting Area to either B1176 Station Road or Little Bytham Road. The railway to the east is a potential constraint for an access road to connect with B1176 Station Road. The B1176 Station Road connects to the A1 via A151 to the north and A1 via Little Bytham Road to the south. However, there is a low bridge present alongside road width restrictions. The B1176 also passes through villages, which is a potential constraint for the road widening and passing bay provision in the built-up areas. Access from the Little Bytham Road, which connects to the A1 via Clipsham Road, Castle Bytham Road, Stretton Road and Clipsham Road to the west has similar road width and residential area restrictions.

6.13.19 WMEL-AZ3.B access from Hollywell Road to the west, connects to the A1 via Little Bytham Road and some local roads to the north. This access route has width restrictions, with residential areas also further limiting the ability for road widening and improvement. The Little Bytham Road, which connects to the A1 via Clipsham Road, Castle Bytham Road, Main Street, Stretton Road and Clipsham Road to the west and A6121 via B1176 to the east, also have width and residential restrictions. Alternatively, the vehicular access could be from Hollywell Road to the south, which connects the A6121 via the B1176. Hollygate Road is a single lane width and not suitable for HGV access and being some distance from the A roads. The B1176 Stamford Road, which connects to the A6121 to the south, also has similar access issues.

6.13.20 WMEL-AZ3.C access would route via Hollywell Road, which connects the A6121 via the B1176 Stamford Road to the east. However, Hollygate Road has width constraints and is a great distance from A roads. Junction mitigation would be expected at junction of Hollywell Road/ B1176 to provide sufficient turning space. Access via the B1176 Stamford Road, which connects to the A6121 to the south, has steep gradients and bends which may limit visibility at the access point, passing through an edge of a village and being some distance from the A roads.

6.13.21 WMEL-AZ3.D is not next to a public highway, an access road would be required to connect the Siting Area via Main Street and the B1176. The railway and West Glen River to the west are also potential constraints. Access from the B1176, which connects to the A6121 to the south is some distance from A roads, and has width and residential constraints. Access is also available via Main Street, which connects to the A6121 via B1176 to the south, however, there are road width constraints and the Siting Area is some distance from the A roads. In addition, a narrow cross river bridge is a potential restriction although no weight restriction signs are evident.

6.13.22 WMEL-AZ3.C would be preferable with regard to Traffic and Transport. Access to WMEL-AZ3.B would require an access road (c.1km) and improvements along B1176 for c. 5km, with additional land needed, and WMEL-AZ3.A would require highway mitigation which may render it less preferred due to the limited space within the villages.

An access road between the Siting Area and the B1167 is considered impracticable for WMEL-AZ3.D due to the existing railway and river.

Engineering and System Preliminary Appraisal Summary

6.13.23 There is no existing infrastructure within any of the Siting Areas, however Electricity Distribution HV (11kV) OHL and potential underground cables are 50m north of WMEL-AZ3.A, and 120m northeast of WMEL-AZ3.D.

6.13.24 The Project would require the existing 400kV 4VK OHL circuits to be diverted and terminated at the WMEL-A substation. WMEL-AZ3.D is located 920m northeast of the 400kV 4VK OHL and is separated by the ECML railway. To terminate the circuits of the 4VK transmission line, a minimum of two crossings over the traction power supply line would be required, resulting in additional measures required for permit application, outage planning, and coordination with the railways. Siting Areas WMEL-AZ3.A, WMEL-AZ3.B and WMEL-AZ3.C are located to the west of the ECML and encompass a portion of the existing 400kV 4VK OHL, therefore they offer a comparatively better location for the required connections to occur and only require one crossing of the rail line for the new OHL connection.

6.13.25 All Siting Areas are large enough to accommodate the required 720m by 400m (28.8ha) substation footprint with the exception of WMEL-AZ2.C, which is marginally short on one side. However, the Siting Area is greater than the 28.8ha required and is feasible should some form of optimisation be undertaken.

6.13.26 WMEL-AZ3.A would likely require significant earthworks to manage level changes, which could require deep foundation solutions in areas of fill. However, due to the footprint, these level changes are anticipated to be able to be managed with 1:3 slopes, as opposed to significant retaining structures. Cutting works would likely require excavations through bedrock. WMEL-AZ3.B would likely require medium to high amounts of earthworks and/or retaining structures to manage level changes, which could require deep foundation solutions in areas of fill. However, due to the footprint of the site, these level changes could likely also be managed with 1:3 slopes. The potential presence of shallow bedrock could constrain earthworks and cut works at the foot of hill, this would require careful consideration. WMEL-AZ3.C would likely require medium to high levels of earthworks and/or retaining structures to manage level changes, which could require deep foundation solutions in areas of fill. The potential presence of shallow bedrock could constrain earthworks and cut works in the east. WMEL-AZ3.D is anticipated to have low to medium amounts of earthworks and/or retaining structures required to manage level changes, which could require deep foundation solutions in areas of fill. However, due to the footprint of the site, these level changes are anticipated to be able to be managed with 1:3 slopes similarly to WMEL-AZ3.A and WMEL-AZ3.B. If developments are made in the south or southwest, there is potential for medium to high amounts of earthworks required, and the potential presence of shallow bedrock could constrain earthworks and cut works. Limestone is present at all the Siting Areas which has the potential for karst features, and possible mining legacy features may also be present. The likelihood for difficult ground conditions requiring more significant consideration in investigation, design and construction is considered possible.

Holford and Horlock Rules

6.13.27 At this early stage of development Horlock Rules 7, 9, 10 and 11 are not considered applicable as they are primarily concerned with the detailed design of substations following site selection.

6.13.28 When reviewed against the applicable Horlock and Holford Rules:

¶ The definition of Siting Areas has taken into consideration environmental features and potential impacts upon identified features (Horlock Rule 1).

¶ All Siting Areas have been defined to exclude areas of highest amenity value and interest in the area (Horlock Rules 2 and 3, and Holford Rules 1 and 2).

¶ Sufficient space is available within the Siting Areas to enable micro-siting to avoid identified socio-economic constraints and further reduce impacts on environmental features present (Horlock Rules 4 and 5).

¶ All Siting Areas offer the opportunity to utilise screening provided by existing features to reduce intrusion into surrounding areas (Horlock Rule 4); with the greatest opportunity offered by Siting Areas WMEL-AZ3.C and WMEL-AZ3.D.

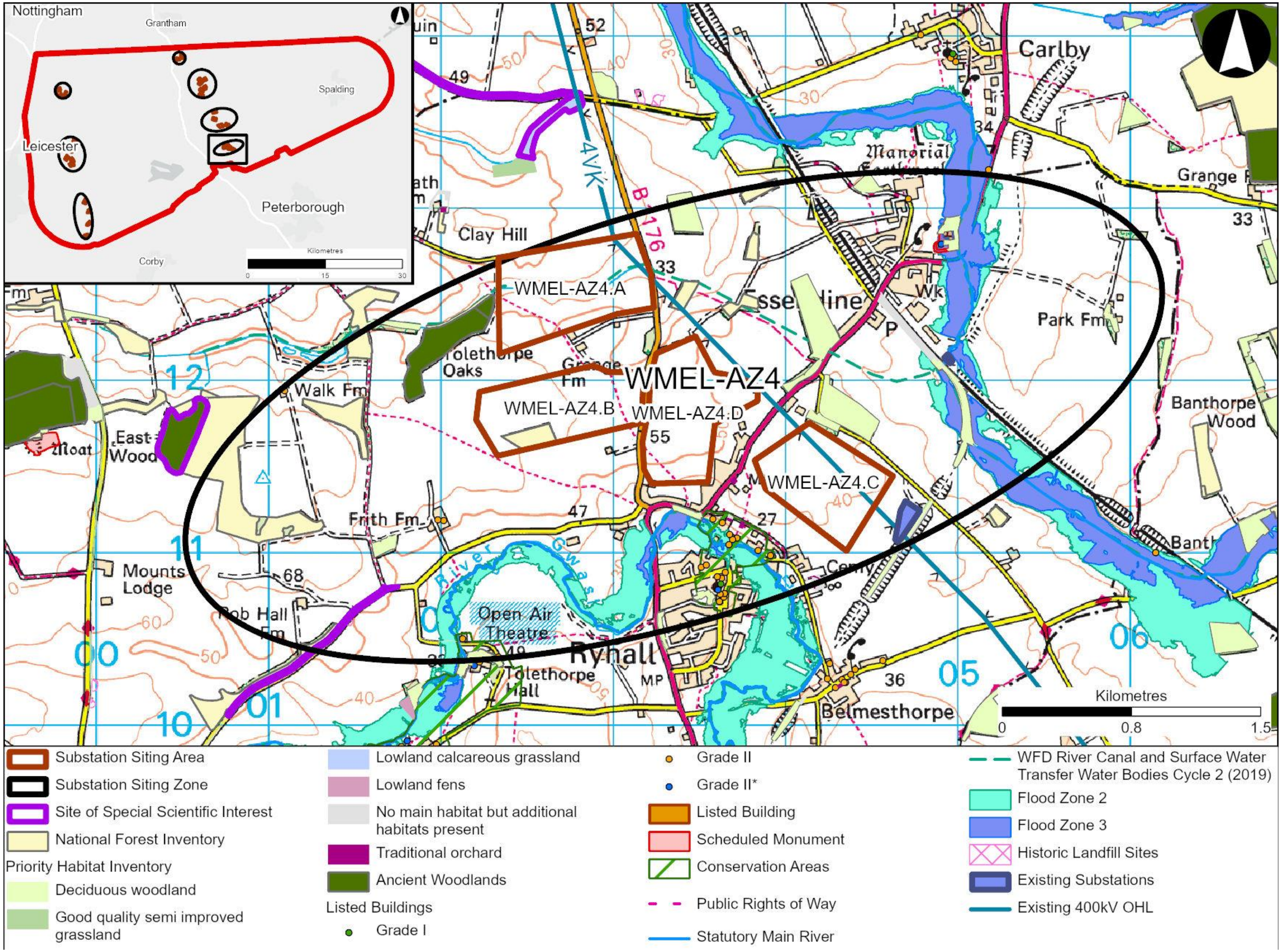
¶ All Siting Areas are predominantly located on agricultural land (Horlock Rule 6 - reducing effect on agricultural land and drainage), all land impacted within WMEL-AZ3 is ALC Grade 3. The impact on BMV agricultural land is considered using publicly available provisional data on ALC (no subgrades or survey data) only, and will be assessed at later project stages.

6.14 Preliminary WMEL-A Substation Siting Zone 4

Introduction

6.14.1 WMEL-AZ4 is an area approximately 5.9km by 2.4km and encompasses Ryhall and Essendine. The ECML runs north south through the east of the zone, and the A6121 approximately routes southwest to northeast through the east of the zone. Key considerations and constraints in this Siting Zone include residential properties, areas of woodland (including ancient woodland), watercourses and associated areas of Flood Zone 2, a Scheduled Monument and listed buildings, the ECML and Mallard Pass Solar development. The Siting Zone, Siting Areas, and environmental constraints are shown in **Figure 6-12**.

Figure 6-12 – WMEL-AZ4 Siting Areas, Key Environmental and Socio-Economic Features



Environmental Preliminary Appraisal Summary

Ecology

6.14.2 Rutland Water SPA and Ramsar is 8.8km west of WMEL-AZ4.B, Grimsthorpe SAC is located 7.7km north of WMEL-AZ4.A, and Baston Fen SAC is 9.4km northeast of WMEL-AZ3.C. There are three SSSIs in proximity to the Siting Areas within WMEL-AZ4: Ryhall Pasture and Little Warren Verges SSSI is 530m north of WMEL-AZ4.A; Tolethorpe Road Verges 970m southwest of WMEL-AZ4.B; and East Wood, Great Casterton SSSI 1.6km west of WMEL-AZ4.B.

6.14.3 There are no priority broadleaved woodland within the Siting Areas, however National Forest inventory woodland is present within WMEL-AZ4.B, and ancient woodland and/or priority broadleaved woodlands are adjacent to WMEL-AZ4.A and WMEL-AZ4.C. Watercourses are notably present across WMEL-AZ4.A and WMEL-AZ4.B. There is potential for adverse effects resulting from direct impact of habitat loss and/or fragmentation of priority woodland, hedgerow, trees, arable field margins. Other adverse effects may arise from impacts relating to habitat degradation from airborne or waterborne pollution, disturbance to species from noise, lighting, vibration and also mortality or injury.

6.14.4 WMEL-AZ4.C followed by WMEL-AZ4.D would be preferable with regard to ecology, given that WMEL-AZ4.A and WMEL-AZ4.B each present potential risks to irreplaceable habitat (ancient woodland) adjacent to WMEL-AZ4.A and forest inventory woodland within WMEL-AZ4.B.

Historic Environment

6.14.5 There are no Scheduled Monuments, RPGs, or listed building in proximity to any of the Siting Areas. Other designated assets are present within the Siting Zone, however these are considered unlikely to experience adverse effects as a result of changes to their settings resulting from OHL; for instance, listed buildings within towns and villages, the significance of which would not be impacted by the presence of OHL or pylons at a distance. In addition, all Siting Areas could have adverse effects on buried archaeological remains would be as a result of direct impacts.

Landscape and Visual

6.14.6 There are no landscape designations located within the Siting Zone. There are two small to medium sized settlements within the Siting Zone, the largest of which being Ryhall in the south and with Essendine in the northeast. A number of additional settlements are in close proximity to the zone, including Little Casterton and Stamford to the south, and Carlby to the northeast.

6.14.7 There are numerous PRoW within the Siting Zone, many of which radiate from and/or connect between the main settlements. The A6106, running northeast to south and the ECML, running north to south, are the principal transport routes in the Siting Zone. A number of local roads are also present connecting between the main settlements. The Siting Areas are located on undulating topography to the north of Ryhall and the River Gwash. There are several blocks and linear belts of woodland within the Siting Zone, indicating some capacity to accept woodland planting as mitigation.

6.14.8 WMEL-AZ4.A would be slightly preferable with regard to landscape character and visual amenity, provided that careful siting and configuration of the substation and associated earthworks can be achieved, existing boundary planting can be retained and robust mitigation planting is included. The remaining Siting Areas are likely to result in greater adverse effects, including to nearby residential properties and PRoW, largely as a result of their elevated positions adjacent to Ryhall.

Water Environment

6.14.9 None of the Siting Areas within WMEL-AZ4 are located in an SPZ1, WMEL-AZ4.A has a WFD waterbody (West Glen - conf West Glen trib to conf East Glen River Water Body) running through its centre with associated Flood Zones 2 and 3. WMEL-AZ4.D and WMEL-AZ4.C are within 150m and 350m respectively of a WFD Waterbody (Gwash Water Body) as well as Flood Zones 2 and 3.

6.14.10 Construction may temporarily and permanently alter flood risk and drainage patterns due to earthworks, excavation, and drainage installation, potentially increasing runoff and localized flooding, that needs to be taken into account by the sites layout and may also affect third party land and property. The addition of impermeable surfaces from the substation may increase surface runoff and pluvial flooding risk.

6.14.11 At all Siting Areas a CEMP would detail good practice pollution prevention measures for all phases of work, including preliminary investigations/enabling works. The Siting Areas should be set out to avoid areas of surface water flooding and to implement a suitable Drainage Strategy that provides adequate attenuation and treatment of surface water runoff and containment of any spillage risk. A Drainage Strategy should then be maintained for the life of the development. Culverting of watercourses for access should also be avoided in preference for clear span options.

6.14.12 When compared to the other Siting Areas within WMEL-AZ4, WMEL-AZ4.A is the least preferable in regard to the Water Environment.

Socio-Economic Preliminary Appraisal Summary

Economic Activity (including Planning)

6.14.13 The EN010127 - Mallard Pass Solar Farm is the only major planning constraint within the Siting Zone. WMEL-AZ4.A, WMEL-AZ4.C and WMEL-AZ4.D are immediately adjacent to the EN010127 - Mallard Pass Solar Farm; WMEL-AZ4.B is in close proximity. There is an opportunity to collaborate with other developers seeking to minimise impacts and maximise benefits which could help to reduce cumulative impacts. If collaboration and alignment is not possible between NSIP projects during the planning and design phases, there may be potential for significant adverse effects on each project and receptors in the vicinity (e.g. landscape and visual impacts, risk to costs and implementation of projects, or risk to compliance with planning policies) There are no other constraints associated with any of the options in relation to NSIPs, committed developments, or plan allocations.

6.14.14 All Siting Areas are located in ALC Grade 3, the extent of BMV (Grade 3a) is not known at this stage and ALC or BMV are therefore not key differentiating factors. Further analysis at later project stages would be required to determine the potential loss of BMV.

Aviation and Defence

6.14.15 There are no known aviation or defence constraints relevant to substations in this Siting Zone.

Traffic and Transport

6.14.16 Siting Areas WMEL-AZ4.A, WMEL-AZ4.B and WMEL-AZ4.D would require access from the B1176, which connects to the A6121 to the south. This road has a minimum width of approximately 5.5m, with steep gradients and bends which may limit visibility at the access point, passing through the edge of a village and being some distance from the A roads. WMEL-AZ4.C is not next to a public highway and an access road would be required to connect the Siting Area to either A6121 or Uffington Lane. The A6121, via the access road, connects to the A1 and A15 through A1175 to the south. The A6121 appears to be c.6.5m wide and should be capable of providing access to the A1175 to the south. Uffington Lane via the access road route has possible width and gradient constraints. WMEL-AZ4.B and WMEL-AZ4.D would be preferable with regard to Traffic and Transport, given that access to WMEL-AZ4.A is some distance from the A road and WMEL-AZ4.C would require an access road to connect to either the A6121 or Uffington Lane, although both would require highway mitigation and potentially additional land along the B1176.

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6.14.17 There is notably a HV (11kV) OHL crossing the east end of WMEL-AZ4.B, and the existing 400kV 4VK OHL line to the northeast of the WMEL-AZ4.D, with NG LV underground distribution cables in the southeast and southwest areas onsite, NG HV (11kV) OHL in the south and southeast areas onsite. In addition, Cadent Gas pipes and associated assets are found along Essendine Road, and ESP Utilities Group existing gas mains or services are located along the southeast boundary and along St Ebba’s Close. WMEL-AZ4.C has the WMEL-A 400kV substation with above ground electricity apparatus located to the southeast, which is connected to underground and fibre transmission cables. Multiple NG Transmission underground and fibre cables are located in the east of the site. A NG Distribution HV (11kV) OHL spans northeast-southwest across site. The line connects to an HV (11kV) OHL and a private line in the northeast, these respectively diverge to routes towards the northwest and southeast. Cadent Gas pipes are found along Essendine Road, with further pipes located in the southwest along the Crescent Road, connecting to Old Manor Farm and adjacent buildings.

6.14.18 The Project would require the existing 400kV ZA OHL circuits to be diverted and terminated at the WMEL-A substation. Siting Areas WMEL-AZ4.A, WMEL-AZ4.C and WMEL-AZ4.D encompasses a portion of the existing 400kV 4KV OHL, and therefore offers a comparatively better location for the required connections to occur. However, this would require some outages and potentially phased construction works. Due to the distance (400m) from the existing 400kV 4KV OHL, Siting Area WMEL-AZ4.B would result in increased OHL connection works, however this would allow for offline works to take place reducing outages and the need for phased construction works.

6.14.19 Siting Area WMEL-AZ4.A is large enough to accommodate the required 720m by 400m (28.8ha) substation footprint. Siting Areas WMEL-AZ4.B, WMEL-AZ4.C and WMEL-AZ4.D are constrained by various environmental and geographical features leaving the Siting Areas short of the required length. The area of these sites is greater than the

28.8ha required and therefore would be feasible provided some form of optimisation was undertaken.

6.14.20 Siting Area WMEL-AZ4.A would require medium to high amounts of earthworks and/or retaining structures to manage level changes, which could require deeper foundation solutions in areas of fill and would likely be made more difficult due to the presence of the central channel / depression, and associated surface water feature. This surface water feature should be avoided if possible, otherwise culverted or diverted. Due to the footprint of the site, these level changes are anticipated to be able to be managed with 1:3 slopes, as opposed to significant retaining structures, however significant retaining structures may be required to manage the watercourse. The potential presence of shallow bedrock could constrain earthworks and cut works. The likelihood for site wide difficult ground conditions at WMEL-AZ4.B, WMEL-AZ4.C and WMEL-AZ4.D is considered relatively low with some earthworks and retaining features required, although this would likely be more significant at WMEL-AZ4.D if developments were to be located in the south of the Siting Area. The potential presence of shallow bedrock at WMEL-AZ4.B, WMEL-AZ4.C and WMEL-AZ4.D could constrain earthworks and cut works. Due to the presence of limestone with potential for karst features the likelihood for difficult ground conditions requiring more significant consideration in investigation, design and construction is considered possible at all Siting Areas.

Holford and Horlock Rules

6.14.21 At this early stage of development Horlock Rules 7, 9, 10 and 11 are not considered applicable as they are primarily concerned with the detailed design of substations following site selection.

6.14.22 When reviewed against the applicable Horlock and Holford Rules:

- The definition of Siting Areas has taken into consideration environmental features and potential impacts upon identified features (Horlock Rule 1).
- All Siting Areas have been defined to exclude areas of highest amenity value and interest in the area (Horlock Rules 2 and 3, and Holford Rules 1 and 2).
- Sufficient space is available within the Siting Areas to enable micro-siting to avoid identified socio-economic constraints and further reduce impacts on environmental features present (Horlock Rules 4 and 5).
- All Siting Areas offer the opportunity to utilise screening provided by existing features to reduce intrusion into surrounding areas (Horlock Rule 4); with the greatest opportunity offered by Siting Area WMEL-AZ4.A.
- All Siting Areas are predominantly located on agricultural land (Horlock Rule 6 - reducing effect on agricultural land and drainage), all land impacted by WMEL-AZ4 is ALC Grade 3. The impact on BMV agricultural land is considered using publicly available provisional data on ALC (no subgrades or surveys data) only, and will be assessed at later project stages.

6.15 Conclusions from Appraisal of Preliminary Corridors and Substation Siting

6.15.1 Following completion of appraisals for environmental, socio-economic, and technical aspects, the Project team undertook a review of findings with the aim of discontinuing least preferred Segments across the Preliminary Corridors and selecting preferred

Route Options which provide an end-to-end OHL solution to progress to the next stage of appraisal.

6.15.2 Direct impact of the areas and assets of highest value have been avoided, and potential impacts minimised, by careful selection of the Preliminary Corridors as described in **Chapter 5**. The key environmental and socio-economic constraints considered in this appraisal of the Preliminary Corridors included Rutland Water SPA and Ramsar site, SACs and SSSIs, RPGs, Scheduled Monuments and other heritage assets, towns and residential properties, airfields, other major developments, access and landscape and visual amenity. The east of the Study Area is entirely within Flood Zone 2 and 3 and all routes would need to cross similar watercourses, therefore, water constraints were not key differentiating factors.

6.15.3 The key technical considerations included number and type of infrastructure crossings and interface, interactions with other electricity infrastructure, ground conditions, topography, technical complexity of connecting to existing OHL at potential substation locations, line diversions, length and tower numbers.

Preliminary Corridor 1

6.15.4 Preliminary Corridor 1 provides a potential northern route in comparison to the other Preliminary Corridors. Segment 1a is constrained by the existing 400kV 4ZM OHL and the proposed new Grimsby to Walpole 400kV OHL. The Segment avoids Spalding Golf Club, routeing north of Surfleet, and avoids Scheduled Monuments to the south. The Segment has a large number of residential properties to traverse. Notable clusters of residential properties in Segment 1a are found: north, south and along Surfleet Bank; along Beinie/Scoldall Lane; along the A152; along Birds Drove; along Saltfeet Lane; along Cheal Road; and Chopdile Drove. Further clusters of residential properties are found in Segments 1b (Beck Bank and First Drove), and Segment 1c (Third Drove, Forth Drove, Fith Drove and along South Forty foot Drain.

6.15.5 Segment 1c has aviation constraints, however the Preliminary Corridor widens allowing for flexibility when routeing in proximity to this constraint. Segment 1d at its eastern end is straddled by the proposed Temple Farm Solar DCO. The development is in its early stages providing potential opportunity to collaborate with the developer to incorporate the OHL through the site, but presenting a risk of cost and programme impacts in managing interaction of the projects. WMEL-AZ1 is located at the west end of Segment 1d and is constrained by electrical OHL infrastructure, crossing the ECML, a Drinking Water Protected Area, and Stoke Rochford Hall RPG to the south. Segment 1e crosses the A1, which is constrained by Great Ponton and Stoke Rochford Hall RPG, then heads south requiring a change in direction. Segment 1f is constrained by aviation, residential settlements (Sproxton and Skillington), landscape and visual amenity, and ecology (priority broadleaved woodland blocks). Links L1-1a and L1-1b connect Segments 1c and 1f and are more heavily constrained by ancient woodland than Segments 1d and 1e, however the Links provide an opportunity for a more direct OHL route and provides a route to Siting Areas WMEL-AZ2.A, WMEL-AZ2.B, and WMEL-AZ2.C in the north of Siting Zone WMEL-AZ2. The L1-1b Segment A1 crossing is constrained by the large intersection with the B6403 and blocks of priority broadleaved woodland blocks.

6.15.6 The constraints (aviation, Temple Farm Solar DCO, residential settlements, Stoke Rochford Hall RPG, and ancient woodland blocks) within this Preliminary Corridor are likely to be manageable with careful routeing and micro siting during assessment and design development, all the Segments and Links are preferable to other discontinued options in Preliminary Corridors 3, 4 and 5.

Segments Progressed

6.15.7 Segments 1a, 1b, 1c, 1d, 1e, 1f, 1g, L1-1a and L1-1b were all progressed for further assessment as they present constraints and opportunities and allow an end to end solution and routeing through to Siting Zones WMEL-AZ1, WMEL-BZ1 and WMEL-AZ2 (north).

Segments Not Progressed

6.15.8 Link L1(1-1) was not progressed as the utilisation of the Link would require a number of direction changes leading to an indirect route.

Preliminary Corridor 2

6.15.9 Preliminary Corridor 2 allows for a direct west route leaving the new Weston Marsh substation Siting Zone avoiding the existing 400kV 4ZM OHL, 400kV 2WS OHL and the proposed new Grimsby to Walpole 400kV OHL that constrain Preliminary Corridor 1 (Segment 1a) Preliminary Corridor 5 (Segment 5a). Similar to Preliminary Corridor 1 constraints from residential properties narrow the available width between Surfleet and Pinchbech, most notably along Herdgate Lane, Old Hall Lane, White Cross Lane, the B1356, and Cuckoo Lane. Clusters of residential properties are also found in Segment 2b and 2c along Parson Drove, Cowbit Drove and Star Lode Drove. However, residential constraints are fewer in Segments 2a, 2b and 2c compared to those in Segments 1a, 1b and 1c. Scheduled Monuments in these Segments have also been avoided. Similar to Preliminary Corridor 1 and 3, the central section of Preliminary Corridor 2 (Segment 2d) is constrained by a number of ancient woodland blocks and Grimethorpe RPG to the south, however sufficient width is available to avoid direct impacts and manage potential impacts to the setting of the heritage assets. Connecting through WMEL-AZ2 (south), the Preliminary Corridor crosses the ECML and the A1. The crossing of the A1 is less constrained than the crossings in Segments 1e and L1-1b due to the greater distance between the ECML and the A1.

6.15.10 These constraints (aviation, Temple Farm Solar DCO, residential settlements, Grimsthorpe Castle RPG, and ancient woodland blocks) are likely to be managed by careful routeing and micro siting during assessment and design development, and all the Segments and Links are preferable to other discontinued options in Preliminary Corridors 3, 4 and 5.

Segments Progressed

6.15.11 Segments 2a, 2b, 2c, 2d, 2e, 2f, 2g, 2h and L2-1 were all progressed for further assessment as they present constraints and opportunities and allow an end to end solution and routeing through to Siting Zones, WMEL-BZ1, WMEL-BZ2 (north) and WMEL-AZ2 (south).

Preliminary Corridor 3

6.15.12 Preliminary Corridor 3 is constrained by three RPGs located immediately adjacent to this Preliminary Corridor, with Grimsthorpe Castle RPG immediately north of Segments 3a and 3b, Holywell Hall Park RPG immediately south and west of Segment 3b, and

Exton Park RPG immediately south of Segment 3c. There are key concentrations of receptors and pinch points between the settlements and scattered properties including the A1, woodland blocks, and the pinch point between Cottesmore, Greetham, Exton Park RPG and Greetham Valley Golf Club (Segment 3c), making this area less preferable. Therefore, Segments 3b and 3c were discontinued. This is further supported by considerable access constraints identified within WMEL-AZ3, including width and height restrictions due to residential properties and infrastructure on the local network, making all locations in this Siting Zone less preferred than other options.

Segments Progressed

6.15.13 Segment 3d was retained to provide a potential link between Segments 2g and 4d, allowing for a potential Route Option to WMEL-BZ2 (south), avoiding the constraints highlighted above in the rest of Preliminary Corridor 3.

Segments Not Progressed

6.15.14 Segments 3a, 3b, 3c and L3-2 were discounted from further consideration primarily owing to pinch points limiting direct routeing of the OHL. Discontinuing these segments also discontinues WMEL-AZ3 from further consideration.

Preliminary Corridor 4

6.15.15 Preliminary Corridor 4 connects to Preliminary Corridor 2 south of Segment 2b, west of Northgate. It provides a southern alternative to potentially connect to the existing 4VK OHL in WMEL-AZ4 and the existing ZA OHL in WMEL-BZ3. There are a number of challenges with Preliminary Corridor 4, firstly the Preliminary Corridor is less direct in comparison to Preliminary Corridors 1 and 2, and connection from Segment 2b into 4a would require a large direction change southwards. Segment 4a has extensive peat deposits and surrounds the Baston Fens SAC, and Baston and Thurlby Fens SSSI. It also contains the Northrope Fen Airstrip 1km buffer which lies adjacent to the northwest of the SAC and SSSI, which in combination constrains the Preliminary Corridor at this point. Link L4-3 was introduced to provide an option to connect with Preliminary Corridor 3, however a number of direction changes would be required to avoid priority broadleaved woodland blocks and residential settlements. In addition, the discontinuance of Preliminary Corridor 3 Segments 3b, 3c and Link L3-2 means there is no end-to-end solution should this Link be utilised.

6.15.16 Approaching the existing 4KV OHL Preliminary Corridor 4 encounters similar constraints found in Preliminary Corridors 1, 2 and 3, with a number of residential areas including Carlby and Essendine (Segment 4b), priority broadleaf woodland and the ECML limiting the approach options into Siting Zone WMEL-AZ4. Similar to the proposed EN010126 - Temple Oaks Solar Park straddling Preliminary Corridor 1, EN010127 - Mallard Pass Solar Farm extends across the width of Segment 4b, and falls in the east WMEL-AZ4. However, in contrast to the EN010126 - Temple Oaks Solar Park proposal, EN010127 - Mallard Pass Solar Farm is more advanced in its development and has been granted development consent. This would limit collaboration opportunities with the developers further constraining OHL routeing options through this Segment and WMEL-AZ4.

6.15.17 Like Preliminary Corridors 1, 2 and 3, Preliminary Corridor 4 is routed to avoid RPGs, however Segment 4c crosses Barnsdale Avenue which falls within Exton Park RPG. An OHL through this Segment would require a number of direction changes, and would directly impact the RPG as well as impacts to its setting. Preliminary Corridor 4 would likely require undergrounding instead of OHL, as options to divert south of the RPG are limited by the presence of Rutland Water SPA and Ramsar (with the qualifying species being wintering birds and presenting a constraint to Segment 4c itself), and the Burley on the Hill RPG.

6.15.18 The east of Segment 4d is constrained by numerous villages, such as Empingham, Oakham, and Langham, each with clusters of listed buildings in proximity to Segment 4d. Segment 4d has greater potential for visual impacts on residential properties than other options. The west of Segment 4d is less constrained by settlements and has been retained as there is an opportunity to form an end to end route to Siting Zone WMEL-BZ2 (south) utilising parts of Segments 2g and 3d.

Segments Progressed

6.15.19 Segments 4d and 4e were both progressed for further assessment as both present opportunities for routeing access to the south of Siting Zone WMEL-BZ2.

Segments Not Progressed

6.15.20 Segment 4a was not progressed due to the presence of an internationally designated site (Baston Fens SAC) and airfield limiting routeing options and ground conditions.

6.15.21 Link L4-3 was not progressed due to priority broadleaved woodland and residential settlement complicating routeing, and as Segments 3b, 3c and Link L3-2 were not progressed, no end-to-end solution is available utilising the Link.

6.15.22 Segment 4b was not progressed due to the presence of the consented EN010127 - Mallard Pass Solar Farm constraining Route Options and access.

6.15.23 Segment 4c was not progressed as it would require crossing Exton Park RPG and the proximity to Rutland Water SPA and Ramsar site, internationally designated for its bird population.

6.15.24 Although Segments 4a, 4b and 4c have not been progressed, WMEL-BZ2 has been progressed for further assessment as there is still an opportunity to form an end-to-end solution via Segments 2g, 3d, 4d and 4e. As Segment 4c was not progressed, WMEL-AZ4 was not progressed for further assessment.

Preliminary Corridor 5

6.15.25 Segment 5a is considered least preferred option for coming west of Weston Marsh Siting Zone as a result of increased length and relative cost, multiple electricity distribution infrastructure crossings to accommodate including the existing 400kV 2WS OHL and several other existing lines. In addition, the proposed new Grimsby to Walpole 400kV OHL route also utilises the Preliminary Corridor limiting space available and producing greater landscape and visual impacts. Therefore, Segment 5a was discontinued.

6.15.26 To connect Segment 5a and 5b requires the utilisation of Segments 4a and 4b which have been discounted from further assessment. Segment 5b is also in close proximity to internationally designated Rutland Water SPA/Ramsar/SSSI, and aviation constraints which form a narrow pinch point near North Luffenham. There are several upstanding Scheduled Monuments (making them more sensitive to setting impacts than buried assets), and the density and dispersal of residential properties and other sensitive visual receptors, including those using long distance and local recreational routes and visitors to other key viewpoints or designated recreational, mean higher risk of visual impacts in Segment 5b.

