Eastern Green Link 3 (EGL 3) and Eastern Green Link 4 (EGL 4)

Corridor and Preliminary Routeing and Siting Study Report

April 2024

nationalgrid

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Table 0-1 – Abbreviations

Abbreviations	Definition
AC	Alternating Current
AIL	Abnormal Indivisible Load
AONB	Area of Outstanding Natural Beauty
BMV	Best and Most Versatile
CPRSS	Corridor Preliminary Routeing and Siting Study
CROW	Countryside and Rights of Way
DC	Direct Current
DCSS	Direct Current Switching Station
DNO	Distribution Network Operator
DTS	Distributed Temperature Sensing
EGL	Eastern Green Link
EPS	European Protected Species
ESO	Electricity System Operator
FEED	Front-End Engineering Design
FES	Future Energy Scenarios
FRA	Flood Risk Assessment
GIS	Geographical Information Systems (or Gas Insulated Switchgear dependent upon context)
GW	Gigawatt
HDD	Horizontal Directional Drilling
HGV	Heavy Goods Vehicle
LCA	Landscape Character Assessment
LCT	Landscape Character Type(s)
MHWS	Mean high-water springs
MLWS	Mean low water springs
MMO	Marine Management Organisation
MPA	Mineral Planning Authority
MW	Megawatt
NCA	National Character Area

Abbreviations	Definition
NCN	National Cycle Network
NETS	National Grid Electricity Transmission System
NGED	National Grid Electricity Distribution Plc
NGET	National Grid Electricity Transmission Plc
NL	National Landscape (formerly Area of Outstanding Natural Beauty (AONB))
NPS	National Policy Statement
OfGEM	Office of Gas and Electricity Markets
OS	Ordnance Survey
PRoW	Public Right of Way
RAG	Red, Amber, Green
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SEC	Sealing End Compound
SGT	Super Grid Transformer
SINC	Site of Importance for Nature Conservation
SPA	Special Protection Area
SPEN	Scottish Power Energy Networks
SQSS	Security and Quality of Supply Standard
SSEN-T	Scottish and Southern Electricity Networks Transmission
SSSI	Site of Special Scientific Interest
TCM	Trenchless Construction Method
WFD	Water Framework Directive

Table 0-2 – Glossary of Terms

Term	Definition
2WS	A 400 kV double circuit overhead line transmission route from Spalding Substation, in Spalding, to a Tee-Point along the 4ZM 400 kV double circuit overhead line transmission route.
4ZM	A 400 kV double circuit overhead line transmission route from West Burton Substation in Bassetlaw to the Burwell Substation in East Cambridgeshire via the Walpole Substation in Kings Lynn and West Norfolk.
Alternating Current (AC) electricity transmission	Electric power transmission in which the voltage varies in a sinusoidal fashion. This is the most common form of electricity transmission and distribution.
Converter Station	Facility containing specialist equipment (some indoors and some potentially outdoors) for the purposes of converting electricity from AC to DC or DC to AC.
Corridor	A broad area, within which the new transmission infrastructure (underground cables) could be routed.
Direct-buried	Direct burial of cables involves excavating trenches into which the cables are installed on a bed of selected sand or cement bound sand with the use of winches or power rollers. Sheet piling or timber is used to support the sides of the trenches.
Direct Current (DC) electricity transmission	Electric power transmission in which the voltage is continuous. This is most commonly used for long distance point to point transmission
Direct Current Switching Station (DCSS)	Direct current switching station (DCSS) provides a more robust and flexible infrastructure for high-voltage direct current transmission, ensuring that power flow can be maintained. Helping to improve system performance and flexibility, especially when dealing with varying load demands or maintenance requirements.
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 DNOs in proximity to the Project are Northern Power Grid (NPG), National Grid Electricity Distribution Plc (NGED) and UK Power Networks (UKPN).
Easement	The right to use the land of another party for a specified purpose. In the context of electricity transmission, easements are often used to grant rights to install and retain equipment such as overhead lines or buried cables across the land of a third party.
Eastern Green Link 3 (EGL 3)	Located between Aberdeenshire in Scotland and Norfolk in England, the Project comprises major reinforcement of the electricity transmission system to meet the requirements of generation connections in Scotland. The Project is expected to comprise of the following component projects: Scottish Onshore, Marine and English Onshore. It is expected to comprise new

Term	Definition
	converter stations, HVDC and HVAC underground cables and new substations.
Eastern Green Link 4 (EGL 4)	Located between Fife in Scotland and Norfolk in England, the Project comprises major reinforcement of the electricity transmission system to meet the requirements of generation connections in Scotland. The Project is expected to comprise of the following component projects: Scottish Onshore, Marine and English Onshore. It is expected to comprise new converter stations, HVDC and HVAC underground cables and new substations.
The Project	The terrestrial components of EGL 3 and EGL 4 located within England. The Project is expected to comprise underground HVDC cables from the landfall location along the east coast of England to proposed converter stations. The proposed converter stations will be connected to a proposed new substation by underground HVAC cables. Where a three-ended connection is required a proposed new switching station (a direct current switching station (DCSS)) will connect to a single proposed converter station by underground HVDC cables before connecting into a new substation proposed by the NGET Grimsby to Walpole Project by new underground HVAC cables.
Electricity System Operator (ESO)	The 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 ESO when they wish to connect to the network. The ESO 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 400 kV and 275 kV 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 ESO, ensuring power can be moved from where it is generated to demand centres across 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.
English Onshore Component	All components of the Project between the electricity transmission connection point in England and the Mean Low Water Spring (MLWS) in England.
Frac-out	The unintentional return or inadvertent loss of drilling fluids from the borehole to the ground surface from points other than its entry and exit points, during a drilling operation.
Future Energy Scenarios (FES)	Published annually by the ESO to indicate possible future power requirements and where future connections may occur across the network.

Term	Definition
Grimsby to Walpole Project	Located in the Humber and East Midlands region of England, the Grimsby to Walpole Project comprises major reinforcement of the electricity transmission system. This will allow increased north-south power flows and facilitate the connection of new sources of clean offshore power that will land on the Yorkshire coast. The Grimsby to Walpole Project is expected to comprise a new overhead electricity transmission line and may include the use of underground cables. There will be associated works to connect the new route into substations at either end, and to alter existing infrastructure crossed by the route, including crossings of existing 400 kV transmission lines.
Holford Rules	A series of guideline rules around overhead line routeing. The guidelines were initially developed in 1959 and 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 provide a set of design criteria that have stood the test of time and become 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 guideline rules for the siting and design of new substations, or substation extensions, converter stations and includes 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 NGET, 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 substation infrastructure.
Landfall	Where the offshore (submarine) cables come ashore. It is the interface between the onshore and offshore component of the Project.
Landfall Study Area	A search area of 1 km around each of the identified preliminary landfall areas and associated preliminary offshore subsea cable routes.
Marine Scheme	All components of the Project within the marine area between mean high-water springs (MHWS) Scotland and MHWS England.
National Grid Group	Throughout this Report the term NGET is used to refer to 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 System Operator (ESO)	National Grid ESO is the Electricity System Operator for the whole of Great Britain. National Grid ESO ensures electricity is always where it is needed, and the network remains stable and secure in its operation. Generators apply to National Grid ESO when they wish to connect to the network and National Grid ESO leads the work to consider how the network may need to evolve to deliver a cleaner, greener future.

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

Term	Definition
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 recently rebranded as National Grid Electricity Distribution. NGED is a DNO operating in proximity to the Project.
National Grid Electricity Transmission Plc (NGET)	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. NGET 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 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; Electricity Networks[1].
National Site Network	Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) in the UK no longer form part of the EU's Natura 2000 ecological network. The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 have created a national site network on land and at sea, including both the inshore and offshore marine areas in the UK. The national site network includes: • Existing SACs and SPAs; and • New SACs and SPAs designated under these Regulations. Designated Wetlands of International Importance (known as Ramsar sites) do not form part of the national site network. Many Ramsar sites overlap with SACs and SPAs and may be designated for the same or different species and habitats. All Ramsar sites remain protected in the same way as SACs and SPAs.
Northern Power Grid (NPG)	A power distribution company operating in northeast England and Yorkshire. NPG is a DNO operating in proximity to 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 NGET'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.

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

Term	Definition
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.
Scottish Onshore Component	All components of the Project between connection point and MLWS in Scotland.
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 (NETS).
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 which a converter station, substation or switching station could be sited.
Siting Zone	An area of land 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.
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.
System 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

Term	Definition
	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.
Tee	The point at which two electrical routes connect together.
Transition Joint Bay	Buried concrete pad with joint connecting offshore and onshore cables located above MHWS.
Three-ended connection	A three-ended connection is use of an additional circuit to build-in extra resilience into the electricity transmission network. Most HVDC electricity links are two-ended allowing power to be transported from where it is being generated to where it is needed. The control systems of a HVDC electricity link allow proportional and directional control of power flow which can be altered very quickly in response to network needs. The role of a third connection (circuit) is to provide additional flexibility in the network which would allow power flows to be rapidly re-routed in the event of an unplanned circuit outage thereby preventing some parts of the network becoming overloaded.
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.

EGL 3 and EGL 4 Document Control

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Executive Summary

Executive Summary

National Grid Electricity Transmission Plc (NGET) owns, builds and maintains the high voltage electricity transmission system in England and Wales. Scottish and Southern Electricity Networks Transmission (SSEN-T) and Scottish Power Energy Networks (SPEN) own, build and maintain the high voltage electricity transmission system in Scotland. In each of their geographical areas, NGET, SSEN-T and SPEN are responsible for making sure electricity is transported safely and efficiently from where it is produced to where it is needed.

Eastern Green Link 3 (EGL 3) and Eastern Green Link 4 (EGL 4) are two proposed new electrical connections being developed by NGET, SSEN-T and SPEN as part of a major programme to reinforce the electricity transmission system between Scotland and England.

EGL 3 will route between Aberdeenshire in Scotland and King’s Lynn and West Norfolk in England, and EGL 4 will route between Fife in Scotland and King’s Lynn and West Norfolk in England. Together, EGL 3 and EGL 4 will help to deliver the UK Government's Net Zero targets and the Scottish Government’s target to become Net Zero by 2045. EGL 3 and EGL 4 are independent of one another, however due to their common connection point in England these projects are being developed in parallel for the onshore cable route in England. This coordinated approach provides the opportunity to potentially reduce the extent of impact and disturbance compared to the projects being developed individually.

EGL 3 and EGL 4 will comprise Scottish Onshore, Marine and English Onshore components. A graphic for EGL 3 and EGL 4 is shown below. NGET is responsible for consenting the marine works in English waters and all onshore works in England. This report has been developed in tandem with the Marine Route Options Appraisals undertaken for EGL 3 and EGL 4 to ensure consistency. This report is written with specific regard to the English Onshore Project component of EGL 3 and EGL 4 Projects (the ‘Project’), located in the Humber, East Midlands, East of England and East Anglia regions of England.

Strategic Optioneering

The indicative location for these two new transmission reinforcements was identified through a Strategic Options Appraisal undertaken at the Strategic Proposal Stage (Stage 1)[3]. This considered a range of options for providing the necessary north-south power flows identified as being needed to accommodate the amount of generation being proposed off the eastern coast of the UK. It also identified the potential for forming a three-ended connection with the proposed Lincolnshire Connection Substations in East Lindsey being developed by the NGET Grimsby to Walpole Project.

The Grimsby to Walpole Project, being developed by NGET to reinforce the electricity transmission system to help deliver the UK Government's Net Zero targets will establish a new (wholly or largely overhead line) 400 kV transmission connection between five new substations. Two of these new substations are the two proposed Lincolnshire Connection Substations which are required to provide new points on the network where connections for customers and other planned transmission connections can be made. One of these substations is the new Walpole substation in King's Lynn and West Norfolk. This substation is a common connection point for both the EGL3, EGL4 and Grimsby to Walpole projects and the need for this new substation exists as a part of either EGL3 and EGL4 or the Grimsby to Walpole Project.

Summary of the Project

The Project will establish two new transmission connections each approximately 100 km in length between a new landfall and two new converter stations and a new 400 kV substation in the vicinity of the existing Walpole substation. The new transmission connections will comprise new underground High Voltage Direct Current (HVDC) underground cable routes, and short underground High Voltage Alternating Current (HVAC) underground cable routes.

Should there be a future requirement to connect one of the new proposed underground cable routes (for either EGL 3 or EGL 4) into an additional substation (a 'three-ended connection') then either EGL 3 or EGL 4 will establish a new transmission connection with a new converter station and a new switching station (DCSS) in the vicinity of the proposed Lincolnshire Connection Substations (LCS) in East Lindsey. The LCS is being developed by the NGET Grimsby to Walpole Project.

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 landfalls, preliminary corridors, preliminary siting zones and preliminary siting areas and the comparative assessment of these to identify NGET's proposed landfall, proposed corridor, proposed siting zones and proposed siting areas which together comprise the broad location of the new infrastructure required to meet the Project need.

This CPRSS will be used to inform the non-statutory consultation and engagement with key stakeholders, including landowners. The non-statutory consultation will take place in Spring 2024.

In summary, the component parts of the Project are as follows:

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[3] NGET'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. NGET's Approach to Consenting is detailed in Chapter 3 of this report.

- A new landfall located on the Lincolnshire coast. The landfall is the interface between the EGL 3 and EGL 4 marine elements and terrestrial elements;
- New underground HVDC cable routes, comprising the EGL 3 and EGL 4 HVDC cables, from the landfalls to two new Walpole converter stations in the vicinity of the existing Walpole substation ('the new Walpole converter stations');
- The new Walpole converter stations;
- New underground HVAC cable routes, comprising the EGL 3 and EGL 4 HVAC cables, between the new Walpole converter stations and a new 400 kV Walpole substation in the vicinity of the existing Walpole substation ('the new Walpole substation'); and
- The new Walpole substation.

Should there be a future requirement for a three-ended connection into the Lincolnshire Connection Substation, the component parts of the Project would also comprise:

- A new underground HVDC cable route, comprising either EGL 3 or EGL 4 HVDC cables, from the landfalls to one of the new Walpole converter stations via the new DCSS and new LCS converter station; and
- A new underground HVAC cable route, comprising either the EGL 3 or EGL 4 HVAC cables, between a new LCS converter station and the new LCS.

In summary, the reasons for selecting each of these as an emerging preference are as follows:

Landfalls

Three preliminary landfall study areas were identified and taken forward in the options appraisal; these were:

- Horseshoe Point, located in a rural setting north-east of the village Marsh Chapel, on the Lincolnshire coast;
- Theddlethorpe, located approximately 4.5 km north of the town of Mablethorpe on the Lincolnshire coast; and
- Anderby Creek, located both north and south of the village of Anderby Creek, on the Lincolnshire coast.

Overall, when considering all topics Anderby Creek was identified as the preferred landfall location over Theddlethorpe and Horseshoe Point. Anderby Creek offers the best opportunity for landfall installation, particularly from an ecological perspective and it poses fewer terrestrial engineering constraints. However, when considering the potential additional ecological and socio-economic effects from multiple landfalls at Anderby Creek alongside the complexities associated with marine routeing (as detailed in the Marine Routeing Appraisals undertaken for EGL 3 and EGL 4), the preference over a landfall at Theddlethorpe is reduced. The option of making landfall at Theddlethorpe has therefore been retained to be progressed at non-statutory consultation, and subject to further studies, as an alternative.

Underground Cables: Landfalls to the River Welland

The emerging preference for the underground cable connection from the landfalls to the River Welland routes around the Lincolnshire Wolds National Landscape (hereafter referred to as the 'Lincolnshire Wolds NL' and formerly known as the Lincolnshire Wolds Area of Outstanding Natural Beauty (AONB)), partially routeing within the Lincolnshire Wolds NL for a short distance north-west of Gunby Park, before continuing past Maltby le Marsh, Alford, Firsby, Frithville, Boston, and Sutterton until reaching a point south of the River Welland. The emerging preference represents the best opportunity to limit environmental and socio-economic effects and technical complexity, whilst also representing the most direct and therefore, lower cost route.

Underground Cables: River Welland to Walpole

The emerging preference for the onward underground cable connection is from the River Welland directly south-east towards the A17 at Holbeach. From Holbeach, the emerging preference would either cross the A17 before continuing to route south-east towards Tydd St Mary, or (subject to detailed studies) follow the A17 before turning south at Sutton Bridge. Routeing for both options would then continue south towards an area north of West Walton. This represents the best opportunity to limit environmental and socio-economic effects (in part by limiting the length) and technical complexity whilst also representing the most direct and least cost route. Retaining route options at this stage also allows for further design flexibility at later stages of the Project.

Walpole

The emerging preference for the new Walpole substation is located within the preferred siting zone to the north of Walton highway and West Walton. The proposed siting area of the new Walpole substation (south-east of the preferred siting zone) represents the greatest opportunity to limit the extent of environmental effects of overhead line deviations of the existing 4ZM 400 kV overhead line, and reduces technical complexity during construction and operation. It also represents an opportunity to limit the length of the overhead line connection for the proposed Grimsby to Walpole Project. The emerging preference for the new Walpole converter stations are located within the preferred siting zone. The proposed siting zone of the new Walpole converter stations represents the greatest opportunity to limit the extent of environmental effects of both the new converter stations and new substation, reduces the technical complexity during construction and operation and represents the opportunity to limit the length of the HVDC underground cables for the Project (from the landfalls) and the HVAC underground cables for the Project between the new Walpole converter stations and the new Walpole substation.

LCS Converter Station and DCSS

Should there be a future requirement for a three-ended connection into one of the proposed 400 kV LCS (proposed by the Grimsby to Walpole Project) then the emerging preference for siting a new converter station and DCSS near the proposed LCS would be north-east of Bilsby. This represents the best opportunity to limit potential landscape and visual effects between the two projects, help to reduce the potential for other environmental and socio-economic effects whilst minimising the length of connecting HVAC underground cables for the Project and the technical complexity during construction and operation.

Graduated Swathe

A ‘graduated swathe’ has been identified within the emerging preferences. The graduated swathe is a way of showing the areas within the emerging preferences where the required permanent 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 best 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 corridor, siting zones and siting areas. The graduated swathe represents the current thinking on where the Project infrastructure may be located. 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 and emerging preferences. 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.

Next steps

During non-statutory consultation, NGET will be inviting feedback from landowners, local communities and stakeholders about our work to date, the proposed corridor and graduated swathe and matters that they would like us to consider as we develop our proposals in more detail. The feedback from non-statutory consultation, along with information from proposed surveys to supplement our baseline data and ongoing design studies will inform the further development of the Project. The final proposed design will be subject to Environmental Impact Assessment, statutory public consultation, and design development prior to submission of the application to the Planning Inspectorate for a Development Consent Order.

1. Introduction

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 is responsible for making sure electricity is transported safely and efficiently from where it is produced to where it is needed and for developing upgrades to the network as agreed with the industry regulator, the Office of Gas and Electricity Markets (OfGEM).

1.1.2 The National Grid Electricity System Operator (ESO) controls and operates the high voltage electricity transmission system in England and Wales. National Grid ESO is a legally separate business, balancing electricity supply and demand to ensure homes and businesses in Great Britain have the electricity they need 24/7. It is currently proposed that the ESO will become a wholly separate entity in 2024 and will no longer form part of the National Grid Group of companies. The ESO 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 7,250 km of overhead lines and a further 1,450 km of underground cable, operating at 400 kilo volts (kV) and 275 kV. The 275 kV grid was developed in the 1950s to provide a national electricity transmission system, and then developed further from the mid-1960s, at 400 kV to increase its power carrying capacity. The overhead lines and underground cables connect around 300 substations to form a highly interconnected network. The substations provide points of connection to the local distribution networks, which operate at voltages from 132 kV down to 240 V (the voltage at which electrical 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 East Midlands, East of England and East Anglia regions of England.

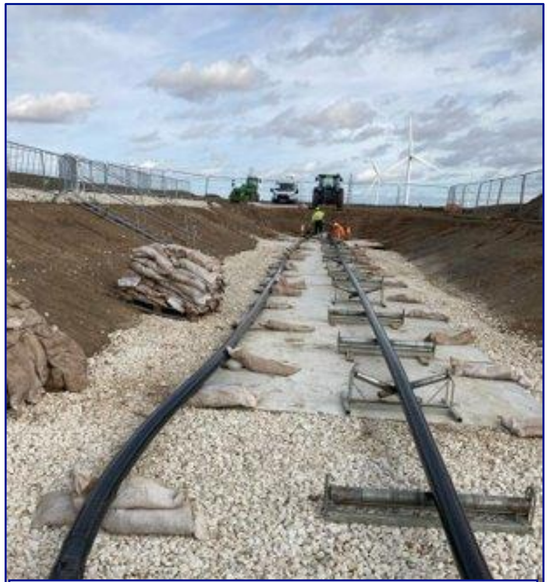
1.1.4 Example images of NGET's transmission system are shown in **Figure 1-1**.

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

Converter Station - North Sea Link - operational

Substation - operational

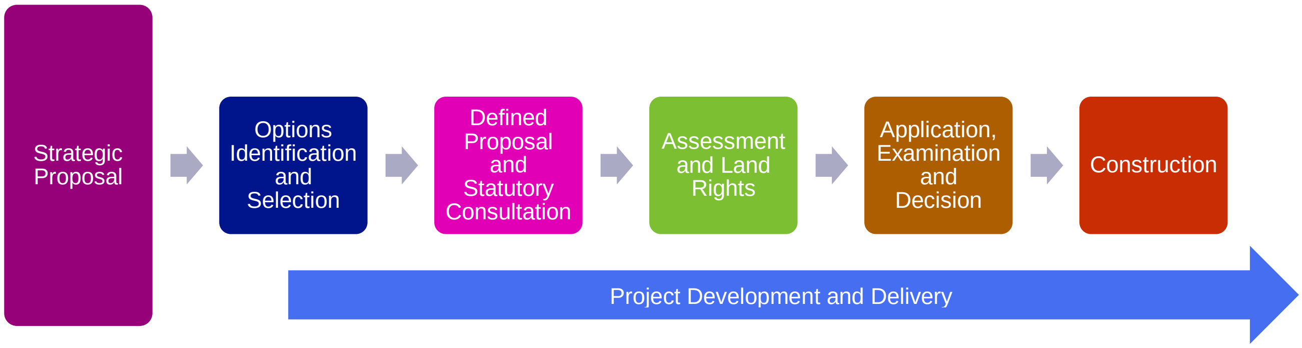
Overhead Line - operational



High Voltage Direct Current (HVDC) Underground Cables – in construction

1.1.5 NGET's Approach to Consenting[4] sets out how NGET seeks to develop, consent, and ultimately deliver its major electricity transmission reinforcement projects in an economic, efficient and co-ordinated manner. The approach is based on these projects being Nationally Significant Infrastructure Projects (NSIP), should section 35 directions be granted, and therefore following the Development Consent Order (DCO) consenting process, under the Planning Act 2008. The approach comprises six distinct stages, as shown in **Figure 1-2** which presents an overview of NGET's staged Approach to Consenting. The Approach to Consenting is explained in more detail in **Chapter 3** of this Report.

Figure 1-2 – NGET's Approach to Project Development and Delivery



Background and Summary of Need

1.1.6 The electricity industry in Great Britain is undergoing unprecedented change. The Climate Change Act 2008 (as amended) now commits the UK Government by law to reducing greenhouse gas emissions by at least 100% from the 1990 baseline by 2050. This 2050 target is commonly known as 'Net Zero'. The Scottish Government's target is to become Net Zero by 2045, five years ahead of the rest of the UK.

1.1.7 To achieve Net Zero, there will need to be a substantial shift away from the use of fossil fuel burning generation and towards new generating and interconnection capacity. The UK Government has set clear targets of 50 Gigawatt (GW) of offshore wind generation by 2030[5] and up to 140[6] GW by 2050. There is particular growth forecast in offshore wind capacity in Scotland[7] and the north-east of England, as well as interconnectors to and from Scotland and to and from European power grids. This will put pressure on the existing network such that reinforcement of the network in the Humber, East Midlands,

4 NGET 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 25 March 2023. The process is detailed further in Chapter 3 of this Report.

5 UK Government, (2022), British Energy Security Strategy. Available at https://www.gov.uk/government/publications/british-energy-security-strategy/british-energy-security-strategy. Accessed 25 March 2022.

6 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 25 March 2023.

7 The Crown Estate Scotland states that the offshore wind leasing round in Scottish waters (ScotWind) could result in as much as 27.6GW of new generating capacity being built over the next decade. Available at https://www.crownestatescotland.com/scotlands-property/offshore-wind/scotwind-leasing-round. Accessed 15 November 2023.

East of England and East Anglia areas has been identified as necessary to ensure optimal operation of the transmission system and reliable economic long-term supply.