6.15.27 The topography of WMEL-BZ3 has been identified as varied and rolling, often with steep slopes forming elevated ridges and more enclosed valleys along watercourses, with numerous PRoW including the Long Distance Routes of the Midshires Way, Macmillan Way and the Leicestershire Round, and part of NCN Route 63 and Route 64; and access constraints have been identified, which make it less preferable to other Siting Zones.

Segments Progressed

6.15.28 None

Segments Not Progressed

6.15.29 Segment 5a was discontinued due to the required crossing of the 400kV 2WS OHL and numerous other OHLs, and the interaction with the proposed new Grimsby to Walpole 400kV OHL. Segment 5b was discontinued due to the proximity of Rutland Water SPA/Ramsar/SSSI, residential properties, heritage assets, and greater potential for landscape and visual impacts as a result of topography and recreational routes, compared to other options.

6.15.30 In isolation Siting Zone WMEL-BZ3 is constrained by high and steep topography, impacting transport and access, landscape and visual receptors. In addition, discounting Segments 5a and 5b means there is no end to end solution to connect to WMEL-BZ3 therefore this Siting Zone was discontinued from further appraisal.

Appraisal Summary

6.15.31 The appraisal process described above has highlighted Preliminary Corridors 1 and 2 as preferrable to Preliminary Corridors 3, 4 and 5 for much of the route, except Segments 4e and 4d in the approach to WMEL-BZ2 and part of Segment 3d which could still be used to connect Segment 2g to 4e and connect into the southern Siting Areas in WMEL-BZ2.

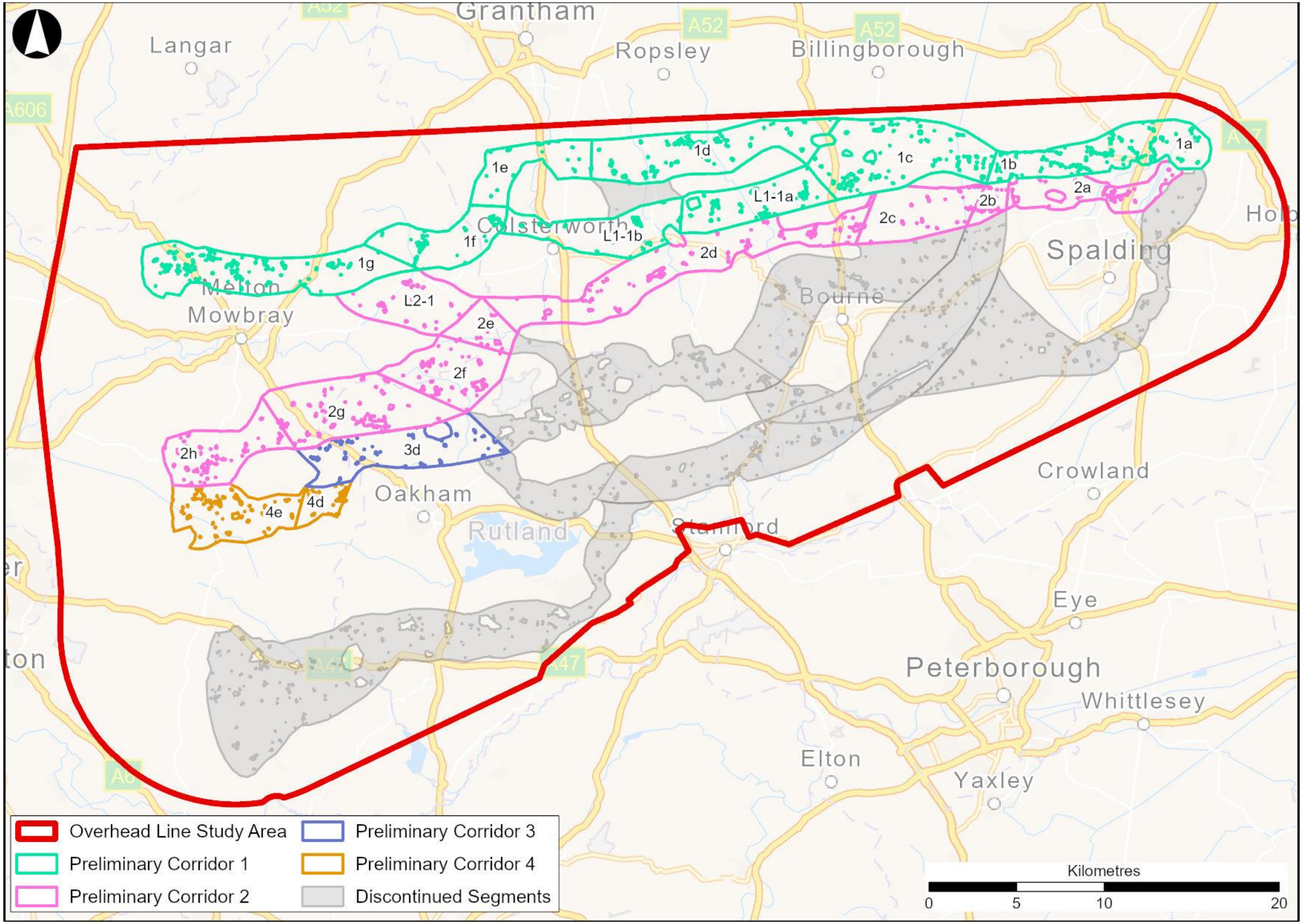
6.15.32 Although constraints and pinch points have been identified in Preliminary Corridors 1 and 2, such as Temple Oaks Solar development (Segment 1d), and narrow available width with properties between Surfleet and Pinch Beck, properties and narrowing Preliminary Corridor in Segment 2d, and technical connection challenges in WMEL-AZ1, these are likely to be managed by careful routeing and micro siting during assessment and design development, and the remaining Segments and Links are preferable to other discontinued options. The remaining corridors, Segments and Links retain the flexibility to develop viable and efficient end-to-end solutions for a new OHL route should other constraints be identified as the Project progresses.

6.15.33 The preferred Route Options that offer end-to-end OHL routes and therefore progress to the next stage of the appraisal (see **Figure 6-13**) are detailed below:

- **Route Option 1**: Segments 1a, 1b, 1c, 1d, 1e, 1f and 1g. Connecting to the grid at WMEL-AZ1 and WMEL-BZ1.
- **Route Option 2**: Segments 1a, 1b, 1c, Links 1-1a and 1-1b, and Segments 1f and 1g. Connecting to the grid at the northern half of WMEL-AZ2, and WMEL-BZ1.

- **Route Option 3**: Segments 2a, 2b, 2c, 2d, 2e, Link 2-1, and Segment 1g. Connecting to the grid at the southern half WMEL-AZ2, and WMEL-BZ1.
- **Route Option 4**: 2a, 2b, 2c, 2d, 2e, 2f, 2g the same segments and alignment as Preliminary Corridor 2. Connecting to the grid at the southern half WMEL-AZ2 and northern half of WMEL-BZ2.
- **Route Option 5**: Segments 2a, 2b, 2c, 2d, 2e, 2f, part of Segment 2g before crossing part of Segment 3d, Segment 4d and 4e. Connecting to the grid at southern half of WMEL-AZ2 and the southern half of WMEL-BZ2.

Figure 6-13 – The Segments Progressed to Route Option Appraisal



7. Route Option Appraisal

7.1 Introduction

7.1.1 This chapter describes the refinement and appraisal of the five Route Options identified in **Chapter 6** (comprising of the segments that have been progressed) and presents a summary of the options appraisal undertaken. The purpose of this chapter is to present the key environmental, socio-economic and technical constraints associated with each Route Option. The appraisal considers whether potential impacts on relevant receptors can be mitigated through careful routeing or by other forms of mitigation.

7.1.2 As the design progressed, regular reviews were undertaken to ensure the emerging preferred Route Option taken forward at this stage is still the preferred route when all applicable aspects are considered.

7.2 Overview of the Route Options

7.2.1 For the purpose of further analysing and appraising these Route Options, the naming convention of Route Option 1, 2, 3, 4 and 5 was adopted to clearly differentiate between the Preliminary Corridors considered in **Chapter 6**.

7.2.2 The five Route Options provide an end-to-end solution between the new Weston Marsh substation infrastructure (to be constructed as part of the Grimsby to Walpole project), the WMEL-A substation, and the WMEL-B substation delivered as part of this Project. The Route Options are comprised of Segments from the Preliminary Corridors and Links discussed in **Chapter 6**:

- Route Option 1: Segments 1a. 1b, 1c, 1d, 1e, 1f and 1g. Connecting to the grid at WMEL-AZ1 and WMEL-BZ1.
- Route Option 2: Segments 1a, 1b, 1c, Links 1-1a and 1-1b, and Segments 1f and 1g. Connecting to the grid at the northern half of WMEL-AZ2 and WMEL-BZ1.
- Route Option 3: Segments 2a, 2b, 2c, 2d, 2e, Link 2-1, and Segment 1g. Connecting to the grid at the southern half WMEL-AZ2 and WMEL-BZ1.
- Route Option 4: Segments 2a, 2b, 2c, 2d, 2e, 2f and 2g. Connecting to the grid at the southern half WMEL-AZ2 and northern half of WMEL-BZ2.
- Route Option 5: Segments 2a, 2b, 2c, 2d, 2e, 2f, part of Segment 2g before crossing part of Segment 3d, Segment 4d and 4e. Connecting to the grid at southern half of WMEL-AZ2 and the southern half of WMEL-BZ2.

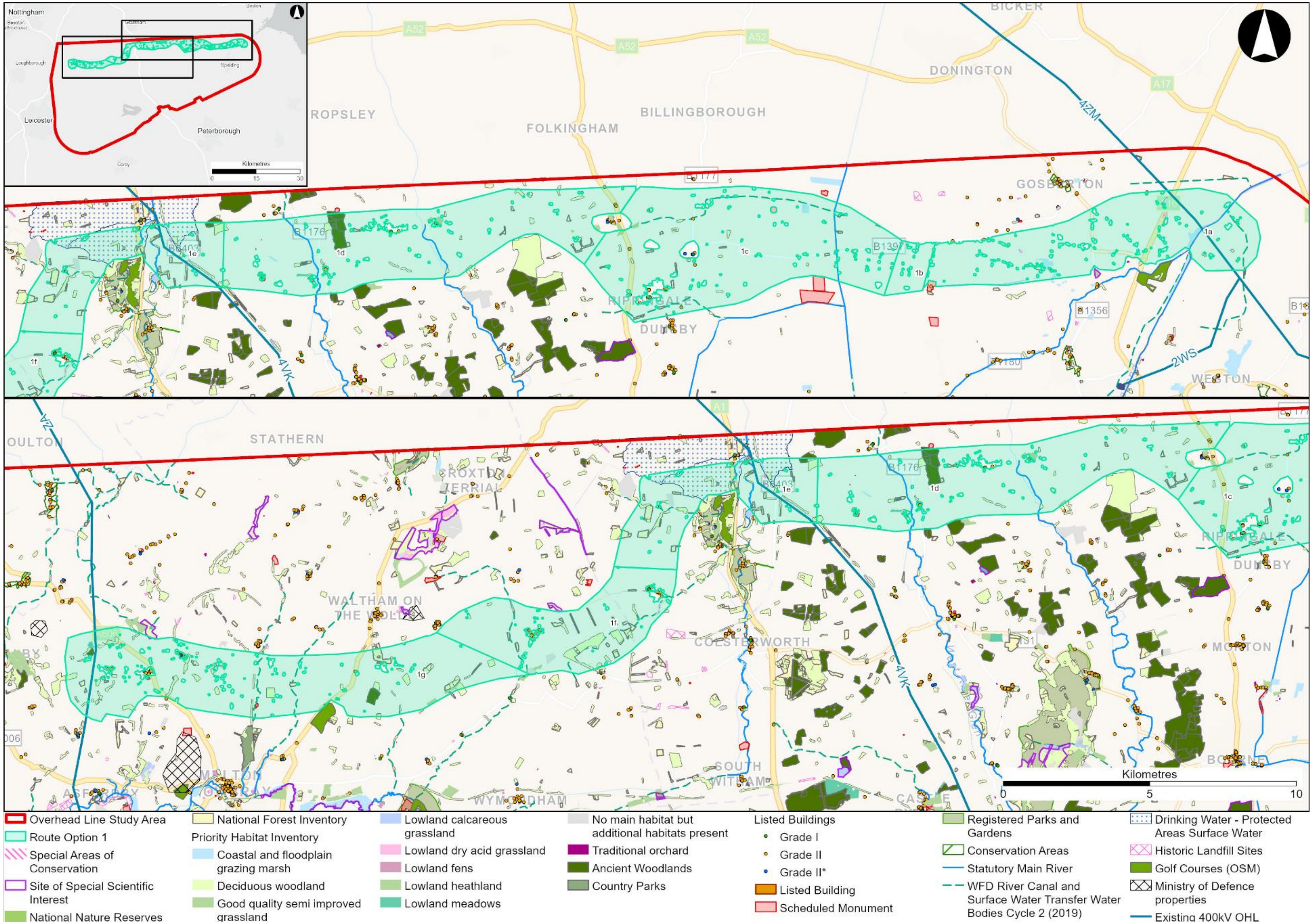
7.2.3 As described in **Chapter 4**, the Route Options, comprising of their Segments and Links, were then further reviewed by NGET and the FEED Engineers, as well as the environmental and social specialists, to confirm their technical feasibility and ensure that key issues, and the interaction of constraints, had been fully considered.

7.3 Route Option 1

Introduction

7.3.1 Route Option 1 is located furthest north within the Study Area and is comprised of segments from Preliminary Corridor 1 (Segments 1a, 1b, 1c, 1d, 1e, 1f, and 1g). This Route Option follows the same course as Preliminary Corridor 1 (refer to **Section 6.3**). An overview of Route Option 1 and the environmental and socio-economic constraints are shown in **Figure 7-1.**

Figure 7-1 – Route Option 1, Environmental and Socio-Economic Features



Environmental Appraisal Summary

Ecology

7.3.2 There are no internationally designated sites within this Route Option but there is potential for adverse impacts to designated sites within 10km, or to sites that are hydrologically connected (such as The Wash and north Norfolk Coast SAC located 5.2km east of the Route Option, hydrologically connected via the River Welland), or where qualifying species (such as wintering birds associated with The Wash SPA and Ramsar site) use functionally linked land that are likely to be present at the eastern end of the Route Option.

7.3.3 There are three SSSIs: Holwell Mouth SSSI marsh (within the northern boundary of Segment 1g), Sproxton Quarry SSSI ((geological) (adjacent to northern boundary of Segment 1f)), and Surfleet Lows SSSI wet grassland and saltpans (near southern boundary of Segment 1a). Only Sowfleet Lows SSSI is hydraulically connected. The Wash National Nature Reserve approximately 7km northeast and is hydrologically connected via the River Welland; the nearest Segment is 1a.

7.3.4 There is one small area of ancient woodland within Segment 1d, one area of ancient woodland in Segment 1e and two areas of ancient woodland in Segment 1g. The adverse effects associated with Route Option 1 are mainly due to the presence of priority habitats. Grassland sites comprising coastal floodplain grazing marsh and good quality semi-improved grassland are present within the eastern Segments 1a – 1c and small woodland sites within western Segments 1d to 1g . Adverse impacts would include direct habitat loss, habitat fragmentation, or habitat degradation as a result of construction activities.

7.3.5 There are six main watercourses that bisect this option within segments 1a, 1d and 1e. Main rivers are likely to be priority habitat. The River Welland is a main river flowing through Segment 1a; the East Glen River is a main river flowing through Segment 1d; the West Glen Upper River flows through Segment 1d; the River Witham is a main river that flows through Segment 1e; and Cringle Brook is a main river and tributary of the River Witham which flows through Segment 1e. Other rivers and streams flow through all segments but they are not designated as a main river by the Environment Agency. Ecological assessment would still apply to these watercourses.

7.3.6 Impacts to woodland and hedgerows are likely to also have adverse impacts on protected species such as bats and dormice if present. Loss of arable land may also impact other protected species such as barn owl, badgers and reptiles. The eastern area of the Route Option 1, Segments 1a and 1b, is lower lying with many drainage ditches and streams, which if impacted either directly or indirectly may result in adverse impacts on aquatic species including otter and water vole. OHL has the potential to impact bats and birds, including those associated with The Wash Ramsar and SPA, during operation if they bisect flight lines to foraging grounds or roosting sites resulting in adverse impacts.

7.3.7 A HRA would be required to assess the likely significant effect on international designated sites within 10km or those that are hydrologically connected and may feature qualifying species. An ecological impact assessment would assess effects on all other ecological receptors to inform mitigation requirements. Priority habitat sites should be avoided by design, particularly ancient woodlands, which are considered irreplaceable habitat, the loss of which cannot be mitigated. If loss of other habitat is unavoidable, adverse impacts on habitat and associated protected species could be mitigated, informed by further survey to reduce any residual effects.

Landscape and Visual

7.3.8 This Route Option passes through a varied landscape, with flat open fenland to the east, transitioning to undulating farmland further west. It is located within the following National Landscape Character Areas: NCA 46: The Fens; NCA 75: Kesteven Uplands; and NCA 74: Leicestershire and Nottinghamshire Wolds.

7.3.9 There is potential for localised indirect effects on Stoke Rochford Hall RPG, although the core area is likely to be largely unaffected. Adverse direct and indirect effects on landscape character are also anticipated, particularly where the landscape is open with expansive views (east and central parts of Route Option 1).

7.3.10 There is potential for a range of adverse and significant effects on residential receptors within this Route Option, particularly within Segments 1a, 1b, 1c (around Pointon, Millthorpe, Dowsby and Rippingdale), a localised part of Segment 1f (near Sproxton), and in Segment 1g (west of Melton Spinner Road and around Ab Kettleby). This is a result of the concentration of receptors in these areas and/or limited separation distance between properties.

7.3.11 The PRoW network is varied across the extent of Route Option 1. Generally, there are fewer PRoW to the east, with a higher concentration radiating from villages such as Ingoldsby (Segment 1d), Waltham on the Wolds (located outside the Route Option boundary to the north of Segment 1g), and throughout Segment 1g. There are several Long Distance Routes (LDR) within or in close proximity to Route Option 1, including the Macmillan Way – Route Option adjacent to a short section at Surfleet. However, views north are influenced by urban elements within Surfleet (Segment 1a); Cross Britain Way – Route Option adjacent to a short section at Little Ponton (Segment 1e); Viking Way – Route Option intersects a short section between Skillington and Sproxton (Segment 1f); and National Cycle Network Route 64 (Segment 1g). There are no viewpoints recognised on Ordnance Survey within or close to Route Option 1. There may be locally valued views from designated Conservation Areas (such as Wartnaby and Ab Kettleby).

7.3.12 Small areas designated as Open Greenspaces (for example, cemetery, church grounds and small recreation grounds) have been identified throughout Route Option 1. These are generally located within the settlements with varying levels of containment and include: Rippingale and Dowsby (Segment 1c); Lenton, Ingoldsby, Birchfield, and Bassingthorpe (Segment 1d); Skillington and Sproxton (Segment 1f); and Ab Kettleby and Wartnaby (Segment 1g). Other notable Open Greenspaces include the following: Stoke Rochford Hall (also a RPG) - high levels of containment and visual screening from existing woodland located adjacent to the southern extents of Segment 1e; and, Melton Mowbray Golf Club ─ adjacent to the southern extents of Segment 1g existing mature trees and Waltham Road provide containment.

7.3.13 Careful routeing to avoid loss of existing features in relation to the landscape pattern and the use of existing trees and topography to provide partial screening would further reduce potential effects on landscape character. Measures to further reduce visual effects include increasing the distance of the routing from receptors and avoiding the positioning towers within principal views. It will also be important to consider the relationship with other existing OHLs to minimise potential for cumulative landscape and visual effects, particularly in Segments 1a, 1c, 1e, 1f and 1g.

7.3.14 Potential effects on landscape designations, such as the RPGs located adjacent to Segments 1a, 1b and 1c, are likely to be limited and localised, indicating neutral implications. The more widespread nature of potential effects on landscape character result in negative implications. Similarly, due to the number and spread of potential visual receptors, negative implications are anticipated, particularly in relation to residential receptors in Segments 1a, 1b, 1c, 1f and 1g.

Historic Environment

7.3.15 The likely potential effects on designated heritage assets would be in cases where the presence of pylons and OHL would alter the setting of assets, resulting in an adverse impact on their significance. This would apply to the Moated site of monastic grange with adjacent earthworks at Rigbolt House (NHLE1009979) in Segment 1a (immediately adjacent to, but outside of the corridor), the Grade II* Church of St Bartholomew (NHLE 1294595) in Segment 1f and the Grade II* Stoke Roachford Hall (NHLE 1000991) in Segment 1e.

7.3.16 Other designated assets are present within the corridor, however, these are considered unlikely to experience adverse effects as a result of changes to their settings resulting from OHL. This includes listed buildings within towns and villages, the significance of which would not be impacted by the presence of OHL or pylons at a distance.

7.3.17 Adverse effects on buried archaeological remains would be as a result of direct impacts. Such remains are likely throughout the corridor, with the eastern fenland portion (Segments 1a, 1b, 1c) having a particular potential to contain well-preserved organic remains of very high value.

7.3.18 Mitigation would be by design; there is scope in the corridor to allow assets to be avoided at a distance where adverse effects would be minimised. However, due to the particular sensitivities of RPGs, it is less likely that adverse effects could be completely avoided for Stoke Roachford Hall. There is scope to avoid some archaeological remains through design, however the principal approach to mitigation would be preservation by record (archaeological investigation and recording). This would reduce but not avoid these adverse effects.

7.3.19 Route Option 1 would potentially result in adverse effects on designated and non-designated heritage assets, however the corridor provides sufficient scope to avoid or reduce many of these effects through design. There are no heritage assets within Route Option 1 that would intrinsically prevent the corridor being taken forward.

Water Environment

7.3.20 Route Option 1 features flat arable land with drainage ditches in the east and more undulating terrain in the west. Several WFD waterbodies traverse the corridor. The option includes Holwell Mouth SSSI (Segment 1g) partially within the corridor and several adjacent to its boundary. It contains several SPZs with one SPZ 1 in Segment 1e and another in Segment 1c, and one Drinking Water Protection Area in Segment 1e. The eastern edge of the route is in Flood Zone 2 and 3 near Holbeach, with small areas in Flood Zone 2 and 3 throughout the corridor adjacent to larger waterbodies/main rivers, and the area is underlain by a mix of Principal and Secondary Aquifers.

7.3.21 Temporary works mitigation include positioning pylons/towers away from water features, avoid watercourse crossings where possible, use non-intrusive methods, and implement temporary drainage and pollution control measures as defined by a CEMP, surface water management plans, avoiding SPZ where possible, ground water management plans, and use effective land drainage, avoid temporary storage areas within floodplains, and minimise construction compounds in these areas

7.3.22 Operation mitigation includes implementing Environmental Management Plans with pollution prevention measures, Groundwater Management Plans, position permanent infrastructure outside high or medium flood risk areas, design foundations to preserve floodplain storage, and provide floodplain compensation if Flood Zone 3 is intersected.

7.3.23 While mitigation measures could avoid many impacts, the potential for adverse impacts on groundwater, surface water and protected sites remains due to the presence of water features (including WFD waterbodies), a Drinking Water Protected Area, SPZs and Principal Aquifers along the route should be considered in the final locating of infrastructure.

7.3.24 All the Route Options carry similar levels of flood risk, and risk in terms of pollution to surface and groundwater, disruption of flow paths, and potential impacts on sensitive sites and aquifers.

Socio-Economic Appraisal Summary

Economic Activity (including Planning)

7.3.25 Route Option 1 covers several villages such as Dowsby, Aslackby, Rippingale, Ingoldsby, Bitchfield, Skillington, Sproxton, and Ab Kettleby, but corridor width allows flexibility to avoid oversailing. Overall, Route Option 1 avoids the main industrial and business focal points and concentrations, such as city centres, industrial facilities, shopping centres, business parks, educational establishments, and healthcare facilities. The Route Option overlaps with areas that have ALC Grades 1 and 2 (Segments 1g, 1a, 1b, 1c, and 1d), which are the most fertile and valuable for agriculture.

7.3.26 Adopted Local Plan Policies (Segment 1e), Neighbourhood Plan Policies (Segment 1g), and Committed developments (Segments 1c and 1d), are present along Route Option 1. However, it is anticipated that the effects could be avoided or reduced, and therefore not a defining factor on progressing the Route Option.

7.3.27 A Petroleum Exploration and Development Licence area is found in Segment 1g. Site visits also identified that throughout King Street Lane there are over 10 oil pipeline crossings (located where Segments 1g and 1f connect).

7.3.28 Section 1a initially interacts with the EN010130 - Outer Dowsing Offshore Wind Project and NGET's Grimsby to Walpole NSIP. Section 1d interacts with the Temple Oaks Renewable Energy Park and WA010003 - Lincolnshire Reservoir and pipeline (both NSIP at DCO Pre-Application Stage). There is an opportunity to collaborate with other developers seeking to minimise impacts and maximise benefits and reduce potential cumulative impacts. These NSIPs could also result in adverse impacts such as complex and protracted negotiations in accommodating or changing infrastructure designs and construction. If collaboration and accommodation is likely to be complex there may be potential for substantial adverse effects which would reduce the preference for Route Option 1 against other options.

Aviation and Defence

7.3.29 Potential aviation and defence receptors presenting a constraint interacting with Route Option 1 include: the Decoy Farm Airstrip within Segment 1c; Buckminster Gliding Club (adjacent to Segment 1f); RAF Station Melton Mowbray (4km from Segment 1g); and

Kendrew Barracks – former RAF Cottesmore (4km from Segment 1e, 1f, and 1g). As the aviation receptors cannot be avoided in those Segments, stringent measures will need to be in place to avoid potential conflicts during the operation stage, and actions to appropriately mitigate impacts during the construction stage. All Route Options are similarly constrained by aviation and defence receptors therefore it is not likely to be a key differentiating factor.

Traffic and Transport

7.3.30 Route Option 1 will unavoidably intersect with the National Cycle Network in Segment 1g, the E2 long-distance path, and multiple PRoW. The Peterborough to Lincoln rail line crosses the corridor with a northwest/southeast orientation near to Spalding (Segment 1a) and the ECML railway crosses the corridor with a northwest/southeast orientation near to Colsterworth (Segment 1e). The River Welland (Segment 1a) and South Forty Foot Drain (Segment 1c) cross the corridor.

7.3.31 The Route Option is crossed by the A1 which is part of the SRN managed by National Highways (Segment 1e). The corridor is crossed by the following A and B roads that are managed by the local highway authorities: A16 and A152 (Segment 1a), A15 (Segments 1c and 1d), A607 and A606 (Segment 1g) B1356 (Segment 1a), B1397 (Segments 1a, 1b and 1c), B1177 (Segment 1c), B1176 (Segment 1d) and B6403 (Segment 1e). Route Option 1 has preferable access due to a larger number of A roads which are the most suitable for HGV traffic.

Engineering and System Appraisal Summary

7.3.32 Overall, Route Option 1 passes through a similar, but marginally less, mapped extent of Peat/Alluvial soils when compared Route Option 2 (relative to percentage of area), and a marginally greater extent when compared to Route Options 3, 4 and 5 (relative to percentage of area).

7.3.33 Route Option 1 has a number of artificial deposits and historical mining/quarry features located in the west of the Route Option:

- Numerous ceased, inactive and active points associated with Great Ponton Quarry (Segment 1e).
- Notable areas of worked ground southeast of Skillington and southeast of Cringle Brook. Including numerous ceased mines and quarries (Segment 1f).
- Significant areas of worked ground to the north, northeast and east of Sproxton. Including numerous ceased (and nearby dormant) quarry/mine points generally correlating with the worked ground to the north, northeast and east of Sproxton (Segment 1f).
- Significant extents of infilled ground to the east of Holwell and more locally to the west. Including numerous ceased points associated with Holwell Iron Mines Pit, Browns Hill Quarries, correlating with the areas of infilled ground to the east of Holwell (Segment 1f).
- Significant extents of Infilled Ground from the west of Holwell, across the A606 and along Six Hill Lane, north/northwest of Ab Kettleby and more locally in the northwest of Ab Kettleby itself. Numerous ceased points associated with Ab Kettleby, Ironstone Pit, Wartnaby Quarry, correlating with Infilled Ground around and to the north/northwest of Ab Kettleby.

7.3.34 The Route Option is within a Coal Mining Reporting Area from approximately Melton Mowbray Golf Club, moving west across the remainder of the route (Segment 1g), although no Development High Risk Areas are indicated. Overall, it is likely that OHL alignment could be planned to avoid these occurrences. It is noted that other areas of historical mines and quarries, artificial deposits and historic landfill are present within the corridor, albeit to lesser extents than those outlined above. There are no occurrences of active landfill sites within the corridor.

7.3.35 The majority of the Route Option 1 consists of flat to gentle slopes with gradients less than 5°, with a relatively small proportion of moderate slopes (5° to 15°) and a very minor percentage of steep slopes (>15°). This route has marginally steeper slopes than Route Option 2 and 3. The route has approximately nine areas where moderate to steep slopes span extensive areas and/or entire width of the corridor, notably in Segments 1d, 1e, 1f and 1g. Of these, a notable pinch point is present in the area of Great Ponton, and steeper slopes also appear to span the corridor around Stoke Rochford and Holwell. A greater degree of earthworks may be required in these areas to construct haul roads, for example, and it may not be possible to construct haul roads in a direct line from OHL tower to tower, subject to actual route selected and where tower positions are placed.

7.3.36 Notable areas of mass movement deposits are shown in topographies to the north of Six Hill Lane in the far west of the route, northwest of Ab Kettleby Areas to the southeast of Holwell (segment 1g). The extent of mass movement deposits in Route Options 1, 2 and 3 are comparable, and greater than those found in Route Options 4 and 5. It should be possible to avoid these mass movement deposits by considering these deposits when siting towers.

7.3.37 This Route Option will need to cross four 132kV OHLs (Segments 1c, 1d/e and 1g), two National Gas transmission pipelines (Segments 1c and 1d), a Total Energies fuel pipeline (Segment 1d), and an Exolum pipeline located at the start of Segment 1g. In addition, an underground cable/pipeline has recently been constructed east of Ingoldsby and runs in a north-south direction across Segment 1d.

7.3.38 This Route Option will require crossing six major road crossings (Type A), two railway crossings, and multiple waterbody crossings. All Route Options have similar requirements for crossing transport infrastructure, noting that Route Option 4 and 5 both require an additional railway crossing.

7.3.39 Flexibility for routeing is potentially reduced by the proposed Temple Oaks Renewable Energy Park located within Segment 1d. It is located on the former RAF Folkingham airfield and surrounding land. The proposed Energy Park comprises a solar farm, a Battery Energy Storage System, will cross the entire width of the Route Option, and will require oversailing if constructed. Therefore, additional and larger pylons could be required to ensure required clearances for operation and maintenance of the Energy Park.

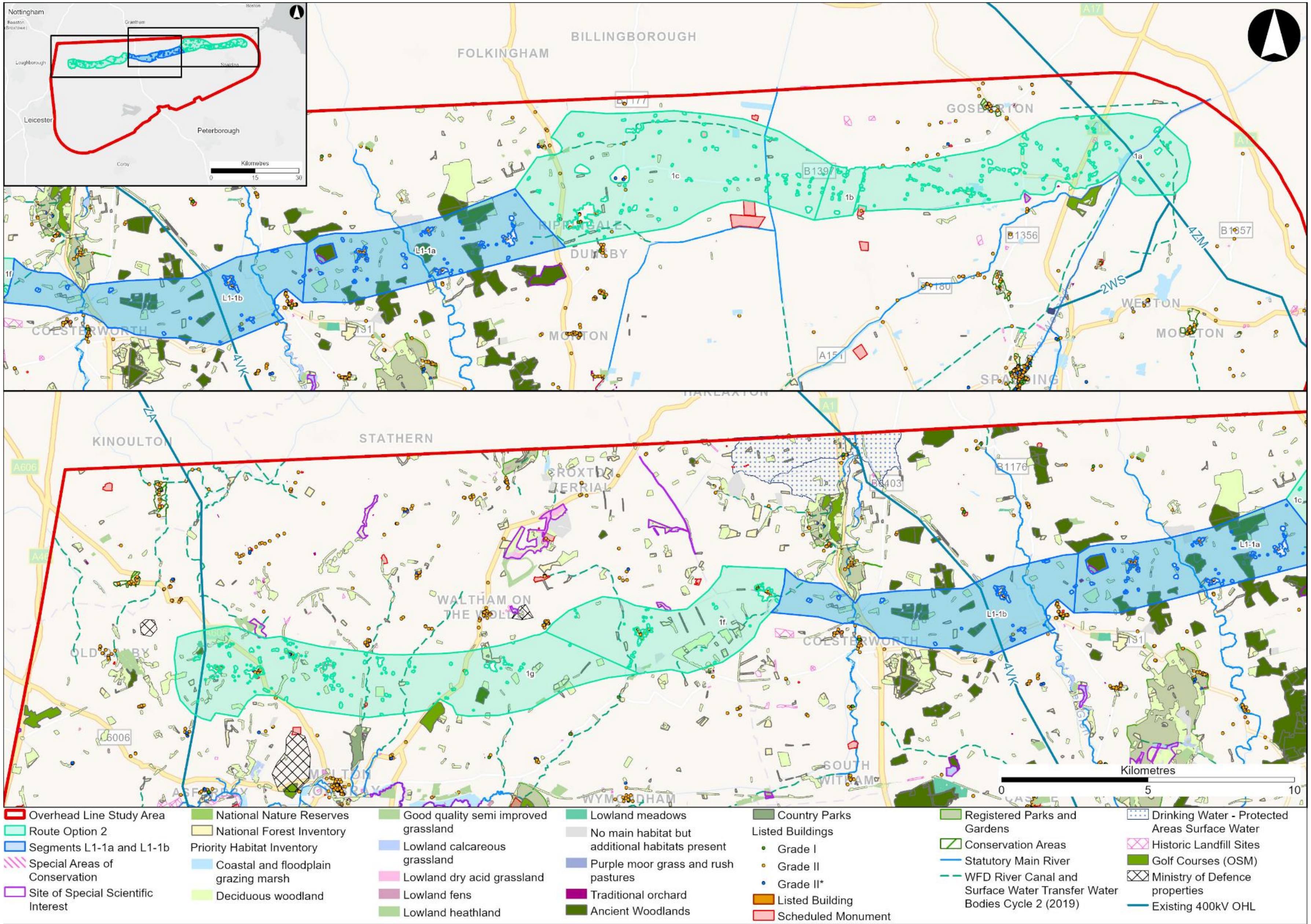
7.3.40 Other notable constrained areas include Segment 1e where the A1, ECML, River Witham and the 400kV 4VK OHL are all within close proximity to each other at a point south of Great Ponton. The Route Option also narrows to the west of this area to approximately 800m, where siting the substation in proximity to the ECML increases complexity in this area.