1.1.8 The existing electricity transmission and distribution networks in Great Britain both operate using predominantly High Voltage Alternating Current (HVAC) systems. However, High Voltage Direct Current (HVDC) technology allows electricity to be transmitted from point to point in much larger volumes, over greater distances, with fewer transmission losses compared to an equivalent HVAC system. This flexibility brings operational benefits; however, to transmit electricity in Direct Current (DC) form, specialist electrical equipment contained within converter stations is required at either end of the transmission line to convert the power from Alternating Current (AC) to DC, or vice versa.

1.1.9 The ESO undertakes an annual Network Options Assessment (NOA), which considers options for reinforcing the transmission system and makes economic recommendations. The 2021/2022 NOA[8] recommended that network reinforcements should be developed to resolve the issues associated with network transmission boundaries B6, B7a and B8. The network transmission boundaries across the UK are shown in **Figure 1-3**[9]. These recommendations referred to the construction of two new 2 GW subsea HVDC circuits on the East Coast between Scotland and England; a new 2 GW subsea HVDC circuit between Peterhead and the South Humber region; and a new 2 GW subsea HVDC circuit between south-east Scotland (subsequently confirmed to be Fife) and the South Humber region. These new HVDC circuits, are part of the continued co-ordinated development of significant cross-border transmission routes that is needed due to the significant and increasing levels of North-South power flows.

1.1.10 In July 2022 the ESO published the Pathway to 2030 Holistic Network Design (HND) report[10] and the NOA 2021/22 Refresh[11]. The HND helps to unlock the UK Government's ambition for 50 GW of offshore wind by 2030, by setting out a single, integrated transmission network design approach that supports large scale delivery of electricity generated from offshore wind, to where it is needed across Great Britain. The NOA 2021/2022 Refresh forms part of the suite of documents that make up the HND, replaces the 2021/2022 NOA and incorporates the recommended offshore network design set out in the HND. The ESO’s HND and 2021/2022 NOA Refresh restated the recommendations for development of two new 2 GW subsea HVDC circuits on the East Coast between Scotland and South Humber region.

1.1.11 The ESO is now engaged in the HND Follow Up Exercise, which is currently envisaged to be published in 2024.

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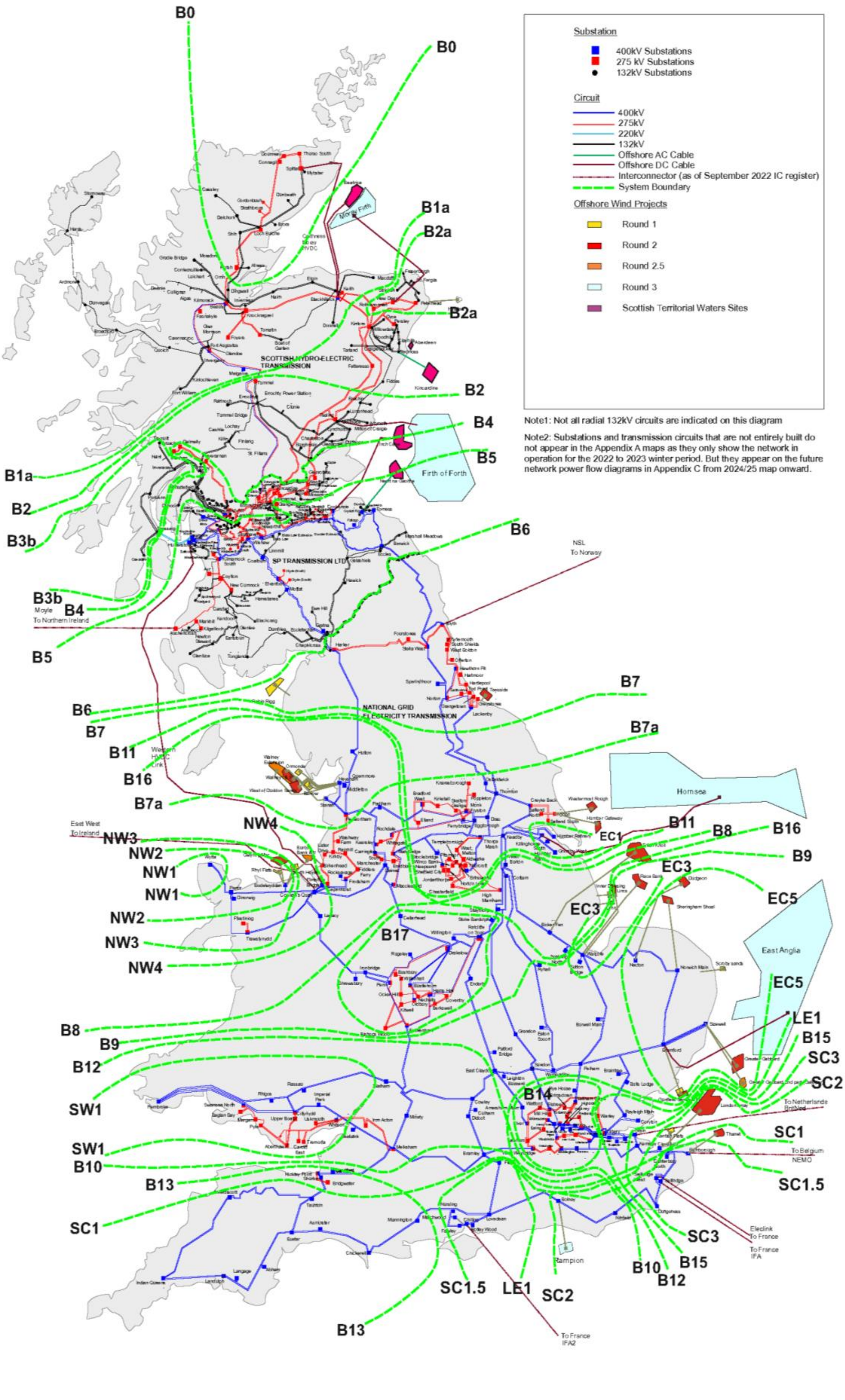
8 Network Options Assessment 2021/22, National Grid ESO (2022) Available at https://www.nationalgrideso.com/document/233081/download. Accessed 08 June 2022.

9 National Grid, (2017), Electricity Ten Year Statement 2017. Available at https://www.nationalgrid.com/sites/default/files/documents/ETYS%202017%20Appendix%20A.pdf. Accessed 08 June 2022.

10 National Grid ESO. (2022). Pathway to 2030. A holistic network design to support offshore wind deployment for net zero. National Grid ESO (2022) https://www.nationalgrideso.com/future-energy/pathway-2030-holistic-network-design Accessed 08 June 2022.

11 Network Options Assessment 2021/22 Refresh, National Grid ESO (2022) Available at https://www.nationalgrideso.com/document/262981/download. Accessed 08 September 2022.

Figure 1-3 – Network Transmission Boundaries



1.1.12 Following the need for the two new 2 GW subsea HVDC circuits on the East Coast between Scotland (Peterhead and Fife) and South Humber region identified by the ESO, NGET is working jointly with the Transmission Owners (TO) in Scotland to further develop the two new electrical connections: Eastern Green Link 3 (EGL 3) and Eastern Green Link 4 (EGL 4) referred to as HVDC Links. Scottish and Southern Electricity Networks Transmission (SSEN-T), operating under licence as Scottish Hydro Electric Transmission plc, is the TO for Northern Scotland and Scottish Power Energy Networks (SPEN) is the TO for the central belt and South of Scotland. The licence areas for NGET, SSEN-T and SPEN are shown on **Figure 1-4**. SSEN-T and SPEN own, build and maintain the high voltage electricity transmission system within their respective regions of Scotland. NGET is responsible for consenting the offshore works in English waters and all onshore works in England.

Figure 1-4 – Transmission Operator Licence Areas

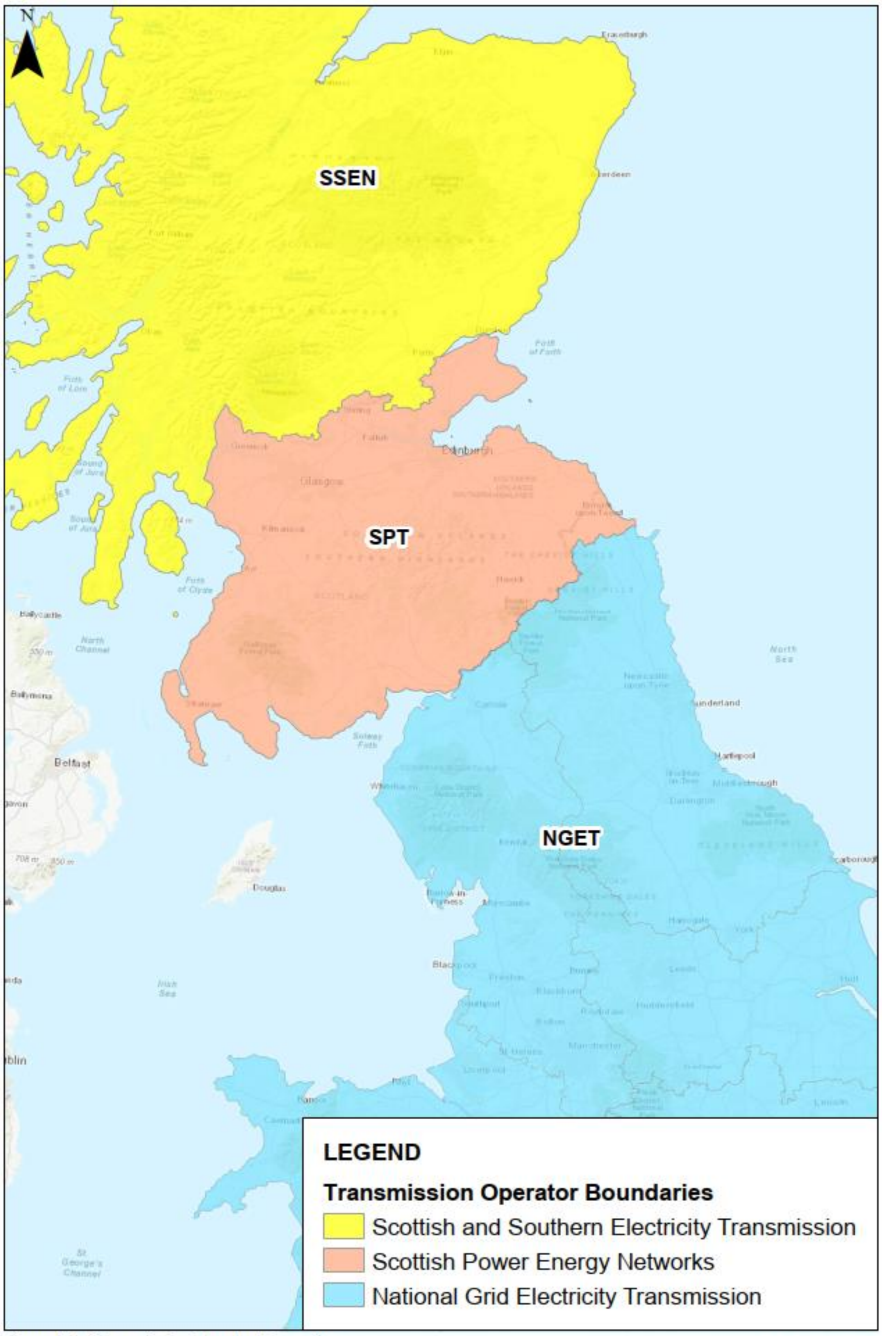


Figure 1- 4 –Transmission Operator Licence Areas

SCALE: 1:2,750,600 0 30 60 km

1.1.13 These HVDC Links will form part of a major programme of reinforcement of the electricity transmission system to accommodate substantial power flows between Scotland and England to meet the requirements of generation connections in Scotland, helping take power generated from low-carbon sources to areas of consumer demand. EGL 3 and EGL 4 are independent of one another, however due to their connection points these projects are being developed in parallel. This coordinated approach provides the opportunity to potentially reduce the extent of impact and disturbance compared to the projects being developed individually.

1.1.14 Following the ESO's recommendation for the two new HVDC Links, 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 Eastern Green Link 3 and 4 Strategic Options Report[12] (the SOR). As detailed in the SOR the Project is needed to:

- provide >10 GW of capacity across the B6, B7a and B8 system boundaries (see **Figure 1-3**); and
- provide >6 GW of capacity across the B9 system boundary (see **Figure 1-3**) for future generation growth resilience.

1.1.15 The SOR considered a range of options for the connection to the transmission system in the eastern England area, of new 2 GW HVDC links from:

- Aberdeenshire (EGL 3, which is being jointly developed by NGET and SSEN-T), and
- Fife (EGL 4, which is being jointly developed by NGET and SPEN).

1.1.16 Potential strategic options were identified to meet the need case for EGL 3 and EGL 4 projects, provide the best economic solution and meet NGET's transmission licence obligations (including to provide an efficient, economic and co-ordinated transmission system in England and Wales). The SOR evaluated each of the identified strategic options in respect of environmental constraints, socio-economic effects, technology alternatives, capital and lifetime costs. The SOR concluded that the EGL 3 and EGL 4 projects should be connected south of the B9 transmission boundary to or near to a Main Interconnected Transmission System substation (identified as a proposed new Walpole substation). This is relayed as EGL Option (OPP) 6 (new Walpole substation), in the SOR, and is shown below in **Figure 1-5**.

1.1.17 The new Walpole substation is identified as a common connection point for the OPP6 and the NGET Grimsby to Walpole Project[13] (described in this Report as the 'G2W Project'). The G2W Project is being developed by NGET 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 to accommodate substantial increases in north-south power flows. It will establish a new (wholly or largely overhead line) 400 kV transmission connection between five new substations (one at Grimsby West, two Lincolnshire Connection substations, one at Weston Marsh and one at Walpole). The SOR confirms that although the new Walpole substation is currently included as part of the G2W Project, the need, and delivery of the new Walpole substation could be met by EGL 3 and EGL 4 or the G2W Project.

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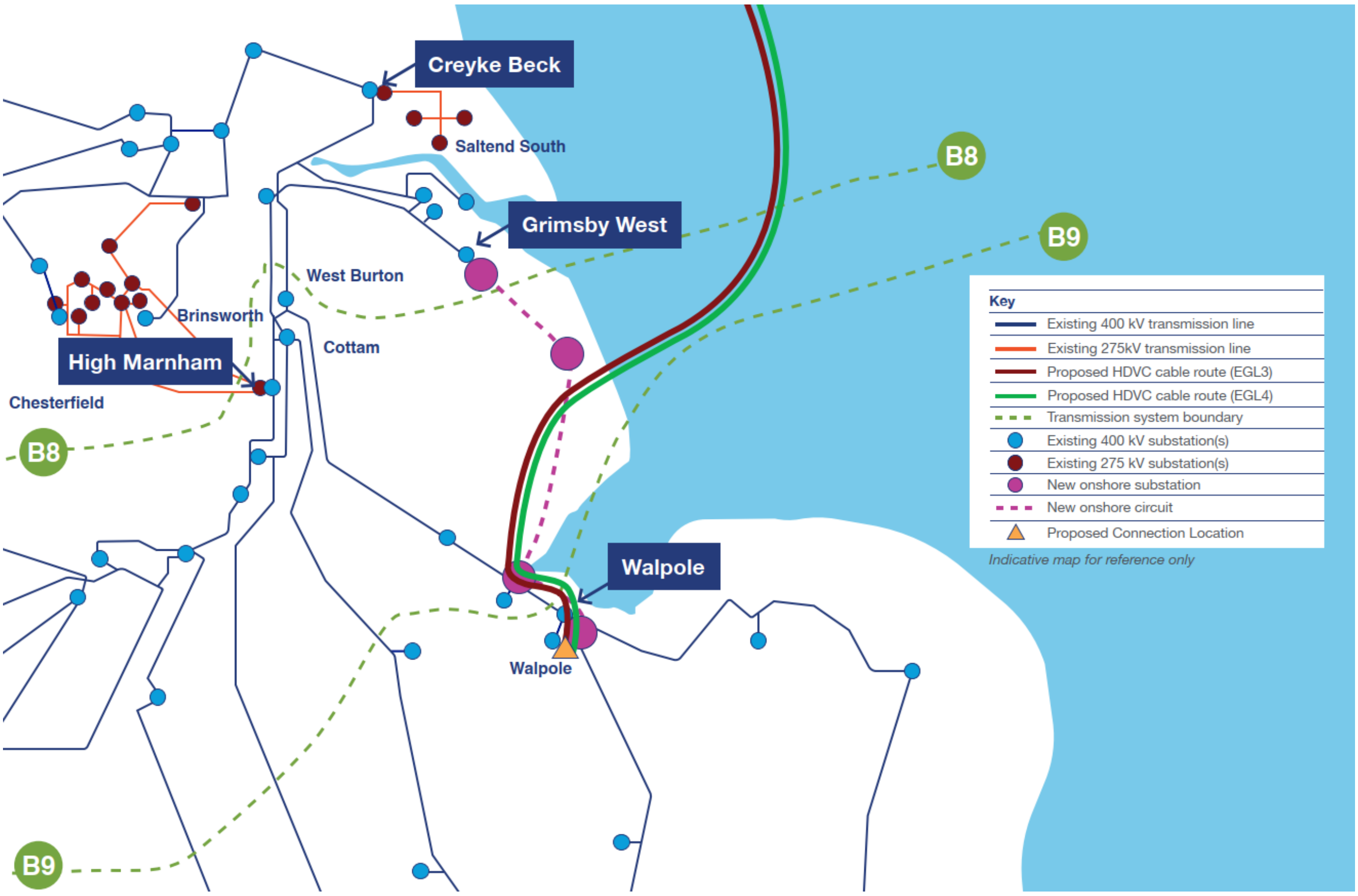
[12] National Grid, (April 2024), Eastern Green Link 3 and 4 Strategic Options Report.

[13] The Strategic Options Report and Corridor and Preliminary Routeing and Siting Study Report for the Grimsby to Walpole Project are available at https://www.nationalgrid.com/electricity-transmission/network-and-infrastructure/infrastructure-projects/grimsby-to-walpole

Figure 1-5 – EGL OPP6 New Walpole Substation potential strategic option



1.1.18 One of the options, described as EGL OPP7 (shown below in **Figure 1-6**) within the SOR, identified the potential for one of the HVDC Links (i.e. either EGL 3 or EGL 4) forming a three-ended connection[14] by connecting to the Lincolnshire Connection substation(s) (proposed by the NGET G2W Project) first, before continuing to a proposed new Walpole substation.

1.1.19 The option of making one of either the EGL 3 or EGL 4 projects three-ended would increase capacity, if required, from one of the two new 400 kV Lincolnshire Connection Substation(s) in the future, subject to the successful delivery of the G2W Project. The three-ended connection is described in more detail in **Chapter 2**) and shown schematically in **Figure 1-7**. Providing the capacity through the EGL 3 or EGL 4 infrastructure would increase capacity without the need for additional circuits in the near term from the 400 kV Lincolnshire Connection Substation(s) (described in this Report as the 'LCS'). To construct a three-ended connection to the LCS, a switching station (described in this Report as a 'DCSS') and an additional converter station would be required in the vicinity of the LCS located south-west of Mablethorpe in East Lindsey.

[14] A three-ended connection is use of an additional circuit to build-in extra resilience into the electricity transmission network.

Figure 1-6 – EGL OPP7 new Walpole substation with three ended HVDC link potential strategic option

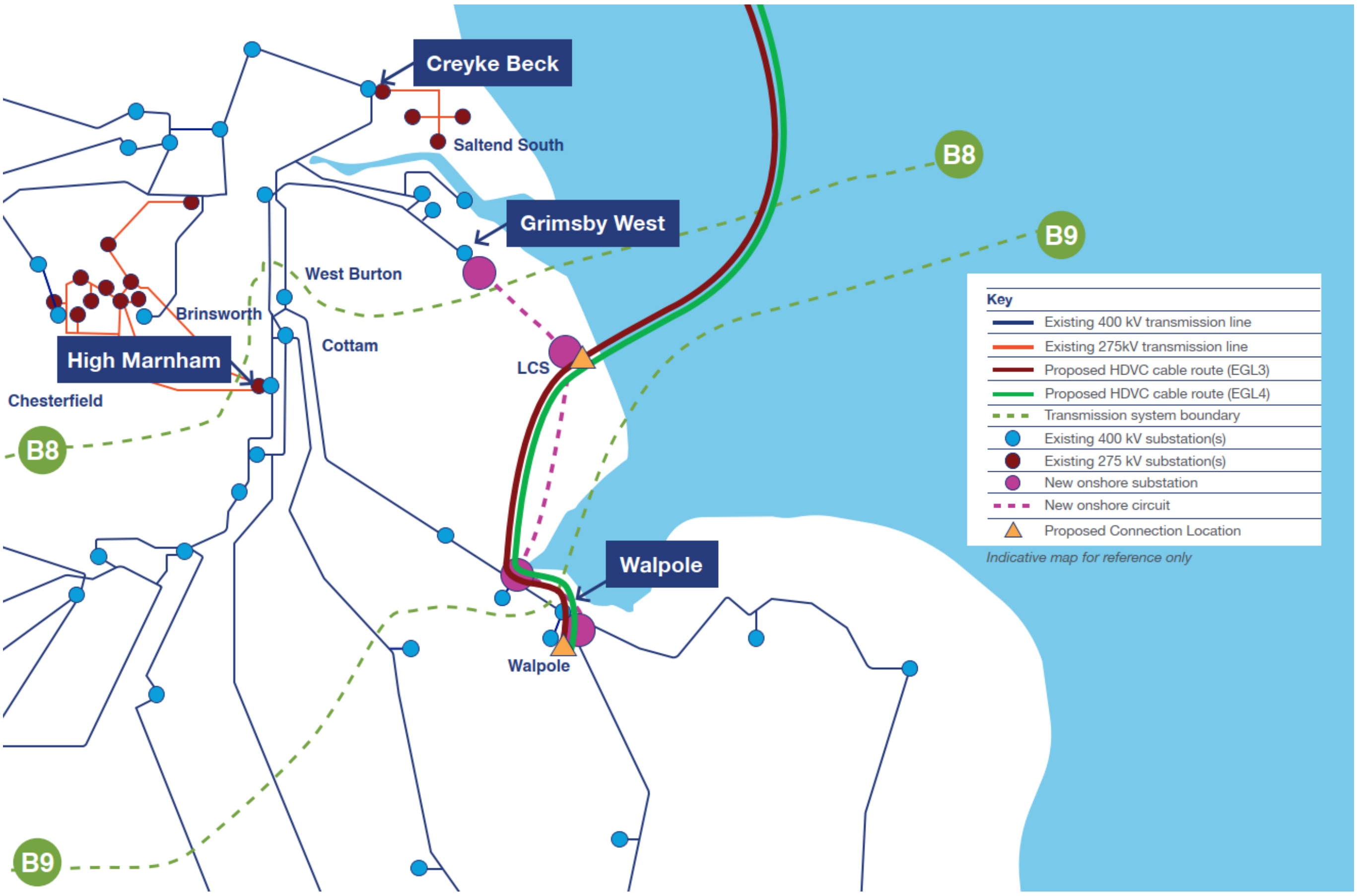
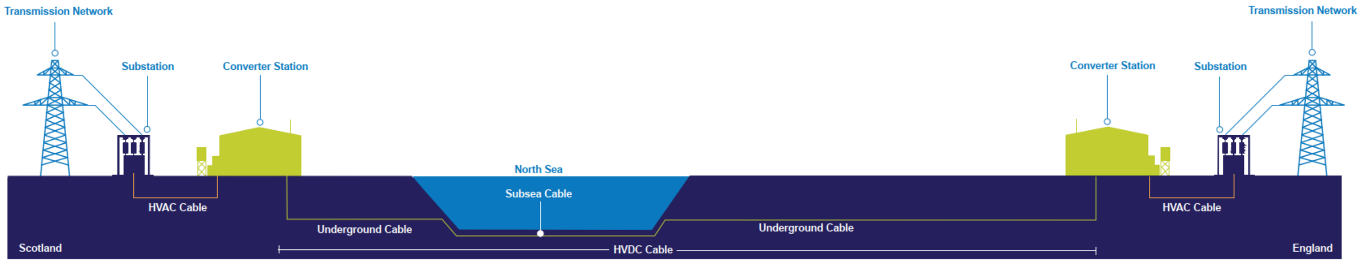
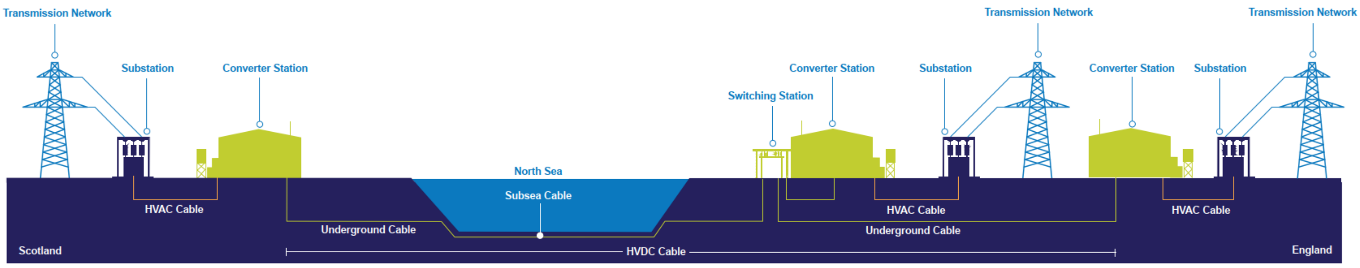


Figure 1-7 – Schematic of Point to Point Connection and Three-ended Connection





1.1.20 The SOR noted that there is not a current requirement for one of either the EGL 3 or EGL 4 projects to be developed as a three-ended connection into the LCS, to meet the need case for EGL 3 and EGL 4. However, NGET considers that the option (EGL OPP6) developed for EGL 3 and EGL 4 should have the ability to be changed to provide a three-ended connection to LCS in the future should additional capacity be required.

1.1.21 Since the publication of the SOR, it has been confirmed that EGL 3 (which is being jointly developed by NGET and SSEN-T) would comprise a 2 GW HVDC link between Aberdeenshire in Scotland, and King's Lynn and West Norfolk in England. It will include the construction of new infrastructure consisting of underground terrestrial and submarine HVDC cables, converter stations, HVAC overhead lines or underground cables, as well as potentially new substations or substation extension/upgrade works. A schematic diagram of the proposed EGL 3 works is provided in **Figure 1-8**. EGL 3 will predominantly comprise of submarine HVDC cables (approximately 85% of the total HVDC link), and where it makes landfall, will predominantly comprise of terrestrial underground HVDC cables (approximately 14% of the total HVDC link).

1.1.22 EGL 4 (which is being jointly developed by NGET and SPEN) would also comprise a 2 GW HVDC link between Fife in Scotland and King's Lynn and West Norfolk in England. It will include the construction of new infrastructure consisting of underground terrestrial and submarine HVDC cables, converter stations, HVAC overhead lines or underground cables, as well as potentially new substations or substation extension/upgrade works. A schematic diagram of the proposed EGL 4 works is provided in **Figure 1-9**. EGL 4 will predominantly comprise of submarine HVDC cables (approximately 83% of the total HVDC link), and where it makes landfall, will predominantly comprise of terrestrial underground HVDC cables (approximately 16% of the total HVDC link).

Figure 1-8 – Schematic of EGL 3

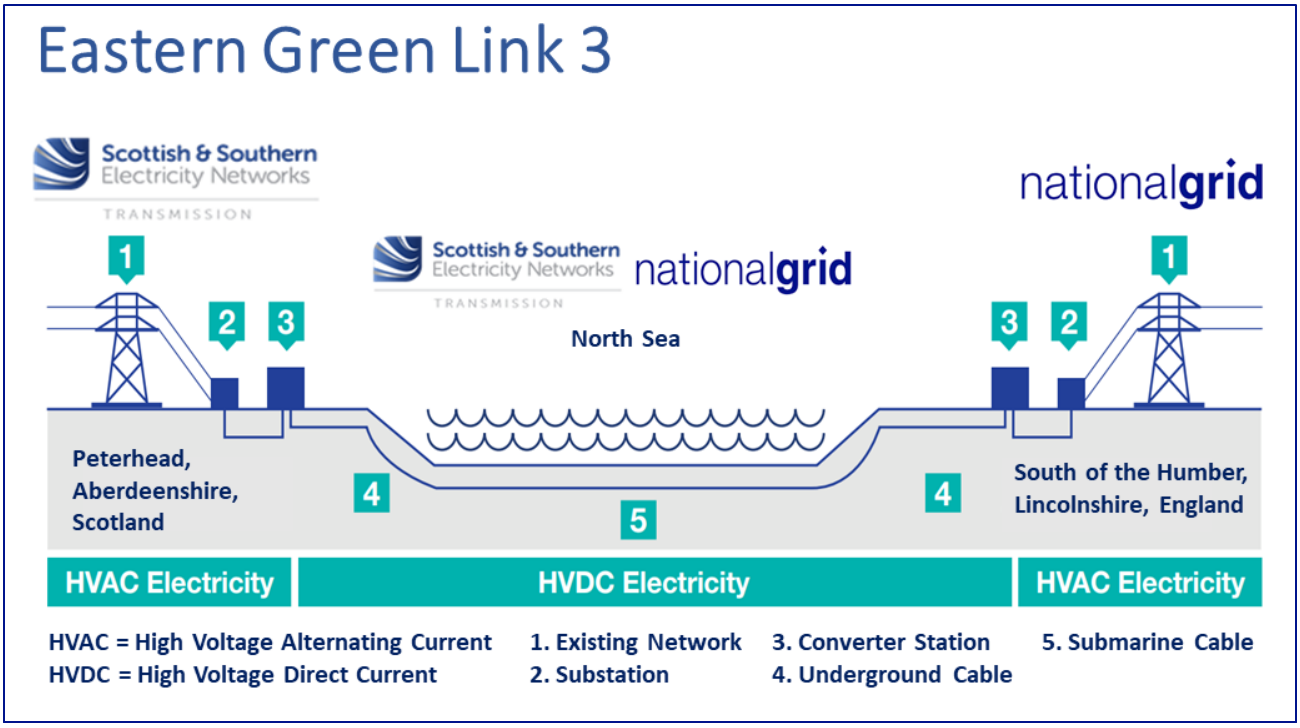
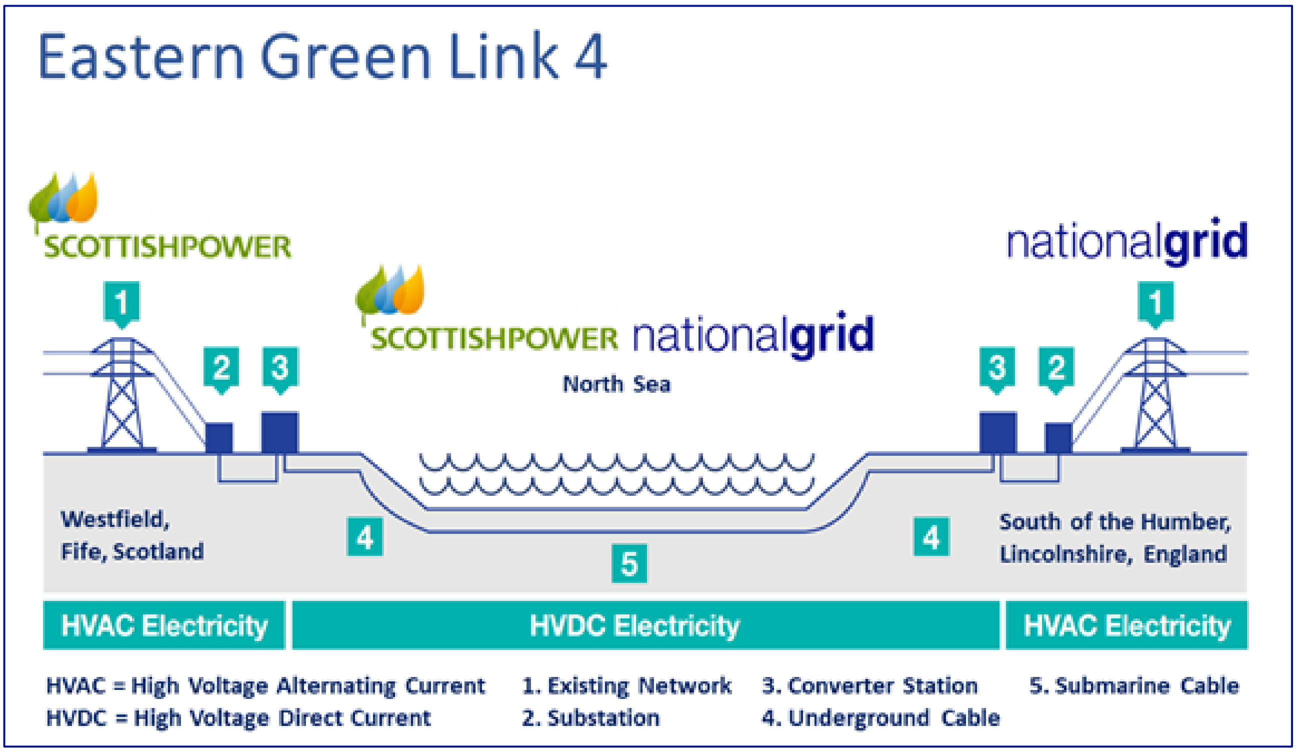


Figure 1-9 – Schematic of EGL 4



1.1.23 As detailed within the SOR, there is not a current requirement for one of either the EGL 3 or EGL 4 projects to be developed as a three-ended connection into the LCS. The option for creation of a three-ended connection as part of either EGL 3 or EGL 4 has been retained should it be determined to be a clear requirement following further work, including the ESO's HND Follow Up Exercise, in 2024 to develop a holistic electricity transmission network design that supports increasing amounts of new energy generation. Therefore, the option for a DCSS and an additional converter station for either EGL 3 or EGL 4 in the vicinity of the LCS is retained.

1.1.24 The scope of this Report consists of the terrestrial components of EGL 3 and EGL 4 within England i.e. the landfall siting areas, the terrestrial underground cable routeing, and the siting of the converter stations, substation and DCSS ('the Project'). The indicative location, in the East Midlands, East of England and East Anglia regions of England, of these components is shown in **Figure 1-10**. This Report has been developed in tandem with the Marine Route Options Appraisal (which focuses on the intertidal/nearshore approach to the landfall siting areas (ending at mean high-water springs (MHWS), and the marine cable routeing) undertaken for EGL 3[15] and EGL 4[16] to ensure a consistent and coordinated approach to routeing and siting.

[15] Eastern Green Link 3 (EGL 3) Marine Route Options Appraisal (NGET and SSEN-T, September 2023)

[16] Eastern Green Link 4 (EGL 4) Marine Route Options Appraisal (NGET and SPEN, September 2023)

Figure 1-10 - EGL 3 and EGL 4 Location – Terrestrial Elements in England

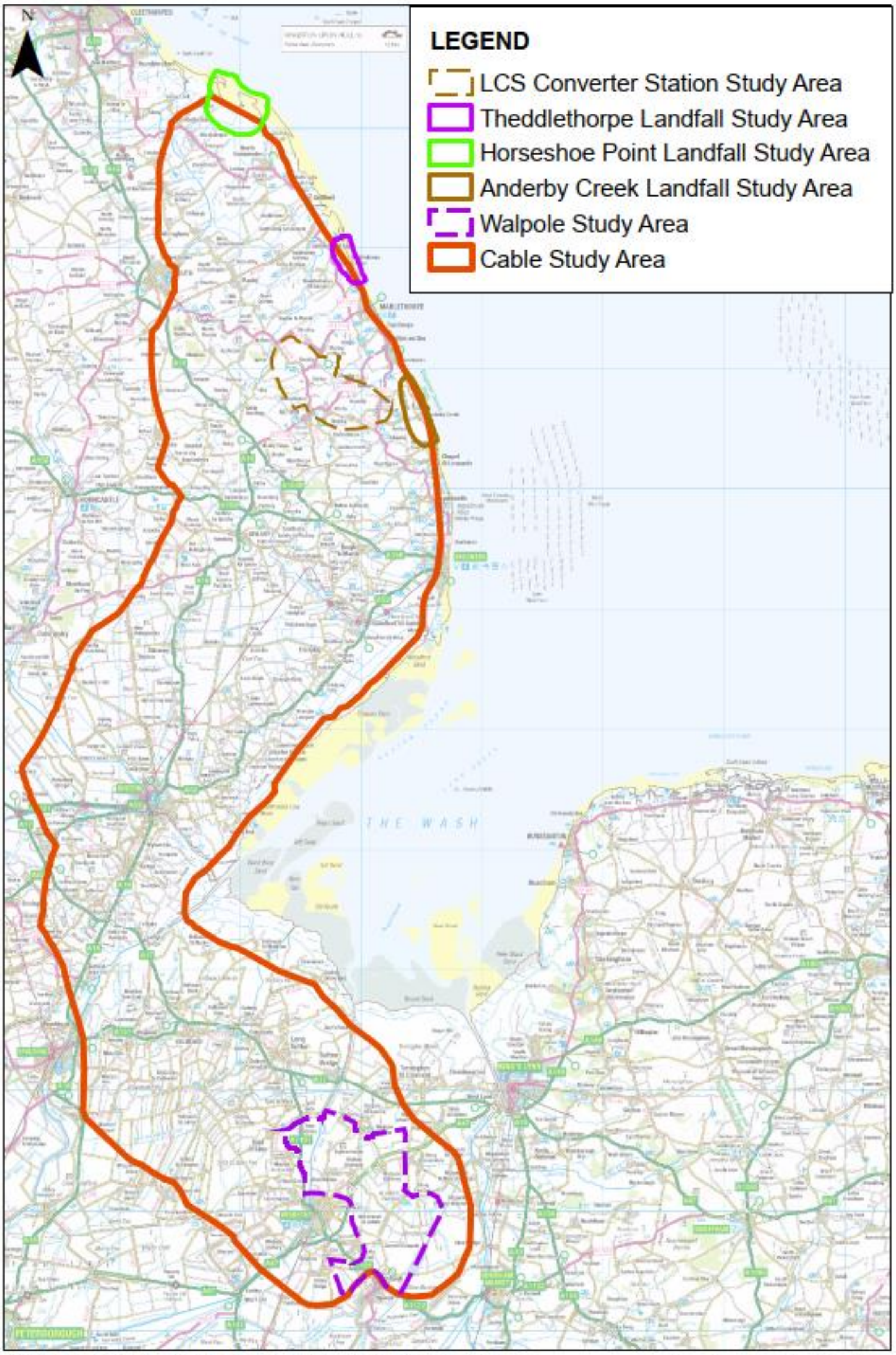


Figure 1-10 – EGL 3 and EGL 4 Location – Terrestrial Elements in England

SCALE: 1:500,000 0 3 6 9 12 15 km

1.1.25 The terrestrial transmission connection components associated within each of EGL 3 and EGL 4 within England (described in this Report as the English Onshore components) are outlined below (and further described in **Chapter 2**):

- EGL 3 English Onshore components:
  - A proposed HVDC cables landfall (ending at mean low water springs (MLWS)) on the Lincolnshire Coast;
  - A Transition Joint Bay (TJB) which will enable the connection of the marine and terrestrial HVDC underground cable connections;
  - Approximately 100 km of terrestrial HVDC underground cables;
  - A new converter station in the vicinity of the existing Walpole substation in King's Lynn and West Norfolk District; and
  - Approximately 4 km of HVAC underground cables.
- EGL 4 English Onshore components:
  - A proposed HVDC cables landfall (ending at MLWS) on the Lincolnshire Coast;
  - A TJB which will enable the connection of the marine and terrestrial HVDC underground cable connections;
  - Approximately 100 km of terrestrial HVDC underground cables;
  - A new converter station in the vicinity of the existing Walpole substation in King's Lynn and West Norfolk District; and
  - Approximately 4 km of HVAC underground cables.

1.1.26 To connect EGL 3 and EGL 4 into the NETS a new 400 kV substation in the vicinity of the existing Walpole substation in King's Lynn and West Norfolk District will be required. This substation is required to facilitate the connection of both the G2W, EGL 3 and EGL 4 projects, and will therefore serve as a common connection point (further information is provided in **Chapter 2)**.

1.1.27 As detailed above, to enable any future requirement for a three-ended connection, additional transmission elements (a new converter station and a DCSS and associated HVDC and HVAC underground cables) would be required as part of either EGL 3 or EGL 4 in the vicinity to the LCS. The option for creation of a three-ended connection as part of either EGL 3 or EGL 4 has been retained should it be determined to be a clear requirement following further work in 2024.

1.1.28 NGET will also need to replace short sections of existing 400 kV overhead line and commission local changes to the lower voltage distribution networks to facilitate the construction of the English Onshore components.

1.2 Purpose

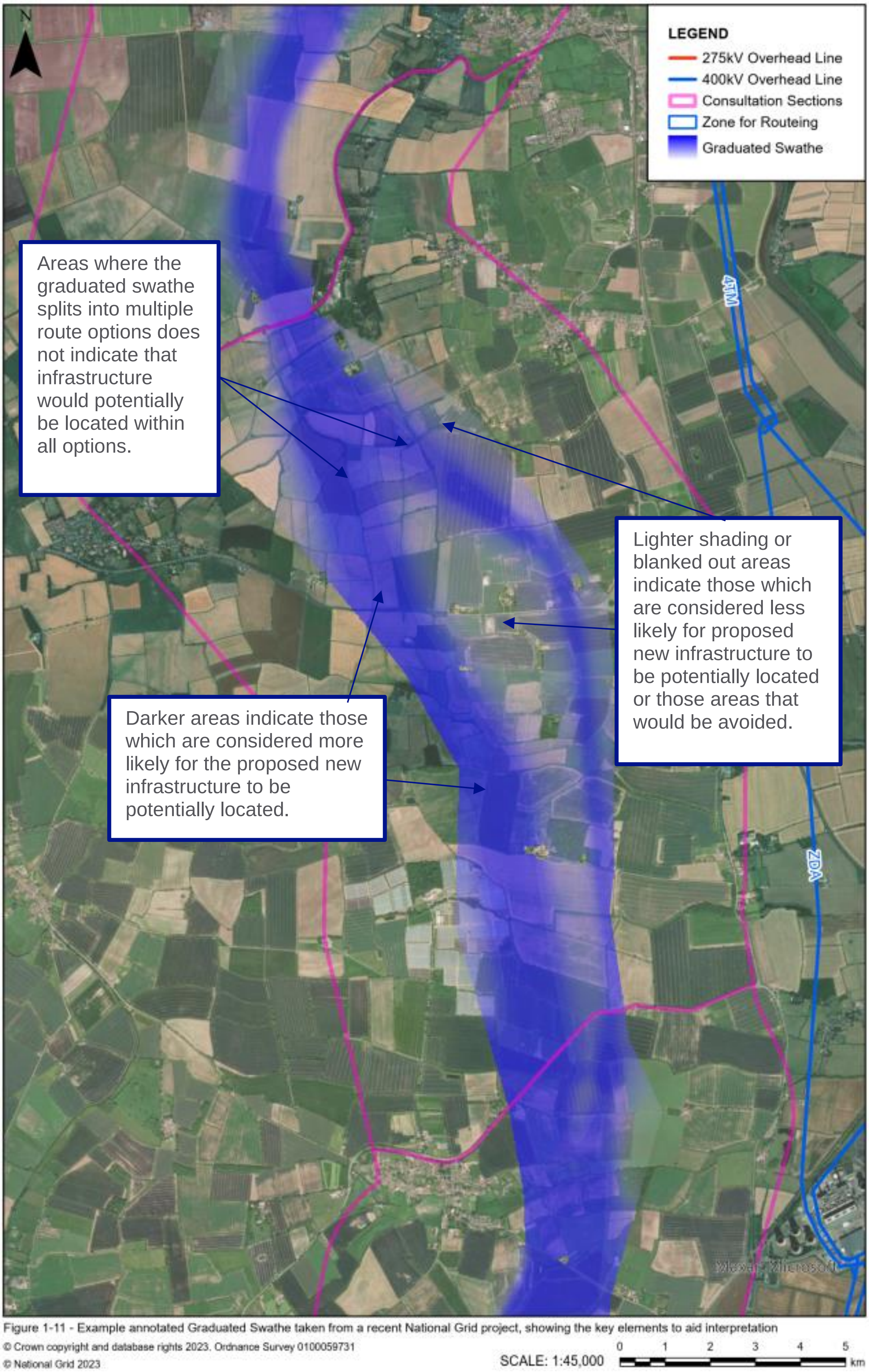
1.2.1 This Report is the Corridor and Preliminary Routeing and Siting Study (CPRSS), which has been undertaken to facilitate the gathering of feedback on the English Onshore components required for the EGL 3 and EGL 4 projects (‘the Project) from all interested parties as part of the non-statutory consultation. The CPRSS reports the process undertaken as part of the Options Identification and Selection Stage (Stage 2) shown in **Figure 1-2**, 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 2**.

1.2.2 This CPRSS sets out the routeing and siting activities undertaken to date, including the identification, refinement and assessment of landfalls, preliminary corridors (described in this Report as ‘corridors’) within which HVDC and/or HVAC underground cables would be located, preliminary siting zones (described in this Report as ‘siting zones’) and preliminary siting areas (described in this Report as ‘siting areas’) within which converter stations, substations and (where required for a three-ended connection) a DCSS would be located. This report also 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, preferred siting zones and preferred siting areas where the required Project infrastructure is considered more or less likely to be located. The 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 1-11**.

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 corridors, 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.

Figure 1-11 – Example annotated Graduated Swathe taken from a recent National Grid project, showing the key elements to aid interpretation



1.3 Structure of this Report

1.3.1 The report is structured as follows:

- **Chapter 2: Aspects of The Project (terrestrial components of EGL 3 and EGL 4 in England)** – summarises the key components of the Project.
- **Chapter 3: National Grid Electricity Transmission’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 sections and links).
- **Chapter 6: Options Appraisal – Landfalls** – provides the key environmental and technical constraints for each landfall location.
- **Chapter 7: Options Appraisal – HVDC Underground Cable Corridors: Landfalls to River Welland** – provides the key environmental and technical constraints for each preliminary corridor between the landfalls and the River Welland.
- **Chapter 8: Options Appraisal – HVDC Underground Cable Corridors: River Welland to Walpole** – provides the key environmental and technical constraints for each preliminary corridor between the River Welland and Walpole.
- **Chapter 9: Options Appraisal – Walpole Stations** – provides the key environmental and technical constraints for each preliminary siting zone for the converter stations and substation at Walpole.
- **Chapter 10: Options Appraisal – LCS Converter Station** – provides the key environmental and technical constraints for each preliminary siting zone for the LCS Converter Station and DCSS.
- **Chapter 11: Option Selection** – provides comparative analysis of the landfalls, corridors, siting zones and siting areas to identify those emerging as preferred.
- **Chapter 12: Cost and Programme Performance** – shows the range of the best and worst performing cost and programme estimates for each of the preliminary corridors.
- **Chapter 13: Development of Graduated Swathe** – summarises the approach taken to developing the graduated swathe for the Project and its intended use.
- **Chapter 14: Summary and Next Steps** – presents a summary of the CPRSS and outlines the next steps in the Project.

2. Aspects of The Project (Terrestrial Components of EGL 3 and EGL 4 in England)

2. Aspects of The Project (Terrestrial Components of EGL 3 and EGL 4 Projects)

2.1 Introduction

2.1.1 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, Government has concluded that there is a critical national priority (CNP) for the provision of nationally significant low carbon infrastructure, and as stated within the Overarching National Policy Statement (NPS) for Energy (EN-1, see **Chapter 3** for further details) "*there is an urgent need for new electricity network infrastructure to be brought forward at pace".*

2.1.2 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 NETS (the "Grid"). The Project 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 generation) to areas of consumer demand across the UK.

2.1.3 As outlined in Paragraph 1.1.13, EGL 3 and EGL 4 are being jointly developed by NGET and SSEN-T and SPEN, respectively. Both EGL 3 and EGL 4 will comprise two new 2 GW HVDC links between Scotland (Aberdeenshire and Fife respectively) and England (Norfolk). Both will include the construction of new infrastructure consisting of underground terrestrial and submarine HVDC cables, converter stations, HVAC overhead lines or underground cables, as well as potentially new substations or substation extension/upgrade works. Also, as outlined in Paragraph 1.1.27, an additional converter station and DCSS (including associated HVDC and HVAC underground cables) may be required should one of either EGL 3 or EGL 4 develop into a three-ended connection, connecting in to the LCS.

2.1.4 The scope of this Report consists of the English Onshore components ('the Project'), located in the East Midlands, East of England and East Anglia regions of England. These components for each of EGL 3 and EGL 4 are:

- EGL 3 English Onshore components:
  - A proposed HVDC cables landfall (ending at MLWS) on the Lincolnshire Coast;
  - A TJB which will enable the connection of the marine and terrestrial HVDC underground cable connections;
  - Approximately 100 km of terrestrial HVDC underground cables;
  - A new converter station in the vicinity of the existing Walpole substation in King's Lynn and West Norfolk District; and
  - Approximately 4 km of HVAC underground cables.