7.4 Route Option 2

Introduction

7.4.1 Like Route Option 1, Route Option 2 begins in the northeast of the Study Area and is comprised of segments from Preliminary Corridor 1 (Segments 1a, 1b and 1c) before continuing southwest after crossing the A15 at Rippingale, following Links L1-1a and L1-1b. The Route Option 2 then joins Segment 1f near Skillington, and then includes Segment 1g to connect to the existing 400kV ZA OHL in WMEL-BZ1 to the north of Melton Mowbray. An overview of Route Option 2 and the environmental and socio-economic constraints are shown in **Figure 7-2**.

Figure 7-2 – Route Option 2, Environmental and Socio-Economic Features



Environmental Appraisal Summary

Ecology

7.4.2 Route Option 2 shares the same constraints as Route Option 1 at its east end (Segments 1a, 1b, and 1c), and west end (Segments 1f and 1g), these being The Wash and north Norfolk Coast SAC, The Wash SPA and Ramsar site, Holwell Mouth SSSI, Sproxton Quarry SSSI, and Surfleet Lows SSSI. Designated sites associated with Segments L1-1a and L1-1b include Grimesthorpe SAC designated for dry grassland steppe habitat that is approximately 4.7km south of Segment L1-1a. The Hermitage SSSI is designated for lowland meadow and immediately adjacent to Link L1-1a near Irnham.

7.4.3 The constraints in Route Option 2 are mainly ancient woodland and priority habitats. Grassland sites comprising coastal floodplain grazing marsh and good quality semi-improved grassland are present within the eastern segments 1a – 1c and priority woodland sites and ancient woodland sites are present especially within Segments L1-1a and 1b and the Link L1 (1-) which may be hard to avoid. There are two smaller isolated blocks of ancient woodland within segment 1g which area avoidable.

7.4.4 There are four main rivers cross this option. Main rivers are likely to be priority habitat. The River Welland is a main river flowing through segment 1a; the East Glen River is a main river flowing through Link L1-1a; the West Glen Upper River flows through Link L1-1b and L1 (1-1); and the River Witham is a main river that flows through Link L1-1b. Other rivers and streams flow through all segments but they are not designated as a main rivers by the Environment Agency. Ecological assessment would still apply to these watercourses if impacted.

7.4.5 Impacts to woodland and hedgerows are likely to also have adverse impacts on protected species such as bats and dormice if present. Loss of arable land may also impact other protected species such as barn owl, badgers and reptiles. The eastern area of the Route Option, in segments 1a and 1b are lower lying with many drainage ditches and streams, which if impacted either directly or indirectly may result in adverse impacts on aquatic species including otter and water vole. OHL have the potential to impact bats and birds, including those associated with the Wash Ramsar and SPA, during the operational phase of the Project if they bisect flight lines to foraging grounds or roosting sites resulting in adverse effects.

7.4.6 HRA would be required to assess the likely significant effect on international designated sites within 10km or that are hydrologically connected and qualifying species that may be present within the corridor and an ecological impact assessment to assess effects on all other ecological receptors to inform mitigation requirements. Priority habitat sites should be avoided by design, particularly ancient woodlands, which are considered irreplaceable habitat, the loss of which cannot be mitigated. If loss of other habitat is unavoidable, adverse impacts on habitat and associated protected species could be mitigated, informed by further survey to reduce any residual effects.

7.4.7 All Route Options have a comparable number of internationally and nationally designated sites affecting them, with similar potential to impact qualifying features. Route Option 2 is more constrained with regard to potential impact on ancient woodland and priority woodland habitat sites (Segments L1-1a and L1-1b), which would require additional consideration through design and mitigation to avoid or reduce of the potential adverse effects.

Historic Environment

7.4.8 The likely potential effects on designated heritage assets would be in cases where the presence of pylons and OHL would alter the setting of assets, leading to an adverse impact on their significance. This would apply to the Moated site of monastic grange with adjacent earthworks at Rigbolt House (NHLE1009979) (immediately adjacent to, but outside of Segment 1a), the Hermitage moated site, 400m northeast of Corby Pasture Farm (NHLE 1016969) and the Grade I Church of All Saints (NHLE 1166122) in Link L1-1a, Grade II Easton Park (NHLE 1000976) in Link L1-1b and the Grade II* Church of St Bartholomew (NHLE 1294595) in Segment 1f.

7.4.9 Other designated assets are present within the corridor, however these are considered unlikely to experience adverse effects as a result of changes to their settings resulting from OHL; for instance, listed buildings within towns and villages, the significance of which would not be impacted by the presence of OHL or pylons at a distance.

7.4.10 Adverse effects on buried archaeological remains would be as a result of direct impacts. Such remains are likely throughout the corridor, with the eastern fenland portion (Segments 1a, 1b, 1c) having a particular potential to contain well-preserved organic remains of very high value.

7.4.11 Mitigation would be by design; there is scope in the Route Option corridor to allow assets to be avoided at a distance where adverse effects would be minimised. However, due to the particular sensitivities of RPGs, it is less likely that adverse effects could be completely avoided for Easton Park RPG. There is scope to avoid some archaeological remains through design, however, the principal approach to mitigation would be preservation by record (archaeological investigation and recording). This would reduce but not avoid the adverse effect.

7.4.12 Route Option 2 would potentially result in adverse effects on designated and non-designated heritage assets, however, the corridor provides sufficient scope to avoid or reduce many of these effects through design. There are no heritage assets within Route Option 2 that would intrinsically prevent the corridor being taken forward.

Landscape and Visual

7.4.13 This Route Option passes through a varied landscape, with flat open fenland to the east, transitioning to undulating farmland further west. It is located within the following National Landscape Character Areas: NCA 46: The Fens; NCA 75: Kesteven Uplands; and NCA 74: Leicestershire and Nottinghamshire Wolds.

7.4.14 There is potential for localised indirect effects on Easton Park RPG, although the core area is likely to be largely unaffected. Adverse direct and indirect effects on landscape character are also anticipated, particularly where the landscape is open and/or elevated with expansive views (east and central parts of Route Option 2).

7.4.15 In addition to the residential receptors noted in Route Option 1, there is potential for a range of adverse and significant effects on residential receptors, particularly in Link L1-1a (around Kirkby Underwood, Hawthorpe, Bulby and Irnham), and localised parts of Link L1-1b (north of Colsterworth). A number of PRoW and Open Greenspaces receptors are noted in proximity to Burton-Le-Coggles and Corby Glen (Link L1-1b).

7.4.16 Careful routeing to avoid loss of existing features, relate to the landscape pattern and making use of existing trees and topography to provide partial screening would help to reduce potential effects on landscape character. Measures to reduce potential visual effects would include, increasing the distance from receptors, avoiding positioning towers in principal views and making use of existing features to provide screening, where possible. It will also be important to consider the relationship with other existing OHLs to minimise potential for cumulative landscape and visual effects, particularly in segments 1a, 1c, L1-1a, 1f and 1g.

7.4.17 Potential effects on landscape designations are likely to be limited and localised, indicating neutral implications. The more widespread nature of potential effects on landscape character result in negative implications. Similarly, due to the number and spread of potential visual receptors, negative implications are anticipated, particularly in relation to residential receptors in segments 1a, 1b, 1c, L1-1a, L1-1b, 1f and 1g.

Water Environment

7.4.18 Route Option 2 has the same topographical features identified in Route Option 1, with flat arable land with drainage ditches in the east and more undulating terrain in the west. Several WFD waterbodies traverse the site. The option includes one nationally designated SSSI (Holwell Mouth) partially within the corridor and several adjacent to its boundary. It contains several SPZs with two SPZ 1s in Segment 1c and one in Link L1-1b, however, as the Route Option avoids Segment 1e there are no Drinking Water Protected Areas present. The eastern edge of the route is in Flood Zone 2 and 3 near Holbeach, with small areas in Flood Zone 2 and 3 throughout the corridor adjacent to larger waterbodies/main rivers, and the area is underlain by a mix of Principal and Secondary Aquifers.

7.4.19 Temporary works mitigation include positioning pylons/towers away from water features, avoid watercourse crossings where possible, use non-intrusive methods, and implement temporary drainage and pollution control measures as defined by a CEMP, surface water management plans, avoiding SPZ where possible, ground water management plans, and use effective land drainage, avoid temporary storage areas within floodplains, and minimize construction compounds in these areas

7.4.20 Operation mitigation includes implementing Environmental Management Plans with pollution prevention measures, Groundwater Management Plans, position permanent infrastructure outside high or medium flood risk areas, design foundations to preserve floodplain storage, and provide floodplain compensation if Flood Zone 3 is intersected.

7.4.21 While mitigation measures could avoid many impacts, the potential for adverse impacts on groundwater, surface water and protected sites remains due to the presence of water features (including WFD waterbodies), SPZs and Principal Aquifers along the route will need to be considered in the design and location of infrastructure.

7.4.22 All the Route Options carry similar levels of flood risk, and risk in terms of pollution to surface and groundwater, disruption of flow paths, and potential impacts on sensitive sites and aquifers.

Socio-Economic Appraisal Summary

Economic Activity (including Planning)

7.4.23 Route Option 2 covers the same villages identified in Segments 1a, 1b, 1c, 1f, and 1g of Route Option 1, with the addition of Kirkby Underwood and Irnham in Link L1-1a, and Corby Glen and Burton-le-Coggles in Link L1-1b. The Route Option overlaps with areas that have ALC Grades 1 and 2 Identified in Route Option 1 (Segments 1g, 1a, 1b, 1c, and 1d), with the addition of Segment 1-1a.

7.4.24 Adopted Local Plan Policies (Link L1-1b), Neighbourhood Plan Policies (Segment 1g), and Committed developments (Segments 1c), are present along Route Option 2, however, it is anticipated that the effects could be avoided or reduced, and are therefore not a defining factor in the appraisal of the Route Option.

7.4.25 There are also a Petroleum Exploration and Development Licence, oil pipeline crossings and poor road conditions identified near King Street Lane (located where Segments 1g and 1f connect) as identified for Route Option 1.

7.4.26 The same NSIPs interact with Route Option 2 in Segment 1a as reported for Route Option 1. WA010003 - Lincolnshire Reservoir and pipeline NSIP would still be a consideration for Segments L1-1a and L1-1b, however, the Route Option does not interact with the Temple Woods Renewable Energy Park NSIP. This would avoid the need to collaborate and reduce the likelihood of cumulative impacts.

Aviation and Defence

7.4.27 Potential aviation and defence receptors presenting a constraint interacting with Route Option 2 include: the Decoy Farm Airstrip within Segment 1c; Buckminster Gliding Club (adjacent to Segment 1f); RAF Station Melton Mowbray (4km from Segment 1g); Kendrew Barracks – former RAF Cottesmore (4km from L1-1b, 1f and 1g); and Black Spring Farm Airstrip (2.75 km from Link L1-1b). As the preferred aviation exclusion areas cannot be avoided completely in those Segments, stringent measures will need to be in place to avoid potential conflicts during the operation stage, and actions to appropriately mitigate impacts during the construction stage. All Route Options are similarly constrained by aviation and defence receptors therefore it is not a key differentiating factor.

Traffic and Transport

7.4.28 Route Option 2 will unavoidably intersect in the National Cycle Network in Segment 1g. the E2 long-distance path, and multiple PRoW. The Peterborough to Lincoln rail line crosses the route with a northwest/southeast orientation near to Spalding (Segment 1a) and the ECML railway crosses the corridor with a northwest/southeast orientation near to Colsterworth (Link L1-1b). The River Welland (Segment 1a) and South Forty Foot Drain (Segment 1c) cross the corridor.

7.4.29 The Route Option is crossed by the A1 part of the SRN managed by National Highways (Link L1-1b). The corridor is crossed by the following A and B roads that are managed by the local highway authorities: A16 and A152 (Segment 1a), A15 (Segments 1c and L1-1a), A607 and A606 (Segment 1g), A151 (L1-1b) B1356 (Segment 1a), B1397 (Segments 1a, 1b and 1c), B1177 (Segment 1c), B1176 (Link L1-1b) and B6403 (Link L1-1b). As with Route Option 1, Option 2 has preferable access due to a larger number of A roads which are the most suitable for HGV traffic.

Engineering and System Appraisal Summary

7.4.30 Overall, this route passes through a marginally greater, mapped extent of Peat/Alluvial Soils when compared to the other routes (relative to percentage of area).

7.4.31 Route Option 2 shares the same artificial deposits and historical mining/quarry features located in Segments 1f and 1g of Route Option 1, extending into Link L1-lb. This area has a pinch point in the west of Link L1-1b where the corridor narrows between Easton RPG and Colsterworth an cross the A1 at a junction, adding further complexity. The Route Option is also within the same Coal Mining Reporting Area found in Route Option 1 and 3 from approximately Melton Mowbray Golf Club, moving west across the remainder of the route, although no Development High Risk Areas are indicated.

7.4.32 It is likely that OHL could be planned to avoid the above ground constraints, presence of worked ground and associated historical mining in the west of Link L1-1b has the potential to worsen ground condition issues at an existing pinch point. It is noted that other areas of historical mines and quarries, artificial deposits and historic landfill are present along the route, albeit to lesser extents than those outlined above for Route Option 1. There are no occurrences of active landfill sites along the route.

7.4.33 The majority of the corridor consists of flat to gentle slopes with gradients less than 5°, with a relatively small proportion of moderate slopes (5° to 15°) and a very minor percentage of steep slopes (>15°). This corridor has approximately ten potential areas where moderate to steep slopes span extensive areas and/or the entire width of the route, notably in segments L1-1a, L1-1b, 1f and 1g. Of these, a notable pinch point is present to the north of Colsterworth, and steeper slopes also appear to span the route significantly around the east of Skillington and Holwell. A greater degree of earthworks may be required and it may not be possible to construct haul roads in a direct line from tower to tower, subject to actual route alignment and tower siting.

7.4.34 Notable areas of mass movement deposits are shown in topographies to the north of Six Hill Lane in the far west of the route, northwest of Ab Kettleby Areas to the southeast of Holwell (Segment 1g). The extent of mass movement deposits in Route Option 1, 2 and 3 are comparable, and greater than those found in Route Option 4 and 5. It should be possible to avoid these mass movement deposits by considering these deposits when siting OHL towers.

7.4.35 This Route Option would cross the existing 400kV 4ZM transmission line at northern side of the new Weston Marsh substation infrastructure (Segment 1a) which would add complexity to the design similar to Route Option 1.

7.4.36 The Route Option will need to cross four 132kV OHLs (Segments 1c, L1-1a,1g), a number of pipelines are present within corridor segments1c, L1-a, L1-b and 1g, a Total Energies fuel pipeline (Link L1-1b), and an Exolum pipeline located at the start of segment 1g. In addition, an underground cable/pipeline has recently been constructed east of Ingoldsby and runs in a north-south direction across Link L1-1a.

7.4.37 This Route Option will require seven major road crossings (Type A), two railway crossings, and multiple waterbody crossings. All Route Options have similar requirements for crossing transport infrastructure, noting that Route Option 4 and 5 both require an additional railway crossing.

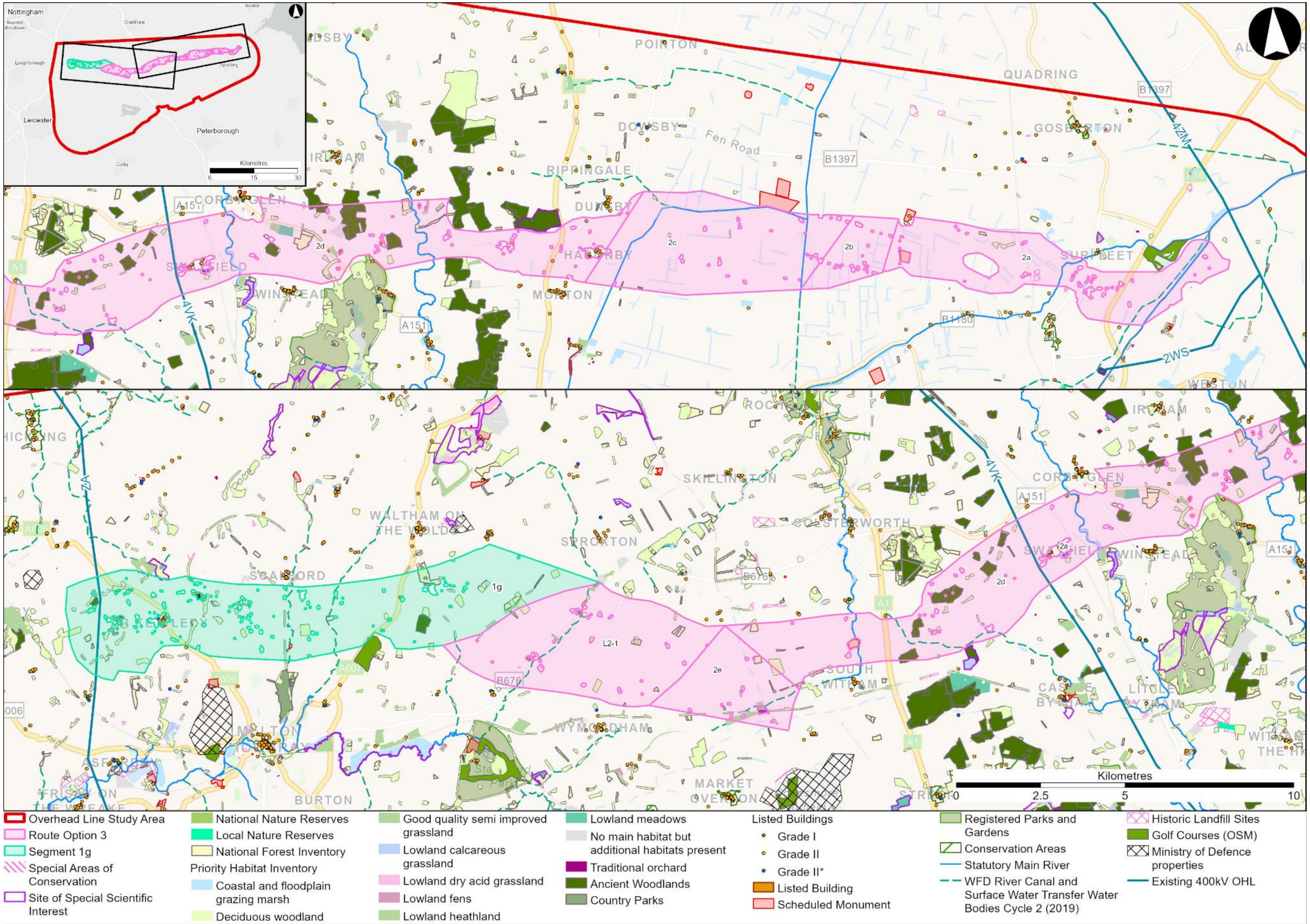
7.4.38 Similar to Route Option 1, Route Option 2 also has a notable constraint in Link L1-1b where the A1, ECML, River Witham, a fuel pipeline and the 400kV 4VK OHL route are all present which adds complexity. The corridor also narrows to the west of this area to approximately 650m where the A1 runs north to south and the B6403 forms a junction with the A1. These will constrain the corridor opportunity, as could several distribution network OHLs, therefore the resulting complexity in this area could represent a higher risk of construction complexities.

7.5 Route Option 3

Introduction

7.5.1 Route Option 3 is located south of Route Option 1 and is comprised of Segments and a Link from Preliminary Corridors 1 and 2 (Segments 2a, 2b, 2c, 2d, 2e, L2-1 and Segment 1g). Up to Segment 2e, this Route Option follows the same course as Preliminary Corridor 2 (refer to **Section 6.4**) before it proceeds through L2-1 and continues west through Segment 1g avoiding the urban area of Melton Mowbray to the south and connecting to the existing 400kV ZA OHL in WMEL-BZ1. An overview of Route Option 3 and the environmental and socio-economic constraints are shown in **Figure 7-3**.

Figure 7-3 – Route Option 3, Environmental and Socio-Economic Features



Environmental Appraisal Summary

Ecology

7.5.2 Cribbs Lodge Meadows SSSI and NNR is encompassed by Segment 2e, and the Route Option is partially in Holwell Mouth SSSI (Segment 1g), though it is anticipated that direct impacts on designated sites would be avoided by design. There are also a number of statutory and non-statutory designations outside of the corridor that have the potential to be indirectly impacted. These include The Wash Ramsar and SPA and The Wash and north Norfolk Coast SAC, Baston Fen SAC, Grimesthorpe SAC, Dunsby Wood SSSI, Swinstead Valley SSSI, and Tortoiseshell wood SSSI. There is the potential to indirectly impact the qualifying features and species of these statutory and non-statutory designations through noise and vibration, pollution of land and water and general disturbance as a result of construction works and of operation. HRA Screening would be required for the SPA and SAC designations if this option were to be taken forward, to determine if Appropriate Assessment was required.

7.5.3 Ancient woodland sites are present within Route Option 3. Ten sites are present in Segments 2d and two smaller isolated blocks in segment 1g. Broadleaved woodland priority habitats are present throughout Route Option 3, but the majority are located within Segment 2d and 2e with the largest woodland sites located in Segment 2d. Ancient woodland should be avoided in accordance with national planning policy. Not all woodland is listed in the inventory so presence of ancient woodland would be confirmed during a habitat survey. There are also several priority woodland habitats within Link L2-1, however, they are small and could be easily avoided so that there are no adverse impacts. Several other small non-designated woodlands are present but could also be avoided. There are several CFGM habitat areas within Segment 2a which should be avoided as these also likely provide wintering bird habitat associated with designated sites. Priority grassland sites will be easier to avoid as OHL can span over the top of them without notable impact unless, as above, the site supports birds associated with designated sites. Although priority habitats are scattered through the rest of the corridor, it is likely they could be avoided in other segments as there none span the entire corridor width.

7.5.4 There are seven main watercourses which flow through this option in Segments 2a, 2c and 2d. These watercourses are: the River Welland and River Glen within 2a; South forty-foot drain and Car dyke are within 2c; and East Glen River, West Glen River and River Witham are within 2d. Other rivers and streams flow through all segments but they are not marked as a main river by the Environment Agency. Ecological assessment would still apply to these watercourses.

7.5.5 Adverse impacts would include direct habitat loss, habitat fragmentation, or habitat degradation as a result of construction activities. Impacts to woodland, and also hedgerows are likely to also have adverse impacts on protected species they could support such as bats and dormice if present. Loss of arable land may also impact other protected species such as barn owl, badgers and reptiles. The eastern area of the route in Segments 2a and 2b are lower lying with many drainage ditches and streams which if impacted either directly or indirectly may result in adverse effects on aquatic species including otter and water vole. The OHL could potentially negatively impact bats and birds, including those associated with The Wash Ramsar and SPA, during the operational phase of the Project if they bisect flight lines to foraging grounds or roosting sites resulting in adverse effects.

7.5.6 All Route Options have a comparable number of internationally and nationally designated sites affecting them, with similar potential to impact qualifying features. Route Option 3 is more constrained with regard to potential impact on ancient woodland and priority woodland habitat sites (Segment 2d and 2e), which would require additional consideration through design and mitigation to avoid or reduce many of these effects.

Historic Environment

7.5.7 The likely potential effects on designated heritage assets would be in cases where the presence of pylons and OHL would alter the setting of assets, leading in an adverse impact on their significance. This would apply to the Moated site of monastic grange with adjacent earthworks at Rigbolt House (NHLE1009979) (immediately adjacent to, but outside of the corridor) and Moated site of Newhall Grange (NHLE 1009981) in Segment 2a (within Corridor), Remains of Knights Templar preceptory, watermill and fishponds (NHLE 1007688) in Segment 2d (within the Corridor), and the Grade I Grimsthorpe Castle (NHLE 1000978) which lies immediately adjacent to Segment 2d.

7.5.8 Other designated assets are present within the corridor, however these are considered unlikely to experience adverse effects as a result of changes to their settings resulting from OHL; for instance, listed buildings within towns and villages, the significance of which would not be impacted by the presence of OHL or pylons at a distance.

7.5.9 Adverse effects on buried archaeological remains could result from direct impacts; such remains are likely throughout the corridor, with the eastern fenland portion (Segments 2a, 2b, 2c) having a particular potential to contain well-preserved organic remains of very high value.

7.5.10 Mitigation would be by design; there is scope in the corridor to allow assets to be avoided at a distance where adverse effects would be minimised. However, due to the particular sensitivities of RPGs, it is less likely that adverse effects could be completely avoided for Grimsthorpe Castle RPG. There is scope to avoid some archaeological remains through design, however the principal approach to mitigation would be preservation by record (archaeological investigation and recording). This would reduce but not avoid the potential adverse effects.

7.5.11 Route Option 3 would potentially result in adverse effects on designated and non-designated heritage assets, however, the corridor provides sufficient scope to avoid or reduce many of these effects through design. There are no heritage assets within Route Option 3 that would intrinsically prevent the corridor being taken forward. The potential setting impacts to Grimsthorpe Castle RPG could require complex/costly mitigation measures.

Landscape and Visual

7.5.12 This option passes through a varied landscape, with flat open fenland to the east, transitioning to undulating farmland further west. It is located within the following National Landscape Character Areas: NCA 46: The Fens; NCA 75: Kesteven Uplands; and NCA 74: Leicestershire and Nottinghamshire Wolds.

7.5.13 There is potential for localised indirect effects on Grimsthorpe Castle RPG and Stapleford Park RPG, although the core area of the latter is likely to be largely unaffected. Adverse direct and indirect effects on landscape character are also anticipated, particularly where the landscape is open with expansive views, has a complex topography and/or increased scenic quality.

7.5.14 There is potential for a range of adverse and significant effects on residential receptors within this Route Option, particularly within Segments 2a, 2b, 2d and 1g. This is a result of the concentration of receptors in these areas and/or limited separation distance between properties.

7.5.15 The PRoW network is varied across the extent of Route Option 3. Generally, there are very limited PRoW to the east, with a higher concentration radiating from villages along the western edge of the Fens (Segment 2d), Wymondham (to the west of Segment 2e) and Waltham on the Wolds (north of Segment 1g), and throughout Segment 1g. There are several Long Distance Routes (LDR) within or in close proximity to Route Option 3, including: Macmillan Way – Route Option adjacent to short section at Pinchbeck (Segment 2a); Viking Way - Route Option crosses LDR between Sewstern and Market Overton (Segment 2e); and National Cycle Network Route 64 (Segment 1g).

7.5.16 Small areas designated as Open Greenspaces (for example, cemetery, church grounds and small recreation grounds) have been identified throughout Route Option 3. These are generally located within the settlements and include: Harconby and Swayfield (Segment 2d); Coston and Garthorpe (Link L2-1); and Ab Kettleby and Wartnaby (Segment 1g). Other notable Open Greenspaces include the following: Spalding Golf Club ─ adjacent to the northern extents of Segment 2a; Within Stapleford Hall (also a RPG) ─ located south of Link L2-1; and Melton Mowbray Golf Club ─ adjacent to the southern extents of Segment 1g.

7.5.17 Careful routeing to avoid loss of existing features, relate to the landscape pattern and making use of existing trees and topography to provide partial screening would help to reduce potential effects on landscape character. Measures to reduce potential visual effects would include, increasing the distance from receptors, avoiding positioning towers in principal views and making use of existing features to provide screening, where possible.

7.5.18 Potential effects on landscape designations are likely to be limited and localised, indicating neutral implications. The more widespread nature of potential effects on landscape character result in negative implications. Similarly, due to the number and spread of potential visual receptors, negative implications are anticipated, particularly in relation to residential receptors in Segments 2a, 2b, 2d and 1g.

Water Environment

7.5.19 Route Option 3 includes flat arable land with drainage ditches in the east and more undulating terrain in the west. Several WFD waterbodies transverse the corridor. One SSSI (Holwell Mouth) is partially within Segment 1g and another SSSI (Cribbs Lodge Meadows) within Segment 2e, and several others adjacent. The area features hydrological connections to these watercourses, with parts underlain by sensitive aquifers, including Principal and Secondary Aquifers. Several SPZs are present within the corridor, including three SPZ1s in Segment 2c. The eastern edge of the route is in Flood Zone 2 and 3 near Holbeach, with small areas in Flood Zone 2 and 3 throughout the corridor adjacent to larger waterbodies/main rivers

7.5.20 Temporary works mitigation include positioning pylons/towers away from water features, avoid watercourse crossings where possible, use non-intrusive methods, and implement temporary drainage and pollution control measures as defined by a CEMP, surface water management plans, avoiding SPZ where possible, ground water management plans, and use effective land drainage, avoid temporary storage areas within floodplains, and minimize construction compounds in these areas.

7.5.21 Operation mitigation includes implementing Environmental Management Plans with pollution prevention measures, Groundwater Management Plans, position permanent infrastructure outside high or medium flood risk areas, design foundations to preserve floodplain storage, and provide floodplain compensation if Flood Zone 3 is intersected.

7.5.22 All the Route Options carry similar levels of flood risk, and risk in terms of pollution to surface and groundwater, disruption of flow paths, and potential impacts on sensitive sites and aquifers. Route Option 3 marginally presents the lowest level of associated risks with the fewest constraints related to WFD waterbodies, SPZs, and Flood Zones compared to the other Route Options.

Socio-Economic Appraisal Summary

Economic Activity (including Planning)

7.5.23 Route Option 3 covers several villages such as Surfleet, Haconby, Corby Glen, Swinstead, Swayfield, North Witham, Garthorpe, Buckminster, and Ab Kettleby however there is sufficient flexibility in the corridor to avoid direct oversailing. Overall, Route Option 3 avoids the main industrial and business focal points and concentrations, such as city centres, industrial facilities, shopping centres, business parks, educational establishments, and healthcare facilities. This Route Option overlaps with areas that have ALC Grades 1 and 2 but this is similar to other Route Options.

7.5.24 Adopted Local Plan Policies (Segment 2d and 2e), Neighbourhood Plan Policies (Segment 2a – 2e, L2-1 and 1g), and committed developments (Segments 2d), are present along Route Option 3. However, it is anticipated that the impacts could be avoided or reduced, and therefore not a defining factor in route selection.

7.5.25 A Petroleum Exploration and Development Licence, oil pipeline crossings, and poor road conditions identified near King Street Lane (located where Segments 1g and 1f connect) are also present in this Route Option as described for Route Options 1 and 2.

7.5.26 Route Option 3 interacts with fewer NSIPs than Route Options 1 and 2, with only the proposed Grimsby to Walpole project (Segment 2a) NSIP, and WA010003 - Lincolnshire Reservoir and pipeline NSIP (Segment 2d) interacting with this Route Option.

Aviation and Defence

7.5.27 Potential aviation and defence receptors presenting a constraint interacting with Route Option 3 include: Buckminster Gliding Club (within 10km buffer for 2d, 2e, and L2-1) RAF Station Melton Mowbray (4km from Segment 1g); Kendrew Barracks – former RAF Cottesmore (Segment 2d, 2e, L2-1 and 1g); and Black Spring Farm Airstrip (within Segment 2d). As the preferred aviation exclusion areas cannot entirely be avoided in those Segments, stringent measures will need to be in place to avoid potential conflicts during the operation stage, and actions to appropriately mitigate impacts during the construction stage. All Route Options are similarly constrained by aviation and defence receptors therefore it is not a defining factor.

Traffic and Transport

7.5.28 Route Option 3 will unavoidably intersect the National Cycle Network in Segment 1g, the E2 long-distance path, and multiple PRoW. The Peterborough to Lincoln rail line crosses the Route Option with a northwest/southeast orientation near to Spalding

(Segment 2a), and the ECML railway crosses the corridor with a northwest/southeast orientation near Colsterworth (Segment 2d).

7.5.29 The Route Option is crossed by the A1 part of the SRN managed by National Highways (Segment 2d). The Route Option is crossed by the following A and B roads that are managed by the local highway authorities: A16 (Segment 2a), A15 (Segment 2d), A151 (Segment 2d), A606 (Segment 1g), A607 (Segment 1g), B1172 (Segment 2a), B1177 (Segment 2d), B1176 (Segment 2d) and B676 (Link L2-1). Although Route Option 3 has A roads present, the number available is fewer than those of Route Option 1 and 2, therefore Route Option 3 is considered less suitable for providing construction HGV access.

Engineering and System Appraisal Summary

7.5.30 Route Option 3 passes through a similar, but marginally greater, mapped extent of Peat/Alluvial Soils when compared to Route Options 4 and 5 (relative to percentage of area) and marginally lesser extents compared to Routes 1 and 2. The route does however pass through the least mapped extents of bedrock (relative to area) when compared to the other routes.

7.5.31 Route Option 3 passes through fewer artificial deposits and historical mining/quarry features along its route, however, it shares the same features located in Segments 1f and 1g of Route Option 1 and 2. The Route Option also resides within the same Coal Mining Reporting Area found in Route Option 1 and 2 from approximately Melton Mowbray Golf Club, moving west across the remainder of the route, although no Development High Risk Areas are indicated.

7.5.32 It is likely that OHL alignment could be planned to avoid many of the above occurrences. It is noted that other areas of historical mines and quarries, artificial deposits and historic landfill are present along the route, albeit to lesser extents than those outlined above. There are no occurrences of active landfill sites within the route.

7.5.33 The majority of the route consists of flat to gentle slopes with gradients less than 5°, with a relatively small proportion of moderate slopes (5° to 15°) and a very minor percentage of steep slopes (>15°). The route has approximately nine potential areas where moderate to steep slopes span extensive area and/or the entire width of the corridor, notably in Segments 2d and 1g. Of these, steeper slopes appear to span the corridor south of Corby Glen around the River Glen and around Holwell. A greater degree of earthworks may be required in these areas and it may not be possible to construct haul roads in a direct line from tower to tower, subject to actual route alignment and where towers are sited.

7.5.34 Notable areas of mass movement deposits are shown in topographies to the north of Six Hill Lane in the far west of the route, northwest of Ab Kettleby Areas to the southeast of Holwell (Segment 1g). The extent of mass movement deposits in Route Option 1, 2 and 3 are comparable, and greater than those found in Route Option 4 and 5. It should be possible to avoid these mass movement deposits by design when siting OHL towers.

7.5.35 Segment 2a leaves west from the new Weston Marsh substation Siting Zone and is not constrained by the 400kV 4ZM OHL like Route Options 1 and 2. The Route Option will need to cross four 132kV OHLs located in Segments 2d, and 1g. In addition, the Route Option will also need to cross the following pipelines:

- Segment 2b. Two National Gas transmission pipelines cross the corridor in a north-south direction and will require crossing.
- Segment 2c: A National Gas transmission pipeline is present within corridor segments 2c in a predominantly north-south direction and will require crossing. Sufficient stand-off distances are required and access limitations may occur.
- Segment 2d: Two National Gas transmission pipelines (Hatton to Peterborough) are present. A fuel pipeline operated by TotalEnergies (Killingholme-Buncefield) crossing the Segment in a north-south direction at a point east of the A1 and will require crossing.
- Segment 2e, L2-1 and 1g: An Exolum pipeline runs through these Segments, generally in a northwest to southeast direction. This pipeline will require crossing and additional complexity may occur if the OHL is proposed in parallel to this pipeline.

7.5.36 This Route Option will require six major road crossings (Type A), two railway crossings, and multiple waterbody crossings. All Route Options have similar requirements for crossing transport infrastructure, noting that Route Option 4 and 5 both require an additional railway crossing.

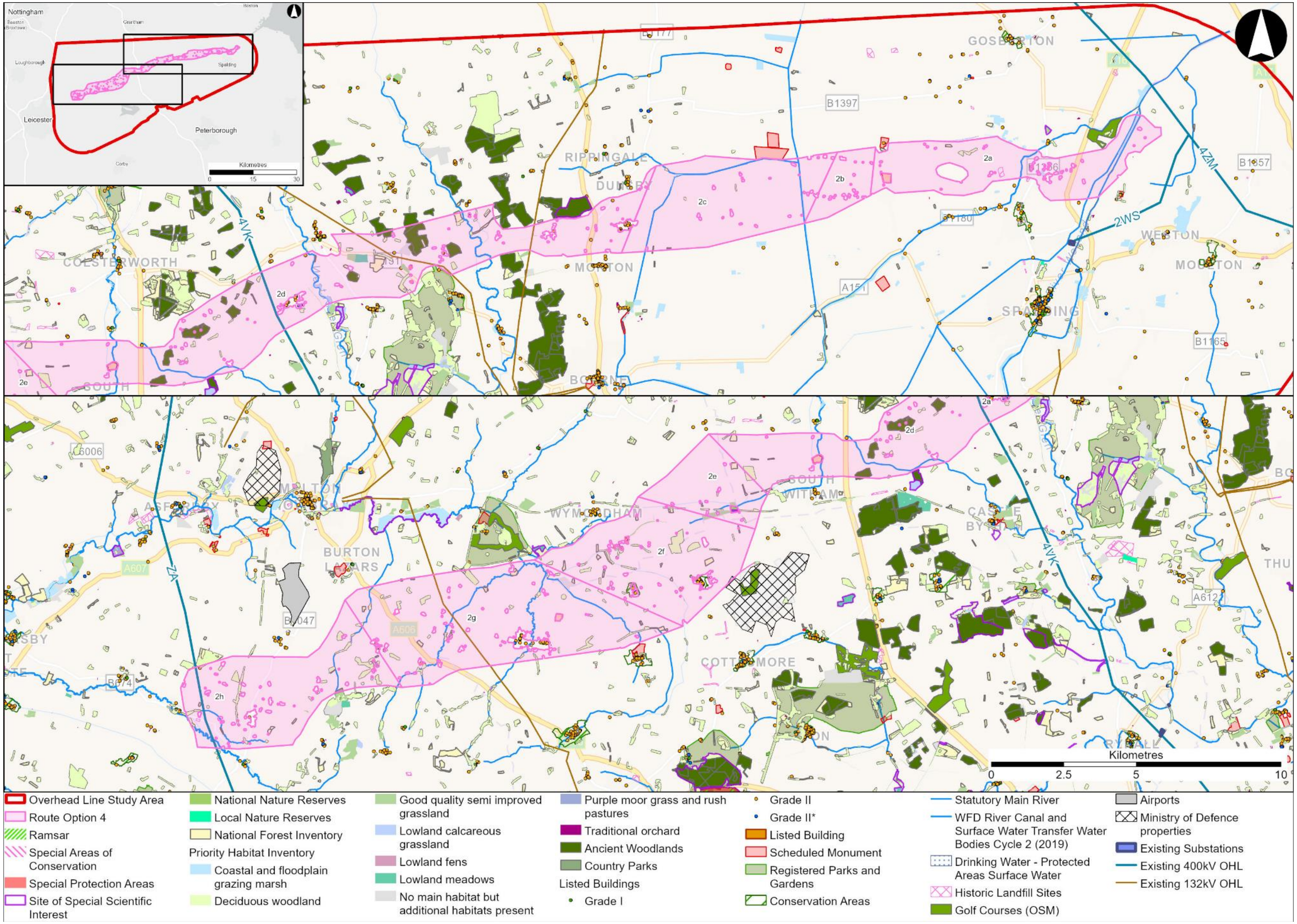
7.5.37 Other notable constrained areas include Segment 2d where the A1, ECML, River Witham, a pipeline, and the 400kV 4VK OHL route are all present, resulting in higher complexity in this area.

7.6 Route Option 4

Introduction

7.6.1 Route Option 4 is comprised entirely of the Segments from Preliminary Corridor 2 (Segments 2a, 2b, 2c, 2d, 2e, 2f, 2g, and 2h), refer to **Section 6.4** for an overview of those Segments. This Route Option is located north within the Study Area from Weston Marsh substation and continues west, Segment 2d passes south of Twyford Forest crossing the A1 between North and South Witham. Route Option 4 then travels southwest with Segments 2e and 2f avoiding Kendrew Barracks – former RAF Cottesmore to the south and then Stapeford Hall to the north. An overview of Route Option 4 and the environmental and socio-economic constraints are shown in **Figure 7-4**.

Figure 7-4 – Route Option 4, Environmental and Socio-Economic Features



Environmental Appraisal Summary

Ecology

7.6.2 Route Option 4 shares the same constraints as Route Option 3 through its east and central parts (Segments 2a to 2e), these being Cribbs Lodge Meadows SSSI and NNR encompassed by Segment 2e, though it is anticipated that direct impacts on designated sites will be avoided. There are also a number of statutory and non-statutory designations outside of the corridor that have the potential to be indirectly impacted. These include Rutland Water SPA, Ramsar, and SSSI, The Wash Ramsar and SPA and The Wash and north Norfolk Coast SAC, Baston Fen SAC, Grimesthorpe SAC, Dunsby Wood SSSI, Swinstead Valley SSSI, and Tortoiseshell wood SSSI. In addition, Wymondham Rough SSSI can be found adjacent to the boundary of Segment 2f. There is the potential to indirectly impact the qualifying features and species of these statutory and non-statutory designations through noise and vibration, pollution of land and water and general disturbance as a result of construction works and of operation. HRA Screening would be required for the SPA and SAC designations if this option were to be taken forward, to ascertain if Appropriate Assessment was required.

7.6.3 There are ancient woodland sites found in Segment 2d, however, no additional ancient woodland sites are found in Segments 2f, 2g, or 2h in the west of Route Option 4. Additional priority habitats are found throughout Segments 2f, 2g and 2h, these are mainly woodland sites. Although priority habitats are scattered through the rest of the Route Option, it is likely that they can be avoided in other segments as there are none that span the entire Route Option width.

7.6.4 There are eight main watercourses that bisect the option within Segments 2a, 2c, 2d, and 2h. These watercourses are: the River Welland and River Glen within Segment 2a; South forty-foot drain and Car dyke are within Segment 2c; East Glen River, West Glen River and River Witham are within Segment 2d; and Gaddesby Brook is within Segment 2h. Other rivers and streams flow through all Segments but they are not designated as main rivers by the Environment Agency. Ecological assessment would still apply to these watercourses if impacted.

7.6.5 Adverse impacts would include direct habitat loss, habitat fragmentation, or habitat degradation as a result of construction activities. Impacts to woodland and hedgerows are likely to also have adverse impacts on protected species that they may support such as bats and dormice if present. Loss of arable land may also impact other protected species such as barn owl, badgers and reptiles. The eastern area of the corridor in Segments 2a and 2b are lower lying with many drainage ditches and streams which if impacted either directly or indirectly may result in adverse effects on aquatic species including otter and water vole, if present. OHL have the potential to impact bats and birds, including those associated with Rutland Water SPA, Ramsar and The Wash Ramsar and SPA, during the operational phase of the Project if they bisect flight lines to foraging grounds or roosting sites resulting in adverse effects.

7.6.6 All Route Options have a comparable number of internationally and nationally designated sites affecting them, with similar potential to impact qualifying features. Route Option 4 is more constrained with regard to potential impact on ancient woodland and priority woodland habitat sites (Segment 2d and 2e), which would require additional consideration through design and mitigation to avoid or reduce many of these impacts.

Historic Environment

7.6.7 The likely potential effects on designated heritage assets would be in cases where the presence of pylons and OHL would alter the setting of assets, leading to an adverse impact on their significance. This would apply to the Moated site of monastic grange with adjacent earthworks at Rigbolt House (NHLE1009979) (immediately adjacent to, but outside of Route Option 4) and Moated site of Newhall Grange (NHLE 1009981) in Segment 2a (within corridor), Remains of Knights Templar preceptory, watermill and fishponds (NHLE 1007688) in Segment 2b, the Grade I Grimsthorpe Castle (NHLE 1000978) which lies immediately adjacent to Segment 2d, Moor Lane moated site, Whissendine (NHLE 1010698), Ashwell medieval settlement remains, watermill and gardens at Old Hall (NHLE 1017212), Moated grange (NHLE 1010307) within Segment 2g, and Grade II Stapleford Hall (NHLE 1000966) which lies immediately adjacent to Segment 2g, Burrough Iron Age hill fort (NHLE 1012441), and the Grade II* Church of St James (NHLE 1176630) in Segment 2h.

7.6.8 Other designated assets are present within the corridor, however these are considered unlikely to experience adverse effects as a result of changes to their settings resulting from OHL; for instance, listed buildings within towns and villages, the significance of which would not be impacted by the presence of OHL or pylons at a distance.

7.6.9 Adverse effects on buried archaeological remains would be as a result of direct impacts. Such remains are likely throughout the corridor, with the eastern fenland portion (Segments 2a, 2b, 2c) having a particular potential to contain well-preserved organic remains of very high value.

7.6.10 Mitigation would be by design; there is scope in the corridor to allow assets to be avoided at a distance where adverse effects would be minimised. However, due to the particular sensitivities of RPGs, it is less likely that adverse effects could be completely avoided for Grimsthorpe Castle RPG. There is scope to avoid some archaeological remains through design, however the principal approach to mitigation would be preservation by record (archaeological investigation and recording). This would reduce but not avoid the adverse effects.

7.6.11 Route Option 4 would potentially result in adverse effects on designated and non-designated heritage assets, however the corridor provides sufficient scope to avoid or reduce many of these effects through design. There are no heritage assets within Route Option 4 that would intrinsically prevent the corridor being taken forward, however potential setting impacts at Grimsthorpe Castle RPG could require complex/costly measures to minimise and manage.

Landscape and Visual

7.6.12 This option passes through a varied landscape, with flat open fenland to the east, transitioning to undulating farmland further west. It is located within the following National Landscape Character Areas: NCA 46: The Fens; NCA 75: Kesteven Uplands; NCA 74: Leicestershire and Nottinghamshire Wolds, and NCA 93: High Leicestershire.

7.6.13 There is potential for localised indirect effects on Grimsthorpe Castle RPG and Stapleford Park RPG, although the core area of the latter is likely to be largely unaffected. Adverse direct and indirect effects on landscape character are also anticipated, particularly where the landscape is open with expansive views, has a complex topography and/or increased scenic quality.

7.6.14 In addition to the residential receptors noted in Route Option 3 there is potential for a range of adverse and significant effects on residential receptors, particularly in Segment

2f – between Edmondthorpe, Teigh and Market Overton; Segment 2g – Whissendie and scattered properties to the northeast of Leesthorpe and Little Dalby; and Segment 2h – scattered properties around Thorpe Satchville limit opportunity to link to the substation zone.

7.6.15 PRoW found in the west include those around Wymondham (to the west of Segment 2e and 2f) and Market Overton. Long distance routes in this area include Jubilee Way near Little Dalby (Segment 2g and 2h); and Leicestershire Round which is adjacent between Thorpe Satchville and Burrough Hill (Segment 2h).

7.6.16 Careful routeing to avoid loss of existing features, relate to the landscape pattern and making use of existing trees and topography to provide partial screening would help to reduce potential effects on landscape character. Measures to reduce potential visual effects would include, increasing the distance from receptors, avoiding positioning towers in principal views and making use of existing features to provide screening, where possible. It will also be important to consider the relationship with other existing OHLs to minimise potential for cumulative landscape and visual effects, particularly in parts of Segments 2d through to 2h.

7.6.17 Potential effects on landscape designations, such as the Grimsthorpe Park RPG (adjacent to Segment 2d) and Stapleford Park RPG (adjacent to Segments 2f and 2g), are likely to be limited and localised, indicating neutral implications. The more widespread nature of potential effects on landscape character result in negative implications. Similarly, due to the number and spread of potential visual receptors, negative implications are anticipated, particularly in relation to residential receptors in Segments 2a, 2b, 2d and 2f to 2h.

Water Environment

7.6.18 As with the other options Route Option 4 features similar flat arable land with drainage ditches in the east and more undulating terrain in the west. Several WFD waterbodies transverse the site. There is one SSSI (Cribbs Lodge Meadows) that is located within Segment 2e, with several others adjacent. The area features hydrological connections to these watercourses, with parts underlain by sensitive aquifers, including Principal and Secondary Aquifers. Several SPZs are present within the corridor, including SPZ1s Segment 2c. The eastern edge of the route is in Flood Zone 2 and 3 near Holbeach, with small areas in Flood Zone 2 and 3 throughout the corridor adjacent to larger waterbodies/main rivers.

7.6.19 Temporary works mitigation include positioning pylons/towers away from water features, avoid watercourse crossings where possible, use non-intrusive methods, and implement temporary drainage and pollution control measures as defined by a CEMP, surface water management plans, avoiding SPZ where possible, ground water management plans, and use effective land drainage, avoid temporary storage areas within floodplains, and minimise construction compounds in these areas

7.6.20 Operation mitigation includes implementing Environmental Management Plans with pollution prevention measures, Groundwater Management Plans, position permanent infrastructure outside high or medium flood risk areas, design foundations to preserve floodplain storage, and provide floodplain compensation if Flood Zone 3 is intersected.

7.6.21 While mitigation measures could avoid or minimise many impacts, the potential for adverse impacts on groundwater, surface water and protected sites remains due to the presence of water features (including WFD water bodies), a Drinking Water Protected

Area, SPZs and Principal Aquifers along the route remains, and should be considered in design and location of infrastructure.

7.6.22 All the Route Options carry similar levels of flood risk, and risk in terms of pollution to surface and groundwater, disruption of flow paths, and potential impacts on sensitive sites and aquifers.

Socio-Economic Appraisal Summary

Economic Activity (including Planning)

7.6.23 Route Option 4 covers several villages such as Surfleet, Haconby, Corby Glen, Swinstead, Swayfield, North Witham, South Witham, Wymondham, Market Overton, Teigh, Barrow, and Twyford, however, the corridor width allows flexibility to avoid direct oversailing. Overall, Route Option 4 avoids the main industrial and business focal points and concentrations, such as city centres, industrial facilities, shopping centres, business parks, educational establishments, and healthcare facilities. However, the corridor overlaps with areas that have ALC Grades 1 and 2 similarly to other Route Options.

7.6.24 Adopted Local Plan Policies (Segment 2d and 2e), Neighbourhood Plan Policies (Segment 2g), and committed developments (Segments 2d and 2g), are present along Route Option 4. However, it is anticipated that the effects could be avoided or reduced, and therefore not a defining factor in Route Option selection. There are no Petroleum Exploration and Development Licence areas found within Route Option 4.

7.6.25 Route Option 4 interacts with fewer NSIPs compared to Route Options 1 and 2, with only the proposed Grimsby to Walpole project (Segment 2a) NSIP, and WA010003 - Lincolnshire Reservoir and pipeline NSIP (Segment 2d) interacting with this Route Option.

Aviation and Defence

7.6.26 Potential aviation and defence receptors presenting a constraint interacting with Route Option 4 include; Buckminster Gliding Club (within 10km buffer for 2d, 2e, and 2f); RAF Station Melton Mowbray (1km from Segment 2g and 2h); Kendrew Barracks – former RAF Cottesmore (adjacent to Segment 2f and within the buffer for Segment 2d, 2e, and 2g); Black Spring Farm Airstrip (1 km buffer within Segment 2d); Eye Kettleby Airstrip (within the buffer for Segment 2g and 2h); and Ranksborough Farm Airstrip (within the buffer for Segment 2g). As the aviation receptors cannot be avoided in those Segments, stringent measures will need to be in place to avoid potential conflicts during the operation stage, and actions to appropriately mitigate impacts during the construction stage. All Route Options are similarly constrained by aviation and defence receptors therefore it is not a defining factor.

Traffic and Transport

7.6.27 Route Option 4 will not intersect the National Cycle Network, however there will still be interaction with the E2 long-distance path and multiple PRoW. As with Route Options 1, 2, and 3 the Peterborough to Lincoln rail line crosses Route Option 4 with a northwest/southeast orientation near to Spalding (Segment 2a), and the ECML crosses the Route with a northwest/southeast orientation near to Colsterworth (Segment 2d). There is an additional crossing: The Melton Mowbray to Stamford rail line which crosses Route Option 4 with a northwest/southeast orientation between Oakham and Melton

Mowbray (Segments 2f and 2g). This additional rail line crossing would mean that this Route Option is less preferable compared with Route Options 1, 2, and 3.

7.6.28 The Route Option is crossed by the A1 part of the SRN managed by National Highways (Segment 2d). The Route Option is crossed by the following A and B roads that are managed by the local highway authorities: A16 (Segment 2a), A15 (Segment 2d), A151 (Segment 2d), A606 (Segment 2g), B1172 (Segment 2a), B1177 (Segment 2d), B1176 (Segment 2d) and B6047 (Segment 2h). Although Route Option 4 has A roads present, the number available is fewer than those of Route Option 1 and 2, therefore Route Option 4 is considered less suitable for providing construction HGV access.

Engineering and System Appraisal Summary

7.6.29 Overall, this Route Option 4 passes through a similar mapped extent of Peat/Alluvial Soils when compared to Route Option 5 (relative to percentage of area) and marginally lesser extents compared to Route Options 1, 2 and 3.

7.6.30 Significant areas of worked ground are found in Segment 2f around Fosse Lane, Ironstone Lane and north of Market Overton, alongside in the east and to the southeast of Market Overton Itself. Including numerous ceased points associated with quarry workings, often correlating with the areas of worked ground. These mapped features cover a smaller extent of Route Option 4 than those found in Route Options 1, 2 and 3.

7.6.31 Overall, it is likely the OHL could be aligned to avoid the above occurrences. It is noted that other areas of historical mines and quarries, artificial deposits and historic landfill are present along the route, albeit seemingly to lesser extents than those outlined above. There are no occurrences of active landfill sites or Coal Mining Reporting Areas or Development High Risk Areas along this route.

7.6.32 The majority of the route consists of flat to gentle slopes with gradients less than 5°, with a relatively small proportion of moderate slopes (5° to 15°) and a very minor percentage of steep slopes (>15°). This route has approximately six potential areas where moderate to steep slopes span extensive areas and/or the entire width of the corridor, notably in Segments 2d, 2g and 2h. Of these, a relatively extensive area of moderate to locally steep slopes is present across a notable part of the west of the route, potentially creating pinch points. Steeper slopes appear to span the corridor south of Corby Glen around the River Glen. A greater degree of earthworks may be required in these areas and it may not be possible to construct haul roads in a direct line from OHL tower to tower, subject to alignment and tower siting.

7.6.33 Areas of mass movement deposits are shown encroaching marginally in the west associated with topographies around Burrough Hill Country Park (Segment 1h). The extent of mass movement deposits in Route Option 4, and 5 are comparable, and fewer than those found in Route Option 1, 2 and 3. It should be possible to avoid these mass movement deposits by OHL design and tower siting.

7.6.34 Segment 2a leaves west from the new Weston Marsh substation Siting Zone and is not constrained by the 400kV 4ZM transmission line like Route Options 1 and 2. The Route Option will need to cross three 132kV OHLs located in Segments 2d, and 2g. In addition, the Route Option will also need to cross the following pipelines:

- Segment 2b. Two National Gas transmission pipelines cross the corridor in a north-south direction and will require crossing.

- Segment 2c: A National Gas transmission pipeline is present within corridor segments 2c in a predominantly north-south direction and will require crossing. Sufficient stand-off distances are required and access limitations may occur.
- Segment 2d: Two National Gas transmission pipelines (Hatton to Peterborough) are present. A fuel pipeline operated by TotalEnergies (Killingholme-Buncefield) crossing the segment in a north-south direction at a point east of the A1 and will require crossing.
- Segment 2e. An Exolum pipeline runs through this Segment, generally in northwest to southeast direction. This pipeline will require crossing and additional complexity may occur if the OHL is required in parallel to this pipeline.

7.6.35 This Route Option will require five major road crossings (Type A), three railway crossings, and multiple waterbody crossings. All Route Options have similar requirements for crossing transport infrastructure, noting that this Route Option requires an additional railway crossing compared to Route Options 1, 2 and 3.

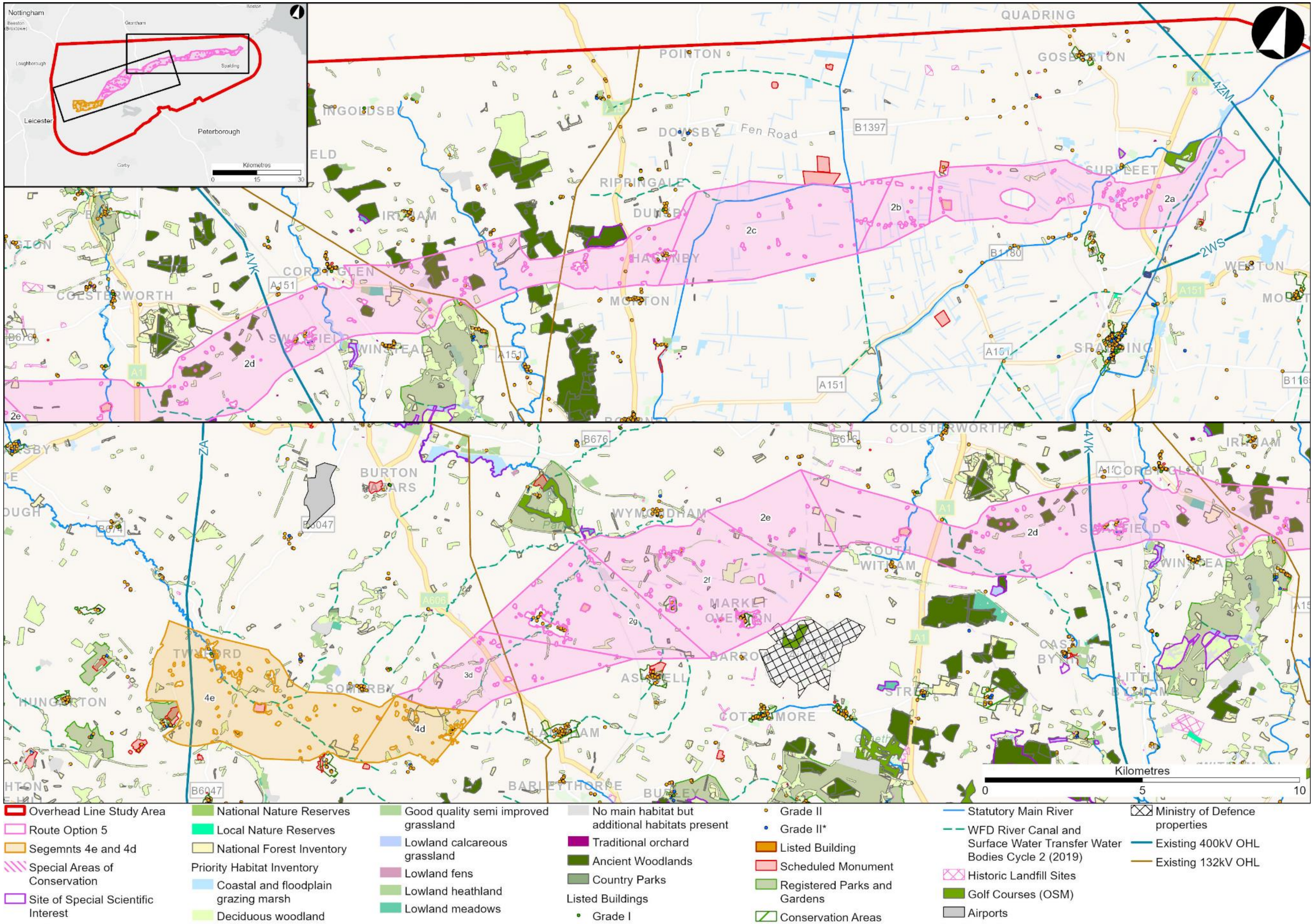
7.6.36 Similar to Route Options 3 and 5, the A1, ECML, River Witham, a pipeline, and the 400kV 4VK OHL are all present in Segment 2d, increasing the complexity and risk in this area.

7.7 Route Option 5

Introduction

7.7.1 Route Option 5 is comprised of Segments from Preliminary Corridor 2 (Segments 2a, 2b, 2c, 2d, 2e, 2f, and part of 2g), part of Segment 3d and Segments 4d and 4e. This Route Option follows the same course as Preliminary Corridor 2 (refer to **Section 6.4**) up until it cuts south at Segment 2g, crosses part of 3d and then follows Segment 4d and 4e to connect to the existing ZA OHL in the southern half of WMEL-BZ2. An overview of Route Option 5 and the environmental and socio-economic constraints are shown in **Figure 7-5**.

Figure 7-5 ─ Route Option 5, Environmental and Socio-Economic Features



Environmental Appraisal Summary

Ecology

7.7.2 Route Option 5 shares the same constraints as Route Option 3 and 4 through its east and central parts (Segments 2a to 2f) these being Cribbs Lodge Meadows SSSI and NNR encompassed by Segment 2e, though it is anticipated that direct impacts on designated sites would be avoided by design. There are also a number of statutory and non-statutory designations outside of the corridor that have the potential to be indirectly impacted. These include Rutland Water SPA, Ramsar, SSSI, The Wash Ramsar and SPA and The Wash and north Norfolk Coast SAC, Baston Fen SAC, Grimesthorpe SAC, Dunsby Wood SSSI, Swinstead Valley SSSI, Tortoiseshell Wood SSSI, and Wymondham Rough SSSI. There is the potential to indirectly impact the qualifying features and species of these statutory and non-statutory designations through noise and vibration, pollution of land and water and general disturbance as a result of construction works and of operation. HRA Screening would be required for the SPA and SAC designations if this option were to be taken forward, to ascertain of Appropriate Assessment would be required.

7.7.3 Route Option 5 has no additional ancient woodland sites in Segments 3d, 4d, or 4e, however, additional priority habitats (predominately woodland sites) are found throughout these Segments. Although priority habitats are scattered through the rest of the Route Option, it is likely they could be avoided as there are none that span the entire corridor width.

7.7.4 There are eight main watercourses within this option in Segments 2a, 2c, 2d, and 4e. These watercourses are: the River Welland and River Glen are within Segment 2a; South forty-foot drain and Car dyke are within Segment 2c; East Glen River, West Glen River and River Witham are within Segment 2d; and Gaddesby Brook is within Segment 4e. Other rivers and streams flow through all Segments but they are not designated as main rivers by the Environment Agency. Ecological assessment would still apply to these watercourses if impacted.

7.7.5 Adverse impacts would include direct habitat loss, habitat fragmentation, or habitat degradation as a result of construction activities. Impacts to woodland and hedgerows are likely to also have adverse impacts on protected species they could support such as bats and dormice if present. Loss of arable land may also impact other protected species such as barn owl, badgers and reptiles. The eastern area of the option in Segments 2a and 2b are lower lying with many drainage ditches and streams which if impacted either directly or indirectly may result in adverse impacts on aquatic species including otter and water vole, if present. OHL have the potential to impact bats and birds, including those associated with Rutland Water SPA, Ramsar, and The Wash Ramsar and SPA, during the operational phase of the Project if they bisect flight lines to foraging grounds or roosting sites resulting in adverse effects.

7.7.6 All Route Options have a comparable number of internationally and nationally designated sites affecting them, with similar potential to impact qualifying features. Route Option 5 is more constrained with regard to potential impact on ancient woodland and priority woodland habitat sites (Segment 2d and 2e), which would require additional consideration through design and mitigation to avoid or reduce these effects.

Historic Environment

7.7.7 The likely potential effects on designated heritage assets would be in cases where the presence of pylons and OHL would alter the setting of assets, leading to an adverse impact on their significance. This would apply to the Moated site of monastic grange with adjacent earthworks at Rigbolt House (NHLE1009979) (immediately adjacent to, but outside of the corridor) and Moated site of Newhall Grange (NHLE 1009981) in Segment 2a (within Corridor), Remains of Knights Templar preceptory, watermill and fishponds (NHLE 1007688) in Segment 2d (within the corridor), the Grade I Grimsthorpe Castle (NHLE 1000978) which lies immediately adjacent to Segment 2d, Moated grange and enclosure at Owston (NHLE 1010305) in Segment 4d adjacent to the corridor), Owston Augustinian Abbey with six fishponds, a gatehouse and boundary (NHLE1008556), North Marefield deserted medieval village and moated site (NHLE 1010306), Lowesby deserted medieval village with three fishponds (NHLE 1012438) and the GII RPG Lowesby Hall in Segment 4e (all adjacent to the corridor).

7.7.8 Other designated assets are present within the corridor, however these are considered unlikely to experience adverse effects as a result of changes to their settings resulting from OHL; for instance, listed buildings within towns and villages, the significance of which would not be impacted by the presence of OHL or pylons at a distance.

7.7.9 Adverse effects of buried archaeological remains would be as a result of direct impacts. Such remains are likely throughout the corridor, with the eastern fenland portion (Segments 2a, 2b, 2c) having a particular potential to contain well-preserved organic remains of very high value.

7.7.10 Mitigation would be by design; there is scope in the corridor to allow assets to be avoided at a distance where adverse effects would be minimised. However, due to the particular sensitivities of RPGs, it is less likely that adverse effects could be completely avoided for Grimsthorpe Castle, Burley on the Hill and Lowesby Hall. There is scope to avoid some archaeological remains through design, however the principal approach to mitigation would be preservation by record (archaeological investigation and recording). This would reduce but not remove the adverse effect.

7.7.11 Route Option 5 would potentially result in adverse effects on designated and non-designated heritage assets; however the corridor provides sufficient scope to avoid or reduce many of these effects through design. There are no heritage assets within Route Option 5 that would intrinsically prevent the corridor being taken forward, however potential setting impacts at of Grimsthorpe Castle RPG could require complex/costly measures to minimise and manage impacts.

Landscape and Visual

7.7.12 This option passes through a varied landscape, with flat open fenland to the east, transitioning to undulating farmland further west. It is located within the following National Landscape Character Areas: NCA 46: The Fens; NCA 75: Kesteven Uplands; NCA 74: Leicestershire and Nottinghamshire Wolds, and NCA 93: High Leicestershire.

7.7.13 In addition to the RPGs highlighted in Route Option 4, there is potential for localised indirect effects on Lowesby Hall RPG. Adverse direct and indirect effects on landscape character are also anticipated, particularly where the landscape is open with expansive views, has a complex topography and/ or increased scenic quality.

7.7.14 Additional residential receptors potentially affected by Route Option 5 include Twyford, John O'Guant and Borough on The Hill (Segment 4d). This is a result of the concentration of receptors in these areas and/or limited separation distance between properties.

7.7.15 Segment 4e intersects the Leicestershire Round long-distance route, and PRoW can be found radiating from the settlement of Burrough on the Hill, south of the Segment.

7.7.16 Careful routeing to avoid loss of existing features in relation to the landscape pattern and the use of existing trees and topography to provide partial screening would help to reduce potential effects to landscape character. Measures to further reduce potential visual effects would include increasing the routing distance from receptors and avoiding positioning towers within principal views. It will also be important to consider the relationship with other existing OHLs to minimise potential for cumulative landscape and visual effects, particularly in parts of Segments 2d to 2g, 3d and 4e.

7.7.17 Potential effects on landscape designations are likely to be largely limited and localised, indicating neutral implications, although with potential for negative implications on Lowesby Hall RPG. The more widespread nature of potential effects on landscape character result in negative implications. Similarly, due to the number and spread of potential visual receptors, negative implications are anticipated, particularly in relation to residential receptors in Segments 2a, 2b, 2d, 2f, 2g and 4e.

Water Environment

7.7.18 Route Option 5 features flat arable land with drainage ditches in the east and more undulating terrain in the west. Several WFD Waterbodies transverse the site. The area features hydrological connections to these watercourses, with parts underlain by sensitive aquifers, including Principal and Secondary Aquifers. There is one SSSI (Cribbs Lodge Meadows) that is located within Segment 2e, with several others adjacent. Several SPZs are present within the corridor, including SPZ1 in Segment 2c. The eastern edge of the route is in Flood Zone 2 and 3 near Holbeach, with small areas in Flood Zone 2 and 3 throughout the corridor adjacent to larger waterbodies/main rivers.