- EGL 4 English Onshore components:
  - A proposed HVDC cables landfall (ending at MLWS) on the Lincolnshire Coast;
  - A TJB which will enable the connection of the marine and terrestrial HVDC underground cable connections;
  - Approximately 100 km of terrestrial HVDC underground cables;
  - A new converter station in the vicinity of the existing Walpole substation in King's Lynn and West Norfolk District; and
  - Approximately 4 km of HVAC underground cables.

2.1.5 To connect EGL 3 and EGL 4 into the NETS a new 400 kV substation in the vicinity of the existing Walpole substation in King's Lynn and West Norfolk District will be required. This substation is required to facilitate the connection of both the G2W, EGL 3 and EGL 4 projects (further information is provided in Paragraph 2.5.16) and will therefore serve as a common connection point.

2.1.6 As detailed in Paragraph 1.1.23, to enable any future requirement for a three-ended connection, additional transmission elements (a new converter station and a DCSS and associated HVDC and HVAC underground cables) would be required as part of either EGL 3 or EGL 4 in the vicinity of the LCS (south-west of Mablethorpe in East Lindsey). The option for creation of a three-ended connection as part of either EGL 3 or EGL 4 has been retained should it be determined to be a clear requirement following further work in 2024.

2.1.7 NGET will also need to replace short sections of existing 400 kV overhead line and commission local changes to the lower voltage distribution networks to facilitate the construction of the new terrestrial transmission connections in England.

2.1.8 EGL 3 and EGL 4 are independent of one another, in effect separate projects, however due to their ultimate common connection point in England (the proposed new Walpole substation), these projects are being considered and developed in parallel. This coordinated and co-located approach to their routeing and siting provides the opportunity to potentially reduced the extent of community and environmental impact and disturbance, in comparison to the projects being considered and developed individually. It also represents an opportunity to promote both the EGL 3 and EGL 4 projects via a single DCO (should section 35 directions under the Planning Act 2008 be granted). This will provide the certainty of a single consenting and land rights acquisition process and a fixed timescale for determination as well as remove the need to apply for separate consents from multiple Local Planning Authorities. Therefore within this Report, the English Onshore components of EGL 3 and EGL 4 (the Project) are described as one where appropriate.

2.1.9 This chapter provides more information in relation to the various components of the Project, including the HVDC/HVAC underground cables, two new converter stations, one 400 kV substation, and other works required to develop and deliver the Project. It also includes information regarding the additional components required should the Project (as part of either EGL 3 or EGL 4) become a three-ended connection. Such improvements will be to the transmission system and electricity distribution networks operated by NGET, NPG, NGED and UKPN.

2.2 Landfalls

2.2.1 Landfalls are the interfaces between the marine and terrestrial components of EGL 3 and EGL 4. The terrestrial components of EGL 3 and EGL 4 end at MLWS in line with terrestrial planning requirements and the marine components of EGL 3 and EGL 4 end at MHWS in line with marine planning requirements. Therefore, this Report has been developed in close parallel with the Marine Route Options Appraisal[15,16] work so as to identify and select preferred and feasible landfall locations.

2.2.2 The landfall site is considered to extend from MLWS (where it overlaps with the marine components of EGL 3 and EGL 4) across the intertidal zone to terminate at a TJB located a short-distance inland. The marine HVDC cables will connect with the terrestrial HVDC underground cables at a buried TJB.

2.2.3 A TJB is a permanent underground chamber constructed of reinforced concrete that houses the cable joints and a fibre chamber/link pit. A single TJB typically comprises an area of 15 m by 4 m (60 sqm). Either two single TJBs or a double TJB will be required for the Project. This will be confirmed at the detailed design stage. A larger area will be required temporarily during construction and installation of the TJB to accommodate temporary construction equipment and storage areas.

2.2.4 A temporary construction compound, which typically extends 150 m by 150 m (2.25 ha) will be required to construct the landfall and the TJB. The temporary compound would contain all necessary plant and equipment plus parking and welfare facilities required. Once installation has been completed the land will be reinstated to pre-existing conditions; the only infrastructure visible on the surface (on otherwise fully reinstated land, see **Figure 2-1**) will be the cover of the link box pit.

2.2.5 Subject to site specific constraints and ground conditions present at identified landfall sites, cable installation can be undertaken using open cut or trenchless methods (described further in paragraph 2.3.25 below). In considering the alternative landfall sites identified in **Chapter 5** and **Chapter 6**, consideration has been given to the most appropriate installation method taking account of the features present and the potential impacts that could occur during construction and installation.

2.2.6 It is recognised that a landfall for the HVDC cables on the Lincolnshire coast is challenging, both technically and environmentally. However, NGET and other energy infrastructure projects have successfully achieved cable landfalls along the Lincolnshire coast, working closely and collaboratively with advising technical specialists and key stakeholders.

Figure 2-1– Example TJB following reinstatement

2.3 Underground Cables

2.3.1 The Project will largely comprise new HVDC underground cables, which allow electricity to be transmitted from point to point in much larger volumes, over greater distances with fewer transmission losses compared to an equivalent HVAC system. The Project will also comprise small sections of HVAC underground cable, between proposed converter stations and substations to connect into the NETS at proposed 400 kV substations. Both HVDC and HVAC underground cables are installed using similar methods, which are described below, however at the AC transmission voltage of 400 kV the size, number and construction area of the underground cables required is greater than those that operate at lower voltages or DC cables.

Underground HVDC Cables

2.3.2 The Project will comprise two sets of two underground HVDC cables (and a Distributed Temperature Sensing (DTS) carrier tube and fibre optic cables for performance monitoring). Each underground HVDC cable (described in this Report as ‘DC cables’) is typically 15 cm in diameter.

2.3.3 The exact configuration of the DC cables route depends on a number of factors including the constraints (such as crossings of major rivers, roads and railways) which are present, prevailing ground conditions, the length of each cable section, suitability of jointing positions and the number of bends and topography of the route.

2.3.4 The following paragraphs provide a high-level description of the DC cable route and of typical DC cable parameters including its design and construction which have been used to inform the routeing and siting for the Project.

High Level Route Description

2.3.5 At the landfall, where the terrestrial and marine components of EGL 3 and EGL 4 overlap, the DC cables continue from marine to terrestrial environment. The Project's DC cables will begin at MLWS and extend across the intertidal zones to connect into a buried TJB (where the submarine and terrestrial DC cables connect). From the TJB, the DC cables will route towards the two new converter stations at Walpole.

2.3.6 Should a three-ended connection be determined as required then the DC cables will firstly route towards a new DCSS, where either the EGL 3 or EGL 4 DC cables will connect, and onto the new LCS converter station, both located in proximity to one of the proposed 400 kV LCS (proposed by the G2W Project). At the LCS converter station, one set of the DC cables (either those for EGL 3 or EGL 4) will connect to the converter station. Both sets of DC cables will then continue south to connect at the two new converter stations at Walpole. This is shown in **Figure 1-7**.

2.3.7 Connections from the converter stations to substations will be via HVAC underground cables as described below.

Physical Description of DC cables

2.3.8 The below provides a summary of the key characteristics of the DC cables. The exact configuration of the DC cables is subject to detailed design following appointment of a contractor; however, the general characteristics below have informed this routeing and siting study.

2.3.9 The DC cables will have a permanent easement. The exact width of the permanent easement is still to be determined. There will be no above ground infrastructure required along the new DC cables route except for small marker posts. These may be installed at field boundaries, crossings, and other locations as appropriate to highlight the presence of the DC cables to landowners, asset owners and those undertaking works within the vicinity.

2.3.10 The DC cables will be laid within two trenches, one for EGL 3 and one for EGL 4, within a single construction swathe. The typical width required for the construction and installation of the DC cables, including for access routes, soil storage and drainage, is approximately 80 m (see **Figure 2-2**). The typical width (subject to cable system design) of a single trench is approximately 2.5 m. The construction and installation of the DC cables will require access via a haul road. The haul road will run adjacent to the area for construction and installation of the DC cables and is typically 7 m in width.

2.3.11 The minimum burial depth of the DC cables is typically 900 mm. Where constraints dictate, such as the presence of Best and Most Versatile (BMV) agricultural land[17], depths of installation may be deeper, typically 1.2 m. This will be determined through feedback from non-statutory consultation, information from surveys, stakeholders, landowners and ongoing design studies.

2.3.12 The DC cables will be installed in sections, typically every 800 m to 1.5 km. These sections will be connected at buried cable joint bays. The number, location and dimensions of cable joint bays required will be determined through feedback from non-statutory consultation, information from surveys and ongoing design studies.

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[17] This is in accordance with Energy Networks Association Guidance "Cable Laying on Agricultural Land" Ref: G57:Issue2:2019 ("ENA Guidance"). Available at: https://www.ena-eng.org/ena-docs/index?Action=ViewDetail&EID=99885

2.3.13 The DC cables will be direct-buried or pulled through pre-installed ducts (via the methods described in Paragraph 2.3.25 below), where constraints such as road crossing and watercourse crossing dictate.

Figure 2-2– Example DC Cable Construction

Viking Link Interconnector: Two HVDC cables in trench during construction

Viking Link Interconnector: Two HVDC cables in trench during construction

Underground HVAC Cables

2.3.14 Underground HVAC cables (described in this Report as AC cables) will connect the new Walpole converter stations to the new 400 kV substation at Walpole. Where there is a requirement for a three-ended connection, AC cables will also be required to connect the new LCS converter station to the LCS.

2.3.15 Each connection from the new converter stations to the new Walpole substation and LCS will require two sets of three AC cables (i.e. a total of six AC cables for EGL 3 and a total of six AC cables for EGL 4). Each AC cable will operate at 400 kV and is typically 15 cm in diameter.

2.3.16 The exact configuration of the AC cables route depends on a number of factors including the constraints which are present, prevailing ground conditions, the length of each cable section, suitability of jointing positions and the number of bends and topography of the route.

2.3.17 The following paragraphs provide a high-level description of the AC cable route and of typical AC cable parameters including its design and construction which have been used to inform the routeing and siting for the Project.

High Level Route Description

2.3.18 The AC cables (including DTS carrier tube and fibre optic cables) will route between the new converter stations (at Walpole, and where required near the LCS) and the new 400 kV substations (at Walpole, and where required the LCS which would form the connection) into the NETS.

Physical Description of AC cables

2.3.19 The below provides a summary of the key characteristics of the AC cables. The exact configuration of the AC cables is subject to detailed design following appointment of a contractor; however, the general characteristics below have informed this routeing and siting study.

2.3.20 The AC cables will have a permanent easement, The exact width of the permanent easement is still to be determined. There will be no above ground infrastructure required along the new AC cables route except for small marker posts or link pillars. Underground link boxes could also be used instead of link pillars at buried cable joint bays. The marker posts may be installed at field boundaries, crossings, and other locations as appropriate to highlight the presence of the AC cables to landowners, asset owners and those undertaking works within the vicinity. Link pillars will be required at buried cable joint bays, where the AC cable sections will be joined. Link pillars are typically 1 m by 1.5 m and are at a height of 1.5 m.

2.3.21 Each set of AC cable (two sets of three AC cables for each project i.e. a total of six AC cables for EGL 3 and six AC cables for EGL 4) will be laid within a single trench. The EGL 3 AC cables will be within a single construction swathe and the EGL 4 AC cables will be within a single construction swathe. The typical width required for the construction and installation of the AC cables, including for access routes, soil storage and drainage, is approximately 65 m (see **Figure 2-3**). The combined width of the AC cables construction swathe for both EGL 3 and EGL 4 is approximately 130 m. The typical width (subject to cable system design) of a single trench is approximately 3.5 m. The construction and installation of the AC cables will require access via a haul road. The haul road will run adjacent to the area for construction and installation of the AC cables and is typically 7 m in width.

2.3.22 The minimum burial depth of the AC cables is typically 900 mm. Where constraints dictate, such as BMV agricultural land, depths of installation may be deeper, typically 1.2 m[17]. This will be determined through feedback from non-statutory consultation, information from surveys and ongoing design studies.

2.3.23 The AC cables will be installed in sections, typically every 800 m to 1.5 km. These sections will be connected at buried cable joint bays. The number and dimensions of cable joint bays will be determined through feedback from non-statutory consultation, information from surveys and ongoing design studies.

2.3.24 The AC cables will be direct buried or pulled through pre-installed ducts (via the methods described in Paragraph 2.3.25 below), Where constraints such as road crossings and watercourse crossings dictate.

Figure 2-3– Example HVAC Cable Construction

HVAC underground cables in construction prior to reinstatement

Underground Cable Installation Methods

2.3.25 There are several different installation methods available for the installation of DC and AC cables. The most appropriate for a given project, or location within a project, is determined based on environmental, land use, cost and technical factor. The open cut and trenchless methods of cable installation are summarised below:

- Open cut methods: These would typically be utilised in open agricultural land. This involves the excavation of a trench into which the DC or AC cables could either be directly laid, or a duct could be laid through which DC or AC cables could then be pulled. This is usually followed by land reinstatement.
- Trenchless methods: These would typically be utilised where specific features (such as main rivers, major roads, railway lines, flood defences or other significant infrastructure) need to be crossed. This would involve the installation of ducts or potentially a tunnel below the feature. The DC or AC cables would then be pulled through the ducts or installed within the tunnel.

2.3.26 Where conditions allow, DC or AC cables are typically installed using open cut methods. Open cut methods are generally preferred as they enable DC and AC cables to be installed at more technically efficient depths. Open cut methods are also generally more economical and often require a smaller construction footprint than trenchless methods. Where technically feasible, and unless other technical or environmental constraints and considerations determine otherwise, all underground cable installation will be by open-cut method.

2.3.27 Where specific environmental or infrastructure features, including main rivers such as the River Witham/The Haven, River Welland and River Nene, preclude the use of DC or AC cables in trenches, as described above, installation in ducts using a trenchless installation technique such as Horizontal Direct Drilling (HDD) is likely to be required. In this instance DC or AC cables are pulled into pre-installed ducts.

2.3.28 Where HDD is not technically viable then a tunnelled solution can be considered. Tunnels can be constructed using a variety of techniques, but all involve civil engineering activities, which result in additional costs, increased construction risks and extended programme durations.

2.3.29 In determining the most appropriate trenchless technique for installing DC or AC cables, NGET need to ensure the electrical performance of the DC or AC cables are not compromised.

2.3.30 The working width of the land required for construction of a trenchless crossings for DC cables is typically between 50 m and 100 m, and for AC cables this is typically 130 m.

2.3.31 The potential trenchless installation methods that could be considered (where constraints prevent the use of the open cut method) for a DC or AC cable crossing of features such as main rivers, major roads, railway lines, flood defences or other significant infrastructure are:

- Horizontal Directional Drilling (HDD);
- Tunnel Boring Machine (TBM) Tunnelling such as;
  - Microtunnelling/Pipejacking; and
  - Conventional Tunnelling Method (CTM).

2.3.32 It is considered that the Project will not be using CTM tunnelling.

2.4 Other Technical Considerations

2.4.1 To construct the new substation, converter stations and (where required) DCSS, a range of other minor temporary and permanent improvement works will need to be carried out 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.

2.4.2 The route required by the Project may result in interactions with NGET overhead lines. Managing interfaces with existing NGET overhead lines will form part of this Project.

2.4.3 In addition to NGET transmission lines, it will be necessary for the new underground cables to cross overhead lines of a lower voltage owned and operated by the local electricity DNOs.

2.4.4 When crossing lower voltage overhead lines 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 11 kV, 33 kV and 132 kV overhead lines 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.

2.4.5 NGET will work with the distribution network operators to design and undertake the replacement or rationalisation of any affected low voltage overhead lines with underground cables wherever this would be technically practicable and not prohibitively expensive.

2.4.6 Managing interfaces with existing NPG, NGED and UKPN overhead lines will form part of this Project.

2.5 New Transmission Converter Stations and Substations

Types of substations

2.5.1 There are two main types of substations; one equipped with Air Insulated Switchgear (AIS) and the other with Gas Insulated Switchgear (GIS). HVAC installations can use either AIS or GIS technology. HVDC converter stations are largely restricted to AIS although it is sometimes beneficial to use GIS components where they exist. Typically the use of GIS in a converter station would be limited to HVAC Switchgear because GIS variants of electrical filters and resistors are not available.

2.5.2 AIS switchgear relies largely on open air to provide insulation between high voltage conductions and earth, and from conductor to conductor. Since air is a relatively poor insulator, large clearances are necessary to avoid insulation failure. Hence equipment must be widely spaced which can require large clearance areas to ensure reliable operation and maintain safety. This takes up a larger area of land compared to GIS installations. AIS substations are typically lower cost than equivalent GIS installations and can involve less construction time, with fewer components required, and are easier to maintain. However, they require a larger area of land and, as they are exposed to the elements, they may not be suitable for certain environments such as coastal areas. This can be mitigated by housing the switchgear and HVDC converters in a building.

2.5.3 The high voltage conductors in a GIS substation are enclosed in tubes filled with compressed gas, which is a superior insulator to air. This allows operational clearances to be significantly reduced and since the conductors are enclosed, there is no requirement to add additional safety clearances. GIS substations therefore 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 have typically required the use of sulphur hexafluoride (SF_6) for insulation - a greenhouse gas. It is noted that alternative insulating gases with much lower global warming impact are being introduced and are expected to replace SF_6 over the next few years.

2.5.4 As noted within NPS EN-5 (Paragraph 2.9.61), it should be considered carefully whether proposed development could be reconceived during the design phase of the process to avoid the use of SF_6-reliant assets. NGET policy generally precludes the future use of SF_6 based insulation gases due to the negative environmental impacts. AIS installations are preferred due to lower costs and the reduced operational maintainability of the technology. However, due to the proximity of the coast at some of the potential converter station and substation sites, there may be greater justification for using gas insulated equipment due to the accelerated corrosion of air insulated equipment in coastal environments. There may also be additional benefits in using gas insulated technology as these generally require less land take and in some instances may be less visually intrusive to the surrounding landscape. Further investigations into the levels of salt pollution at the converter station and substation siting areas identified as preferred, and into the historical performance of AIS equipment in the area will be required following non-statutory consultation. These investigations will confirm whether GIS equipment will be justified. 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 significantly 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 therefore being monitored and has not been discounted completely at this point. However, based on NGET policy, an air insulated solution is currently considered the preferred option. For the purposes of the current stage of the Project and to inform the siting work, the use of AIS substations is anticipated. As part of the final design should no SF_6-free alternatives be commercially available, and a SF_6 GIS solution be identified as preferred, the Project will include information on the potential greenhouse gas emissions from use of the GIS solution, emissions monitoring and control measures, and the costs of implementing alternative solutions in line with NPS EN-5.

Converter Stations

2.5.5 The existing electricity networks in Great Britain operate using HVAC technology. To transmit electricity using HVDC technology, converter stations are required at each end of the electricity transmission link. The converter stations contain specialist electrical equipment which converts electricity from AC to DC (or vice versa depending on the direction of electricity transmission). The footprint of a converter station can vary according to particular DC technology requirements and capacity of the transmission connection being developed.

2.5.6 Some of the specialist electrical equipment must be located indoors in buildings potentially 26 m tall, while some could be located outdoors or in smaller buildings.

New Walpole Converter Stations

2.5.7 Two new converter stations will be required at Walpole in proximity to the existing Walpole substation, and new Walpole substation (which will be a new connection point on the network for the new Walpole converter stations and is described in Paragraph 2.5.16 below).

2.5.8 It is assumed that the converter stations would be located near to the new Walpole substation. Therefore, for the purposes of the current stage of the Project and to inform the siting work, it has assumed that each converter station (one for EGL 3 and one for EGL 4) with outdoor (AIS) HVAC switchgear could extend to approximately 350 m by 300 m (approximately 11 ha). Regardless of the technology choice for the HVAC switchgear (AIS or GIS), permanent access would be needed to the new converter stations, together with peripheral landscaping, drainage, and other related works. This would result in approximately 20 ha required for the Walpole converter stations.

Three-ended connection and LCS converter station

2.5.9 The G2W Project is being developed by NGET 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 to accommodate substantial increases in north-south power flows. It will establish a new (wholly or largely overhead line) 400 kV transmission connection between five new substations. Two of these new substations are the two 400 kV LCS south-west of Mablethorpe in East Lindsey, which are required to provide new points on the network where connections for customers and other planned transmission connections can be made.

2.5.10 The siting of the two 400 kV LCS (LCS-A and LCS-B) as part of the G2W Project[18] sought to identify suitable locations for the LCS. As the LCS will act as attractors for customers and other planned transmission connections, the potential for new infrastructure associated with connecting these projects was taken into consideration as part of the siting of the two LCS based on contracted customers and planned onshore and offshore transmission connections at the time. This includes the assumptions that:

- *"separate consents will be required by each of the connections to the two 400 kV LCS"*;
- *"the final locations of these substations or converter stations will be subject to other developers' own siting work and the decisions they will make on location preferences"*;
- *"substations or converter stations would be located within 4 km of each LCS 400 kV substation, as it is considered that other developers (subject to each project's own technical requirements) would seek to limit the lengths of high voltage alternating current (HVAC) connections wherever possible"*;
- *"either EGL 3 or EGL 4 should have the ability to form a three-ended connection by siting a converter station and a DCSS in proximity to either"* of the two 400 kV LCS; and
- the converter station and DCSS for either EGL 3 or EGL 4 to provide a three-ended connection is approximately 10 ha in size.

2.5.11 As described in the SOR (see Paragraph 1.1.27), there is not a current requirement to provide a three-ended connection to the two 400 kV LCS to meet the need case for EGL 3 and EGL 4. However, the Strategic Proposal taken forward provides the ability to provide a three-ended connection in the future should additional capacity be required.

2.5.12 Engineering solutions are available to locate the new LCS converter station and the DCSS in the same or connected structures, which would reduce the footprint for the new LCS converter station and DCSS. These engineering solutions will be explored at later stages of the Project should a three-ended connection be required. For the purposes of the current stage of the Project it has been assumed that the new LCS converter station and DCSS would not be within the same or connected structures but would be in proximity to each other.

2.5.13 Should a three-ended connection be required, a new converter station (the LCS converter station) will be required, in addition to a DCSS (described Paragraph 2.5.23 below), in proximity to one of the LCS. For the purposes of the current stage of the Project and to inform the siting work, it has assumed that that the LCS converter station (for either EGL 3 or for EGL 4) with outdoor (AIS) HVAC switchgear could extend to approximately 350 m by 300 m (approximately 11 ha). Regardless of the technology choice for the HVAC switchgear (AIS or GIS), permanent access would be needed to the new converter stations, together with peripheral landscaping, drainage, and other related works.

Substations

2.5.14 An essential component in the energy network, substations connect sources of generation, such as wind farms and power stations. They connect overhead and

[18] National Grid (2024) Grimsby to Walpole Combined Routeing and Siting Study Report. Available at: [Grimsby to Walpole | National Grid ET]

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 132 kV stepping-up to 400 kV), manage the frequency of the electricity and increase efficiency and reliability of the power supply.

2.5.15 Substations are critical in maintaining a safe and reliable energy supply, as they provide a means of rapidly detecting high voltage equipment faults and automatically disconnecting those faults from the network. This provides a high level of fault resilience, which is reflected in the very low levels of loss of supply attributable to transmission. Systems are installed which provide real time data and report back to operators on equipment status and power flows, allowing problems to be identified and interventions made to redirect power through alternate routes.

New Walpole Substation

2.5.16 NGET's existing 400 kV Walpole substation, to the west of Walpole St Andrew, was built in 1969 to provide energy to a significant part of East Anglia (feeding into Lincolnshire) and to the town of Wisbech and the surrounding area and as a connection point at the convergence of the 400 kV transmission lines connecting the Bicker Fen, Burwell Main, and Norwich Main substations. The electricity is distributed to the surrounding area from the adjacent UKPN 132 kV substation via electricity distribution lines owned and operated by UKPN and NGED. More recently, the substation has become a connection site for numerous electricity generation customers in the area.

2.5.17 The location of the existing 400 kV Walpole substation, adjacent 132 kV substation and connecting overhead lines is shown in **Figure 2-4** below.

2.5.18 A proposal for a new Walpole substation is currently being developed by NGET to facilitate the connection of future projects requiring connections into the electricity transmission system. Future transmission and generation projects requiring connections include the Project, the G2W Project 400 kV overhead line circuit and the Stratera Electrolyser and Combined Cycle Gas Turbine (CCGT).

2.5.19 The new Walpole substation will connect to the 400 kV 4ZM transmission line that runs north from Burwell towards the existing Walpole substation. A turn-in of the 4ZM 400 kV overhead line will be necessary to connect the line into the new Walpole substation. Temporary diversions of the route may also be required to maintain electricity supplies whilst the permanent works are undertaken. The proposed connection arrangement at Walpole is shown in **Figure 2-5**.

2.5.20 As a key connection point for both the Project and the G2W Project, the new Walpole substation will be developed as one of these projects and is currently included as part of both projects.