7.7.19 Temporary works mitigation include positioning pylons/towers away from water features, avoid watercourse crossings where possible, use non-intrusive methods, and implement temporary drainage and pollution control measures as defined by a CEMP, surface water management plans, avoiding SPZ where possible, ground water management plans, and use effective land drainage, avoid temporary storage areas within floodplains, and minimise construction compounds in these areas.

7.7.20 Operation mitigation includes implementing Environmental Management Plans with pollution prevention measures, Groundwater Management Plans, position permanent infrastructure outside high or medium flood risk areas, design foundations to preserve floodplain storage, and provide floodplain compensation if Flood Zone 3 is intersected.

7.7.21 While mitigation measures could avoid or minimise many impacts, the potential for adverse impacts on groundwater, surface water and protected sites remains due to the presence of water features (including WFD waterbodies), SPZs and Principal Aquifers along the route, and should be considered in the design and location of infrastructure

7.7.22 All the Route Options carry similar levels of flood risk, and risk in terms of pollution to surface and groundwater, disruption of flow paths, and potential impacts on sensitive aquifers.

Socio-Economic Appraisal Summary

Economic Activity (including Planning)

7.7.23 Route Option 5 covers several villages such as Surfleet, Haconby, Corby Glen, Swinstead, Swayfield, North Witham, South Witham, Wymondham, Market Overton, Teigh, Knossington, Oswton, Marefield, and Twyford, however, there is flexibility in the corridor width to avoid direct oversailing. Overall, Route Option 5 avoids the main industrial and business focal points and concentrations, such as city centres, industrial facilities, shopping centres, business parks, educational establishments, and healthcare facilities. However, the Route Option overlaps with areas that have ALC Grades 1 and 2, similar to other Route Options.

7.7.24 Adopted Local Plan Policies (Segment 2d and 2e), Neighbourhood Plan Policies (Segments 2g, 3d, 4d and 4e), and committed developments (Segments 2d, 2g, 3d, 4d, and 4e), are present along Route Option 5. However, it is anticipated that the effects could be avoided or reduced, and therefore not a defining factor in the appraisal of the option. There are no Petroleum Exploration and Development Licence areas found within Route Option 5.

7.7.25 Option 5 interacts with fewer NSIPs than Options 1 and 2, with only the proposed Grimsby to Walpole (Segment 2a) NSIP, and Lincolnshire Reservoir and pipeline NSIP (Segment 2d) interacting with this Route Option.

Aviation and Defence

7.7.26 Potential aviation and defence receptors presenting a constraint interacting with Route Option 5 include Buckminster Gliding Club (within 10km buffer for 2d, 2e, and 2f) RAF Station Melton Mowbray (1km from Segment 2g and 2h); Kendrew Barracks – former RAF Cottesmore (adjacent to Segment 2f and within the buffer for Segment 2d, 2e, and 2g); Black Spring Farm Airstrip (within Segment 2d); Ranksborough Farm Airstrip (within the buffer for Segment 3d and 4d); and Leicester Airport (within 10km buffer of Segment 4e). As the preferred aviation exclusion areas cannot be entirely avoided in those Segments, stringent measures will need to be in place to avoid potential conflicts during the operation stage, and actions to appropriately mitigate impacts during the construction stage. All Route Options are similarly constrained by aviation and defence receptors therefore it is not a differentiating factor.

Traffic and Transport

7.7.27 Route Option 5 would not intersect the National Cycle Network, however there would still be interaction with the E2 long-distance path and multiple PRoW. As with Route Options 1, 2, and 3 the Peterborough to Lincoln rail line crosses Route Option 4 with a northwest/southeast orientation near to Spalding (Segment 2a), and the ECML crosses the Route with a northwest/southeast orientation near to Colsterworth (Segment 2d). There is an additional crossing, the Melton Mowbray to Stamford rail line which crosses Route Option 5 with a northwest/southeast orientation between Oakham and Melton Mowbray (Segments 2f, 2g and 3d). This additional rail line crossing would mean that this Route Option is less preferable compared with Route Options 1, 2, and 3.

7.7.28 The Route Option is crossed by the A1 which is part of the SRN managed by National Highways (Segment 2d). The Route Option is crossed by the following A and B roads that are managed by the local highway authorities: A16 (Segment 2a), A15 (Segment 2d), A151 (Segment 2d), A606 (Segment 2f), B1172 (Segment 2a), B1177 (Segment

2d), B1176 (Segment 2d) and B6047 (Segment 4e). Although Route Option 5 has A roads present, the number available is fewer than those of Route Option 1 and 2, therefore, Route Option 5 is considered less suitable for providing construction HGV access.

Engineering and System Appraisal Summary

7.7.29 Overall, Route Option 5 passes through a similar mapped extent of Peat/Alluvial soils when compared to the Route 4 (relative to percentage of area) and marginally less extents compared to Routes 1 , 2 and 3. The route passes through a marginally less mapped extent of bedrock (relative to area) than Route Options 1 and 4, and a greater mapped extent of bedrock (relative to area) when compared to Route Option 2 (only marginally) and Route 3 (greater difference).

7.7.30 Notable areas of worked ground are found in Segment 2f around Fosse Lane, Ironstone Lane and north of Market Overton, to the east and to the southeast of Market Overton itself. This also includes numerous ceased points associated with quarry workings, often correlating with the areas of worked ground. These mapped features cover a smaller extent of Route Option 5 than the those found in Route Option 1, 2 and 3.

7.7.31 Overall, it is likely that OHL could be aligned to avoid the above occurrences. It is noted that other areas of historical mines and quarries, artificial deposits and historic landfill are present along the route, albeit to lesser extents than those outlined above. There are no occurrences of active landfill sites or Coal Mining Reporting Areas or Development High Risk Areas within the route.

7.7.32 The majority of the route consists of flat to gentle slopes with gradients less than 5°, with a relatively small proportion (albeit marginally greater relative to other routes) of moderate slopes (5° to 15°) and a very minor percentage of steep slopes (>15°). This route has approximately five potential areas where moderate to steep slopes span extensive areas and/or the entire width of the corridor in Segments 2d, and extensively across most of 4d and 4e. Pinch points are considered likely across 4d and 4e. A greater degree of earthworks is likely required in these areas, and it may not be possible to construct haul roads in a direct line from OHL tower to tower, subject to alignment and tower siting.

7.7.33 Segment 2a leaves west from the new Weston Marsh substation Siting Zone and is not constrained by the 400kV 4ZM transmission line in the same way as Route Options 1 and 2. The Route Option will need to cross three 132kV OHLs located in Segments 2d, 2f, 3d and 4d. In addition, the Route Option will also need to cross the following pipelines:

- Segment 2b. Two National Gas transmission pipelines cross the Segment a north-south direction and will require crossing.
- Segment 2c: A National Gas transmission pipeline is present within corridor Segment 2c in a predominantly north-south direction and will require crossing. Sufficient stand-off distances are required, and access limitations may occur.
- Segment 2d: Two National Gas transmission pipelines (Hatton to Peterborough) are present. A fuel pipeline operated by TotalEnergies (Killingholme-Buncefield) crossing the Segment in a north-south direction at a point east of the A1 and will require crossing.

- Segment 2e: An Exolum pipeline runs through this Segment, generally in northwest to southeast direction. This pipeline will require crossing and additional complexity may occur if the OHL is required in parallel to this pipeline.

7.7.34 Route Option 5 would require five major road crossings (Type A), three railway crossings, and multiple waterbody crossings. All Route Options have similar requirements for crossing transport infrastructure, noting that this Route Option requires an additional railway crossing compared to Route Options 1, 2 and 3.

7.7.35 The A1, ECML, River Witham, a pipeline, and the 400kV 4VK OHL are all present in Segment 2d, resulting in higher complexity and risk in this area.

7.8 Route Option Appraisal Conclusion

Ecology

7.8.1 All Route Options have a similar number of constraints associated with internationally and nationally designated sites and their qualifying features, their potential impact on habitats and protected species. The defining feature between the Route Options is the presence of ancient woodland sites, most notably found within Segments L1-1a, L1-1b and 2d. As Route Option 1 has the least amount of ancient woodland present, from an ecological perspective it would be the preferred Route Option.

Historic Environment

7.8.2 All Route Options would potentially result in adverse effects on designated and non-designated heritage assets. However, there are no heritage assets that would intrinsically prevent any Route Option from being taken forward as all Route Options allow sufficient scope to avoid or reduce many of these effects through design. Route Options 3, 4 or 5 could require complex and/or costly measures to minimise and manage potential setting impacts at Grimsthorpe Castle RPG.

Landscape and Visual

7.8.3 Route Option 3 would be slightly preferable with regard to landscape character and visual amenity, followed by Route Options 1, 2, and 4. Each of the options has the potential to result in adverse effects on one or more designated landscapes (RPG), although careful routeing could ensure these are limited and localised in nature. Route Option 5 is considered to be the least preferable as it has a greater potential to cause adverse effects, notably to Lowesby Hall RPG, and a greater quantity of residential and recreational receptors (Segments 2a, 2b, 2d, 2f, 2g and 4e).

7.8.4 With regards to landscape character, the eastern parts of each Route Option cross the fens, with potential for OHL towers to be relatively conspicuous due to the flat and open nature of this landscape. Route Options 3 to 5 (Segments 2a and 2b) potentially offer slightly greater opportunities for a simple alignment which relates to the existing linear pattern and grain of the landscape. A more complex alignment is likely to be required in the east of Route Options 1 and 2 due largely to the pattern of scattered settlement. The topography and landscape character in the west of each option tends to be more complex than that of the east, adding to the scenic quality and presenting greater challenges and also some opportunities for careful routeing. This is particularly the case for Route Option 5, where greater undulations in topography adds to the complexity of achieving a successful alignment.

7.8.5 Each Route Option presents challenges and risks related to visual amenity, particularly associated with views from settlement and/or scattered residential properties. The settlement pattern within the eastern part of each Route Option limits alignment options and increases the potential for adverse effects. Pinch points between settlements and/or individual properties exist along each of the options, with Route Option 3 marginally more favourable with potential for adverse effects to be slightly more limited.

7.8.6 Overall, the nature and extent of potential adverse effects is likely to be broadly similar across the options, with Route Option 3 providing slightly greater opportunities to achieve a successful alignment.

Water Environment

7.8.7 All the Route Options carry similar levels of risk in terms of pollution to surface and groundwater, disruption of flow paths, Flood Zones 2 and 3, and potential impacts on sensitive aquifers. Route Option 1 has a Drinking Water Protection Area within Segment 1e which makes it marginally less preferable than the other options. While none of the remaining options stands out as notably better than the others, Route Option 3 would be marginally preferable as it presents slightly lower levels of risks associated with the water environment.

Economic Activity (including Planning)

7.8.8 Route Options 2, 3, 4, or 5 would be preferable with regard to economic activity due to the options having the lowest number of material constraints. The constraints associated with all Route Options can likely be mitigated and managed through careful design and engagement however Route Options 3, 4, or 5 would be marginally preferable with regard to economic activity due to the options having the lowest number of material constraints.

7.8.9 Route Option 2 has been identified as the preferred option, followed by Route Option 1. Route Options 3, 4 and 5 would entail additional challenges when routeing and siting due to interaction with Local Plan Policies, NSIPs, or committed developments. In particular, Route Options 3, 4 and 5 interact with four minerals and waste policy areas (M11 and M12), compared to Route Options 1 and 2 that interact with only two minerals and waste policy areas.

Aviation and Defence

7.8.10 Aviation and defence receptors potentially constrain all Route Options. However, Buckminster Gliding Club - located at the former RAF Saltby (Segments 1e and 1f) is the only receptor indicating active use. The receptor in Segment 1c is a decoy airfield; both Kendrew Barracks - Former RAF Cottesmore (Segment 2d, 2e and 2f) and Former RAF Melton Mowbray (Segment 2g and 2h) no longer have active runways; and Black Spring Farm Airstrip (Segment 2d) is unlicenced. Given the activity at Buckminster Gliding Club Route Options 3, 4, and 5 would be preferable due to the greater distance from the club reducing the likelihood of mitigation being required.

Traffic and Transport

7.8.11 Given that there is a larger number of A roads in Route Options 1 and 2, and this class of road is most suitable for providing construction HGV access, Route Options 1 and 2 would be preferable in regard to traffic and transport. In addition, Route Options 1, 2 and 3 cross fewer rail lines therefore requiring less assessment and engagement.

Engineering and System

7.8.12 A review of the geological constraints highlights that Route Options 1, 4 and 5 are marginally preferable over Route Options 2 and 3.

7.8.13 Route Options 1, 2, and 3 all share artificial deposits/historical mining features predominantly found in Segments 1f and 1g. Segment 1g also contains a Coal Mining Reporting Area. Route Options 4 and 5 also have these features in Segment 2f, but to a lesser extent. Route Option 2 has additional artificial deposits/historical mining features found in L1-1b adjacent to the and ECML crossing adding further complexity to an existing pinch point. Great Ponton Quarry adjacent to the A1 and ECML crossing along Route Option 1 further restricts an existing pinch point. Overall, it is possible that the OHL could be aligned to avoid these constraints. As such, only Route Option 2 is marginally less preferable to the other Route Options.

7.8.14 Mass movement deposits are found in all Route Options, most notably in the northwest end of Segment 1g and adjacent/on the boundary of Segment 2h. However, it may be possible that the OHL could be aligned in such a way to avoid these constraints. All Route Options have similar topographical constraints, with the exception of Route Option 5, which is least preferred due to sloping ground in Segment 4e which would increase earthworks complexity and costs.

7.8.15 Overall, from a geotechnical perspective Route Option 4 is marginally preferable to Route Options 1 and 3, followed by Route Option 2 and finally Route Option 5. Options 1 to 4 are all preferable to Route Option 5.

7.8.16 All Route Options interact with the existing 4VK and ZA OHLs and a comparable number of 132kV OHL. However, Segment 1a of Route Options 1 and 2 is additionally constrained by the existing 400kV 4ZM OHL which runs through the area. Residential receptors are present throughout, with a noticeable pinch point present due to residential properties in the middle of Segment 2a north of Crossgate.

7.8.17 Preference for Route Option 1 is potentially reduced by the proposed Temple Oaks Renewable Energy Park located within corridor Segment 1d. The proposed Energy Park crosses the entire width of the corridor and would require oversailing if constructed, therefore additional and larger pylons could be required to ensure satisfactory clearances for operation and maintenance of the Energy Park.

7.8.18 All Route Options require crossing a similar number of major roads, railways and waterbodies, with noticeable pinch points on all Route Options where they intersect with the A1, the ECML rail line, and the 4VK OHL. Route Options 4 and 5 also have an additional rail line crossing which make them less preferable.

7.9 Next Step – Emerging preferred Corridor, Siting Zones, Siting Areas developing the graduated swathe (Step 8)

7.9.1 Overall, this chapter has considered the relative preference for each of the key environmental, social and technical aspects of the appraisal and confirmed that all Route Option offer feasible solutions. Where Route Options would require careful routeing and/or mitigation to reduce any potential impacts to the identified receptors and risks to delivery, these have been identified for further comparative analysis. **Chapter 9** goes on to consider how the factors presented in this chapter, and costs presented in **Chapter 8**, have influenced the decision-making process in determining the emerging preferred Route Option.

8. Cost and Programme

8.1 Introduction

8.1.1 Section 9 of the Electricity Act requires NGET to '*develop and maintain an efficient, co-ordinated and economical system of electricity distribution*' therefore due regard should be given to the potential cost associated with different options for each Project component, as well as the environmental, socio-economic and technical consideration described in this report so far.

8.1.2 In line with the methodology identified in **Chapter 5**, following the appraisal of the refined corridors, cost estimates were developed. Cost and programme estimates are high-level, relative, and confidential at this stage, as they are based on simple indicative OHL distances, which will ultimately change as the detailed design is developed during further stages of the Project. The cost estimates are subject to further design and survey work and are also highly influenced by market forces such as resource availability and external market rates.

8.2 Costing

8.2.1 A simple cost estimate to determine the relative costs associated with a potential OHL between the new Weston Marsh substation infrastructure and the WMEL-B substations has been undertaken. The estimated route lengths have been costed using the NGET cost tool based on historic project outturn data in line with the cost per km provided in the SOR.

8.2.2 **Table 8-1** outlines the indicative cost of the relevant proposed technology. It is assumed that an OHL solution is required with no undergrounding identified as required for any option at this stage.

8.2.3 Technical appraisal of routeing through these locations yielded estimates of between 57 and 63km OHL. Pylon type and conductor configuration to define a unit cost per kilometre of OHL are assumed to be standard lattice pylon as described in **Chapter 2** of this report.

8.2.4 The Route Options described and appraised in **Chapter 7** which could form end-to-end solutions between the new Weston Marsh substation infrastructure and WMEL-B substations, are considered in this section. Recognising that there is potential variance in the specific alignment through a Route Option corridor, for the purposes of developing cost estimates, an assumption was made for each of the Route Option corridors that the alignment would follow the most technically feasible path, whilst considering key routeing constraints and professional expertise pertaining to OHL design.

8.2.5 The cost estimates do not include capital costs associated with the new substations or any connection works. It is considered that all routes would require similar modifications at substations and as such have not been included in the below comparative figures, which are therefore not representative of total Project costs, but do provide a comparative estimate to inform option appraisal.

8.2.6 Secondary costs arising as a result of significant environmental or engineering constraints (which would require a major localised adjustment to the transmission technology selected) have not been included. The notable engineering constraints identified within the Study Area, such as the A1, the ECML railway, watercourses and other transmission and distribution infrastructure, generally run north-south. With the proposed new OHL running approximately east to west, each option encounters similar challenges such as requirements for localised underground cabling including trenchless crossings, associated transitional equipment, line swap overs, duck-unders or existing overhead transmission line reconfigurations. Although there may be some differences in the exact number and type of challenges across the Route Options, they are unlikely to be a key differentiating factors in comparative costs and have therefore not been included in this high-level option appraisal at this early stage.

8.2.7 The length of the existing ZA OHL that would be subject to reconductoring as part of this Project will vary between options based on the final location of the WMEL-B substation. However, it is part of an overall requirement to upgrade a larger part of the existing ZA OHL; therefore, the overall cost for implementing the whole length of reconductoring does not change as result of it being partially delivered by different projects. The cost of the reconductoring potentially allocated to this Project has therefore not been considered in this appraisal as it is not a key differentiating factor in overall cost.

Table 8-1 ─ Indicative Cost of Technology

Technology		Indicative Costs	
OHL	AC Underground Cable (AC Cable)	OHL	AC Underground Cable (AC Cable)
No. of conductor sets "bundles" on each arm/circuit of a pylon	No. of cables per phase	Cost for a two circuit pylon route	Cost for a two-circuit AC cable route
3 conductors per phase (9 conductors per circuit)	3 cables per phase (9 cables per circuit)	£3.98m/km	£39.89m/km

8.3 Indicative Results

8.3.1 The cost estimates associated with potential Route Option for OHLs between the new Weston Marsh substation infrastructure and the WMEL-B substation based on route lengths and the NGET cost factors as based on historic project outturn data are provided in **Table 8-2**. There are currently no notable lengths of underground cables required in any of the Route Options which could result in notable cost implications, therefore, undergrounding is not considered further.

Table 8-2 ─ Indicative Cost Summary

Route Option	Indicative Route Length (km)	Indicative Cost (£m)
1	63	£251

2	60	£239
3	57	£227
4	58	£231
5	60	£239

8.3.2 As shown in **Table 8-2**, the indicative costs range from £227m to £251m, based solely on OHL length, with the lowest indicative cost being for Route Option 3 whilst the highest indicative cost is for Option 1.

8.4 Programme

8.4.1 The current expected in service date for each Route Option is 2034, therefore construction programme is not a key differentiator at this stage.

8.5 Conclusion

8.5.1 Five end-to-end-connection Route Options were appraised on cost alongside and following the technical and environmental appraisals as part of the decision-making process. This was based solely on approximate length of new OHL required for each option and NGET cost factors per kilometre for new OHL.

8.5.2 The costs considered ranged from £227m to £251m, with Route Option 3 presenting the lowest indicative costs as the shortest potential alignment between the Weston Marsh substation infrastructure (to be delivered by the Grimsby to Walpole Project) and the potential substation Siting Areas for the WMEL-B substation (as part of this Project) in Siting Zones at the western end of the corridors selected as preferred during the appraisal process.

9. Option Selection

9.1 Introduction

9.1.1 Following the Options Appraisal phases (presented in **Chapter 6 and 7**), the appraisal findings for the Route Options, their individual Segments, and the substation Siting Zones and Areas were reviewed by the Project Team considering environmental and socio-economic aspects, as well as technical aspects, and cost (presented in **Chapter 8**).

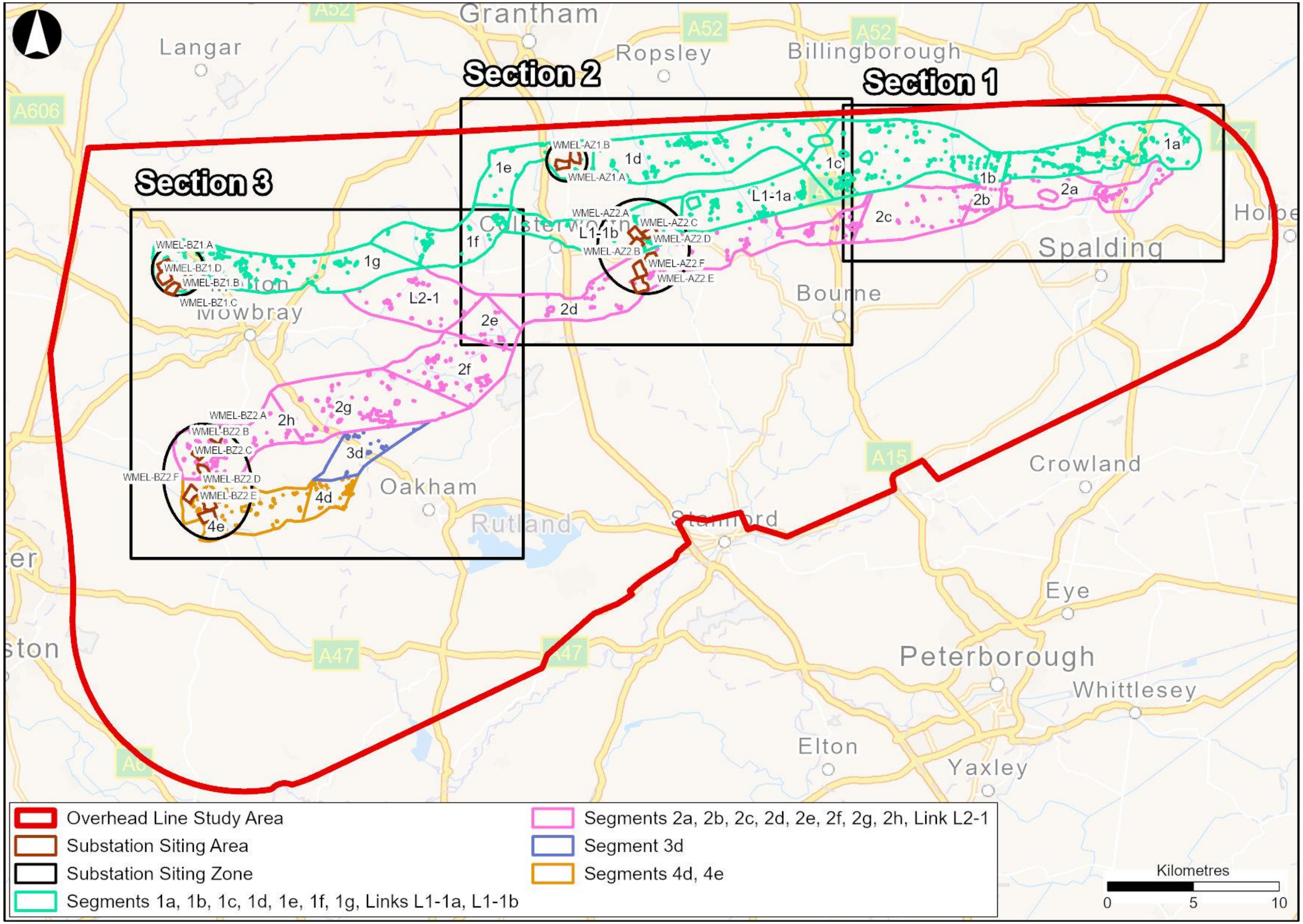
9.1.2 This chapter presents a summary of the factors considered to influence the decision-making process for determining the emerging preferred Route Option and substation Siting Zones and Areas. The emerging preferred Route Option and substation Siting Zones and Areas were considered to provide the most appropriate overall solution in light of the environmental, socio-economic, engineering, cost and technical constraints present within the Route Options, their Segments and Links, and the substation Siting Zones and Areas.

9.1.3 A comparative evaluation was undertaken of sections of the Route Options and substation Siting Zones. The areas considered under each section are set out below. The route was spilt into sections to allow closer scrutiny and appraisal across the options when approached in a sequential manner routeing east to west, and the overall Route Options and substation locations in the end-to-end solution. The sections are shown in **Figure 9-1** and are titled:

- Section 1 – Consider the Route Options between Weston Marsh and Rippendale/Halconby;
- Section 2 – Consider the Route Options between Rippendale/Halconby and Buckminster/Sewstern, and Substation Siting Zones WMEL-AZ1 and WMEL-AZ2;
- Section 3 – Consider the Route Options between Buckminster/Sewstern to the existing 400kV ZA OHL, and Substation Siting Zones WMEL-BZ1 and WMEL-BZ2.

9.1.4 As the design progresses, regular reviews will be undertaken to ensure the emerging preferred option taken forward at this stage remains the preferred Route Option, taking into account consultation responses and future design development.

Figure 9-1 – Comparative Appraisal Sections



9.2 Summary of Route Option Constraints

9.2.1 Following **Chapter 7** and **8,** to understand which of the constraints identified in each Route Option could be a determining factor in taking that Route Option forward, and aiding in the comparative appraisal, the constraints were summarised and are shown in **Table 9-1**.

Table 9-1 – Comparative Summary of Route Option Constraints

Sub-topic	Route Option 1	Route Option 2	Route Option 3	Route Option 4	Route Option 5
Technical	• 400kv 4SM OHL present • Artificial ground • Historic mines/quarries • Mass movement deposits • Length 63km	• 400kv 4SM OHL present • Artificial ground • Historic mines/quarries • Mass movement deposits • Length 60km	• Artificial ground • Historic mines/quarries • Mass movement deposits • Length 57km	• Artificial ground • Historic mines/quarries • Mass movement deposits • Length 58km	• Artificial ground • Historic mines/quarries • Mass movement deposits • Comparably steeper ground • Length 60km
Cost & Programme (In-service date)	• £251 • 2034	• £239 • 2034	• £227 • 2034	• £231 • 2034	• £239 • 2034
Landscape and Visual	• Stoke Rochford Hall RPG • Residential receptors – Pointon, Millthorpe, Dowsby, Rippingdale, Sproxton and Ab Kettleby • Multiple PRoW	• Easton Park RPG. • Residential receptors – Pointon, Millthorpe, Dowsby, Rippingdale, Kirkby Underwood, Hawthorpe, Bulby, Irnham, Colsterworth, Sproxton and Ab Kettleby • Multiple PRoW	• Grimsthorpe Castle RPG and Stapleford Park RPG • Residential receptors – Haconby, Stainfield, Swayfield, Coston, Garthorpe, Ab Kettleby and Wartaby • Multiple PRoW	• Grimsthorpe Castle RPG and Stapleford Park RPG • Residential receptors – Haconby, Stainfield, Swayfield, Edmondthorpe, Market Overton, Whissendine and Thorpe Satchville • Multiple PRoW	• Lowesby Hall RPG, Grimsthorpe Castle RPG and Stapleford Park RPG • Residential receptors – Haconby, Stainfield, Swayfield, Edmondthorpe, Market Overton, Whissendine, Cold Overton and Twyford • Multiple PRoW

Ecology	• SSSIs • Fewest Ancient woodland sites	• SSSIs • Multiple Ancient woodland sites	• SSSIs • Multiple Ancient woodland sites.	• SSSIs • Multiple Ancient woodland site	• SSSIs • Multiple Ancient woodland sites
Historic Environment	• Scheduled Monuments • Stoke Rochford Hall RPG	• Scheduled Monuments • Easton Park RPG	• Scheduled Monuments • Grimsthorpe Castle RPG and Stapleford Park RPG	• Scheduled Monuments • Grimsthorpe Castle RPG and Stapleford Park RPG	• Scheduled Monuments • Lowesby Hall RPG, Grimsthorpe Castle RPG and Stapleford Park RPG
Water	• WFD waterbodies • Flood Zone 2 & 3 • 10 waterbody crossings • SPZ1 • Protected drinking water area	• WFD waterbodies • Flood Zone 2 & 3 • 9 waterbody crossings • SPZ1	• WFD waterbodies • Flood Zone 2 & 3 • 6 waterbody crossings • SPZ1	• WFD waterbodies • Flood Zone 2 & 3 • 10 waterbody crossings • SPZ1	• WFD waterbodies • Flood Zone 2 & 3 • Multiple waterbody crossings • SPZ1
Economic Activity	• EN010130 - Outer Dowsing Offshore Wind NSIP, EN020036 - Grimsby to Walpole Electricity Transmission NSIP, WA010003 - Lincolnshire Reservoir and pipeline NSIP, and EN010126 - Temple Oaks Solar Park NSIP	• EN010130 - Outer Dowsing Offshore Wind NSIP, EN020036 - Grimsby to Walpole Electricity Transmission NSIP, and WA010003 - Lincolnshire Reservoir and pipeline NSIP	• EN020036 - Grimsby to Walpole Electricity Transmission NSIP and WA010003 - Lincolnshire Reservoir and pipeline NSIP	• EN020036 - Grimsby to Walpole Electricity Transmission NSIP and WA010003 - Lincolnshire Reservoir and pipeline NSIP	• EN020036 - Grimsby to Walpole Electricity Transmission NSIP and WA010003 - Lincolnshire Reservoir and pipeline NSIP

Aviation and Defence	• Buckminster Gliding Club • Decoy Farm Airstrip	• Buckminster Gliding Club • Decoy Farm Airstrip	• Kendrew Barracks – former RAF Cottesmore • Black Spring Farm Airstrip	• Kendrew Barracks – former RAF Cottesmore • Black Spring Farm Airstrip	• Kendrew Barracks – former RAF Cottesmore • Black Spring Farm Airstrip
Traffic and Trasport	• 2no. major railway crossings • 6no. A Road crossings • Greater number of A roads in area for access	• 2no. major rail crossings • 7no. A Road crossings • Greater number of A roads in area for access	• 2no. major rail crossings • 6no. A Road crossings • Fewer A roads in area for access	• 3no. major rail crossings • 5no. A Road crossings • Fewer A roads in area for access	• 3no. major rail crossings • 5no. A Road crossings • Fewer A roads in area for access
Key Issues	• Buckminster Gliding Club • EN010130 - Outer Dowsing Offshore Wind NSIP, Grimsby to Walpole Electricity Transmission NSIP, WA010003 - Lincolnshire Reservoir and pipeline NSIP, and EN010126 - Temple Oaks Solar Park NSIP • Historic mines/quarries	• Buckminster Gliding Club • EN010130 - Outer Dowsing Offshore Wind NSIP, EN020036 - Grimsby to Walpole Electricity Transmission NSIP, and WA010003 - Lincolnshire Reservoir and pipeline NSIP • Artificial ground • Historic mines/quarries	• Grimsthorpe Castle RPG. • Greater distance from A road access	• Grimsthorpe Castle RPG. • Additional rail line crossing • Greater distance from A road access	• Grimsthorpe Castle RPG • Additional rail line crossing • Greater distance from A road access • Comparably steeper ground

9.3 Comparative Appraisal of Route Options

Section 1 Weston Marsh to Rippendale/Halconby

9.3.1 Section 1 considers the following Route Options between the proposed Weston Marsh substation infrastructure and the area around the settlements of Rippendale and Halconby.

- Route Option 1 and 2 (Segments 1a,1b, and 1c)
- Route Option 3, 4 and 5 (Segments 2a, 2b, 2c)

Comparative Appraisal

9.3.2 Route Option 1 and 2 route north and then west avoiding Spalding Golf Club and Surfleet. The existing 400kV 4ZM OHL restricts the width available in this area for routeing. These Route Options would also interface with the EN010130 - Outer Dowsing Offshore Wind NSIP and EN020036 - Grimsby to Walpole Electricity Transmission NSIP. The convergence of all these multiple OHLs would increase the potential for a wirescape in this area resulting in adverse impacts on landscape and visual receptors. Segments 1a, 1b and 1c are heavily constrained by individual residential and agricultural properties across the width of the corridor which would require a number of direction changes requiring more prominent angle pylons further contributing to adverse impacts on landscape and visual receptors.

9.3.3 Route Options 3, 4 and 5 routeing west, to the south of Spalding Golf Club interact with the Grimsby to Walpole NSIP, however these options would be directly west from the connection with Weston Marsh substation infrastructure and avoid other NSIPs to the north. Individual residential and agricultural properties also are found throughout the Route Options most noticeably at a pinch point between Pinchbeck and Surfleet. Further west of the pinch point, these options are less constrained by properties. Fewer direction changes and associated angle pylons would be required in this area, resulting in fewer/lower potential visual impacts.

9.3.4 Due to the interaction with the existing 400kV 4ZM OHL and additional NSIPs and visual receptors in Route Options 1 and 2, it was considered that Route Options 3, 4 and 5 performed better from an environmental perspective. Route Options 3, 4 and 5 also provided the most direct and shortest Route Option with the least associated cost, performing better than the other options from both a technical and cost perspective.