2.5.21 The G2W Project's proposed new 400 kV overhead line, which would route from Weston Marsh into the new Walpole substation, will require a separate consent to bring the overhead line to the new Walpole substation. As such this component does not form part of the Project. However, as the new Walpole substation would facilitate the connection of this project (and its associated infrastructure) a coordinated approach (in line with Paragraph 2.13.16 of NPS EN-5) has been adopted from the outset. Therefore, the components for the G2W Project are taken into consideration as part of the siting for the new Walpole substation.

Figure 2-4– Location of the Existing 400 kV Walpole Substation, Adjacent UKPN 132 kV Substation and Connecting 400 kV Overhead Lines

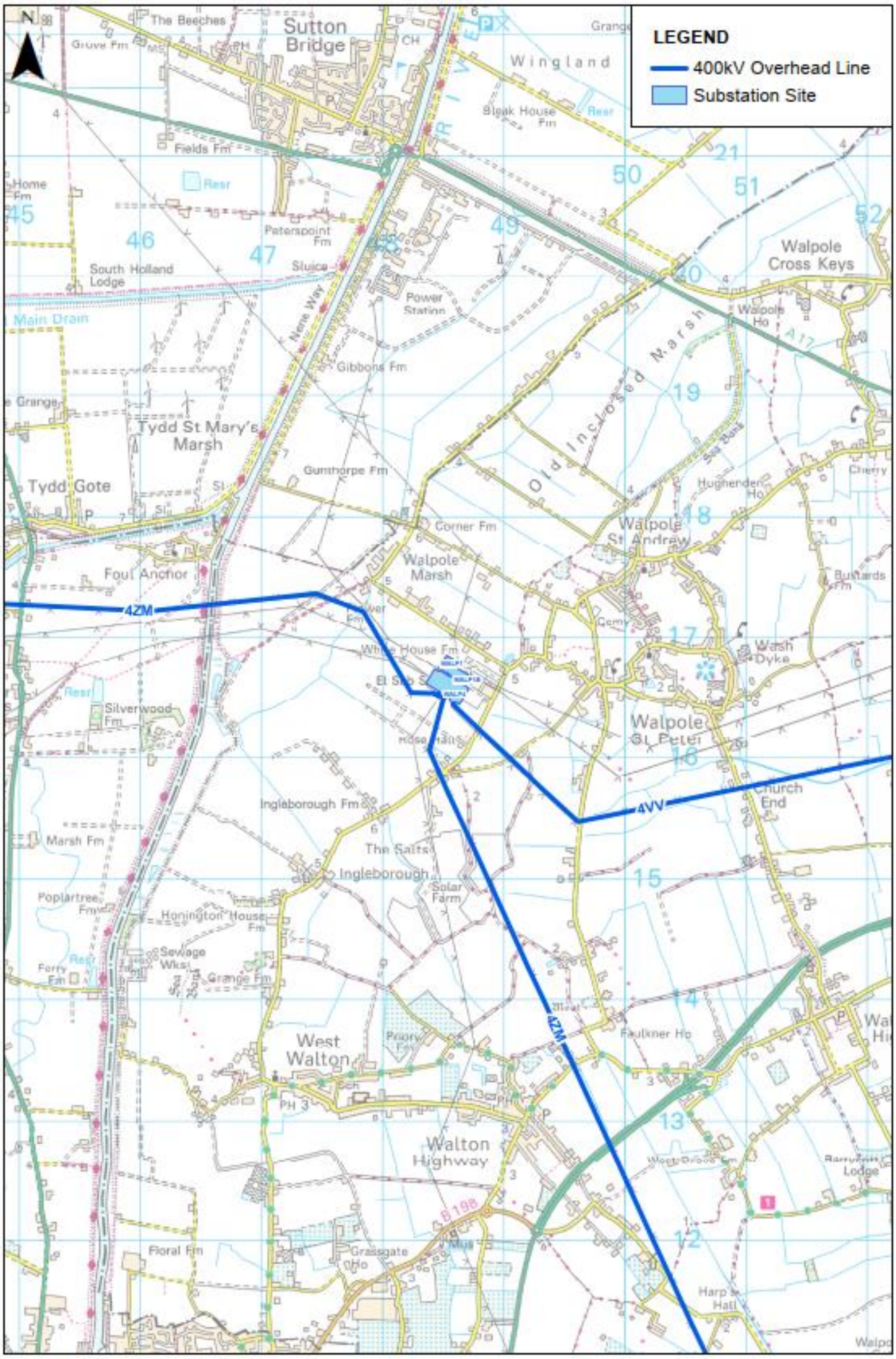
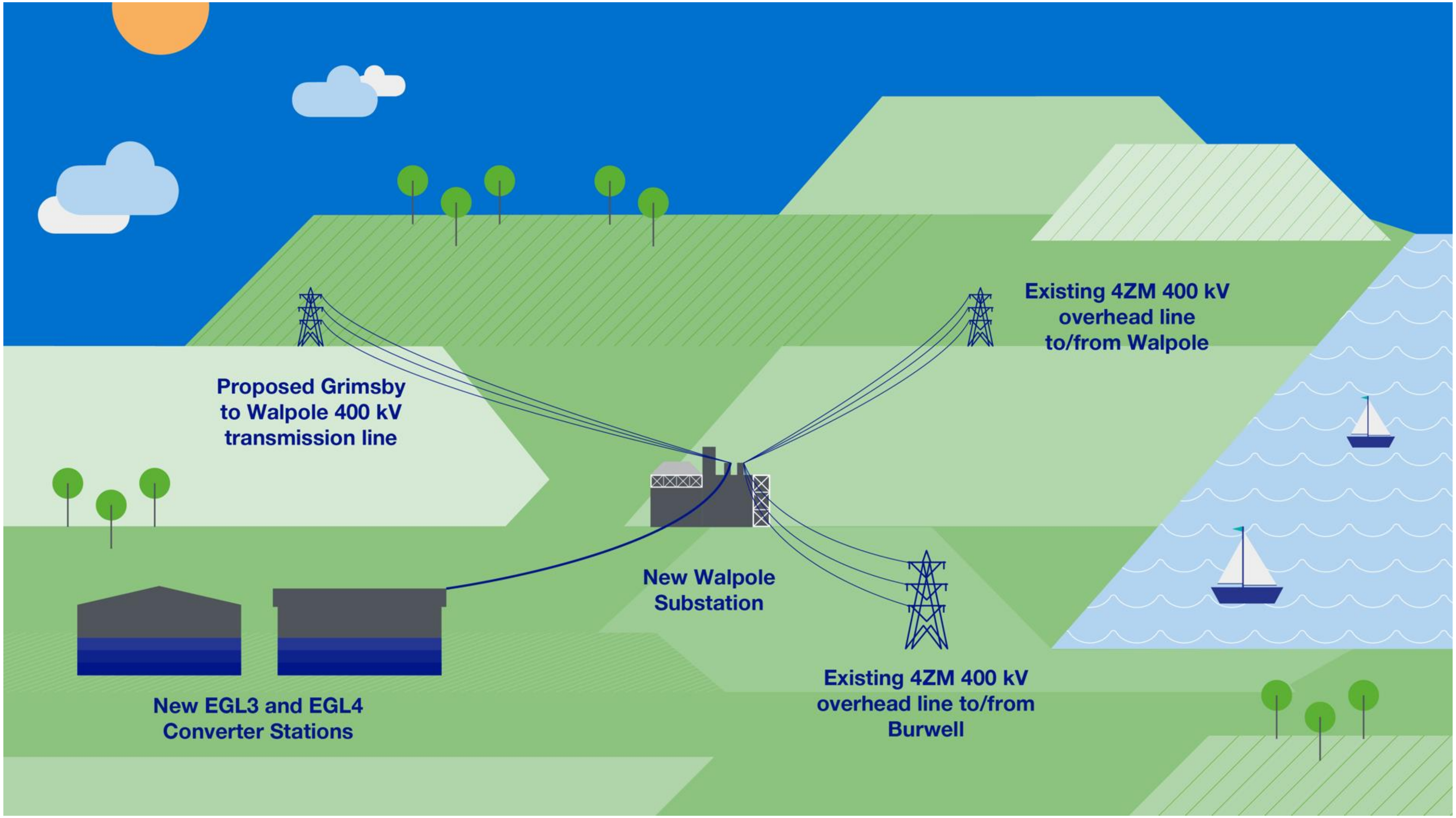


Figure 2-4 – Location of the Existing 400 kV Walpole Substation, Adjacent 132 kV Substation and Connecting Overhead Lines

Figure 2-5– Proposed Connections at the new Walpole Converter Stations and new Walpole Substation



2.5.22 The new Walpole converter stations will connect into the new Walpole substation, via the AC cables. The final technology type for the new Walpole substation has not yet been confirmed. For the purposes of the current stage of the Project and to inform the siting work it is anticipated that a new AIS Walpole substation could extend approximately 800 m by 200 m (approximately 16 ha) dependent upon the final number of connections required. Regardless of the technology chosen, permanent access would be needed to the new Walpole substation, together with peripheral landscaping, drainage, and other related works.

Three-ended connection switching station (DCSS)

2.5.23 As described in Paragraph 2.5.9, should a three-ended connection be required with the LCS, then a DCSS will be required alongside the LCS converter station. As noted in Paragraph 2.5.12, engineering solutions are available to locate the DCSS and the LCS converter station within the same or adjoining structures. However for the purposes of the current stage of the Project it has been assumed that the new LCS converter station and DCSS would not be within the same or connected structures but would be in proximity to each other.

2.5.24 A DCSS provides a more robust and flexible infrastructure for HVDC transmission, ensuring that power flow can be maintained. It helps to improve system performance and flexibility, especially when dealing with varying load demands or maintenance requirements. For the purposes of the current stage of the Project and to inform the siting work it is anticipated that a new DCSS could extend to approximately 190 m by 100 m (approximately 2 ha) and would require permanent access, peripheral landscaping, drainage, and other related works.

2.5.25 The DCSS would be connected to the LCS converter station by DC cables and the LCS converter station to the LCS by AC cables.

3. NGET's Approach to Routeing and Siting

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, 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:

  "It shall be the duty of the holder of a licence authorising him to participate in the 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:

  "(1) In formulating any relevant proposals, a licence holder or a person authorised by 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, sites, buildings or objects."

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, 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:

> *"By the end of 2023 we are set to increase our capacity by a further 15 per cent. But now we must go further and faster, building on our global leadership in offshore wind." [It aims to] "deliver up to 50 GW by 2030, including up to 5 GW of innovative floating wind."*

3.3.4 The British Energy Security Strategy recognises that:

> *"Accelerating our domestic supply of clean and affordable electricity also requires 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 system could bring down costs by up to £10 billion a year by 2050."*

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

- set out a *"blueprint for the whole system by the end of 2022 in the Holistic Network Design (HND) and Centralised Strategic Network Plan (CSNP). The HND will identify strategic infrastructure needed to deliver offshore wind by 2030.";* and
- *"Dramatically reduce timelines for delivering strategic onshore transmission network 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-2020s."*

3.3.6 The Powering Up Britain paper[19] 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.

[19] Energy White Paper: Powering our net zero future, December 2020 https://www.gov.uk/government/publications/energy-white-paper-powering-our-net-zero-future

3.4 National Policy Statements (NPS)

3.4.1 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 Statements provide the primary national policy context for decisions on applications for electricity transmission projects classified as Nationally Significant Infrastructure Projects.

3.4.2 The process undertaken as part of the Options Identification and Selection Stage and reported within this CPRSS was primarily undertaken in 2023 and based on the 2011 NPSs (adopted July 2011) which comprised the designated National Policy Statements at the time. Revised versions of EN-1 (Overarching National Policy Statement for Energy) and EN-5 (National Policy Statement for Electricity Networks Infrastructure) were published in November 2023 and came into force on 17 January 2024. Therefore, the commentary below reflects the November 2023 NPSs. NGET has reviewed the changes introduced by the revised versions of the NPSs and concluded that they do not change the policy appraisals undertaken to inform this CPRSS or the conclusions reached.

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

3.4.3 EN-1 sets out the need for new nationally significant infrastructure to be brought forward at pace to meet out 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.

3.4.4 EN-1 sets out the critical national priority (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.

3.4.5 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.) recognises that due to the significant amount 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.

3.4.6 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 Section 5.10 of EN-1);
- Visual (as described in Section 5.10 of EN-1);

- Ecology (covering the ‘biodiversity’ impacts described in Section 5.4 of EN-1);
- Historic environment (as described in Section 5.9 of EN-1);
- Air quality (covering the ‘air quality and emissions’ and ‘dust’ impacts described in Section 5.2 of EN-1);
- Noise and vibration (as described in Section 5.12 of EN-1);
- Geology and soils (covering the ‘geological conservation’ impacts described in Section 5.4 of EN-1);
- Water (covering the ‘flood risk’ and ‘water quality and resources’ impacts described in Sections 5.8 and 5.16 of EN-1, respectively);
- Economic activity (covering the ‘socio-economic’ impacts and ‘land use, including open space, green infrastructure, and green belt’ impacts described in Sections 5.13 and 5.11 of EN-1, respectively);
- Aviation and defence (covering the ‘civil and military aviation and defence interests’ impacts described in Section 5.5 of EN-1); and
- Traffic and transport (as described in Section 5.14 of EN-1).

3.4.7 Greenhouse Gases, coastal change, odour, artificial light, smoke, steam, insect infestation and waste management impacts, as described in Sections 5.6, 5.7, and 5.15 of EN-1, respectively, would not have a significant influence 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).

3.4.8 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[20] on such matters.

3.4.9 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. Section 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* registered parks and gardens; 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. Section 5.10.32 of EN-1 confirms that National Parks and Areas of Outstanding Natural

[20] 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

Beauty (AONBs, now National Landscapes (NL)) 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:

  - *"the need for the development, including in terms of national considerations, and 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 opportunities, and the extent to which that could be moderated."*

- Socio-economics – applicants for a given project should identify the impacts of new energy infrastructure and potential mitigation measures.
- Coastal change - 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 Nationally Significant Infrastructure Projects (NSIPs) is set out in section 5.7 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 application is supported by a Flood Risk Assessment (FRA).*
  - *the Sequential Test has been applied 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 urban 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."*

Sequential Test

3.4.10 The Sequential Test is set out in Planning Practice Guidance[21] 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[22].

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

- 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[23] within medium risk areas (i.e., Flood Zone 2). If there is no reasonably available site in Flood Zone 1, then projects can be 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[24]). In these circumstances, energy NSIPs can be 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.

3.4.12 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

3.4.13 If, following application of the Sequential Test, it is not possible for the project to be 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.

3.4.14 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:

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[21] See Paragraph: 024 Reference ID: 7-024-20220825 of the Planning Practice Guidance ('PPG').

[22] See Paragraph: 024 Reference ID: 7-024-20220825 of the Planning Practice Guidance ('PPG') and paragraph 5.8.21 of EN-1.

[23] '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.

[24] 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.

- it must be demonstrated that the project provides wider sustainability benefits to the community [25] 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[26].

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

3.4.15 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, EN-5 states that:

- 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 (Paragraph 2.9.9) - 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 impacts.

3.4.16 While EN-5 covers above ground electricity lines, it is explained in Paragraph 1.6.4 that "*In addition, this NPS will apply to other kinds of electricity networks infrastructure including offshore transmission of any type (defined at section 2.12.4)…, underground cables at any voltage, associated infrastructure as referred to above and lower voltage overhead lines, where that infrastructure becomes subject to the 2008 Act – and so be covered by this NPS – in the following circumstances*:

i. if it constitutes associated development for which consent is sought along with an NSIP such as an offshore wind generating station or relevant overhead line...; or

ii. if the Secretary of State gives a direction under Section 35 of the 2008 Act (for developments which, when completed, will be wholly in one or more of the areas specified in subsection 35(3)) that it should be treated as an NSIP and requires a development consent order (DCO)".

3.4.17 EN-5 makes clear that the Horlock Rules should be followed by developers when designing their proposals for substations, and while it is the government's position that overhead lines should be the strong starting presumption for electricity networks developments in general, EN-5 Paragraph 2.9.20 explains that *"this presumption is reversed when proposed developments will cross part of a nationally designated landscape (i.e. National Park, The Broads, or Area of Outstanding Natural Beauty)."*

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

[26] 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.

3.4.18 EN-5 Paragraph 2.9.22 states that "*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 effects of the scheme."*

3.4.19 Taking into consideration Paragraph 3.4.2 above, EN-5 reiterates the assessment principles outlined in Section 4 of EN-1 i.e., that "*Applicants must show how any likely significant negative effects would be avoided, reduced, mitigated or compensated for, following the mitigation hierarchy".* This however is recognised in the context that there is an urgent need for CNP infrastructure and that this in general will outweigh any other residual impacts not capable of being addressed by application of the mitigation hierarchy.

3.5 The Holford and Horlock Rules

3.5.1 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 overhead lines; and
- Horlock Rules – guidelines for the design and siting of substations, converter stations and sealing end compounds (SECs)[27].

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

3.5.3 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.

Holford Rules

3.5.4 Paragraph 2.9.16 of NPS EN-5 makes clear that the Holford Rules are *"a common-sense approach to overhead line route design"* and *"should be embodied in the applicants' proposals for new overhead lines"*. In summary, the Holford Rules state that routeing of high voltage overhead transmission lines 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'[28]; and

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[27] 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 overhead lines".*

[28] Caused by multiple overhead lines running in different angles or the proximity of multiple overhead lines.

- 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.

3.5.5 Whilst the guidelines were initially developed in 1959, they have been reviewed on several occasions by NGET and by the other UK transmission licence holders, including a review against the Electricity Act 1989. The guidelines have stood the test of time and have become accepted industry best practice in overhead line routeing.

3.5.6 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.

Horlock Rules

3.5.7 Paragraph 2.9.18 of NPS EN-5 makes clear that the Horlock Rules (guidelines for designing and siting substations) *"should be embodied in the applicants' proposals for the infrastructure"*. The Horlock Rules state that[29]:

- 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 overhead lines 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

[29] https://www.nationalgrid.com/sites/default/files/documents/13796-The%2orlock%20Rules.pdf (nationalgrid.com)

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.

3.5.8 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.

3.5.9 As detailed above, the National Policy Statement for Electricity Networks Infrastructure (EN-5) (2023) in paragraph 2.9.18 confirms that the Horlock Rules "*should be embodied in Applicants' proposals for the infrastructure associated with new overhead lines*".

3.6 National Planning Policy Framework (NPPF) (2023)

3.6.1 The National Planning Policy Framework (NPPF) 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.

3.6.2 Paragraph 5 of NPPF states that the:

"*Framework does not contain specific policies for nationally significant infrastructure 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 plans and making decisions on planning applications."*

3.6.3 When considering new electricity infrastructure, NGET have regard to the NPPF.

3.7 National Grid Electricity Transmission's Approach to Consenting

3.7.1 NGET's Approach to Consenting[30] 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, Examination and Decision; and
- Stage 6: Construction.

3.7.2 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,

[30] https://www.nationalgrid.com/electricity-transmission/document/142336/download

the local community, relevant planning policy, other existing and proposed developments as well as technical and engineering design information.

3.7.3 The aim of the approach is to balance consideration of these factors and identify an emerging preferred corridor, emerging preferred siting zones and areas within which the underground cables, converter stations, substations and upgrade works to existing transmission infrastructure could be routed and sited.

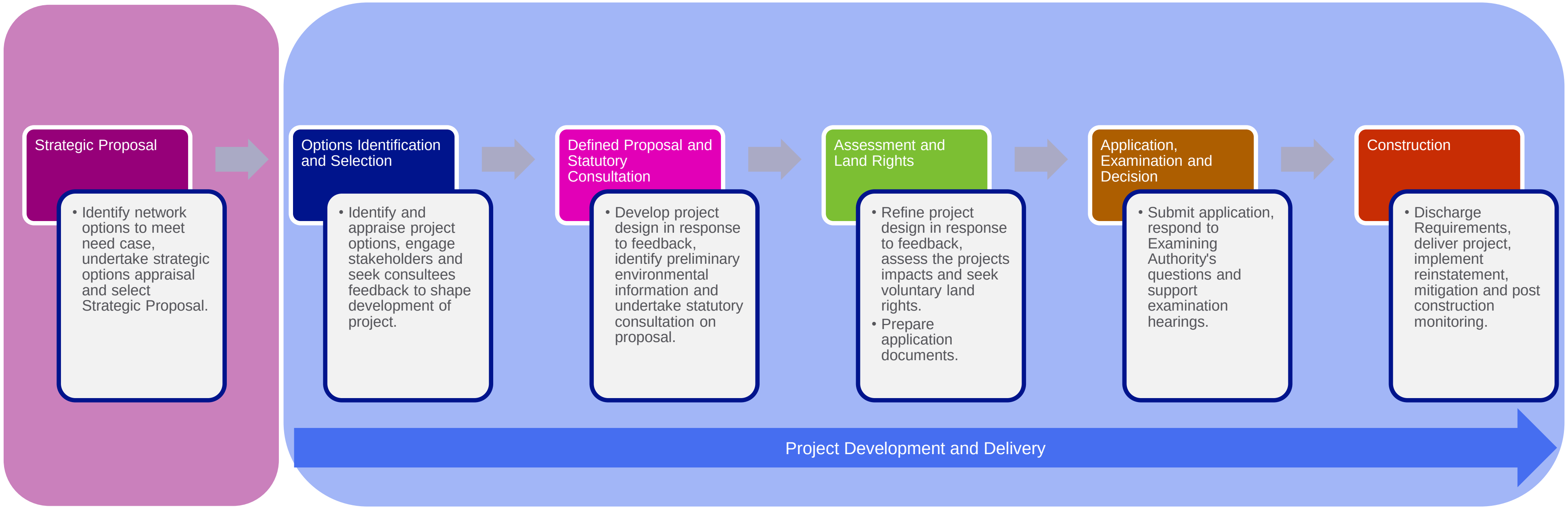
3.7.4 **Figure 3-1** presents an overview of NGET's Approach to Consenting; a summary of the main objectives of this stage of the consenting process can be seen below that stage. The Project is at the Options Identification and Selection Stage (Stage 2).

3.7.5 This CPRSS has been undertaken as part of 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 developing a graduated swathe for non-statutory consultation; and
- Step 9 – Undertake non-statutory consultation.

3.7.6 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. Options Identification and Selection Process (Stage 2)

4.1.1 The Strategic Proposal[31] Stage (Stage 1) was completed in 2024 and a Strategic Proposal was selected, as described in Section 1.2. This CPRSS presents the findings of the Options Identification and Selection Stage (Stage 2) and identifies the corridor, siting zones and/or siting areas which are emerging as preferred for the Project. The findings of this CPRSS will be used as part of the non-statutory consultation. The feedback received on the Project during non-statutory consultation will be used to inform 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, siting zones and landfalls) required for the Project could be located and within which detailed environmental and socio-economic data is gathered to inform Stage 2.
- Landfall – Where the offshore (submarine) cables come ashore. It is the interface between the onshore (terrestrial) and offshore (marine) components of the Project.
- Corridor – a broad area within the study area, within which new transmission infrastructure (underground cables) 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 converter station, substation or DCSS (described as ‘stations’ in this Report) could be sited.
- Emerging Preferred Corridor – a broad area within which the underground cables for the Project could be located, based on the findings of Stage 2.
- Emerging Preferred Siting Zone – a broad area within which the Emerging Preferred Siting Area could be located, based on the findings of Stage 2.
- Emerging Preferred Siting Area – a broad area within which the station (converter, substation or DCSS) infrastructure for the Project could be located, based on the findings of Stage 2.

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

- 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.
- 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
- Define study area(s) and data gathering.

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

Step 3
- Ascribe a weight to, confirm and agree features.
- Develop heat maps for underground cables and stations.
- Identify emerging preferred landfalls

Step 4
- Define preliminary siting zones and where applicable siting areas.
- Run GIS 'cost corridor' analysis.
- Define corridors.

Step 5
- Review corridors and siting zones to create 'end-to-end' solution(s).
- Identify siting areas where applicable.

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

Step 7
- Undertake options appraisal of corridors, siting zones and siting areas.

Step 8
- Identify the corridor, siting zone and siting areas emerging as preferred.
- Develop graduate swathe for non-statutory consultation.

Step 9
- Undertake non-statutory consultation with stakeholders.

4.2 Step 1: Define the Study Area

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

4.2.2 Given the large geographical extent of the Project, distinct, but interrelated study areas have been defined for the landfall, new stations (new LCS converter station and DCSS, and new Walpole converter stations and 400 kV substation) and the underground transmission connection between these connection points.