Summary of Decision

9.3.5 Route Options 1 and 2 would result in converging routes, the need for multiple angle pylons would likely result in wirescape and cumulative landscape and visual impacts, and complex infrastructure interactions and diversions, due to the existing converging and diverging OHLs. Overall Route Options 3, 4 and 5 were preferred primarily as they avoid the existing 400kV 4ZM OHL and other NSIPs north and south of Weston Marsh. These Route Options provide a more direct route and are less constrained by residential and agricultural properties resulting in fewer/lower potential visual impacts.

Section 2 Rippendale/Halconby to Buckminster/Sewstern

9.3.6 Section 2 considers the following Route Options and Siting Zones from the area around the settlements of Rippendale and Halconby to the area around the settlements of Buckminster and Sewstern.

- Route Option 1 (Segments 1d,1e, and 1f)
- Route Option 2 (Link L1-1a and L1-1b and Segment 1f)
- Route Option 3, 4 and 5 (Segments 2d, and 2e)
- Siting Zone WMEL-AZ1 and WMEL-AZ2

Comparative Appraisal

9.3.7 Route Option 1 provides the most northerly connection from Rippendale/Halconby through to the existing 400kV 4VK OHL in the proposed WMEL-AZ1 Siting Zone, and then onward to Buckminster/Sewstern. The proposed EN010126 - Temple Oaks Solar Park NSIP is located within Segment 1d on the former RAF Folkingham airfield and surrounding land. The proposed solar park crosses the entire width of the corridor and would require oversailing if constructed, therefore additional and taller towers could be required to ensure satisfactory clearances for operation and maintenance of the solar park. WA010003 - Lincolnshire Reservoir and pipeline NSIP is also present in Segment 1d however as this NSIP has a pipeline design this would be a limited constraint on the Route Option. Route Options 2, 3, 4 and 5 also interface with the WA010003 - Lincolnshire Reservoir and pipeline NSIP, however they do not interact with EN010126 - Temple Oaks Solar Park NSIP.

9.3.8 Within Segment 1e, the A1, ECML Railway, Great Ponton Quarry, River Witham, a Drinking Water Protected Area, and the 4VK 400kV route are all within close proximity to each other at a point south of Great Ponton. Route Option 1 also narrows to the west of this area to approximately 800m, therefore further limiting alignment options in this Segment, as well as opportunities for siting the substation in proximity to the ECML. Segment 1e and 1f routes require a direction change to avoid the Buckminster Guiding Club to the northwest. Infrastructure should generally be avoided within 2km and may present issues within 10km of airfields. If progressed, this would be a consideration for Route Options 1 and 2, the alignment may need to route to the south of the corridor to avoid this area, increasing direction changes and impacts woodland and residential areas of Skillington. Avoidance is preferred as potential alternate solution results in cost and engineering challenges. Segment 2d is within the 1km buffer zone of the Black Spring Farm Airstrip, as this is an unlicenced airstrip, however, there is flexibility in the corridor at this location for the alignment to avoid the required zone and pass to the north of Swayfield therefore avoid potential impacts.

9.3.9 Segments 2d and Links L1-1a and L1-1b are constrained by ancient woodland blocks to a greater degree than Segments 1d and 1e. As the A1, ECML Railway, River Witham, a fuel pipeline and the 400kV 4VK OHL route are all present in Link L1-1b, this results in a higher degree of technical complexity. The corridor also narrows to the west of this area to approximately 650m where the A1 runs north-south toward the Segment’s west and where the B6403 intersects with the A1. The A1/B6403 intersection also has a large number of priority broadleaved woodland blocks and artificial ground constraining the junction. These will constrain the corridor as could several distribution network OHLs. Segment 2d also crosses the A1 however the Segment is much less constrained by environmental and technical features.

9.3.10 The presence of EN010126 - Temple Oaks Solar Park NSIP (Route Option 1) and the complexity around the A1 crossing (Route Option 1 and 2) results in Route Options 3, 4 and 5 performing better from an environmental perspective and technical perspective. Route Options 3, 4 and 5 also provided the most direct and shortest route option with the least associated cost, performing better than the other options from both a technical and cost perspective.

9.3.11 Substation Siting Zone WMEL-AZ2 has ancient woodland, and priority broadleaved woodland blocks throughout, however none are present within the substation Siting Areas. Siting Zone WMEL-AZ1 is not constrained by ancient woodland blocks, however priority broadleaved woodland blocks are present in some substation Siting Areas. WMEL-AZ1 has a Drinking Water Protection Area present along the north of the Siting Zone. The ECML railway, main rivers (River Witham (WMEL-AZ1), River West Glen (WMEL-AZ2)) and the 400kV 4VK OHL route constrain both Siting Zones. These features are much more closely grouped in WMEL-AZ1 and constrain possible new OHL routes into the Siting Areas. There are no aviation constraints in WMEL-AZ1. Unlicenced Black Spring Farm Airfield (1986-present) is located just outside of the WMEL-AZ2, within 1km of Siting Area WMEL-AZ2.F. However, there is flexibility in the corridor at this location for the alignment to avoid the required zone and pass to the north of Swayfield therefore avoid potential impacts. The A171 passes through WMEL-AZ2 providing good access. WMEL-AZ1 is accessed from south via the B6403, which is then constrained by the ECML, limiting access to the north of the Siting Zone via this route. Access to the north of the WMEL-AZ1 is also constrained as the route would require access through Great Ponton.

Summary of Decision

9.3.12 Segments 1d, 1e and 1f were not preferred due to the presence of an additional NSIP, the complexity of crossing the A1 and ECML near Great Ponton, and the presence of aviation constraints. Links L1-1a and L1-1b were not progressed due to the technical complexities of the A1/B6403 crossing, the presence of artificial ground near the crossing, and the greater number of ancient woodland and priority broadleaved blocks.

9.3.13 Overall, Segments 2d and 2e were preferred primarily as they avoid NSIPs, complex highway crossings, and alignment can avoid aviation constraints. These Route Options provide a more direct route and are less constrained.

9.3.14 Overall Siting Zone WMEL-AZ1 was not preferred due to the environmental and technical challenges associated with the tight grouping of the ECML, existing 4VK 400kV OHL and the River Witham constraining the Siting Zone. WMEL-AZ1 is further constrained by residential settlements limiting access to main roads. WMEL-AZ1 would require further appraisal. Overall Siting Zone WMEL-AZ2 was preferred and progressed as it is considered to have fewer environmental and technical constraints.

Section 3 Buckminster/Sewstern to ZA Overhead Line

9.3.15 Section 3 considers the following Segments and Substation Siting Zones from the area around the settlements of Buckminster and Sewstern to the existing 400kV ZA OHL:

- Route Option 2 (Link L2-1)
- Route Option 1, 2 and 3 (Segment 1g)
- Route Option 4 (Segments 2f, 2g and 2h)

- Route Option 5 (Segments 2f, 2g, 3d, 4d and 4e)
- Siting Zone WMEL-BZ1 and WMEL-BZ2

Comparative Appraisal

9.3.16 Route Option 2 Link L2-1 connects Segment 2e with 1g and has few environmental and technical constraints.

9.3.17 Route Option 4 Segment 2f contains some scattered residential properties and Market Overton creates narrowing of the corridor in the east of the Segment. In Segment 2g Whissendine creates a narrowing of the corridor in the south. Scattered individual properties are also noted in the centre of Segment. Thorpe Satchville (Segment 2h) and scattered residential properties may cause some constraint in the western area of the Segment, especially to the south. Priority broadleaved woodland blocks are also present throughout Segments 2f, 2g and 2h.

9.3.18 Route Options 1, 2 and 3 Segment 1g also contains a number of scattered residential properties and priority broadleaved woodland blocks. Route Options 1, 2 and 3 are slightly more preferred as the likely routeing path would be more direct than Route Option 4.

9.3.19 Route Options 4 and 5 have an additional rail line crossing, the Birmingham to Peterborough rail line in west of Segment 2f. This rail line also runs across the start of Segment 2g. This adds an additional technical complexity to Route Options 4 and 5 over Route Options 1, 2 and 3 which do not require another rail line crossing.

9.3.20 Moderate to steep slopes are found extensively across most of Segments 4d and 4e and pinch points are considered likely. A greater degree of earthworks is also likely required in these areas to construct haul roads; it may not be possible to construct haul roads in a direct line from OHL tower to OHL tower, subject to actual route selected and where tower positions are placed. This makes Route Option 5 less preferrable to the other Route Options.

9.3.21 WMEL-BZ2 is highly constrained by elevated ground with variable topography, with the potential for extensive earthworks and/or retaining walls in many areas to achieve a level platform for development. WMEL-BZ1 also has a variable topography however the Siting Zone is less elevated with slopes less likely to require as extensive earthworks and/or retaining walls compared to those in WMEL-BZ2.

9.3.22 Due to the elevation of WMEL-BZ2 there are likely to be relatively open and close-range views. Inclusion of robust mitigation planting and earthworks would be required to reduce potential adverse effects. Scheduled Monument Lowesby deserted medieval village with three fishponds and Grade II Lowesby Hall RPG is located in the south of WMEL-BZ2. Development in this area would likely result in changes to its their setting and adverse effect. Due to the lower elevation WMEL-BZ1 is less constrained by landscape receptors with the potential for the existing woodland blocks within and adjacent to the Siting Zone to screen development. WMEL-BZ1 also contains heritage features such as the Scheduled Monument Moated site at Ab Kettleby, however these are predominantly found in the Ab Kettleby and Wartnaby and screened from the wider Siting Zone.

Summary of Decision

9.3.23 Segment 2f was not preferred due to the presence of the Birmingham to Peterborough rail line which would require an additional complex rail line crossing. Segments 4d and 4e were not preferred due to the presence of extensive moderate to steep slopes which would be likely to create pinch points and constructability constraints.

9.3.24 Link L2-1 and Segment 1g were preferred as the routeing would be the most direct, reducing the need for multiple angle pylons and minimising landscape and visual impact. This Segment also requires no additional rail line crossing which would further reduce technical complexity.

9.3.25 WMEL-BZ2 is not the preferred zone for new substation due to the elevation, changes in gradient and presence of heritage features constraining the Siting Zone. Overall Siting Zone WMEL-BZ1 was preferred and progressed as it is considered to have fewer environmental and technical constraints regarding elevation, slope gradient, and heritage features.

9.4 WMEL-A Substation Siting Area

Comparative Appraisal

9.4.1 Within the WMEL-A Siting Zone 2 (WMEL-AZ2), six substation Siting Areas were identified (WMEL-AZ2.A, WMEL-AZ2.B, WMEL-AZ2.C, WMEL-AZ2.D, WMEL-AZ2.E and WMEL-AZ2.F) all of which are located west of Corby Glen and west to north of Swayfield (see **Chapter 6**). The topography of the Siting Zone is variable, with the West Glen River valley defining the eastern half, with a series of smaller shallow valleys separated by low ridges to the west and watercourses present within or adjacent to WMEL-AZ2.D, WMEL-AZ2.E and WMEL-AZ2.F. There are multiple small geometric woodland blocks in the western part of the Siting Zone, although overall woodland and tree cover is limited.

9.4.2 No priority broadleaved woodland exists within or near the Siting Areas, but there is National Forest inventory woodland adjacent to site WMEL-AZ2.E. Given the effects associated with the different options presented, WMEL-AZ2.C and WMEL-AZ2.F would be slightly preferable with regard to landscape character and visual amenity, provided that existing boundary vegetation can be retained, robust mitigation planting is included, and careful configuration of the substation can be achieved. The remaining options are likely to result in greater adverse effects, including to nearby residential properties and PRoW, with WMEL-AZ2.B and WMEL-AZ2.D the least favourable options.

9.4.3 There are no Scheduled Monuments or RPGs in proximity to any of the Siting Areas in WMEL-AZ2. There is the potential for adverse impacts from WMEL-AZ2.D on the Grade II listed buildings: Milestone on north side of B676 near Heath Farm, Forge, waggon hovel and loose boxes at Heath Farm, and Heath Farmhouse resulting from the change to their setting.

9.4.4 All Siting Areas within WMEL-AZ2 are large enough to accommodate the required 28.8ha substation footprint, however WMEL-AZ2.A, WMEL-AZ2.C and WMEL-AZ2.D would require reconfiguration of the standard substation design as the 720m length could not be accommodated.

9.4.5 WMEL-AZ2.B is located 600m northeast of the 400kV 4VK OHL and is separated from it by the ECML. To terminate the circuits of the 4VK transmission line a minimum of one crossing over the traction power supply line would be required in addition to the new OHL line crossing. This means additional complexity for works in proximity to rail lines, as well as outage and line closure planning. Siting Areas WMEL-AZ2.A, WMEL-AZ2.C, WMEL-AZ2.D, WMEL-AZ2.E and WMEL-AZ2.F are located to the west of the ECML and only require one crossing of the rail line for the new OHL connection. WMEL-AZ2.A, WMEL-AZ2.C, and WMEL-AZ2.E encompass a portion of the existing 400kV 4VK OHL therefore offer comparatively better locations for the required connections to occur, however this would require some outages and potentially phased construction works. Due to their distance from the existing 400kV 4KV OHL both WMEL-AZ2.D (300m) and WMEL-AZ2.F (190m) would require additional connection works.

9.4.6 For WMEL-AZ2.C and WMEL-AZ2.D low to medium amounts of earthworks are anticipated to be required to manage level changes, with WMEL-AZ2.C potentially requiring deeper foundation solutions in areas of fill, and WMEL-AZ2.D requiring medium height retaining structures. Both Siting Areas have the potential presence of shallow bedrock which could also constrain earthworks and cut works. The likelihood for site wide difficult ground conditions at WMEL-AZ2.E and WMEL-AZ2.F is considered relatively low with some earthworks and retaining features required. A British Pipeline Agency high pressure fuel pipeline runs north to south along the western corner of WMEL-AZ2.A and WMEL-AZ2.C.

9.4.7 Siting Area WMEL-AZ2.C is located immediately to the north of the A151 and is preferable with regard to Traffic and Transport, given that access to WMEL-AZ2.D, WMEL-AZ2.E and WMEL-AZ2.A would require the installation of an access road (c.400m, c. 700m and 1.3km, respectively) needing additional land. WMEL-AZ2.B would require improvements along the B1176 needing additional land as well as a headroom restriction (4.6m) to the west on the A151. WMEL-AZ2.F would also require improvements along single lane width local roads needing additional land and being some distance (c.4km) to the nearest A road, even if an access road (c. 700m) could be provided to link with the A151, it crosses Overgate Road which provides the main access into Swayfield from the west meaning an increased likelihood of additional road closures/diversions.

9.4.8 Given the effects associated with the different options presented, Option WMEL-AZ2.C would be slightly preferable with regard to landscape character and visual amenity, heritage, technical, and traffic and transport, provided that the appropriate distance from the fuel pipeline can be achieved, and there is robust mitigation planting and careful configuration of the substation. However, WMEL-AZ2.C has the flexibility to reconfigure and/or move the location within the area to avoid the pipeline and manage construction constraints associated with being underneath the existing 4VK line. The other options are likely to result in greater adverse effects, including from nearby residential properties, heritage features, rail infrastructure and PRoW – see **Table 9-2** for a comparative summary of the WMEL-AZ2 constraints.

Table 9-2 – Comparative Summary of the WMEL-A Substation Siting Zone 2 Siting Areas Constraints

Sub-topic	WMEL-AZ2.A	WMEL-AZ2.B	WMEL-AZ2.C	WMEL-AZ2.D	WMEL-AZ2.E	WMEL-AZ2.F
Technical	• Limestone with potential karst features. • 11kV and 132kV NG Distribution OHL present. • Site layout design reconfiguration /optimisation required. • British Pipeline Agency high pressure fuel pipeline present.	• Limestone with potential karst features. • 11kV and 132kV NG Distribution OHL present. • Additional crossing of the rail line required.	• Limestone with potential karst features. • 11kV NG Distribution OHL present. • Low to medium earthworks. • British Pipeline Agency high pressure fuel pipeline present.	• Limestone with potential karst features. • Additional connection works required to reach existing 400kV 4KV OHL. • Site layout design reconfiguration/optimisation required. • Low to medium earthworks.	• Limestone with potential karst features. • 132kV NG Distribution OHL present. • Low earthworks.	• Limestone with potential karst features. • Additional connection works required to reach existing 400kV 4KV OHL. • Low earthworks. • UXO mitigation required.
Landscape and Visual	• Residential receptors. • PRoW network crossing.	• Residential receptors.	• Residential receptors.	• Residential and recreational receptors – notably villages of Swayfield and Corby Glen. • PRoW network crossing.	• Residential and recreational receptors – notably Swayfield and Corby Glen • PRoW network within boundary. • Hedgerow and tree loss landscape effects likely due to	• Residential and recreational receptors – notably Swayfield. • PRoW network crossing.

					sloping and elevated nature.	
Ecology	• Direct impact of habitat loss and/or fragmentation of arable land, old hedgerows with mature trees.	• Direct impact of habitat loss and/or fragmentation of arable land, old hedgerows with mature trees and a small copse associated with a hedgerow.	• Direct impact of habitat loss and/or fragmentation of arable land, hedgerows and trees – fewer trees in this option.	• Direct impact of habitat loss and/or fragmentation of arable land, old hedgerows with mature trees both within hedgerows and standalone.	• Direct impact of habitat loss and/or fragmentation of arable land with field margins, old hedgerows with mature trees. • Priority woodland adjacent to the west of the option. • Watercourse/drainage ditch present.	• Direct impact of habitat loss and/or fragmentation of arable land and hedgerows with several mature trees - fewer than other options. • Two partial sections of watercourses/drainage ditches present.
Historic Environment	• Buried archaeological remains.	• Buried archaeological remains.	• Buried archaeological remains.	• Buried archaeological remains. • Grade II listed buildings – Milestone on north side of B676 near Heath Farm, Forge waggon hovel and loose boxes at Heath Farm, and Heath Farmhouse.	• Buried archaeological remains.	• Buried archaeological remains.
Water Environment	• Surface water flow path along boundary.	• Fluvial/pluvial flood risk - to the north and	• Surface water flow path crossing.	• Surface water flow path along boundary.	• Surface water flow path crossing.	• Surface water flow path crossing and along boundary.

		south of the site.				
Economic Activity (including Planning)	• N/A	• N/A	• N/A	• N/A	• N/A	• N/A
Aviation and Defence	• N/A	• N/A	• N/A	• N/A	• N/A	• Black Spring Farm Airfield within 1km.
Traffic and Transport	• PRoW closure/ diversion. • Additional access road required.	• Restricted access existing road – unsuitable for HGVs.	• PRoW closure/diversion.	• PRoW closure/diversion. • Additional access road required.	• PRoW closure/diversion. • Existing single track road – unsuitable for HGVs. • Additional access road required.	• PRoW closure/diversion. • Narrow existing road – unsuitable for HGVs. • Additional access road required – would have to cross existing Overgate Road.
Key Issues	• Limestone with potential karst features. • Pipeline Agency high pressure fuel pipeline present.	• Limestone with potential karst features. • Restricted access road – unsuitable for HGVs.	• Limestone with potential karst features. • Pipeline Agency high pressure fuel pipeline present.	• Limestone with potential karst features. • Additional connection works required to reach existing 400kV 4KV OHL. • Residential and recreational receptors – notably villages of	• Limestone with potential karst features. • Residential and recreational receptors – notably Swayfield and Corby Glen. • Priority woodland adjacent to the west of the option. • Existing single track road –	• Limestone with potential karst features. • UXO mitigation required. • Residential and recreational receptors – notably Swayfield. • Black Spring Farm Airfield within 1km.

	Swayfield and Corby Glen. • Grade II listed buildings – Milestone on north side of B676 near Heath Farm, Forge waggon hovel and loose boxes at Heath Farm, and Heath Farmhouse.	unsuitable for HGVs.	• Narrow existing road – unsuitable for HGVs. • Additional access road required – would have to cross existing Overgate Road.

9.5 WMEL-B Substation Siting Area

Comparative Appraisal

9.5.1 Within the WMEL-B Siting Zone (WMEL-BZ1), four substation Siting Areas were identified (WMEL-BZ1.A, WMEL-BZ1.B, WMEL-BZ1.C, WMEL-BZ1.D) all of which are located west and southwest of Ab Kettleby and west to southeast of Wartnaby (see **Chapter 6**). Undulating topography with woodland blocks and linear vegetation are characteristic features of the landscape of the Siting Zone with watercourses present within or adjacent to WMEL-BZ1.B, WMEL-BZ1.C and WMEL-BZ1.D.

9.5.2 Priority broadleaved woodland is found within the boundary of WMEL-BZ1.A, and adjacent to all the other Siting Areas. National Forest inventory is present within WMEL-BZ1.B. Given the effects associated with the different options presented, WMEL-BZ1.B would be slightly preferable with regard to landscape character and visual amenity, provided that some or all of the existing woodland can be retained, robust mitigation planting and careful configuration of the substation can be achieved. There is potential to reconfigure and/or reshape WMEL-BZ1.B to minimise habitat loss and maximise the retention of existing habitats as visual screening for nearby receptors. The other options are likely to result in greater adverse effects, including from nearby residential properties and PRoW, with WMEL-BZ1.C and WMEL-BZ1.D the least favourable options.

9.5.3 There is one Scheduled Monument in the Siting Zone – Moated site at Ab Kettleby approximately 500m east of WMEL-BZ1.C. Listed buildings with the potential to experience adverse impact to their settings due to their proximity to WMEL-BZ1.C include the Grade II* Church of St. Michael and Grade II* Church of St James the Greater.

9.5.4 As the most level Siting Area, WMEL-BZ1.C performs best with regards to ground conditions. WMEL-BZ1.A has mapped infilled ground and a history of mining. WMEL-BZ1.D also has a history of mining, whereas WMEL-BZ1.B has noticeable level changes that would need to be managed. Although WMEL-BZ1.C would require the least amount of ground works, it is the furthest away from the existing ZA OHL, which would require the existing ZA OHL to be diverted and reconstructed adding further OHL in the area.

9.5.5 WMEL-BZ1.C and WMEL-BZ1.D would require access via narrow track roads through residential settlements which would limit HGV movements. WMEL-BZ1.A is readily accessible from Six Hill Lane. WMEL-BZ1.B is also accessible from Six Hill Lane, however an additional access road would need to be installed to allow access.

9.5.6 Given the effects associated with the different options presented, Option WMEL-BZ1.B would be slightly preferable with regard to landscape character and visual amenity, heritage, technical, Traffic and Transport (distance to existing ZA OHL), provided that some or all of the existing woodland can be retained, robust mitigation planting, careful configuration of the substation can be achieved, and maximisation of the opportunity to retain existing vegetation as visual screening. WMEL-BZ1.C is preferred from a ground engineering perspective requiring less ground works and level changes. The other options are likely to result in greater adverse effects, including from nearby residential properties, heritage features and PRoW - see **Table 9-3** below for a comparative summary of the WMEL-B Substation Siting Areas constraints.

Table 9-3 – Comparative Summary of the WMEL-B Substation Sting Zone 1 Siting Areas constraints

Sub-topic	WMEL-BZ1.A	WMEL-BZ1.B	WMEL-BZ1.C	WMEL-BZ1.D
Technical	• 400kV ZA OHL present. • Mining legacy. • Site layout design reconfiguration/optimisation required. • Artificial ground.	• 400kV ZA OHL present. • Site layout design reconfiguration/optimisation required. • Significant earthworks and/or retaining structures.	• 11kV NG Distribution OHL present. • Site layout design reconfiguration/optimisation required. • Increased OHL connection works required.	• 400kV ZA OHL present. • Mining legacy. • Site layout design reconfiguration/optimisation required. • Mapped buried river channel.
Landscape and Visual	• Residential, recreational and motorised receptors.	• Residential and recreational receptors.	• Residential and recreational receptors.	• Residential and recreational receptors.
Ecology	• Direct impact of habitat loss and/or fragmentation of priority woodland, non-designated woodland, hedgerow, trees, arable field margins. • Two small ditches/ watercourses partially located within.	• Direct impact of habitat loss and/or fragmentation of National Forest Inventory woodland, hedgerow, trees, arable field margins. • A ditch or watercourse intersects. • Blocks of National Forest Inventory woodland adjacent to the south and west.	• Direct impact of habitat loss and/or fragmentation of hedgerow, trees, arable field margins.	• Direct impact of habitat loss and/or fragmentation of hedgerow, trees, arable field margins. • A watercourse, large pond and woodland are adjacent.
Historic Environment	• Buried archaeological remains.	• Buried archaeological remains.	• Buried archaeological remains. • Grade II* listed buildings - Church of St. Michael and	• Buried archaeological remains.

			Church of St James the Greater.	
Water Environment	• N/A	• Watercourse present.	• N/A	• N/A
Economic Activity (including Planning)	• Recreational receptors. • Friars Well Estate and Business Centre – 120m east.	• Recreational and residential receptors.	• Recreational and residential receptors.	• Residential and recreational receptors.
Aviation and Defence	• N/A	• N/A	• N/A	• N/A
Traffic and Transport	• PRoW closure/diversion.	• PRoW closure/diversion. • Access road required.	• PRoW closure/diversion. • Access inappropriate for HGVs. • Access road in proximity to village.	• PRoW closure/diversion. • Access inappropriate for HGVs.
Key Issues	• Friars Well Estate and Business Centre – 120m east.	• Significant earthworks and/or retaining structures.	• Increased OHL connection works required. • Grade II* listed buildings - Church of St. Michael and Church of St James the Greater. • Access road in proximity to village.	• Mapped buried river channel. • Access road in proximity to village.

9.6 Preferred Route Option, Siting Zones and Siting Areas

9.6.1 For the Project, five OHL Preliminary Corridors and seven substation Siting Zones were identified and appraised, as reported in **Chapter 6**. These Preliminary Corridors were divided in Segments and Links for appraisal and led to the identification of five Route Options and four substation Siting Zones, appraised in **Chapter 7**. Following the appraisal of the Segments, Links, Siting Zones and Siting Areas in isolation a Preferred Route Option, Siting Zones and Siting Area review was then undertaken. This review considered each progressed Segment, Link, Siting Zone and Siting Area in the context of the wider end-to-end solution and ensured that the reasoning and justification for progressing one part of the emerging Preferred Route Option, or Siting Zones and Siting Areas did not incorrectly impact on the decision made for the next Segment, Link or Siting Zone and Siting Area. The wider end-to-end solution review also incorporated cost performance, reported in **Chapter 8**.

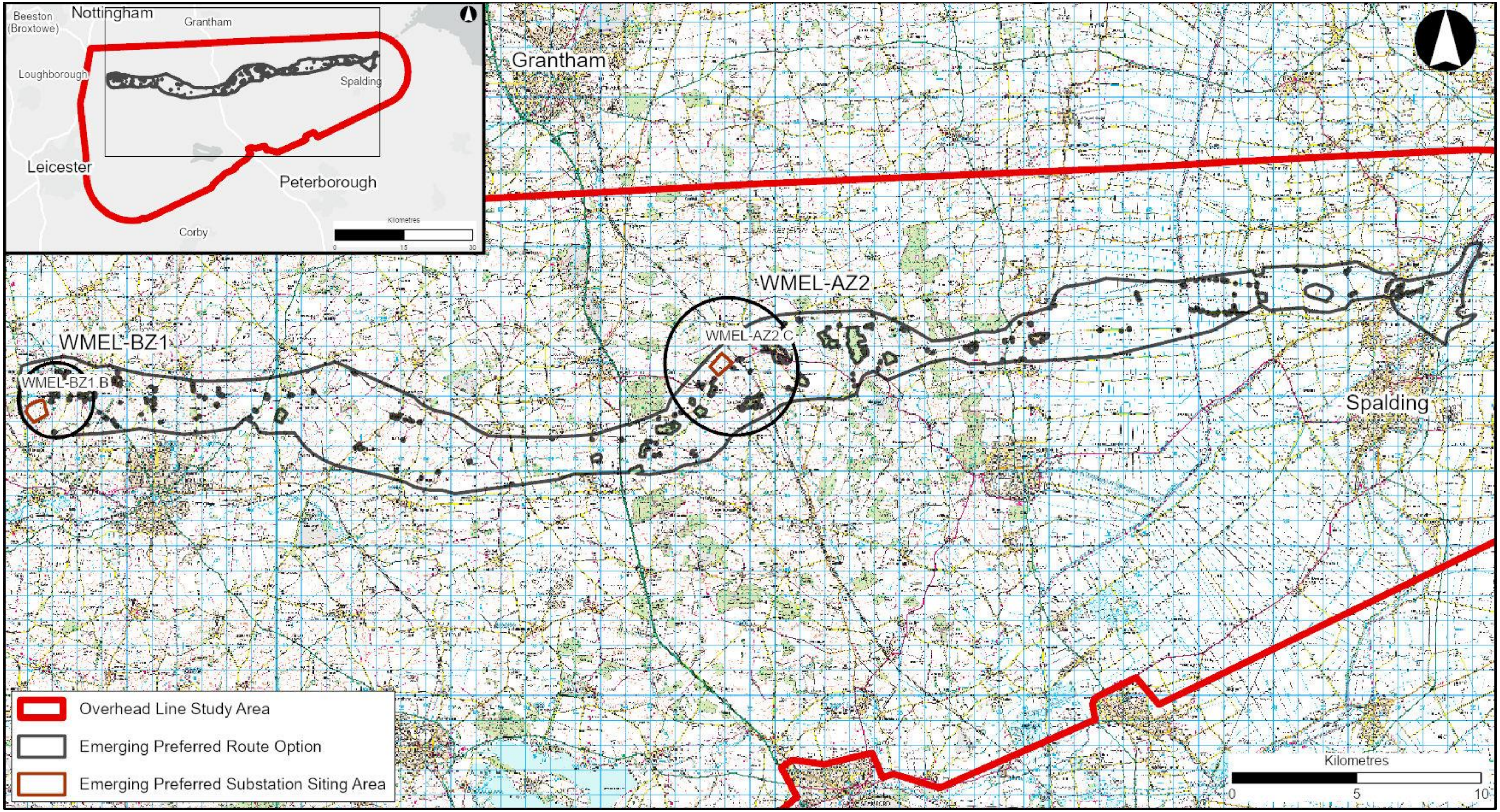
9.6.2 Following the comparative appraisal of Route Options and Siting Areas, the identified emerging Preferred Route Option and Siting Areas were subject to further challenge and review and further analysis by the Project team. The review considered further information gathered from the environment and planning site visits (ground-truthing key issues during the desk studies) and further design and construction issues identified by the technical teams. During this review the following amendments were identified and made to the emerging Preferred Route Option:

- Widening of Segment 1g south of Ab Kettleby to allow additional space for OHL routeing.
- Widening of Segment 2d to incorporate access to the north of WMEL-AZ2 (north) Siting Zone (as shown by the inclusion of land to the north of Corby Glen in **Figure 9-2** when compared to **Figure 7-3**).
- Widening of the east end of Segment 2a to interface with the draft Order Limits of the EN020036 - Grimsby to Walpole Electricity Transmission NSIP.
- Residential property locations were reviewed based on residential land use data and removed from the corridors, including the buffer discussed in **Chapter 5**.
- A corner in the south of Segment 2e to the west of South Witham was removed as no longer required for alignment.
- The extension of WMEL-AZ2.C to include land to the east up the ECML to ensure the existing pipeline could be avoided.

9.6.3 Route Option 3 was identified as the emerging Preferred Route Option and consists of Segments 2a, 2b, 2c, 2d, 2e, Link 2-1, and Segment 1g. Siting Area WMEL-BZ1.B within Siting Zone WMEL-BZ1, and Siting Area WMEL-AZ2.C within Siting Zone WMEL-AZ2 were identified as the emerging Preferred Siting Zones and Siting Areas. The emerging Preferred Route Option, Siting Zones and Siting Areas are shown in **Figure 9-2**.

9.6.4 Overall, the emerging Preferred Route Option, Siting Zones and Siting Areas are considered to offer the optimum balance between environmental, technical, cost and socio-economic considerations.

Figure 9-2 — Emerging Preferred Route Option



10. Development of Graduated Swathe

10.1 Introduction

10.1.1 Following the selection of the emerging preferred Route Option, preferred Siting Zones and preferred Siting Areas, a preliminary design exercise was undertaken to identify where it may be more appropriate to locate the required infrastructure within the corridor (based on the information understood about the emerging preferred route option at the time of writing this report). This exercise considered the Holford and Horlock Rules alongside local sites and features. This included features such as larger settlement areas, environmental and socio-economic constraints, and other technical and cost considerations. The outcome of this exercise is shown by a 'graduated swathe' – coloured shading of varying intensity to indicate areas more likely (darker colour) and less likely (lighter colour) to be the location of the proposed infrastructure. Figures showing the location of the proposed graduated swathe are presented in this chapter. Detailed plans showing the location of the proposed graduated swathe are included in **Appendix A**.

10.1.2 The graduated swathe is based on a feasible potential alignment of the new OHL which is both preliminary and indicative. It is intended as a tool for non-statutory consultation and engagement with communities and other stakeholders, including landowners. The feedback from non-statutory consultation will inform the further design development of the Project. The development of the graduated swathe allows for more meaningful engagement and non-statutory consultation, prompting more beneficial feedback.

10.1.3 Within the area covered by the graduated swathe there are areas where there is greater flexibility for routeing, and areas where there is less flexibility. This is reflected in the way the width of the darker parts of the graduated swathe varies: in some areas the darker shading covers a broader area (greater flexibility), and in other areas the darker shading is more focused (lesser flexibility).

10.1.4 In some sections the graduated swathe forms two or more distinct paths, defined by local sites and features that may constrain the routeing of a new OHL. In other places the graduated swathe follows a single path with the width varying dependent upon local sites and features and design principles, such as the preference to follow more direct routes where opportunities exist.

10.1.5 The outcomes of the analysis, as depicted in the graduated swathe, may be subject to change as the design and consenting process continues, more information becomes available, surveys are undertaken, and the views of stakeholders and communities are considered. It does not rule out development within other parts of the emerging preferred corridor, or indeed outside of the emerging preferred corridor, if necessary, after considering these inputs.

10.1.6 As discussed in **Chapter 3**, detailed localised routeing of the new OHL will follow the guidelines set out in the Holford Rules and other principles of good design. In order to limit the number of bulkier angle pylons and develop a more coherent design solution, opportunities will be sought to develop straight sections of route wherever practicable. Accordingly, any detailed design proposal will be a response to local environmental, technical, cost, and socio-economic considerations and will seek to follow the holistic principles of good design.

10.2 Developing the Graduated Swathe

10.2.1 The development of the graduated swathe was informed by the location of designated sites and environmental and social features within and beyond the emerging preferred route option, which were identified from extensive data collection, mapping, thorough review and appraisal and confirmed by site visits.

10.2.2 The emerging preferred Route Option, Siting Zones and Siting Areas were appraised to identify areas that may be more, or less, sensitive to the introduction of new infrastructure. Following that, preliminary designs were developed to identify where a new OHL may most appropriately be routed or substation located, designing in accordance with the Holford and Horlock Rules respectively. Environmental and socio-economic features, cost and technical requirements were also considered. Where the options appraisal identified potential opportunities for close parallel routes, this opportunity was considered in the development of the graduated swathe. As the Project design evolves, mitigation measures will be developed and assessed on a case-by-case basis.

Avoidance of Properties and Ancient Woodland

10.2.3 The removal of larger settlements, individual residential properties and ancient woodland from the corridors, to the extent practicable, was a key consideration of the refinement process. This was apparent when appraising the Preliminary Corridors through to the refined corridors and Route Options (as detailed in **Chapters 6 and 7**). As a result, it is considered that potential impacts to larger settlements, and residential properties within, have been avoided and/or minimised through this iterative process.

10.2.4 Further analysis regarding potential impacts to residential properties and ancient woodland, and appropriate mitigation measures will be undertaken as the Project progresses.

10.3 Description of the Graduated Swathe

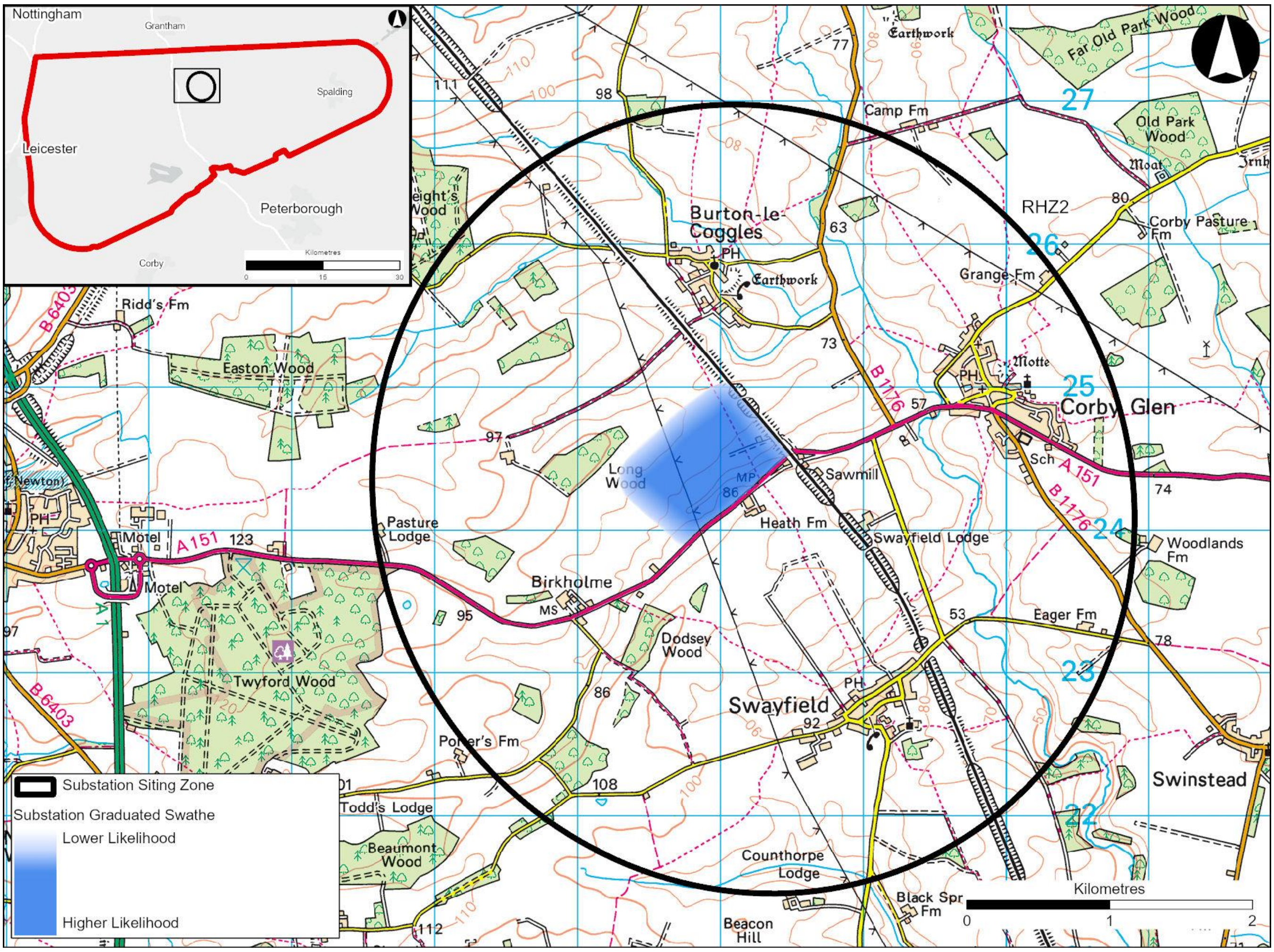
10.3.1 For the purposes of non-statutory consultation, the graduated swathe has been split into its different infrastructure components (substations and OHL). The graduated swathes for the substations and the OHL need to overlap to provide an end-to-end solution for the Project. The graduated swathe for the OHL has also been split into 5 separate sections to allow visual detail to be shown and discussed. These have been largely defined by geographical features and are intended to provide clarity during reporting and to aid public feedback to non-statutory consultation. A summary of the graduated swathe for each infrastructure component of the Project is provided below.

Substations

WMEL-A Substation

10.3.2 Within the WMEL-A substation Siting Zone 2 (WMEL-AZ2) Siting Area WMEL-AZ2.C was identified as the emerging preferred location through the appraisal process. Potential outline substation layouts were developed by engineering specialists and reviewed by environment specialists and the Project Team. The outcome confirmed that WMEL-AZ2.C was preferred, located west of the ECML and adjacent to the north side of the A151. This area largely avoids environmental constraints and retains existing vegetation as visual screening. However, there are technical constraints that need to be considered in the developing design and layout of the substation, such as an existing pipeline and construction planning beneath the existing OHL, and suitable flexibility to account for those in the design is available and reflected in the graduated swathe. Therefore, the graduated swathe is larger than the actual proposed footprint of the substation to provide that flexibility to allow the design, layout and configuration to be delivered within it. The graduated swathe for the WMEL-A substation is shown in **Figure 10-1.**

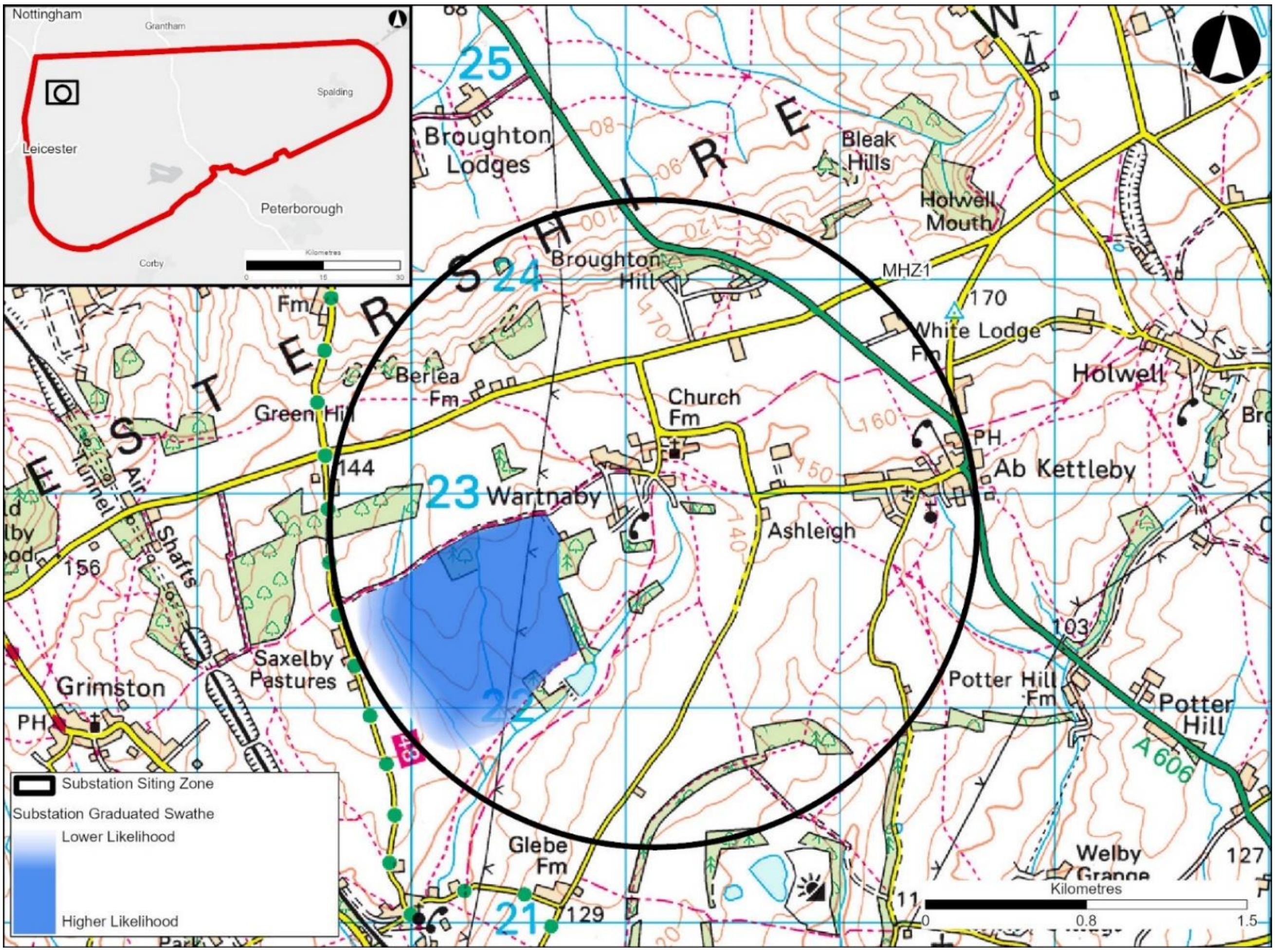
Figure 10-1 – WMEL-A Graduated Swathe



WMEL-B Substation

10.3.3 Within WMEL-B substation Siting Zone 1 (WMEL-BZ1), Siting Area WMEL-BZ1.B emerged as preferred outline potential substation layouts were developed by engineering specialists and reviewed by environment specialists and the project team. The outcome confirmed that area WMEL-BZ1.B was preferred; located southwest of Wartnaby the area largely avoids key environmental constraints and, although some woodland and/or hedgerow habitat may need to be removed, the design could be developed to minimise this loss and maximise retention of existing vegetation for screening views from Wartnaby and from the west. There are technical constraints that need to be considered and managed in the developing design, such as ground engineering and construction beneath the existing OHL. Therefore the final footprint will require some flexibility, this is reflected in the graduated swathe being larger than the actual proposed footprint of the substation to provide that flexibility to allow the design, layout and configuration to delivered within it. The graduated swathe for the WMEL-B substation is shown in **Figure 10-2**.

Figure 10-2 ─ WMEL-B Graduated Swathe

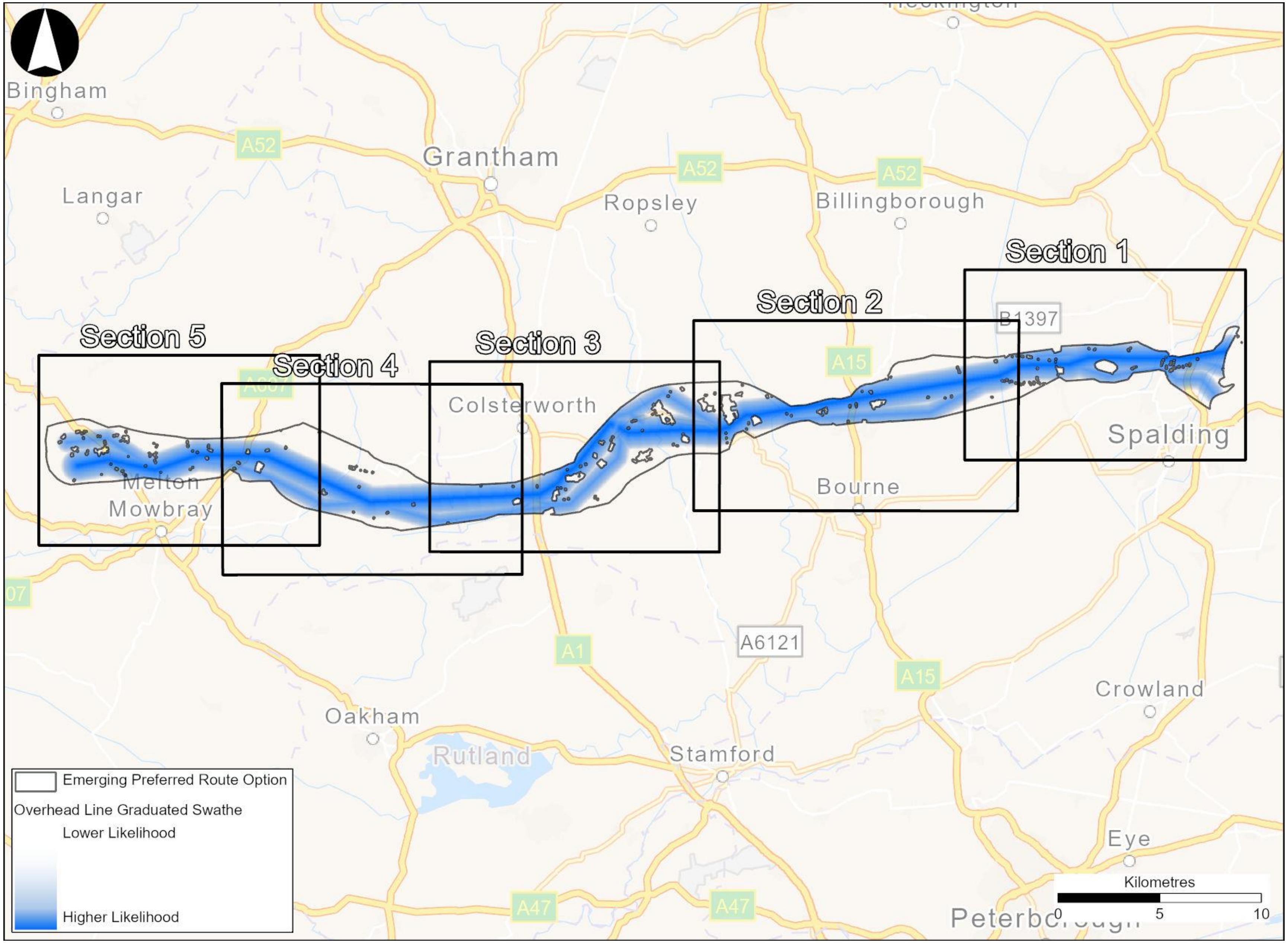


Overhead Line Corridor

10.3.4 The 5 graduated swathe sections are listed below, described in subsequent sections of this chapter, and shown in **Figure 10-3**.

- Section 1: Weston Marsh ─ South Forty Foot Drain
- Section 2: South Forty Foot Drain ─ Irnham
- Section 3: Irnham to North and South Witham
- Section 4: North and South Witham ─ A607
- Section 5: A607 to WMEL-B

Figure 10-3 – Graduated Swathe Sections



Section 1 – Weston Marsh to South Forty Foot Drain

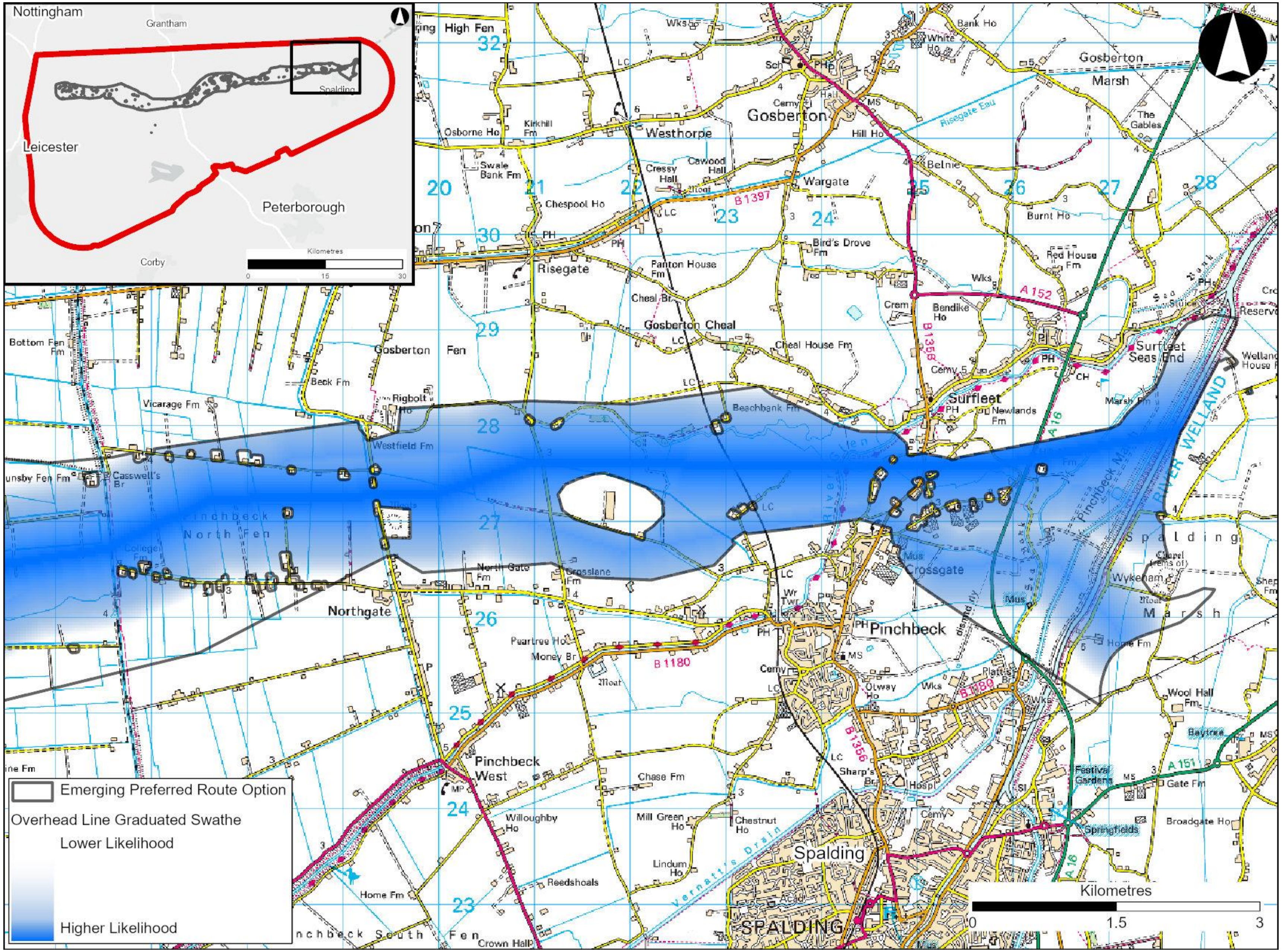
10.3.5 This section of the emerging preferred Route Option runs from the connection point at the new Weston Marsh substation infrastructure to a point immediately west of South Forty Foot Drain, as shown in **Figure 10-4**.

10.3.6 The new OHL would route west out of the Weston Marsh Siting Zone, crossing the River Welland and the A16. Weston Marsh Siting Zone (part of the Grimsby to Walpole Project) comprises less design information compared to other sections of that project which is now out for statutory consultation. There have been changes to the connections required at Weston Marsh as well as identification of additional network reinforcement. As a result, further design work is being undertaken including consideration of whether there is a need for up to two new substations. Therefore, the graduated swathe for the Project extends north and south to cover the western extent of the Weston Marsh Siting Zone to allow flexibility in connecting to the potential locations of up to two substations within the Weston Marsh Siting Zone.

10.3.7 Continuing west there is a narrowing of the area to pass between Pinchbeck and Surfleet constrained by individual properties across this section. Routeing through the north of this area is currently preferred, but due to the narrowness of this area the optionality of passing north or south of the individual properties has been retained subject to the outcome of non-statutory consultation and more detailed studies.

10.3.8 Once passed through this narrower area, the OHL routes directly west crossing a rail line, avoiding an agricultural feature by passing to the north or south before passing north of the Moated site of Newhall Grange Scheduled Monument, then onward to South Forty Foot Drain passing between individual residential properties located along Parsons Drove and Star Lode Drove.

Figure 10-4 – Section 1 Graduated Swathe (Weston Marsh to South Forty Foot Drain)



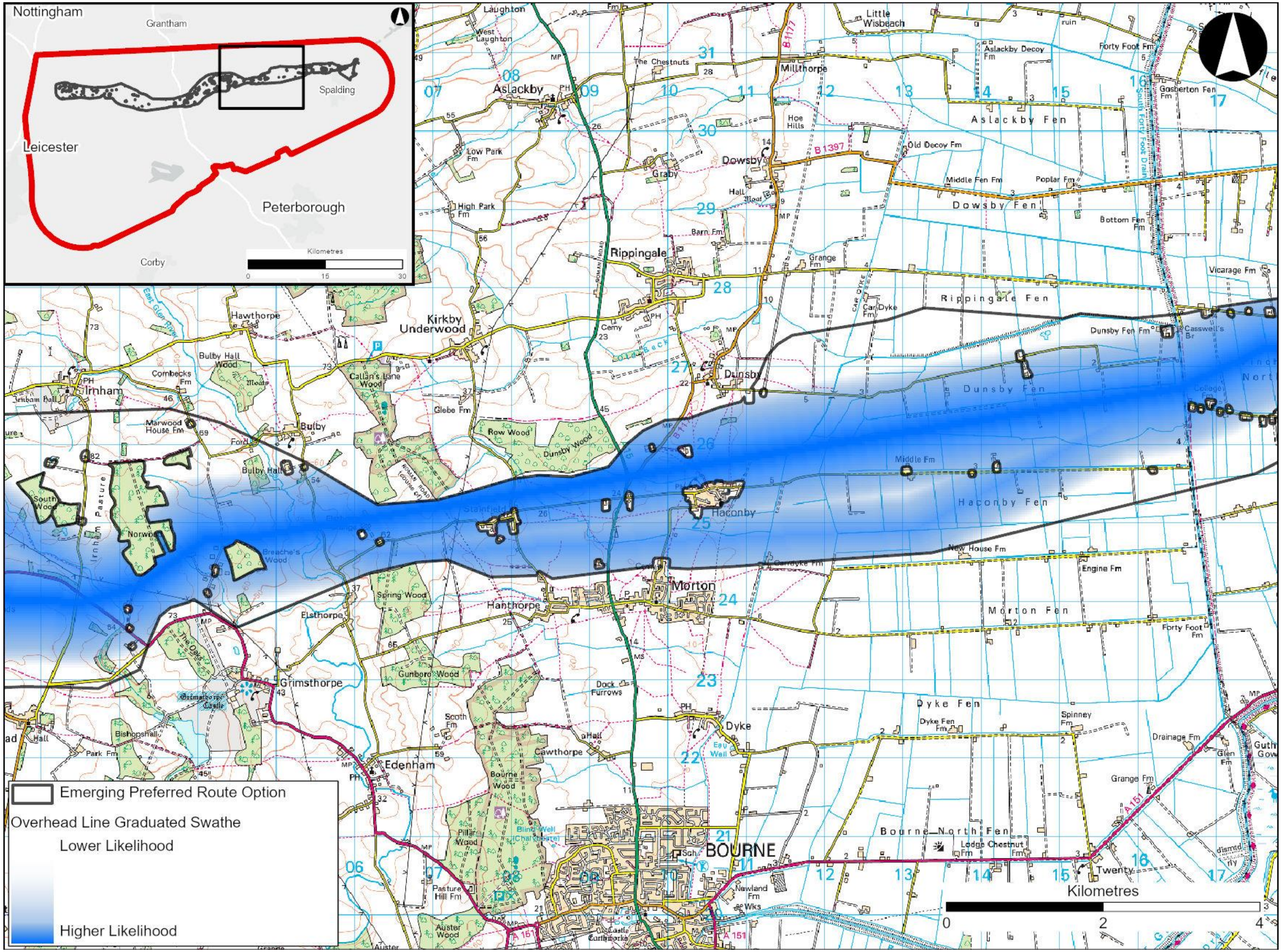
Section 2 - South Forty Foot Drain to Irnham

10.3.9 This section of the emerging preferred Route Option runs from the area immediately west of South Forty Foot Drain to a point south of Irnham and north of Grimsthorpe Castle, as shown in **Figure 10-5**.

10.3.10 The alignment needs to pass through a narrow gap to the west of Stainfield, between two notable woodland blocks. In the section to the east of this pinpoint the alignment could pass to the north or south of Haconby and Stainfield, crossing the A15 in both options, and these alignment approach options and the current preference for the northern alignment are reflected in the graduated swathe. This optionality has been retained subject to the outcome of non-statutory consultation and more detailed studies.

10.3.11 Past this narrow point the OHL is constrained by ancient woodland blocks in the north of the area and Grimsthorpe Castle RPG to the south. The option of routeing to the north or south of Haconby and Stainfield is retained to allow potential impacts on the setting of the RPG to be minimised, maintain the most direct line, and avoid scattered features in the area, with flexibility to be informed by non-statutory consultation and further design and assessment in later project stages.

Figure 10-5 – Section 2 (South Forty Foot Drain to Irnham)



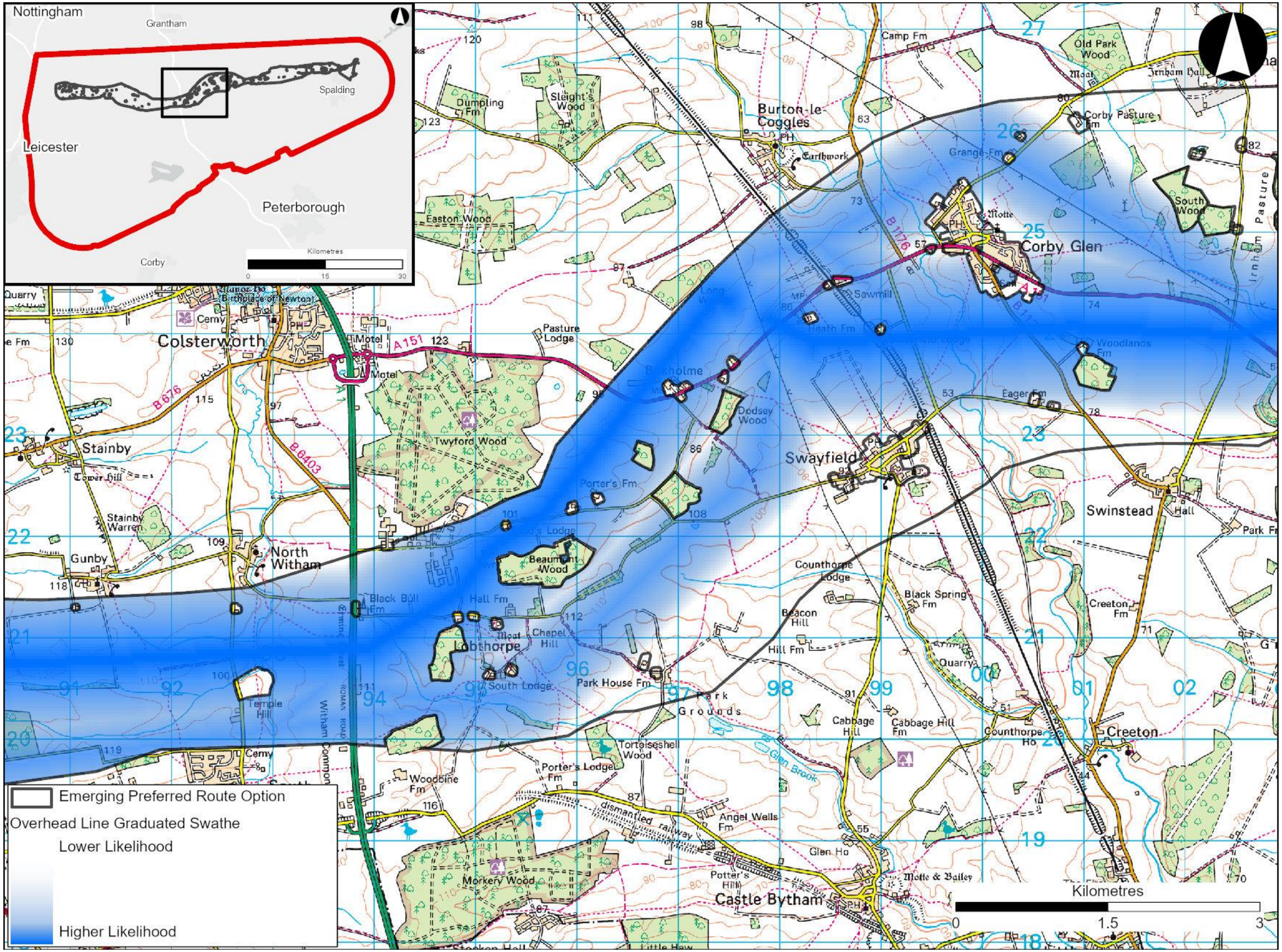
Section 3 – Irnham to North and South Witham

10.3.12 This section of the emerging preferred Route Option runs from the area immediately west of a point between Irnham and Grimsthorpe Castle to a point between North and South Witham, as shown in **Figure 10-6**.

10.3.13 Routeing directly west the OHL is likely to pass to the south of Corby Glen, crossing the ECML north of Swayfield before crossing the 400kV 4VK OHL. However, the complexity of connecting into the proposed WMEL-A Substation in this area means that there are several OHL alignments under consideration as reflected in the graduated swathe, subject to further engagement, design development, and assessment. With WMEL-AZ2.C as the preferred Siting Area, to the west of Corby Glen, the new OHL could enter and exit the proposed substation using a north or south arrangement, with the alignment avoiding the residential properties and woodland blocks in the area with the option to pass the north or south of them as the OHL continues southwest towards South Witham.

10.3.14 The alignment could then cross the A1 to continue west passing north or south of the Scheduled Monument (Remains of Knights Templar preceptory, watermill and fishpond) between North and South Witham.

Figure 10-6 – Section 3 (Irnham to North and South Witham)

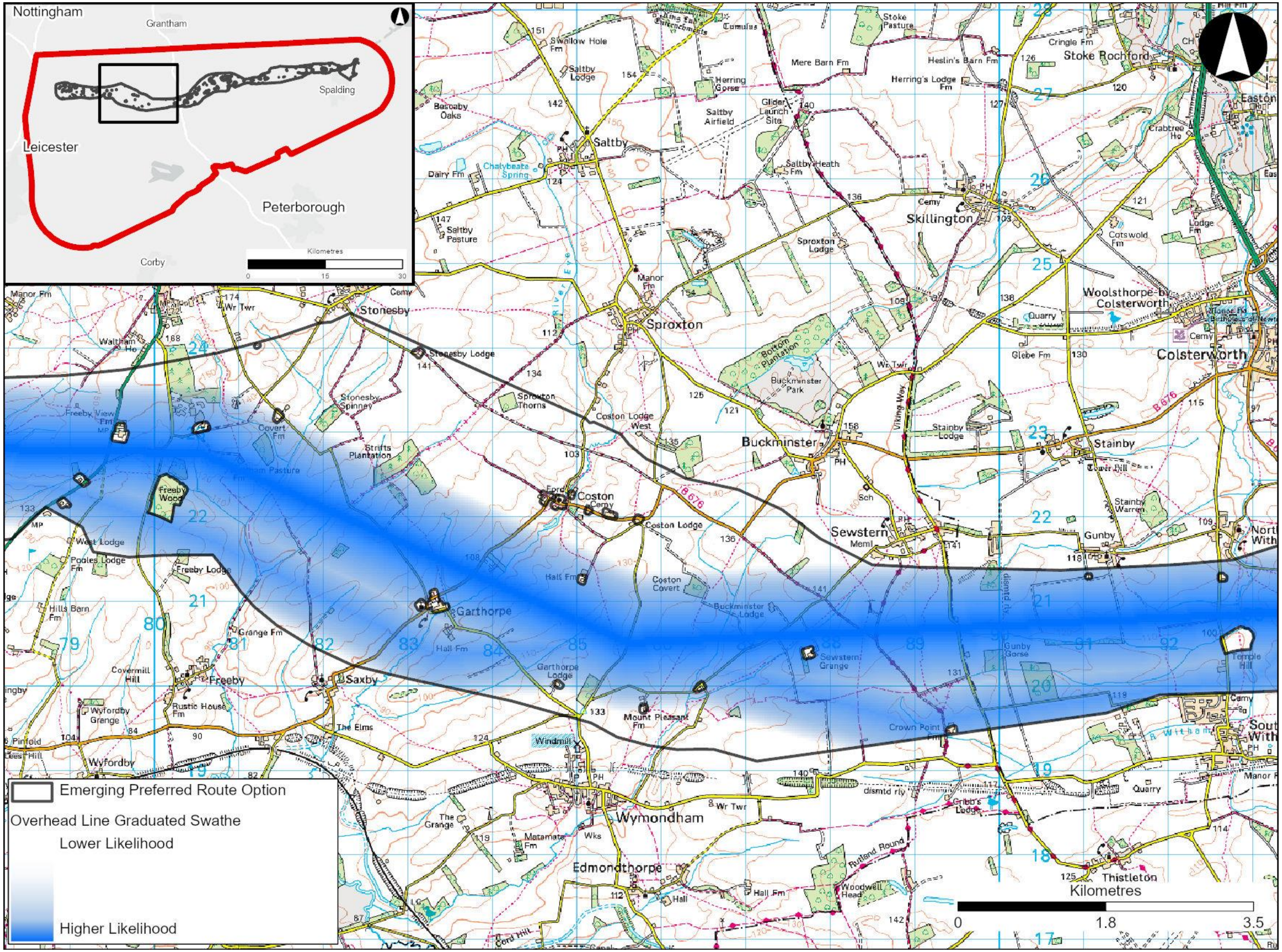


Section 4 – North and South Witham to the A607

10.3.15 This section of the emerging preferred Route Option runs from point between North and South Witham to the A607, south of Waltham on the Wolds, as shown in **Figure 10-7**.