4.2.3 The study areas that have been developed are informed by:

- The connection points (start/end points) and strategic zones identified by the Strategic Proposal Stage (Stage 1);
- the distribution of areas of the highest amenity value or environmental feature (for example internationally designated sites);
- the nature of the physical and human geography. The presence of major geographical features such estuaries or hills, or 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 Horlock Rules (for siting of stations) and Holford Rules (for routeing of an underground cable).

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 Strategic Options Report 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. The indicative study area informed the study areas developed at this stage (Stage 2).

4.2.6 The study areas developed must encompass the area within which landfalls, preliminary corridors and siting zones may be identified but exclude areas where these are unlikely to be feasible. They 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 preliminary 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; 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 environmental 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 won't be a differentiating factor because of 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, 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 include air quality and emissions, dust, landscape and visual amenity, ecology, historic environment, noise and vibration, soils and geology, water (including coastal change), economic activity, traffic and transport, and aviation and defence. In addition coastal change is considered within the water topic at the landfalls.

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. At this stage of the Project, climate change from flooding and coastal erosion is considered as part of the water topic. Waste management, electric and magnetic fields and climate change (aspects relating to transmission loses) 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)[32] 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 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 British Geological Survey, Civil Aviation Authority, Environment Agency, Forestry Commission, Joint Nature Conservation Committee, Marine Management Organisation, Ministry of Defence (MoD), Department for Levelling Up, Housing and Communities, Natural England, Office for National Statistics, Ordnance Survey (OS), Sustrans, The Royal Society for the Protection of Birds (RSPB) 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 for Lincolnshire County Council, Cambridgeshire County Council, Norfolk County Council, North-east Lincolnshire Council, East Lindsey District Council, Boston Borough Council, South Holland District Council, Fenland District Council and King's Lynn and West Norfolk District Council to identify further environmental features and opportunities, such as county and regional level designation or other locations important to the public;
- Review of 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 locations of watercourses and waterbodies; and
- Review of other local information through online and published media such as tourism sites and walking routes.

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

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

4.4.1 To allow for the identification of corridors and siting zones and areas, 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 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 (underground cables and stations). For example, Ministry of Defence Low Flying Zones are a far more important consideration for stations but would not likely affect underground cable routeing. Another example is potential inundation by flooding. This is a far more important consideration for station siting than it is for underground cable routeing as it could result in a station ceasing to function, whilst an underground cable would likely function as normal in most circumstances in flood conditions.

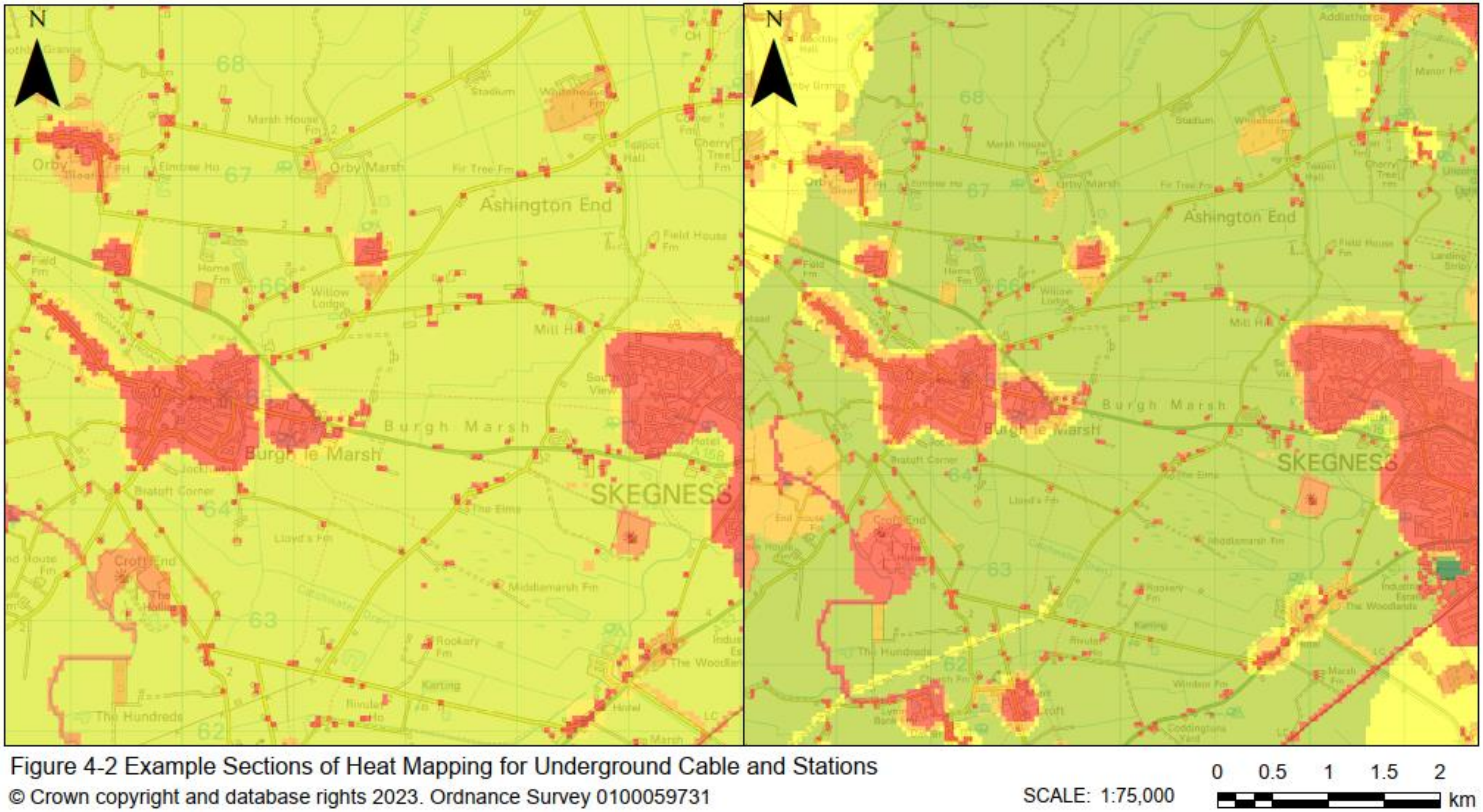
4.4.4 The sensitivity weighting effectively formed a robust scoping exercise to ensure a focus on features that materially inform decision-making. This gave the highest weight to features of national or international value, whilst not excluding features of more local importance.

4.4.5 Sensitivity weightings associated with these features were reviewed and confirmed between NGET and the Front-end engineering design (FEED) Contractor and were then combined to produce separate composite 'heat maps'[33], showing the highest 'weight' for each cell[34] of the map. Examples of the heat maps produced for underground cable and stations are shown in **Figure 4-2**. These composite heat maps reflect the relative importance of different features and help to visualise the constraints to developing infrastructure for the Project and, when combined with professional judgement, informed the identification of corridors and siting zones, as described in **Chapter 5**.

[33] 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.

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

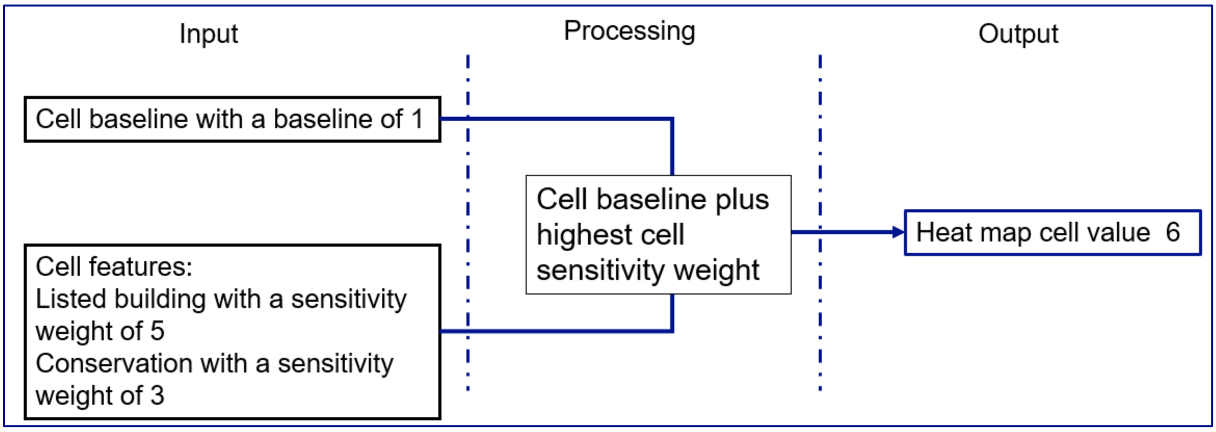
Figure 4-2 – Example Sections of Heat Mapping for Underground Cable (left) and Stations (right)



4.4.6 For composite heat maps, and to enable further GIS analysis of the information within the heat maps, the study areas were broken down into 10 m square 'cells' based on the OS grid. Within each of these cells the sensitivity weighting of a feature is added to a 'baseline' score of one[35]. The heat map therefore shows numerical weightings of one to six.

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 one, contains a listed building with a weight of five and is located within a conservation area with a weight of three, then the cell would have a weight of six (baseline of one, plus listed building, five). This process is shown in **Figure 4-3**.

Figure 4-3 – 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 (or small areas of high weight) informed the development of the corridors, siting zones 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 corridors and siting zones, particularly to allow the refinement of buffer zones and to test the weighting assumptions. An example of this is for the setting of heritage assets. For the development of an indicative corridor, siting zone, or where applicable, siting area, an appropriate buffer all-round the asset was weighted. However, prior to the development of the indicative corridors and siting zones, the assets within a corridor and siting zones were preliminarily reviewed to identify any 'directionality' in the setting. 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. This review will be backchecked and verified by site visits as the Project progresses.

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, siting zones and siting areas, as described in **Chapter 5**.

[35] The entire study area starts with an even 'weight' of one, so that the lowest cost across a 'level playing field' is a straight line - the shortest line.

Identifying emerging preferred landfalls

4.4.11 The identification of the landfalls emerging as preferred, in order to begin identifying and defining corridors from, was done in collaboration with the marine cable routeing undertaken for EGL 3 and EGL 4 to ensure a consistent and coordinated approach to routeing and siting. The landfalls, emerging as preferred as identified in **Chapter 6**, were then used as the starting point for the terrestrial underground cable routeing.

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 environmental specialists who have due regard to the environmental and socio-economic considerations alongside the required technical parameters. The aim of identifying early 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 that the options identified meet the Project engineering requirements.

Identifying and Defining Siting Zones and Siting Areas

4.5.2 A siting area is an area which has the capacity to accommodate the siting of a single station (converter, substation or DCSS). A siting zone is an area which has the capacity to accommodate multiple siting areas.

4.5.3 The identification of the preliminary siting zones and siting areas was led by the environmental specialists from the Project team. Identification takes into consideration the key drivers for each required station (as set out below), the technical parameters (detailed in **Chapter 2**) and the relevant environmental and technical constraints identified from Step 1.

4.5.4 In siting landfalls, areas that benefit from the below factors were identified:

- Appropriate topography;
- Presence of soft sediment to allow for burial of assets; and
- Narrow intertidal areas to minimise additional construction works.

4.5.5 In siting stations, 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; and
- proximity to major roads, to minimise the extent of required new access roads.

4.5.6 Key drivers for the location of each new station; two new converter stations at Walpole and a new 400 kV substation at Walpole and a new LCS converter station and DCSS include:

Walpole (two new converter stations and a new 400 kV substation)

- Seek to identify locations south of the B9 boundary to provide the required reinforcement of the electricity transmission system which would provide additional north-south power flows per the SOR.
- Seek to identify locations which provide the potential for the two new converter stations infrastructure (required to facilitate a connection to the new Walpole substation and into the electricity transmission network) and new 400 kV substation infrastructure to be in reasonable proximity. The connection of the new converter stations to the new substation is a key driver for the new substation.
- Seek to identify locations close to the existing 400 kV 4ZM overhead line between Burwell and the existing Walpole substation. This would minimise the length of circuit reconfiguration and 400 kV overhead lines into the new substation for reasons of operational efficiency and to minimise environmental impacts (by reducing the geographical extent of effects) and costs.

LCS converter station and DCSS

- Seek to identify locations which are in reasonable proximity to either of the two new LCS (LCS-A and LCS-B, proposed by the G2W Project).
- Balance the distance from the coast (to minimise the length of DC cables from potential landfall locations) against the distance from either of the two new LCS (to minimise the length of AC cables from potential LCS converter station and DCSS locations).

4.5.7 Where the identified area for siting zones results in the identification of one zone, then preliminary siting areas are identified. Identification of the siting zones and siting areas was informed by the Horlock Rules and Holford Rules to take account of the combined effects of both the stations and the overhead line (where applicable) and underground cable connections. The following guiding principles informed identification:

- Using or adapting existing infrastructure will generally be of benefit/advantage compared with creating new infrastructure.
- Using available brownfield land[36] will generally be of benefit/advantage compared with utilising greenfield land[37].
- Shorter routes (for underground and overhead line connections) will generally be of benefit/advantage compared with longer routes, as smaller scale infrastructure projects are generally likely to have lower environmental, safety, sustainability, and cost implications (for comparable technology options).
- Financially less expensive options, both in terms of capital and lifetime cost, will generally be of benefit/advantage, as these support NGET's statutory duty under Section 9 of the Electricity Act 1989 to develop and maintain an *'efficient, co-ordinated and economical'* transmission network.
- Options which avoid, minimise and/or mitigate impacts on environmental or socio-economic features will generally be of benefit/advantage compared with those which have likely significant residual effects, as less environmentally damaging or socially

[36] Land that is or was occupied by a permanent structure, including the curtilage of the developed land and any associated fixed surface infrastructure.

[37] Land, usually farmland, that has not previously been developed.

disruptive sites support NGET’s statutory duty under Schedule 9 of the Electricity Act 1989 to *‘have regard to the desirability of preserving amenity’*, and will more readily achieve consent.

4.5.8 The identification of siting zones and siting areas was then used to inform the identification of corridors, as set out below.

Identifying and Defining Corridors

4.5.9 The heat maps produced in Step 3 were used to undertake a GIS ‘corridor analysis’. This is a GIS tool that takes the weight applied to each cell as the ‘cost’ of crossing it and calculates the total cost of every possible path between the start and end points. From this it is possible to identify potential corridors that minimise the environmental ‘cost’, where the environmental ‘cost’ is determined by the combination of distance and the sensitivity weighting applied by the heat map.

4.5.10 The GIS tool helps identify potential corridors which are likely to have the least potential for adverse impacts on those aspects of the environment that can be mapped, by finding routes across the heat map surface to connect the start and end points of the Project which have the least environmental ‘cost’ – the least interaction with environmental features. This approach ensures that potential corridors prioritise key issues, including mapped technical constraints, whilst retaining all data to be considered so that further analysis can be undertaken to address areas identified as particularly constrained (‘pinch points’) and later for developing the graduated swathe.

4.5.11 The corridors generated through the GIS corridor analysis provided a starting point for the Project team landscape and environmental specialists. They work with the wider Project team as appropriate, 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 will result in a narrow corridor being available, whereas in areas with fewer features, the width could be considerably wider. This has resulted in a variety of widths for the preliminary corridors ranging between 300 m and 2.8 km. Corridors included aspects which cannot be mapped but are no less important considerations to the routeing of a transmission connection.

4.5.12 The options identified were then subject to review by the FEED Contractor and the Project team who used their professional judgement to recommend amendments (i.e., to park, refine or expand) to the corridors. For example, where possible, corridors were refined to limit nationally designated sites in line with the policy tests as set out in NPS EN-1. In addition corridors were identified, where possible, or refined to avoid (or include areas where an alignment could avoid) 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 NPS EN-1. 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.

4.5.13 As part of this exercise, the distribution and density of constraints (environmental, technical and socio-economic) was examined to identify areas where it might be particularly challenging to identify a technically feasible and/or environmentally acceptable transmission connections (subject to further analysis).

4.5.14 The outcome of Step 4 is a set of early corridors, 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.

4.5.15 To enable a clear comparative analysis and understanding of the early corridors, the complex network of corridors were divided. This exercise was undertaken so that an emerging preference can be identified using a corridor then via another corridor, to bypass an area of greater constraint and create an 'end-to-end' solution taking account of the siting of the stations. The corridors are described in **Chapters 7** and **8**.

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 Contractor 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 Zone and Siting Areas

4.7.1 Following the identification of the landfalls, corridors, siting zones and siting areas (Steps 4 and 5), site visits were undertaken by landscape, heritage and ecology specialists, the FEED Contractor 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 during the desk studies and to identify further construction and design hazards that might mean corridors, 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, where applicable:

- any options which are less preferred;
- any new options that are identified; or
- any amendments to existing options where applicable.

4.7.3 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 landfalls, 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 back-check 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 considers the potential impacts on relevant features, and whether such impacts could be avoided or mitigated through careful routeing or siting. Where impacts cannot be avoided or mitigated by careful routeing, other forms of mitigation were considered such as utilising trenchless crossings to cross features such as major roads and watercourses.

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). The findings of the Options Appraisal for the relevant sub-topics are detailed within **Chapters 6 to 10**.

4.8.6 The Options Appraisals also took cognisance of the requirements of the Environment Act (2021) regarding biodiversity net gain (BNG) and climate resilience and greenhouse gas emissions. The Environment Act introduces new environmental targets across waste and resource efficiency, air quality, water, nature, and biodiversity. Although not yet in force, the most notable of these is the mandatory 10% BNG requirement for developments, including in respect of nationally significant infrastructure projects such as the Project. The requirement for 10% BNG is also included in the Environmental Action Plan 2021-2026[38]. The Options Appraisal noted where land may be available and/or may be suitable to support BNG requirements (subject to collaboration with landowners and Local Nature Partnerships). Higher value habitats are considered for avoidance through careful routeing and siting where possible, for example priority habitats and traditional orchards, this aims to reduce biodiversity impacts and BNG requirements. The consideration of BNG in detail will form part of the later stages of the Project.

4.8.7 The Project itself is designed to enable renewable energy generation thus contributing to combating climate change. The subsequent stages of the Project will need to assess climate change both in terms of greenhouse gas emissions and climate resilience. However, both components of climate change have been inherently considered at a high-level in the Options Appraisals i.e., consideration of presence of peaty soils, Flood Zones and underground cable lengths. With regards to Flood Zones specifically, the

[38] Our 2021–2026 Environmental Action Plan April 2021 (National Grid, 2021). Available at: https://www.nationalgrid.com/electricity-transmission/document/136551/download

Options Appraisal took cognisance of the policy tests (sequential and exception tests) as described within NPS EN-1, thus where possible supporting a preference for options that fall within areas of lower flood risk. At this stage of the Project a high-level carbon cost exercise was undertaken across options and further information on this is provided in **Chapter 10**.

4.8.8 The process of comparison and selection of options is described under Step 8.

4.9 Step 8: Confirm Emerging Preferred Corridor, Siting Zone and Siting Area and Develop Graduated Swathe for Consultation

4.9.1 Following completion of Step 7, a challenge and review workshop was held and attended by NGET, the FEED Contractor and the environmental specialists. 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. The aim being to conclude upon options which provide the optimum balance of efficiency and economy, whilst having appropriate regard to environmental and socio-economic impacts.

4.9.2 The landscape team and FEED Contractor then sought to identify areas within the emerging preferred landfalls, corridors, siting zones and siting areas where the infrastructure for the Project might be best located based on the work undertaken to date. Identified preliminary areas were then sifted taking into consideration the initial heat mapping and the Horlock and Holford Rules. Of particular pertinence for this review were:

- Horlock Rules 2, 3, 4, 5 and 6 – to avoid areas of amenity value and minimise noise, visual and land use impacts; and
- Holford Rules 1 and 2, and the Supplementary Notes – to avoid areas of amenity value and while taking this into consideration selecting a direct route.

4.9.3 A workshop attended by the Project Team was then undertaken to discuss the outputs of the routeing and siting and to review the technical requirements for creating a graduated swathe. The outcome of this workshop is graphically represented in the form of a 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 public consultation to engage stakeholders, statutory consultees and interested parties, including the public.

5. Study Area and Corridor Definition

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

5.1 Introduction

5.1.1 **Figure 1-10** shows the location of the Project, which is in the East Midlands, East of England and East Anglia regions. This chapter presents the details of defining the study areas for the Project (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[39] for the Project as shown in **Figure 5-1.**

5.2.2 The approach to developing the study area for the Project was based on balancing:

- NGET's statutory duty to develop an efficient, co-ordinated and economical system of transmission (Section 9 of the Electricity Act 1989);
- NGET's statutory duty to preserve amenity 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 connection points (landfall, the new Walpole converter stations, new Walpole substation, and if required for a future three-ended connection, new LCS converter station) were taken as a start point for the definition of the study areas for the terrestrial components (the Project) for EGL 3 and EGL 4. The landfalls, new Walpole 400 kV substation and, if required for a three-ended connection, one of the new LCS mark the end points for the Project.

5.2.4 Given the large geographical extent of the Project, four distinct but interrelated study areas have been defined since the SOR for each component of the Project as shown in **Figure 5-1** and are described below, these are:

- the landfall;

[39] An area within which a range of potential corridor options, station siting zones or areas for the new infrastructure will be considered.

- the new underground cable terrestrial connections;
- the new Walpole converter stations and new 400 kV Walpole substation; and
- the new LCS converter station and DCSS (should a three-ended connection be required).

5.2.5 The study areas were defined to be sufficient to encompass the initial design (as outlined in **Chapter 2**) for the Project, whilst satisfying NGET's statutory duties and obligations, meeting the Project objectives and not extending to include areas unlikely to yield such a design which could not be consented. The development of the four study areas is explained below.

Figure 5-1 – Study Areas

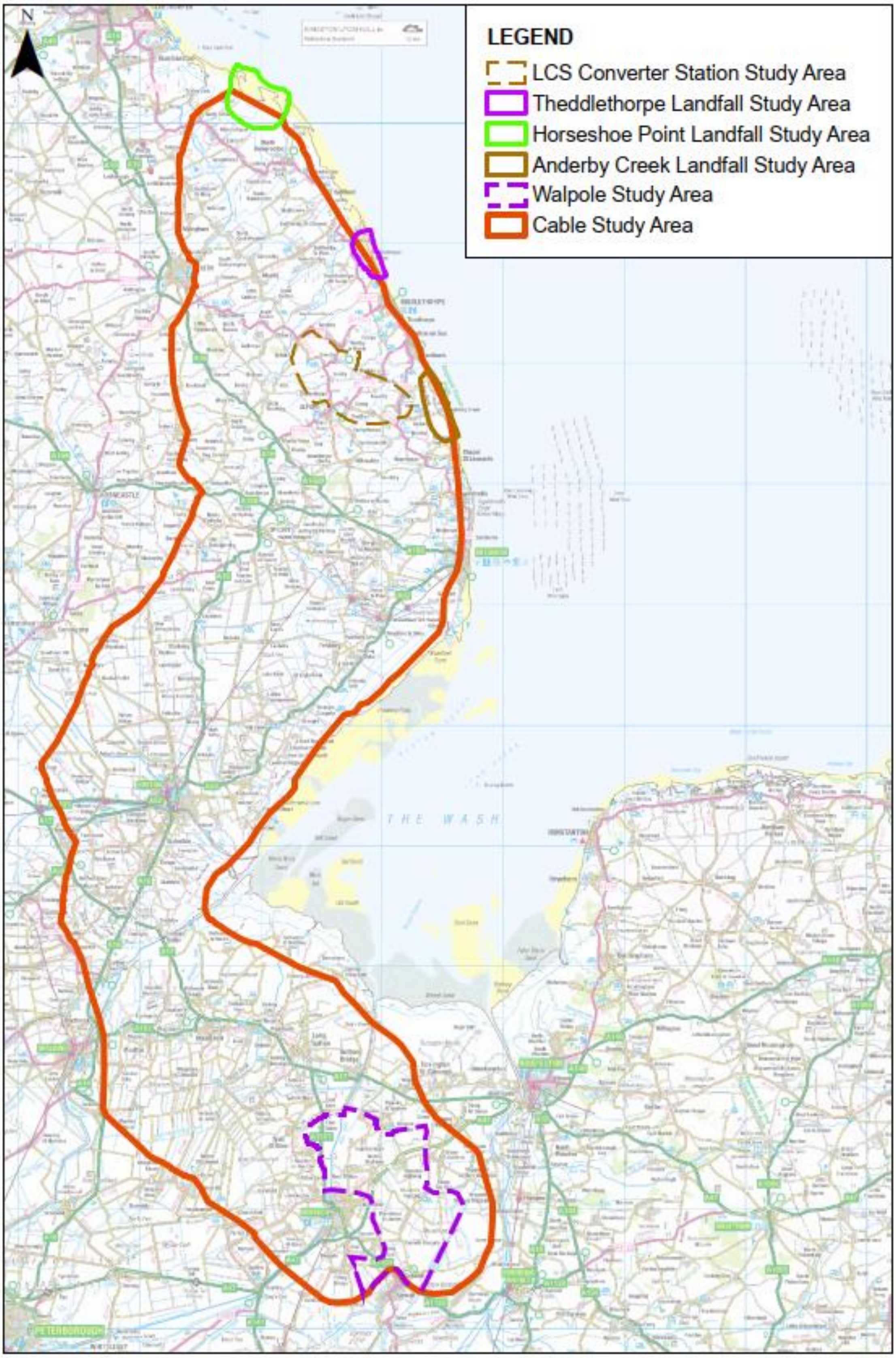


Figure 5-1 - Study Areas

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SCALE 1:500,000 0 3 6 9 12 15 km

Landfalls

5.2.6 As part of the SOR[12] consideration was given to strategic Project options which made landfall on either the Lincolnshire coastline (between south of Cleethorpes and north of Chapel St Leonards) or the North Norfolk coastline (between Blakeney Point and Cromer). Seven options were considered with new connection points into the NETS in the South Humber area to meet the Project need case. One option (EGL OPP6) had the feasibility to connect into the NETS with a landfall on either the North Norfolk or Lincolnshire Coastline. Following appraisal, landfall on the north Norfolk coastline was significantly less preferred as this option would result in a greater number of statutory designations being impacted compared with a landfall on the Lincolnshire coastline and was less preferred for technical and environmental reasons in both the marine, nearshore and terrestrial environments. Further information on this phase of the Project can be found in the SOR.