10.3.16 From between North and South Witham the OHL would continue west, from either north of south of the Scheduled Monument (Remains of Knights Templar preceptory) through a relatively unconstrained area with alignment options converging to the single line around 1.3km north of Wymondham. Then routeing northwest the OHL passes either north or south of Garthorpe and crosses the B676. In doing so, the route would seek to maintain separation from potential visual receptors aiming to maintain the shortest and most direct route possible through to reduce both potential landscape impacts and increased costs. The route would then continue west crossing the A607 at one of two possible locations south of Waltham on the Wolds and north of Melton Mowbray Golf Club, subject to further engagement, design development and assessment to confirm preferred alignment from the east and the approach to Ab Kettleby.

Figure 10-7 – Section 4 (North and South Witham to the A607)

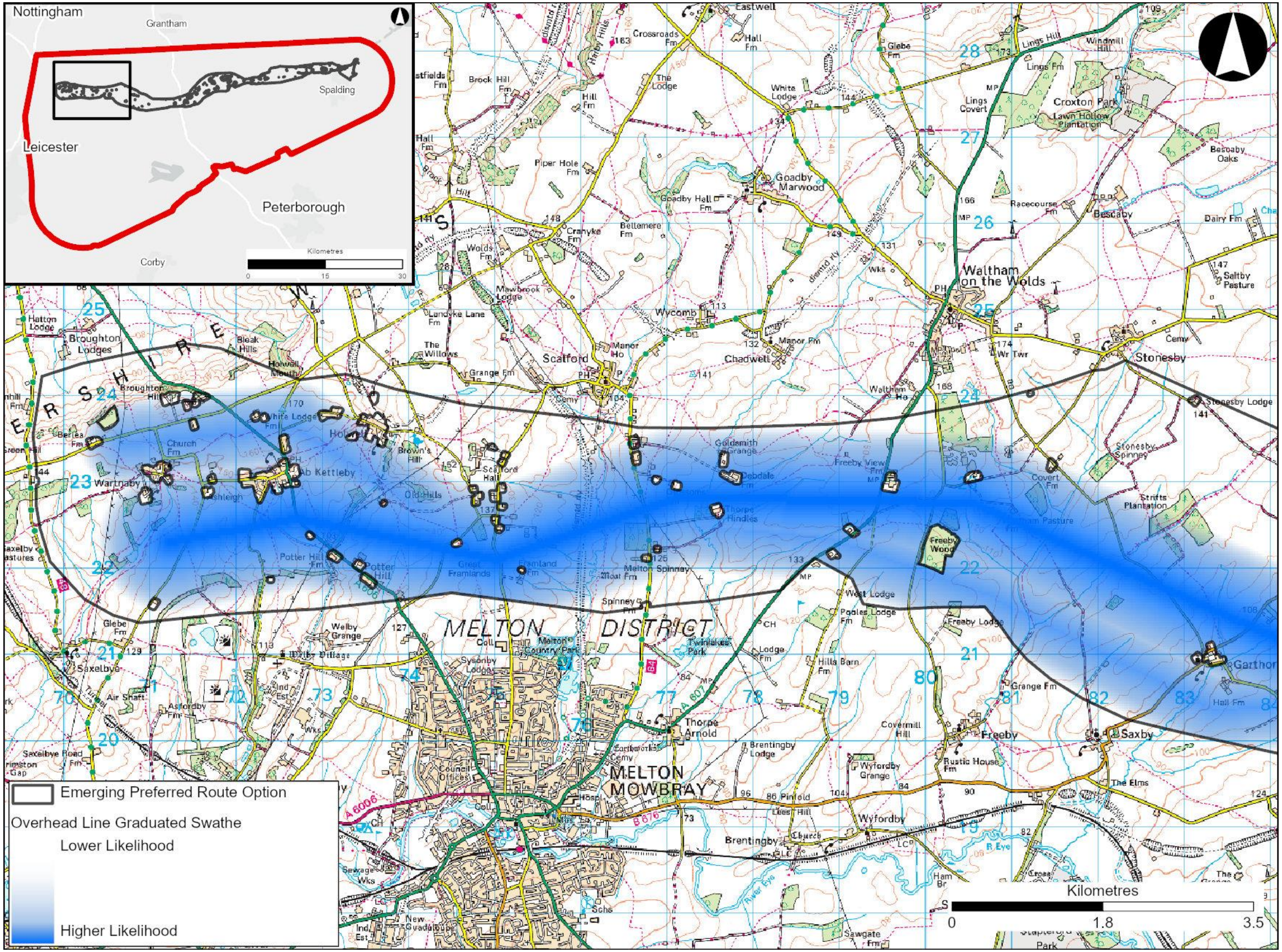


Section 5 –The A607 to WMEL-B

10.3.17 This section of the emerging preferred Route Option continues west from the potential crossing locations of the A607 south of Waltham on the Wolds to the WMEL-B substation at the existing 400kV ZA OHL, as shown in **Figure 10-8**.

10.3.18 From the crossing of the A607, the OHL would then continue west, crossing the 132kV TZ OHL and avoiding residential properties before both alignment options converge to the single alignment approximately between Melton Spinney Road and Scalford Road. The OHL would cross Scalford Road and continue to the south of the individual properties along that road, around 1km north of properties in the north of Melton Mowbray. To the west of Scalford Road, in the approach to Ab Kettleby, there are residential properties and woodland features that can be avoided and/or their impacts can be minimised by either aligning north or south of Ab Kettleby and Wartnaby, to connect to the WMEL-B substation and the existing ZA 400kV OHL west/southwest of Wartnaby.

Figure 10-8 – Section 5 (A607 to WMEL-B)



10.4 Summary of the Graduated Swathe

10.4.1 The graduated swathe represents the current thinking on where the Project infrastructure is more likely to be located based on the current appraisal of constraints that have been identified. This will be further informed by feedback received during non-statutory consultation (as part of Step 9), so there is potential for the current indicated preference to move within the graduated swathe. In some instances, feedback may indicate that the preference should be to find a pathway through areas currently being shown as less preferable.

10.5 Next Step – Undertake non-statutory consultation (Step 9)

10.5.1 Where there is more than one potential alignment option with the same probability of having infrastructure in part of the corridor, non-statutory consultation responses and further assessment can influence the final selection of the preferred alignment. This will be addressed at the next stage of the Project. Feedback received during non-statutory consultation will also be summarised within a consultation report during the next stage of the Project.

10.5.2 The feedback will be fully considered through the development of the Project, whilst maintaining the principles used to develop the current graduated swathe, such as the avoidance, where practicable, of areas of highest constraint and amenity.

11. Summary and Next Steps

11.1 Summary of Options Identification and Selection Process (Stage 2)

11.1.1 A detailed Options Identification and Selection Process (Stage 2) (as defined in **Chapter 4**) has been undertaken to identify the emerging preferred corridor and graduated swathe for a new 400kV OHL electricity transmission connection to the new 400kV transmission substation infrastructure at Weston Marsh (as identified as part of the Grimsby to Walpole Project), and identify proposed Siting Zones and Siting Areas for WMEL-A and WMEL-B substations to connect the new OHL to the existing 4VK and ZA lines respectively.

11.1.2 Five Preliminary Corridors were identified, divided into Segments, and appraised (**Chapter 6**). The Preliminary Corridors were then subsequently refined and preferred corridor and Segments selected to identify end-to-end Route Options, and less preferred Segments and corridors discontinued. Five end-to-end Route Options were identified from the remaining preferred corridor Segments which were then comparatively appraised against each other (**Chapter 7**), and high-level indicative costs estimated (**Chapter 8**), to allow for the identification of an emerging preferred Route Option (**Chapter 9**).

11.1.3 To summarise, the emerging preferred Route Option comprises the following (as shown in **Chapter 9**, **Figure 9-2**):

- Segments 2a, 2b, 2c, 2d, 2e: Extends west out of Western Marsh Substation crossing the River Welland and the A16 and passing between Surfleet and Spalding. The route continues west past Haconby, crossing the A15 north of Morton, the A151 and ECML likely to the south of Corby Glen, then continues southwest crossing the A1 between North and South Witham.
- Link 2-1: Turns northwest from Segment 2e after South Witham and continues crossing the B676 past Garthorpe, towards Waltham on the Wolds.
- Segment 1g: South of Waltham on the Wolds the route extends west from Link 2-1 to the north of Melton Mowbray, crossing the A607 and A606 and passing to the north or south of Ab Kettleby connecting to the existing OHL to the west/southwest of Wartnaby.

11.1.4 Substation Siting Zones were identified where the corridors intersected the existing 400kV OHL, in which the new substations will require connection to, alongside consideration of the Horlock Rules (refer to **Section 3.6.6**). Several Siting Areas were identified within each Siting Zone and appraised using the environmental, socio-economic and technical criteria defined in **Chapter 5**. The emerging preferred Siting Areas were WMEL-AZ2.C and WMEL-BZ1.B.

11.1.5 The emerging preferred Route Option was ultimately selected to avoid, where possible, potential impacts to areas with the highest amenity value in alignment with Holford Rules 1 and 2, as well as finding a direct path in alignment with Holford Rule 3. Segments 2a, 2b, and 2c avoid the existing 400kv 4ZM OHL and the NSIPs north and south of Western Marsh. These Segments provide a direct route which is the least constrained by residential and agricultural properties, therefore resulting in the least potential visual and socio-economic impacts. Furthermore, Segment 2d and Segment 2e would allow for the Route Option to avoid complex highway crossings and the flexibility to avoid aviation constraints. Link 2-1, connecting Segment 2e with Segment 1g, reduces the need for multiple angle pylons, further minimising potential landscape and visual impacts. Link 2-1 also requires no additional rail line crossings which further reduces technical complexity. These Segments and Links provide an end-to-end corridor with the least environmental and technical constraints and were therefore identified as the emerging preferred corridor.

11.1.6 Following the identification of the emerging preferred corridor, a graduated swathe was developed. The graduated swathe is a way of showing the areas within the emerging preferred corridor where the required Project infrastructure is considered more or less likely to be located. The graduated swathe is shown with a colour shading, with the depth of shading indicating NGET's emerging view of where infrastructure would be better located based on the work undertaken to date. Darker shading indicates more likely locations, whilst lighter shading indicates less likely locations.

11.1.7 The use of the graduated swathe is intended to emphasise the preliminary nature of judgements made to date in respect of infrastructure locations within the emerging preferred corridor. This will be informed by feedback received during non-statutory consultation and, therefore, there is the potential for the final design of the Project to extend beyond the graduated swathe. This will be fully considered through the development of the Project, whilst maintaining the principles used to develop the current graduated swathe, for instance, the avoidance of areas of highest constraint and amenity.

11.2 Non-statutory Consultation

11.2.1 This report will be used as part of the non-statutory consultation and engagement with key stakeholders, including landowners and the public. The non-statutory consultation is scheduled to take place in summer 2025.

11.2.2 During the non-statutory consultation, feedback will be gathered from non-statutory consultation events, feedback forms and emails on the preferences identified in this report and on the graduated swathe, which highlights where Project infrastructure is more or less likely to be located.

11.2.3 The emerging preferred corridor identified in this report, in conjunction with the other elements of the Options Identification and Selection Process (Stage 2), will be kept under review throughout the development of the Project.

11.3 Analysing Non-statutory Consultation Feedback

11.3.1 The feedback from non-statutory consultation will inform the further development of the Project.

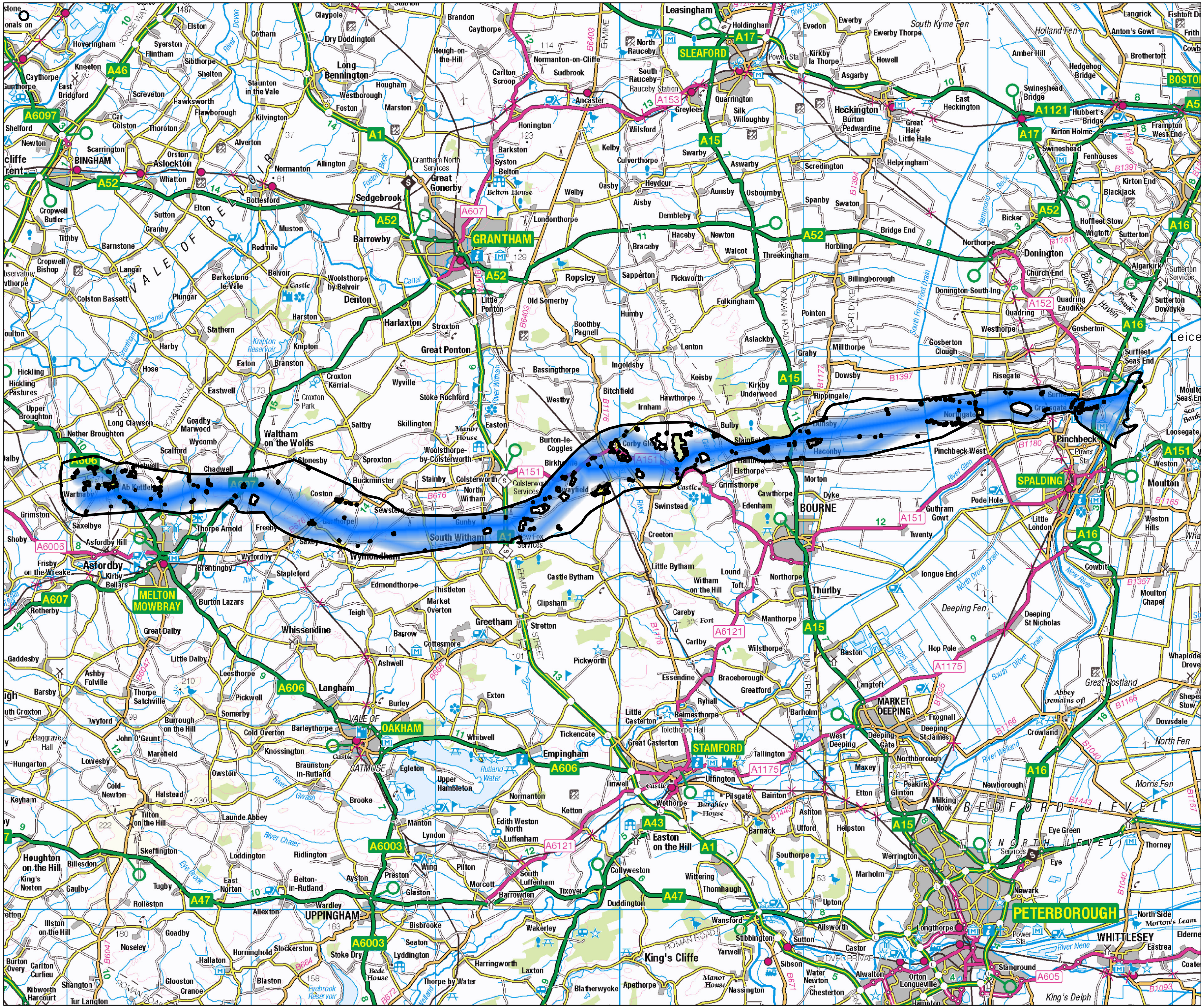
11.3.2 Information from surveys undertaken to obtain baseline data and ongoing design studies will also inform the development of the Project.

11.4 Defined Proposal and Statutory Consultation (Stage 3)

11.4.1 Following the completion of non-statutory consultation, including the analysis of non-statutory consultation feedback, NGET will progress the Defined Proposal and Statutory Consultation Stage (Stage 3). As part of this, the design will be subject to a statutory Environmental Impact Assessment, further statutory consultation, and iterative design development prior to submission of the application for a DCO.

Appendix A Graduated Swathe Drawings

nationalgrid



Emerging Preferred Route Option

Lower Likelihood

Higher Likelihood

A3

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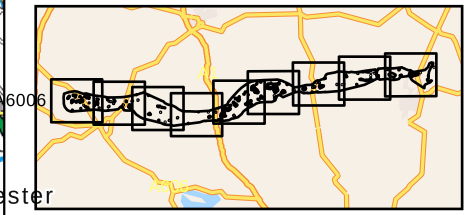

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Ordnance Survey

Metres

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Client

National Grid Electricity Transmission

Project Name

Weston Marsh to East Leicestershire

Drawing Title

Overhead Line Graduated Swathe Overview

Scale at A3

1:200,000

Role

Suitability

For Information

Project Number: **07599**

Rev: **P01**

Drawing Number

07599-AEAR-ENV-DWG-0001

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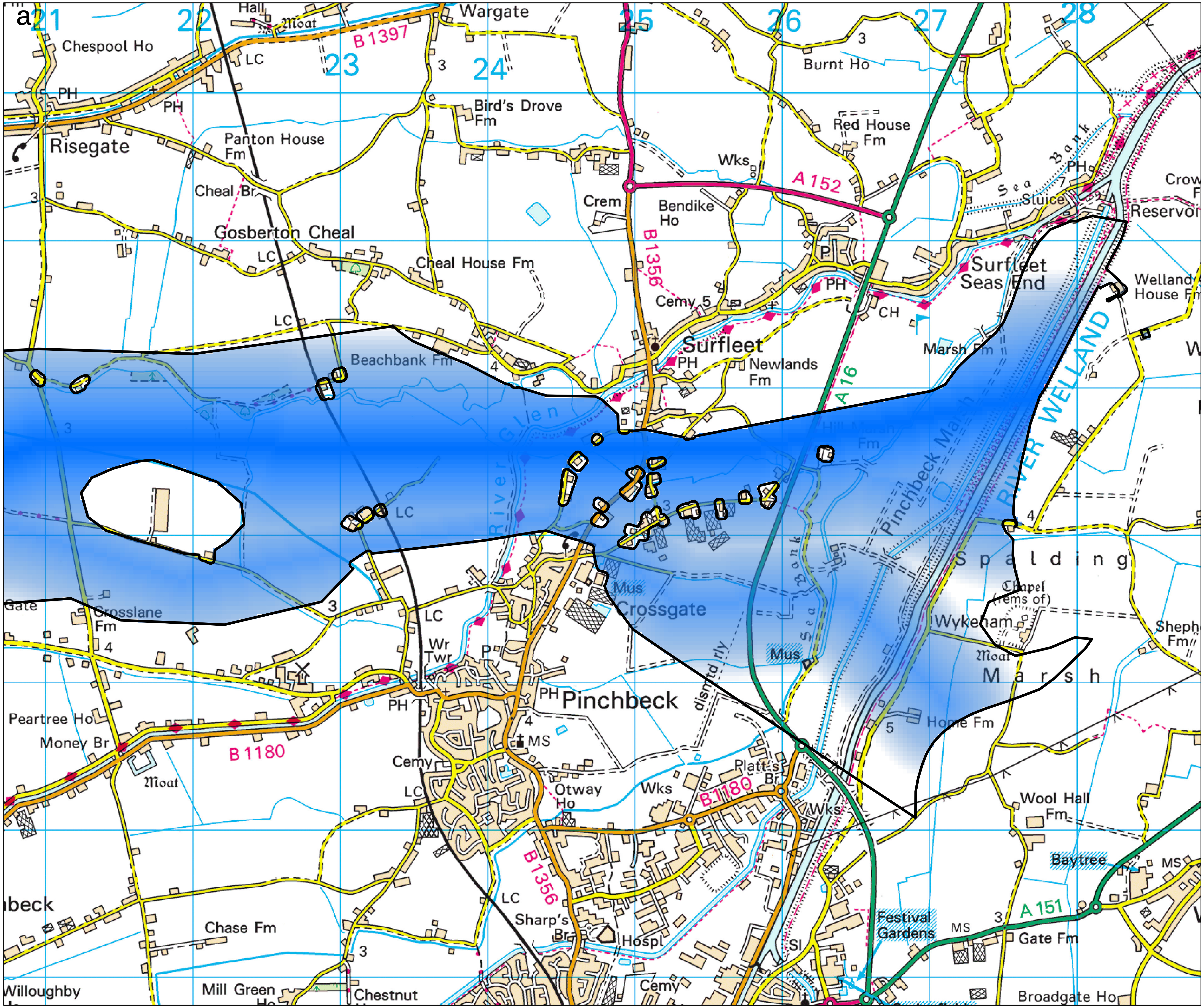

Emerging Preferred Route Option

Overhead Line Graduated Swathe

Lower Likelihood

Higher Likelihood

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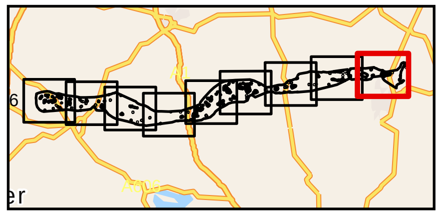

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Drawing Title
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Role

Suitability
For Information

Project Number **07599** Rev **P01**

Drawing Number
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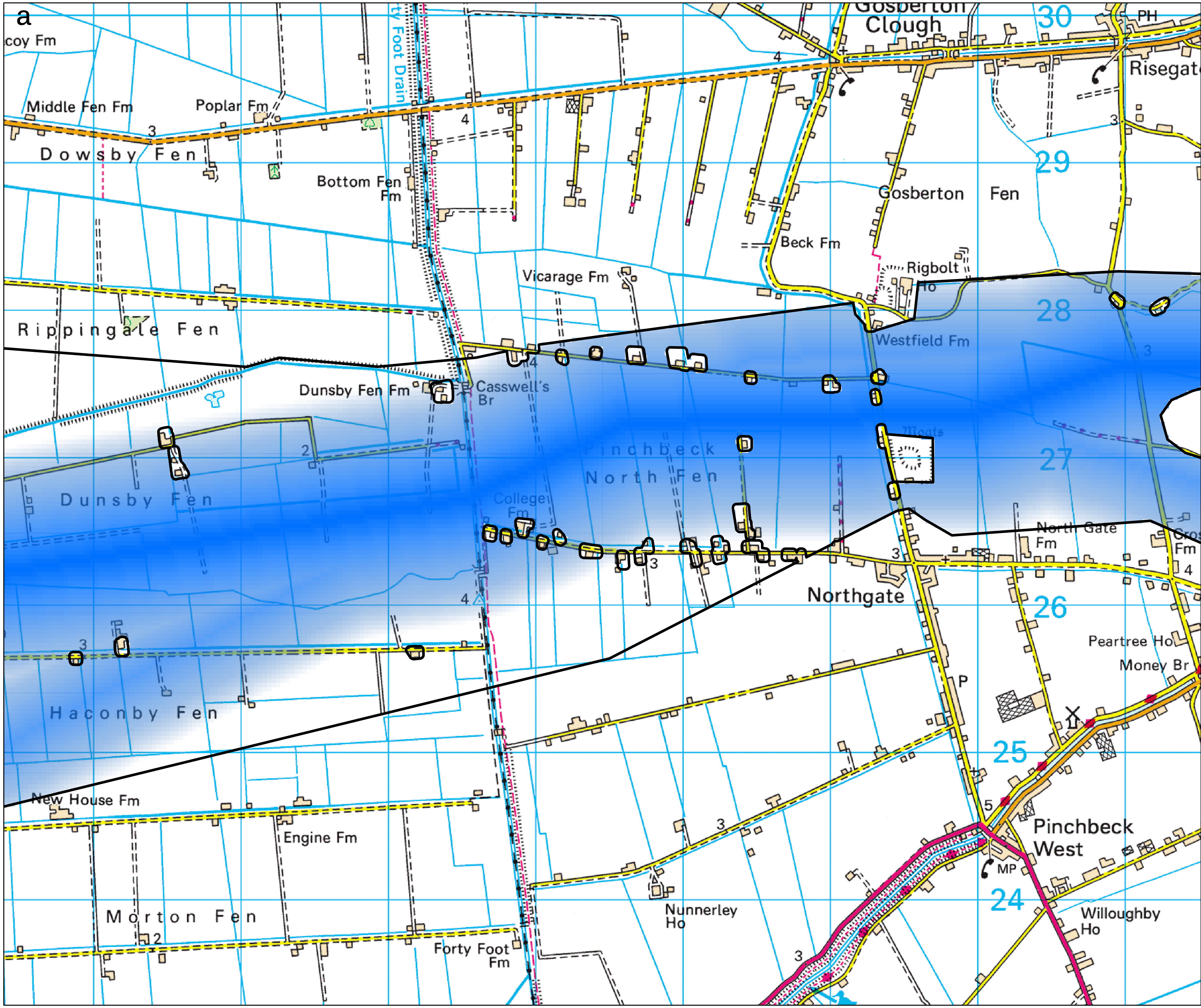

Emerging Preferred Route Option

Overhead Line Graduated Swathe

Lower Likelihood

Higher Likelihood

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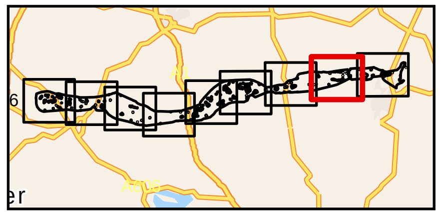

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Client

National Grid Electricity Transmission

Project Name

Weston Marsh to East Leicestershire

Drawing Title

Overhead Line Graduated Swathe Sheet 2 of 9

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Role

Suitability

For Information

Project Number

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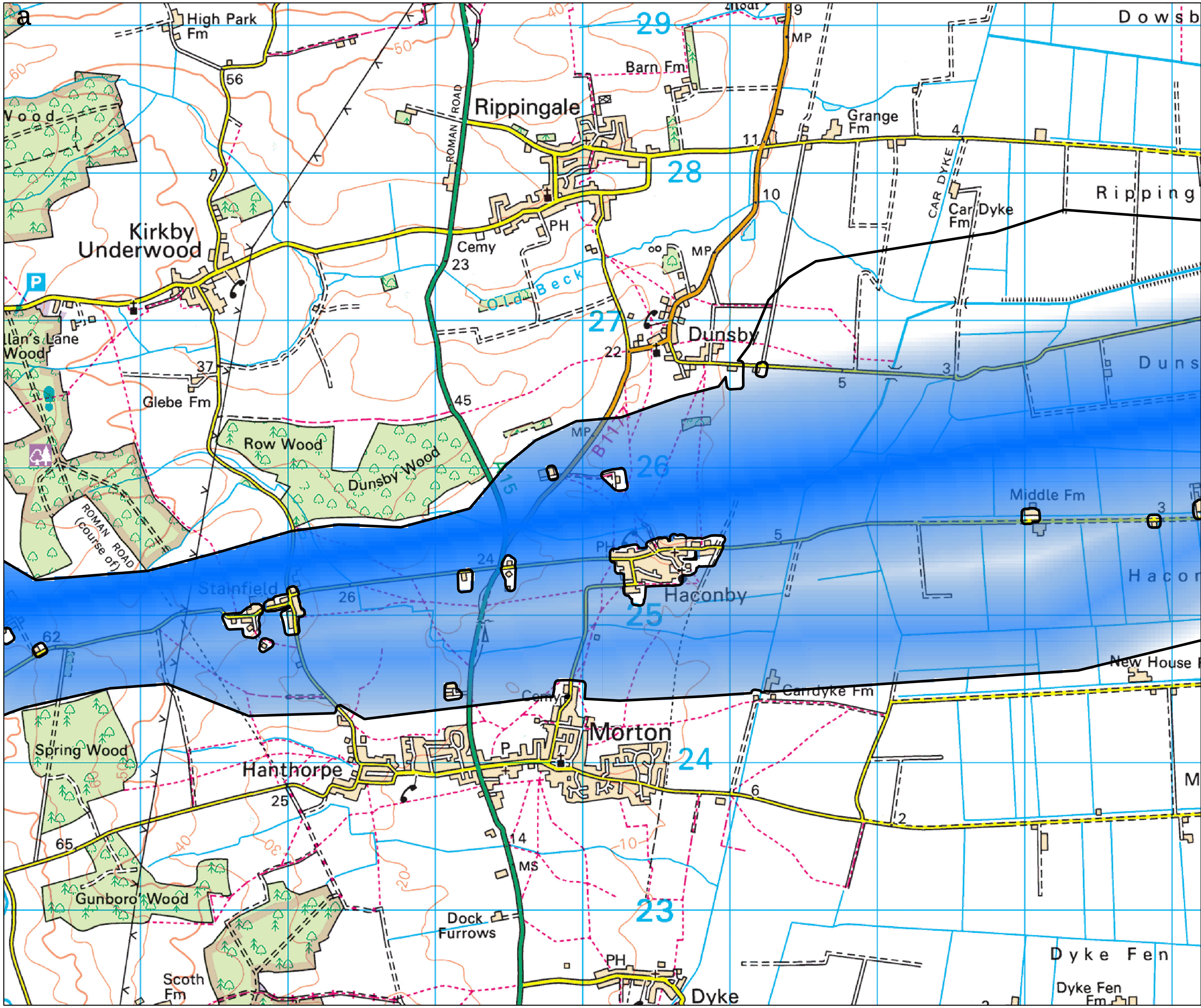

Emerging Preferred Route Option		A3

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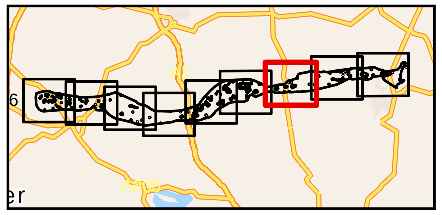
Overhead Line Graduated Swathe

Lower Likelihood

Higher Likelihood



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Role

Suitability
For Information

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07599	P01

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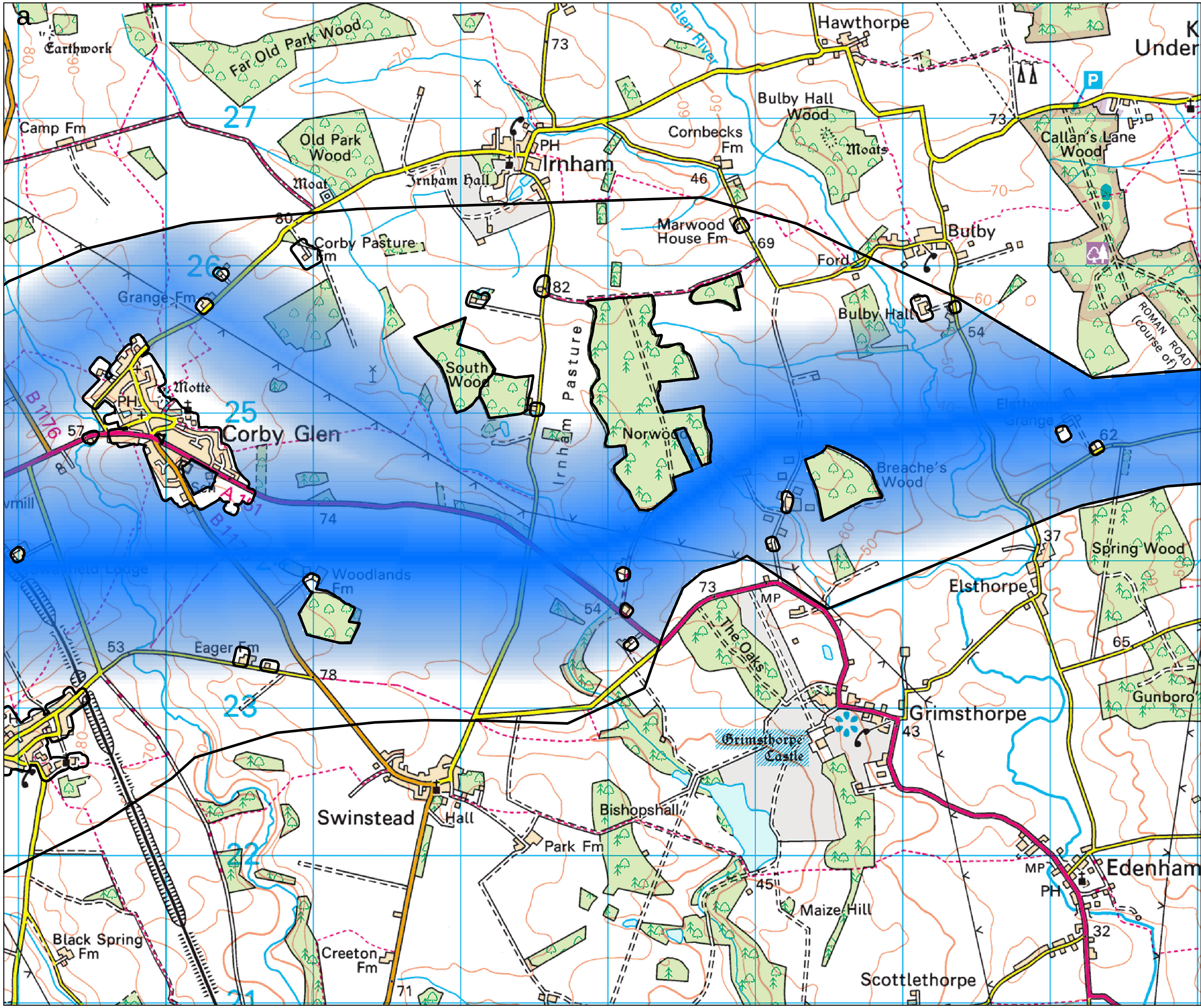

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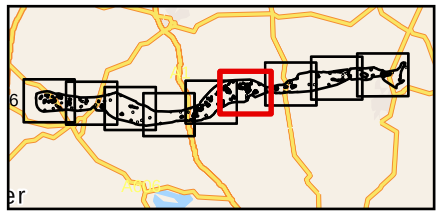
Emerging Preferred Route Option

Overhead Line Graduated Swathe

Lower Likelihood

Higher Likelihood



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National Grid Electricity Transmission

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Role

Suitability
For Information

Project Number	Rev
07599	**P01**

Drawing Number
07599-AEAR-ENV-DWG-0005

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