5.2.7 Following the Strategic Options Appraisal and the selection of a preferred option which would make landfall on the Lincolnshire coastline and connect into a new substation at Walpole, a desktop preliminary landfall assessment[40] was undertaken in 2022 appraising 90 km of Lincolnshire coastline, from the Humber Estuary in the north, to the north side of the Wash in the south. The appraisal considered environmental, socio-economic and technical constraints along the coastline to identify potential landfall locations (referred to in this Report as the preliminary landfall study area). It also considered onshore and offshore areas adjacent (within 1 km) to preliminary landfall study area to ensure feasibility of onwards terrestrial and marine cable routeing.

5.2.8 The preliminary landfall assessment comprised three steps:

- Step 1: Identification of environmental, technical or other constraints which influence landfall feasibility;
- Step 2: a Red-Amber-Green (RAG) review of the coastline taking account of immediate coastal constraints; and
- Step 3: a review of Amber and Green sections of the coastline, including onwards onshore/offshore cable routeing to identify potential preliminary landfall study areas.

5.2.9 The RAG review identified large sections of the coastline which were highly constrained (identified as ‘Red’) with limited or no feasible landfall opportunities. These areas were not progressed due to a combination of constraints including coastal settlements (including Grimsby, Cleethorpes, Humberstone, Mablethorpe, Chapel Point, Ingoldmells and Skegness as well as a number holiday and caravan parks), existing infrastructure and built development (pipelines associated with Theddlethorpe Gas Terminal and cables associated with the Viking Link Interconnector (a 525 kV HVDC underground transmission link between Denmark and the UK) and Triton Knoll Offshore Windfarm), ecological designations and military practice areas. Five sections of the coastline were identified as ‘Amber’ or ‘Green’ and as providing landfall opportunities. Therefore, these sections were subject to further appraisal considering constraints present along the coastline, and the potential for both onwards subsea cable routeing and onwards onshore underground cable routeing.

5.2.10 These five sections of coastline were Horseshoe Point (which includes the Donna Nook area), Saltfleetby to Mablethorpe (described in this Report as Theddlethorpe), Sandilands to Anderby Creek, Anderby Creek to Chapel Point and Ingoldmells. The

[40] AECOM (2023), Eastern Green Link 3 and 4: Preliminary Landfall Study.

appraisal identified preliminary landfall study areas at three locations (north to south): Horseshoe Point (including Donna Nook); Theddlethorpe; and Anderby Creek (a combination of both the Sandilands to Anderby Creek and Anderby Creek to Chapel Point sections). Land at Ingoldmells was identified as less preferred as a preliminary landfall study area due to onshore built development constraining onwards underground cable routeing whilst subsea cable routeing would require a greater number of crossings, with some within statutory ecological designations, when compared with the other preliminary landfall study areas.

5.2.11 These preliminary landfall study areas were used as a starting point for identifying the terrestrial 'Landfall Study Area' for each of Horseshoe Point, Theddlethorpe, and Anderby Creek (described as Landfall Study Areas in this Report) and were subject to review by marine environmental and engineering consultants to identify preliminary offshore subsea cable routes for each preliminary landfall study area to determine the extent of coastline to be included in the Landfall Study Area.

5.2.12 Landfall Study Areas were defined as a search area of 1 km around each of the preliminary landfall study areas and associated preliminary offshore subsea cable routes. The Landfall Study Areas are from MLWS to approximately 1 km inland and are shown in **Figure 5-2**. Landwards from the potential landfall areas, the Landfall Study Areas overlap with the study area for the underground cables, these areas are referred to as 'the Study Area' (Paragraph 5.3.1) and are described further in **Section 5.3**.

Figure 5-2 – Landfall Study Areas and Key Features

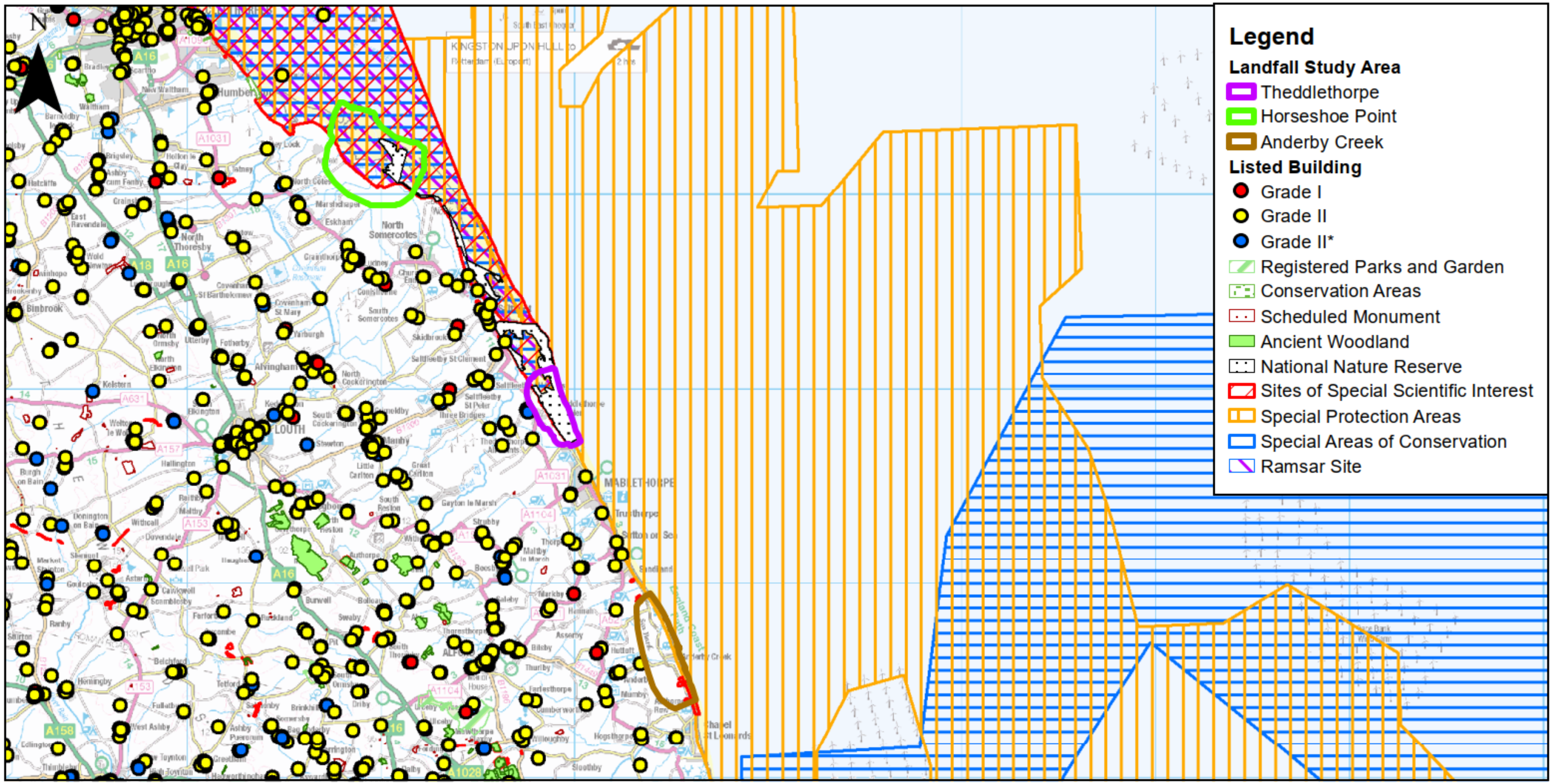

Figure 5-2 - Landfall Study Areas and Key Features

SCALE: 1:450,000

0 2 4 6 8 10 12 km

Underground cables

5.2.13 The study area for the underground cables was defined through a five-phase process which is outlined below and shown in **Figure 5-7.**

5.2.14 The approach to defining the study area for the underground cables was based on balancing NGET's statutory duty to develop an efficient, co-ordinated and economical system of transmission (Section 9, Electricity Act 1989); NGET's statutory preservation of amenity duty under Section 38 and Schedule 9 of the Electricity Act 1989; and 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"*.

Phase I: Connection Points

5.2.15 The first phase involved joining three connection points[41], comprising the Landfall Study Areas in the north and east and the Walpole substation/converter stations in the south via the two preferred siting zones for the proposed LCS in the centre, in the most economic and efficient manner: being a straight line between these connection points. The connection points used were the centre points of each station study area (the process of defining the study areas for each station is described below from paragraph 5.2.25 and above for the landfalls in paragraph 5.2.12). All other things being equal, a straight line would be the shortest route and therefore represent both the least cost solution and the least amount of new development, potentially minimising community and environmental impacts and resulting in a potentially shorter construction programme.

Phase II: High-level Constraints Review

5.2.16 A high-level desk-based review was then 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. Major areas of highest amenity value included the Lincolnshire Wolds National Landscape (formerly Area of Outstanding Natural Beauty (AONB)) ('the Lincolnshire Wolds NL'); Humber Estuary Special Area of Conservation (SAC), Special Protection Area (SPA) and Ramsar Site; Greater Wash SPA; Saltfleetby-Theddlethorpe Dunes & Gibraltar Point SAC; Gibraltar Point SPA and Ramsar; The Wash SPA and Ramsar Site; The Wash and North Norfolk Coast SAC and the Inner Dowsing, Race Bank and North Ridge SAC. The main centres of population identified included Boston, Spalding, Skegness and Wisbech. Key technical constraints for the underground cables, at this scale, were also identified; however, these did not change the study area. Key technical constraints comprised main rivers (such as River Witham, River Lymn, Steeping River, South Forty Foot Drain, River Welland and River Nene), existing gas pipelines (such as the Theddlethorpe To Hatton pipeline, Gosberton To Tydd St. Giles pipeline and a network of gas pipelines in the vicinity of the existing Walpole substation), other existing high voltage underground cables (such as Viking Link Interconnector and Triton Knoll Offshore Windfarm) and railways.

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[41] For the purposes of this first phase, the two LCS (LCS-A and LCS-B) proposed by the Grimsby to Walpole Project are considered to represent one connection point.

5.2.17 The straight lines were then amended to avoid the major areas of highest amenity value and main centres of population that had been identified. It was considered that the key technical constraints could be overcome via careful routeing and or construction mitigation. The following amendments were made at this stage:

- The straight lines were deviated to avoid the Lincolnshire Wolds NL and to avoid the UK national site network (NSN) (of SACs and SPAs) and Ramsar sites along the Lincolnshire coastline;
- The straight lines were deviated to avoid the main centres of population of Skegness, Boston and Spalding.

Phase III: Initial Search Area

5.2.18 A search area was then introduced around the line established following Phase II, to allow for the development of a reasonable range of early corridors. A search area totalling 10 km wide (5 km either side of the straight lines identified in Phase II) was considered sufficient to enable the development of early corridor options that avoid the major constraints.

Phase IV: Refinement of Search Area

5.2.19 This initial 10 km wide search area was then reviewed and refined to exclude the major areas of highest amenity value and the main centres of population identified in Phase II.

5.2.20 At this stage, the search area was refined to avoid the populated areas of Skegness and Spalding; and to avoid the NSN sites and Ramsar Sites along the coastline.

Phase V: Expansion of Search Area

5.2.21 A high-level desk-based review of the unconstrained areas within the likely study area for the underground cables identified in Phase IV was then undertaken to identify areas where the likely study area could be expanded to avoid constraints and provide opportunities to reduce environmental impacts.

5.2.22 Two areas were identified for expansion. The first was an expansion to the area between Croft and Boston, as initial consideration of OS maps and the Defra MAGIC GIS dataset showed the area to be relatively unconstrained, thus providing further options for potential corridors that avoid major areas of highest amenity and centres of population.

5.2.23 The second expansion was to the area between Spalding and Wisbech, as initial consideration of OS maps and the Defra MAGIC GIS dataset showed the area to be relatively unconstrained, thus providing further options for potential corridors that avoid major areas of highest amenity and centres of population.

5.2.24 The Underground Cable Study Area as presented in **Figure 5-3** begins to the south of Grimsby at the most northerly landfall for the Project, as shown by the red pin. The Underground Cable Study Area extends to Burgh Le Marsh, then west to Spalding and to Wisbech in the south, which is the southern connection point for the Project, and is shown by the blue pin.

Figure 5-3 – Process of Defining the Underground Cable Study Area

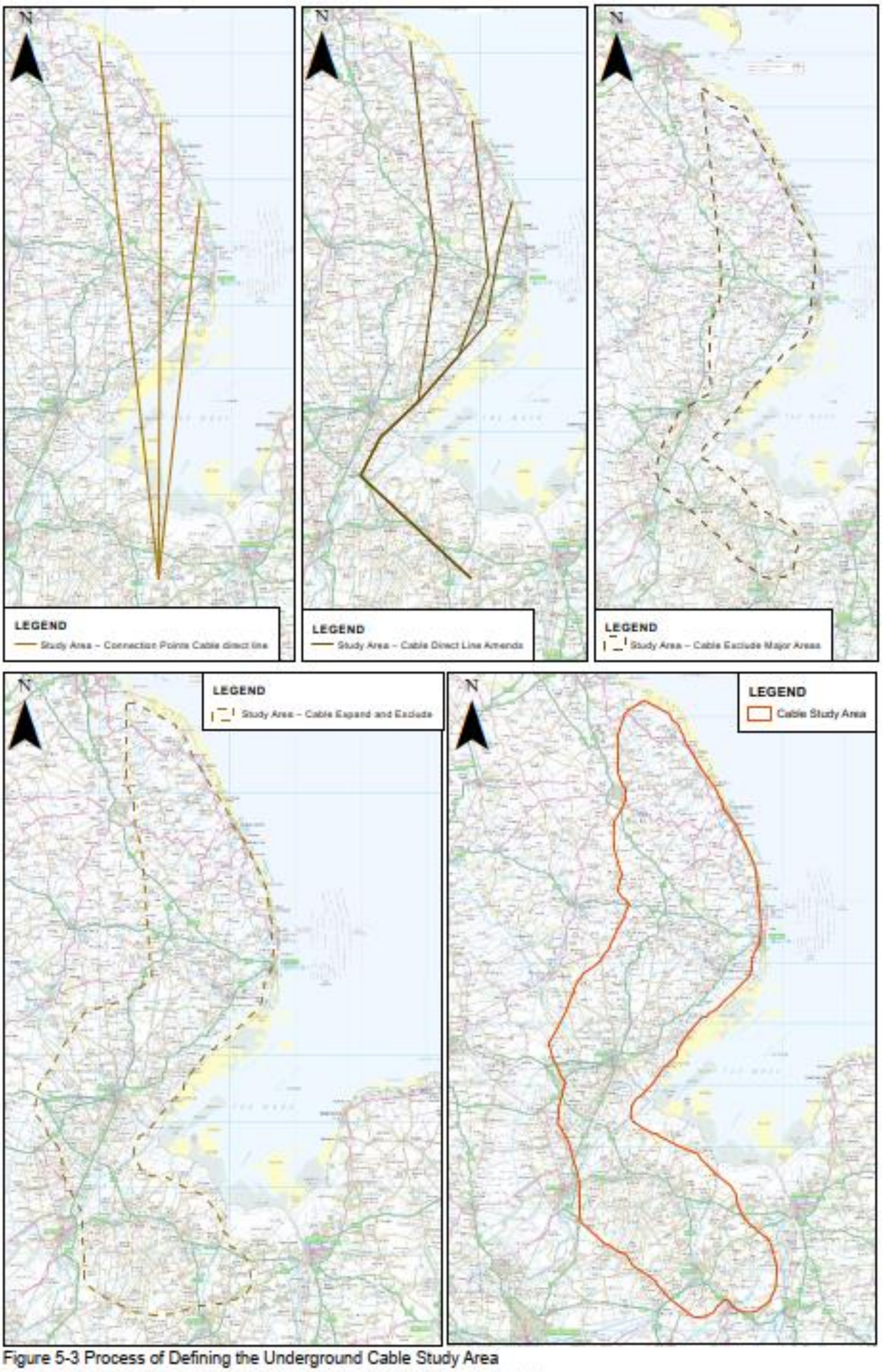


Figure 5-3 Process of Defining the Underground Cable Study Area

Figure 5-4 –The Underground Cable Study Area

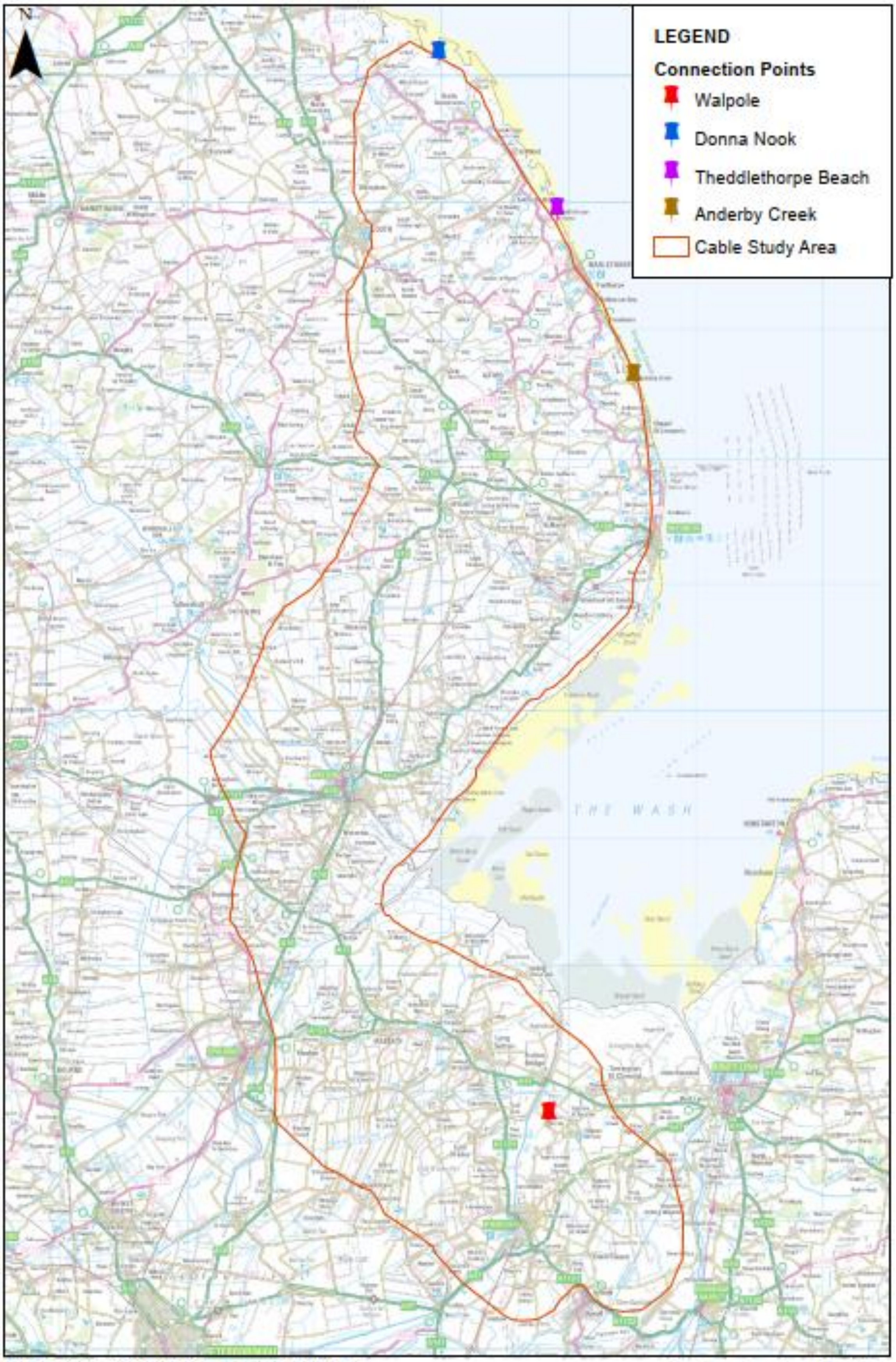


Figure 5-4 - The Underground Cable Study Area

SCALE: 1:475,000 0 3 6 9 12 15 km

Station Study Areas

New Walpole Converter Stations and New Walpole Substation

5.2.25 The definition of the study area for the two new Walpole converter stations and the new Walpole substation involved a three-phase process taking into consideration the key drivers for the location of the new converter stations and substation, as described in Paragraph 4.5.6.

5.2.26 For the first phase, an initial search area of 5 km was identified, from the existing 400 kV 4ZM overhead line between the existing Walpole substation and the Middle Level Main Drain. An initial search area of 5 km was considered likely to yield suitable locations for siting while addressing the key drivers. Increasing the distance further south or east was discounted as this would increase the length of the proposed transmission connection from the landfall sites on the Lincolnshire coastline and for the Grimsby to Walpole (G2W) Project’s 400 kV overhead line. Increasing the distances north and west, further from the existing 400 kV 4ZM overhead line between Burwell and Walpole, was discounted as this would increase the length of diversion or turn-in of the existing 400 kV 4ZM transmission line. This increase in distance would increase the geographical spread of development and be likely to increase the scale of environmental and socio-economic impacts, costs and the duration of construction. The initial search area is shown in **Figure 5-5.**

5.2.27 For the second phase, following identification of the initial search area, a high-level desk-based review was undertaken to identify the major areas of highest amenity, main centres of population and major technical constraints. Those identified for the new Walpole substation include:

- Centres of population at Upwell, Outwell, Emneth, Wisbech, St John’s Highway, Newton, Walpole St Peter, Walpole St Andrew, Tydd Gote, Sutton Bridge and Walpole Cross Keys;
- The existing 400 kV overhead lines; one that runs between Sleaford and the existing Walpole substation (4ZM), one that runs between the existing Burwell Main and existing Walpole substations (4ZM), and one that runs between the existing Norwich and existing Walpole substations (4VV);
- The existing NGET 400 kV Walpole substation and existing UKPN 132 kV Walpole substation;
- The existing 132 kV overhead lines which route into the existing UKPN 132 kV Walpole substation from the north, south, east and west;
- The existing Sutton Bridge Power Station, Rose and Crown Farm Solar Farm, Wisbech Compressor Station and sewage treatment plants (adjacent to the River Nene);
- The existing gas pipelines which route to the gas sites (including Wisbech Compressor Station) located either side of the River Nene;
- Flood Zone 3 covering almost the entire initial search area;
- River Nene Main River, North Level Main Drain and Middle Level Main Drain Water Framework Directive (WFD) Waterbodies;
- Peaty Soils;

- Marshland Airfield; and
- Grade I, II and II* listed buildings scattered throughout the initial search area.

5.2.28 For the third phase, the initial search area was subject to a review and refinement process which sought to avoid the identified constraints where practicable and seek to reduce the amount of connection infrastructure required. The initial search area for the new Walpole substation was amended as follows:

- To avoid identified centres of population (where possible), the Sutton Bridge Power Station, the Middle Level Main Drain; and
- To focus on areas in closer proximity to the existing 400 kV overhead lines.

5.2.29 The study area for the new Walpole converter stations and the new Walpole substation following this final phase is shown in **Figure 5-5**. The study area for the new Walpole converter stations and new Walpole substation are described in this Report as the 'Walpole Study Area'.

Figure 5-5 – Walpole Initial Search Area, Study Area and Key Features

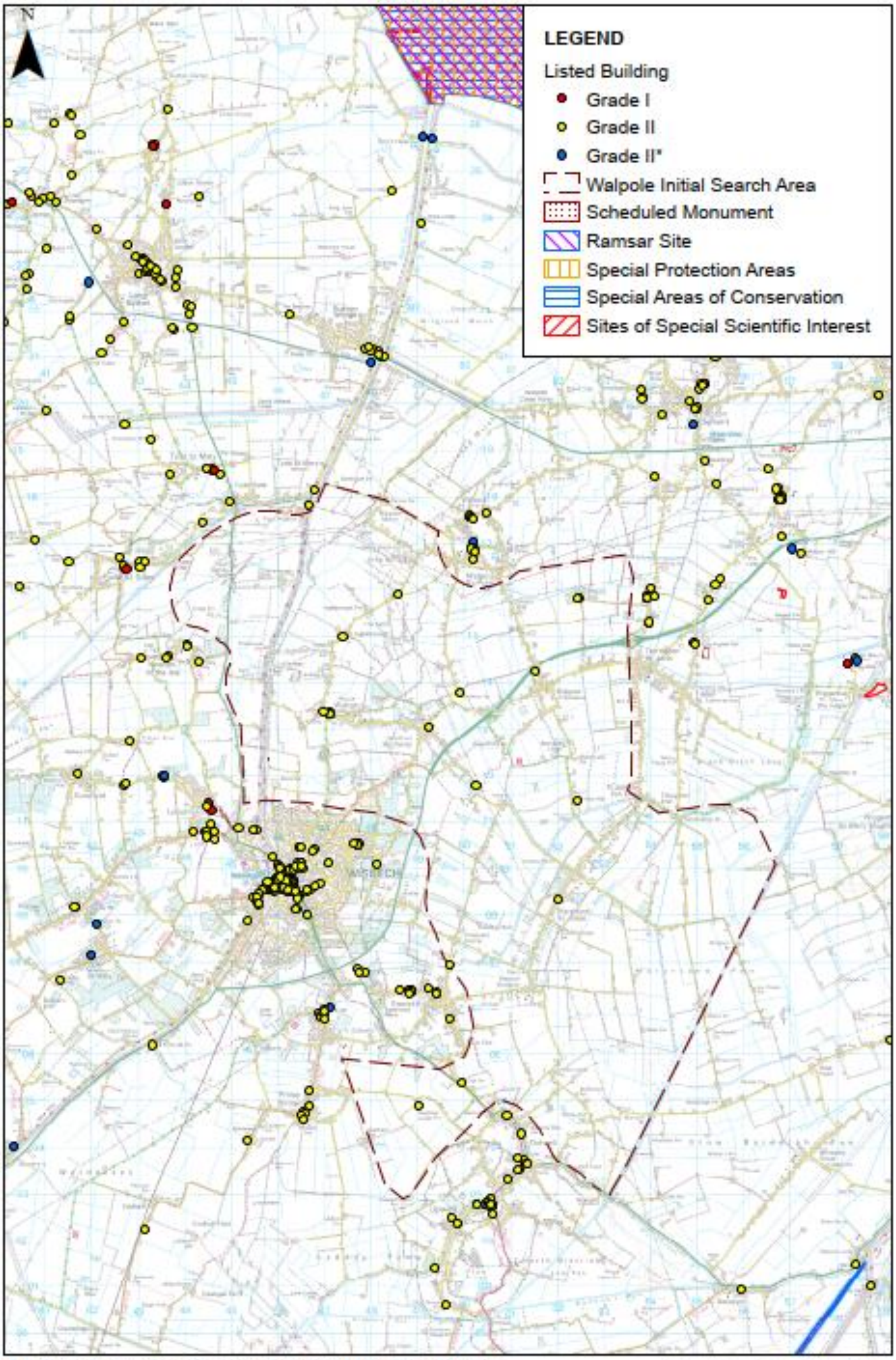


Figure 5-5 Walpole Initial Search Area, Study Area and Key Features

New LCS Converter Station

5.2.30 As described in Paragraph 4.5.6, two key drivers influenced the initial starting point from which the development of the study areas for the new LCS converter station could commence. A balance also needed to be achieved between the distance from the coastline (to reduce the length of DC cables required) and the distance from either of the proposed 400 kV LCS (to reduce the length of AC cables required). As such, the preferred locations (the preferred siting zones) for the LCS i.e., between the villages of Withern, Alford and Hutoft (see **Figure 5-6**), and the Landfall Study Areas (of Horseshoe point/Donna Nook, Theddlethorpe and Anderby Creek) defined the inception point from which the LCS converter station study areas were further developed.

5.2.31 An initial search area of 2 km around each of the preferred locations for the proposed 400 kV LCS and Landfall Study Areas was identified. An initial search area of 2 km was considered to yield suitable locations for siting as increasing the distance further from the preferred locations of the proposed LCS would increase the length of the AC and DC cables from the LCS and the Landfall Study Areas respectively. This increase in distance will increase the geographical spread of development and is likely to increase the scale of environmental and socio-economic impacts, costs and the duration of construction. The initial search area is shown in **Figure 5-6.**

5.2.32 During the identification of the study areas for the new LCS converter station, the appraisal of the Landfall Study Areas was completed and the landfall at Horseshoe/Donna Nook identified as less preferred. The details and outcomes of the landfall appraisal are set out in **Chapter 6**. Therefore, identification of the study area for the new LCS converter station continued from the Landfall Study Areas identified for Theddlethorpe and Anderby Creek.

5.2.33 Following identification of the initial search area, a high-level desk-based review was undertaken to identify the major areas of highest amenity, main centres of population and major technical constraints. Those identified for the new LCS converter station include:

- Centres of population at Mablethorpe, Sutton-on-Sea, Theddlethorpe, Maltby Le Marsh, Alford, Bilsby, Withern, Woodthorpe;
- Great Eau and Wold Grift Drain Main Rivers (and WFD waterbodies); Trusthorpe Pump Drain (upper end), Trusthorpe Pump Drain (lower end), Boygrift Drain and Anderby Main Drain WFD waterbodies;
- Areas of ancient woodland, most notably Greenfield Wood/Mother Wood;
- Strubby Glider Field and Strubby Airfield;
- Flood Zones 2 and 3 which cover a substantial extent of the initial search area;
- Grade I, II and II* listed buildings scattered throughout the initial search area.

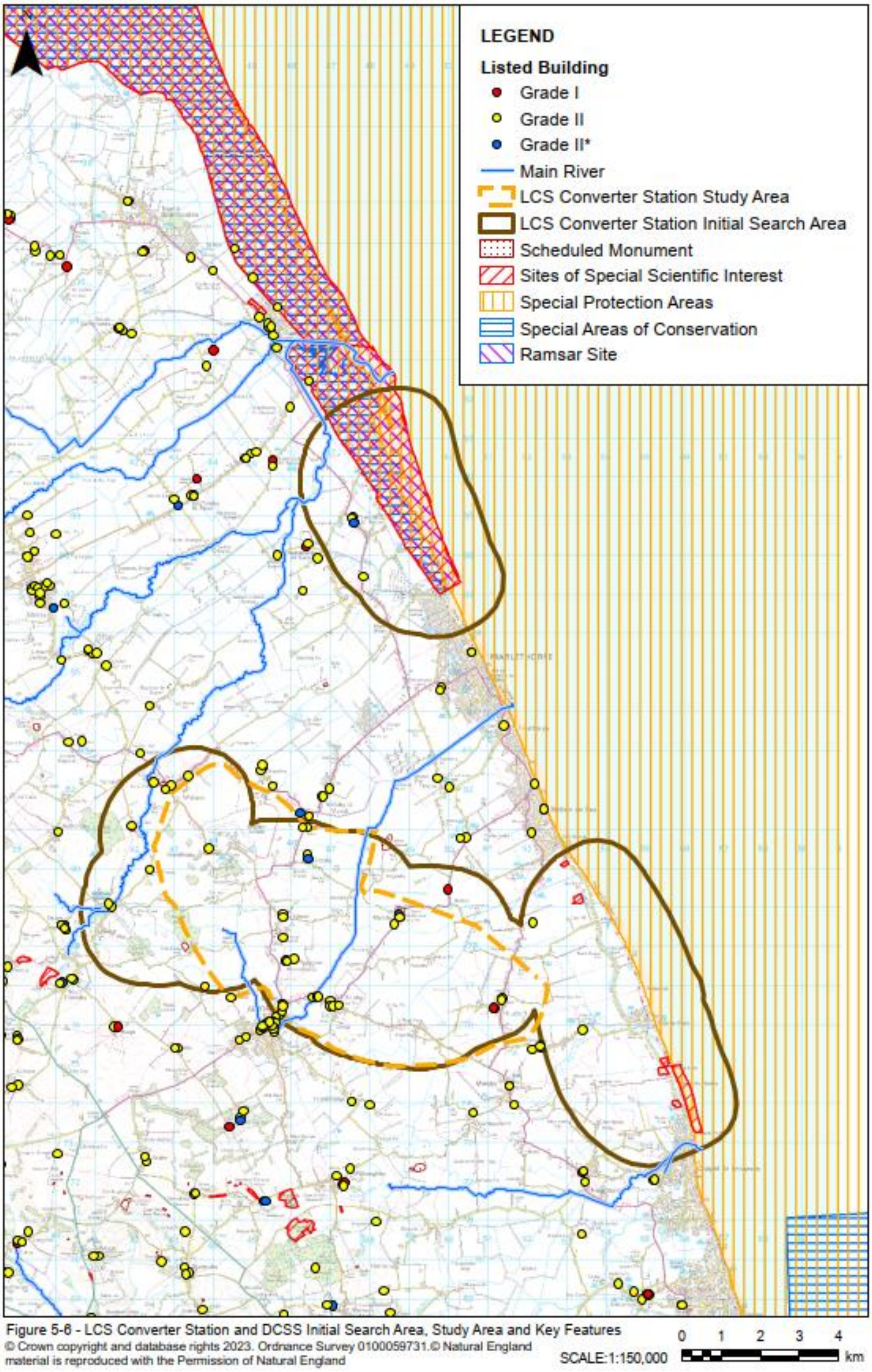
5.2.34 Following this, the initial search area was subject to a review and refinement process which sought to avoid the identified constraints where practicable and seek to reduce the amount of connection infrastructure required. The initial search area for the new LCS converter station was amended as follows:

- To avoid identified centres of population (where possible) and areas substantially covered by Flood Zone 2 and 3;
- To avoid Woodthorpe Camping and Leisure Park/Golf Club; and

- To seek areas in closer proximity to either of the preferred new LCS proposed by the G2W Project.

5.2.35 The study area for the new LCS converter station (described in this Report as the DCSS Study Area) following this final phase is shown in **Figure 5-6.**

Figure 5-6 – LCS Converter Station Initial Search Area, Study Area and Key Features



5.3 Description of the Study Areas

5.3.1 As the Landfall Study Areas, Underground Cable Study Area, Walpole Study Area, DCSS Study Area overlap, the baselines of all study areas are summarised together below. These combined areas are referred to as 'the Study Area', shown in **Figure 5-7**, which can be considered in three parts: the northern extent, the central extent and the southern extent.

5.3.2 The northern extent of the Study Area is bounded by multiple villages such as North Cotes, Marshchapel, Wragholme and North Somercotes and the A1031 runs through from north-west to south-east of the northern extent. The northern extent of the Study Area is located between the settlements of Grimsby and Skegness (Grimsby to the north and Skegness to the south). There is also a Lincolnshire Wolds NL within the northern extent of the Study Area. This section is located primarily within the district of East Lindsey, with areas of the north and north-west within the districts of North East Lincolnshire. The northern extent primarily comprises the low-lying coastal plain landscape of the Lincolnshire Coast and Marshes National Character Area (NCA) as well as the Lincolnshire Wolds NCA. The location of the NCAs is shown in **Figure 5-8**.

5.3.3 The road network of the northern extent comprises the A16, A1031, A157, A1104, A1111, A52, and A158 connecting Grimsby, Louth, Skegness and Boston. The Saltfleetby-Theddlethorpe Dunes & Gibraltar Point SAC, Greater Wash SPA; Inner Dowsing, Race Bank and North Ridge SAC, and Humber Estuary Ramsar, SAC and SPA are located along the Lincolnshire coastline to the east.

5.3.4 The central extent of the Study Area is bounded by the A158 in the north and the River Welland to the south, and is located between the settlements of Donnington, Heckington and Halton Holegate in the west and The Wash SPA and Ramsar, and The Wash and Norfolk Coast SAC to the east. This section is located primarily within the districts of East Lindsey and Boston, with areas to the south and west extending into South Holland and North Kesteven. The central extent primarily comprises the distinctive, historic, and human influenced wetland landscape of The Fens NCA. Existing electricity transmission and distribution infrastructure include two 132 kV substations (north of Croft and south of Boston) and the connecting 132 kV overhead lines. The road network of the central extent comprises the A52, A16, and A1121, connecting Skegness, Boston and Spilsby. Gibraltar Point Ramsar and SPA, and Inner Dowsing, Race Bank and North Ridge SAC also lie along the Lincolnshire coastline to the east.

5.3.5 The southern extent of the Study Area is bounded by the River Welland and The Wash SPA and Ramsar, and The Wash and Norfolk Coast SAC in the north and Walpole to the south. It is located between Spalding in the west and the villages of Walpole Cross Keys to the east and the town of Wisbech to the south. This section is located within the district of South Holland, with areas to the south-east extending into Fenland and Terrington St John. The southern extent primarily comprises the distinctive, historic, and human influenced wetland landscape of The Fens NCA. Existing electricity transmission and distribution infrastructure include the existing 4ZM 400 kV overhead line connecting to the existing Bicker Fen 400 kV substation and continuing to meet the existing 2WS overhead line north-east of Spalding. The road network of the southern extent comprises the A17, A151 and A1101 connecting Boston, Spalding and Wisbech.

Figure 5-7 – The Study Area

Figure 5-7 The Study Area

Figure 5-8 – The Study Area – National Character Areas

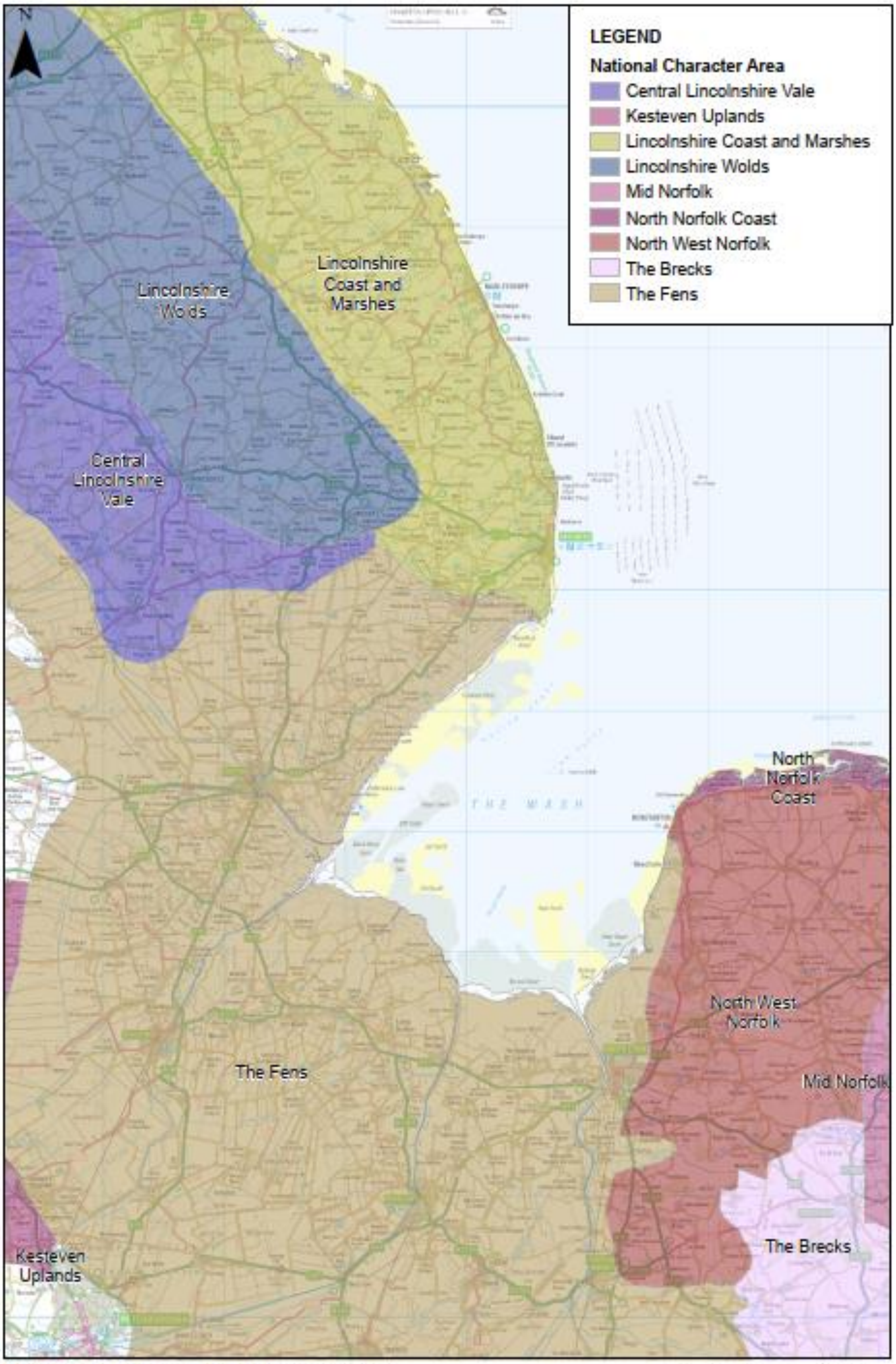


Figure 5-8 The Study Area – National Character Areas

5.4 Scope of 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, impacts on the setting of the Lincolnshire Wolds NL or designated heritage assets, or impacts on migrating wildfowl from an ornithologically 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.

5.4.2 Features representing potential constraints to development were categorised as either 'seek to avoid' or 'seek to minimise' to either avoid or minimise impacts whilst achieving the Project objectives for each of the technology options (underground cables and stations). 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 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 underground cables and **Table 5-2** for stations.

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. 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 transmission development must be avoided but instead are areas where transmission development should be minimised. The buffers are shown in **Table 5-1** for underground cables and **Table 5-2** for stations.

Table 5-1 – Data Gathering Features (Undergrounding)

Sub-topic	Constraint Name	Buffer
Air Quality	Residential Properties	25 m
	Education Establishments (such as schools and colleges)	
	Buildings (other than residential properties e.g. retail, industrial estates)	
	Air Quality Management Areas (AQMAs)	
Ecology	Ancient Woodland	50 m
	National Nature Reserves	
	Ramsar	500 m
	Special Area of Conservation (SAC)	500 m, 2 km
	Special Protection Area (SPA)	1 km
	Site of Special Scientific Interest (SSSI)	500 m
	Important Bird Area	500 m
	Local Nature Reserves (LNR)	
	Royal Society for the Protection of Birds (RSPB) Reserves	250 m
	Priority Habitat Inventory	
	Traditional Orchard	50 m
	National Forest Inventory Woodland	
Economic Activity	Business parks/Retail and shopping centres/Industrial estates	
	Best Most Versatile (BMV) agricultural land (Agricultural Land Classification (ALC) Grades 1, 2, 3)	
	Solar Farms	
	Wind farms and wind turbines	
	Planning Applications/Consents (only for Nationally Significant Infrastructure Projects registered with the Planning Inspectorate and Large Scale Housing or Infrastructure application registered with the relevant Local Authority)	
	National Trust Inalienable Land	
	Aggregates and Mineral Resource Areas	
	Local Plan Allocations	
Geology and Soils	Peaty Soils	
	Geological Sites of Special Scientific Interest	

Sub-topic	Constraint Name	Buffer
	Local Geodiversity Sites	
	Available Brownfield Land Sites	
	Aggregates and Mineral Resource Areas	
	Landfill sites	
Historic Environment	Scheduled Monuments	250 m
	Listed Buildings	250 m
	Registered Parks and Gardens	250 m
	Conservation Areas	
	National Trust Properties & Inalienable Land	
Landscape and Visual	National Landscapes (NL)	
	Residential settlements and individual dwellings	25 m
	Viewpoints	
	Recreational Areas	
	Outdoor recreational facilities including golf courses, canals and caravan parks	
	Local Landscape Designations	
	Licensed Airfield/Aerodrome	

Sub-topic	Constraint Name	Buffer
Aviation and Defence	Ministry of Defence properties (including military airfields)	500 m
	Civil Aviation Authority Airports or Aerodromes	1 km
Noise and Vibration	Residential properties	25 m
	Education establishments (e.g., Schools and Colleges)	
	Health care facilities (e.g., hospitals, hospices, clinics)	
	Places of worship	
Traffic and Transport	Rail Stations	
	Rail Network	
Water	Statutory Main Rivers	
	Water Framework Directive (WFD) surface waters	
	Internal Drainage Board (IDB) surface waters	
	Flood Zones 2 & 3 excluding ‘Areas Benefitting from Flood Defences’	
	Risk of Flooding from Reservoirs	

Sub-topic	Constraint Name	Buffer
	Groundwater vulnerability (medium/high to high)	
	Principal Aquifers	
	Groundwater Dependent Terrestrial Ecosystems	
	Groundwater Source Protection Zones – Inner/Zone 1	

Table 5-2 – Data Gathering Features (Stations)

Sub-topic	Constraint Name	Buffer
Air Quality	Residential Properties	25 m
	Education Establishments (such as schools and colleges)	
	Buildings (other than residential properties e.g. retail, industrial estates)	
	Air Quality Management Areas (AQMAs)	
Ecology	Ancient Woodland	50 m
	National Nature Reserves	
	Ramsar	500 m and 2 km
	Special Area of Conservation (SAC)	500 m
	Special Protection Area (SPA)	500 m and 1 km
	Site of Special Scientific Interest (SSSI)	500 m
	Important Bird Area	500 m and 2 km
	Local Nature Reserves (LNR)	
	Royal Society for the Protection of Birds (RSPB) Reserves	250 m
	Priority Habitat Inventory	
	Traditional Orchard	
	National Forest Inventory Woodland	
Economic Activity	Business parks/Retail and shopping centres/Industrial estates	
	Best Most Versatile (BMV) agricultural land (Agricultural Land Classification (ALC) Grades 1, 2, 3)	
	Solar Farms	
	Wind farms and wind turbines	
	Planning Applications/Consents (only for Nationally Significant Infrastructure Projects registered with the Planning Inspectorate and Large Scale Housing or Infrastructure application registered with the relevant Local Authority)	
	National Trust Inalienable Land	
	Aggregates and Mineral Resource Areas	
	Local Plan Allocations	
	Peaty Soils	

Sub-topic	Constraint Name	Buffer
Geology and Soils	Geological Sites of Special Scientific Interest	
	Available Brownfield Land Sites	
	Aggregates and Mineral Resource Areas	
	Landfill sites	
Historic Environment	Scheduled Monuments	250 m
	Listed Buildings	250 m
	Registered Parks and Gardens	250 m
	Conservation Areas	
	National Trust Properties & Inalienable Land	
Landscape and Visual	National Landscapes (NL)	2 km
	Residential settlements and individual dwellings	25 m
	Viewpoints	
	Recreational Areas	
	Outdoor recreational facilities including golf courses, canals and caravan parks	
	Local Landscape Designations	

Sub-topic	Constraint Name	Buffer
Aviation and Defence	Ministry of Defence properties (including military airfields)	
	Civil Aviation Authority Airports or Aerodromes	1 km
Noise and Vibration	Residential properties	25 m
	Education establishments (e.g., Schools and Colleges)	
	Health care facilities (e.g., hospitals, hospices, clinics)	
	Places of worship	
Traffic and Transport	Rail Stations	
	Rail Network	
Water	Statutory Main Rivers	
	Water Framework Directive (WFD) surface waters	
	Internal Drainage Board (IDB) surface waters	
	Flood Zones 2 & 3 excluding ‘Areas Benefitting from Flood Defences’	
	Groundwater Dependent Terrestrial Ecosystems	

Sub-topic	Constraint Name	Buffer
	Risk of Flooding from Reservoirs	
	Groundwater vulnerability (medium/high to high)	
	Principal Aquifers	
	Groundwater Source Protection Zones – Inner/Zone 1	

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 Study Area and informed the identification of early 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 thus not help in distinguishing between options. Following this review, several amendments were made, including the addition of residential density, derived from OS AddressBase residential property data.

5.5.3 The heat maps were reviewed again following these changes and approved for the identification of early underground cable corridors, and station siting zones and siting areas. The heatmaps for each technology type for the Project are shown in **Figure 5-9** and **Figure 5-10**.

Figure 5-9 – Stations Heatmap

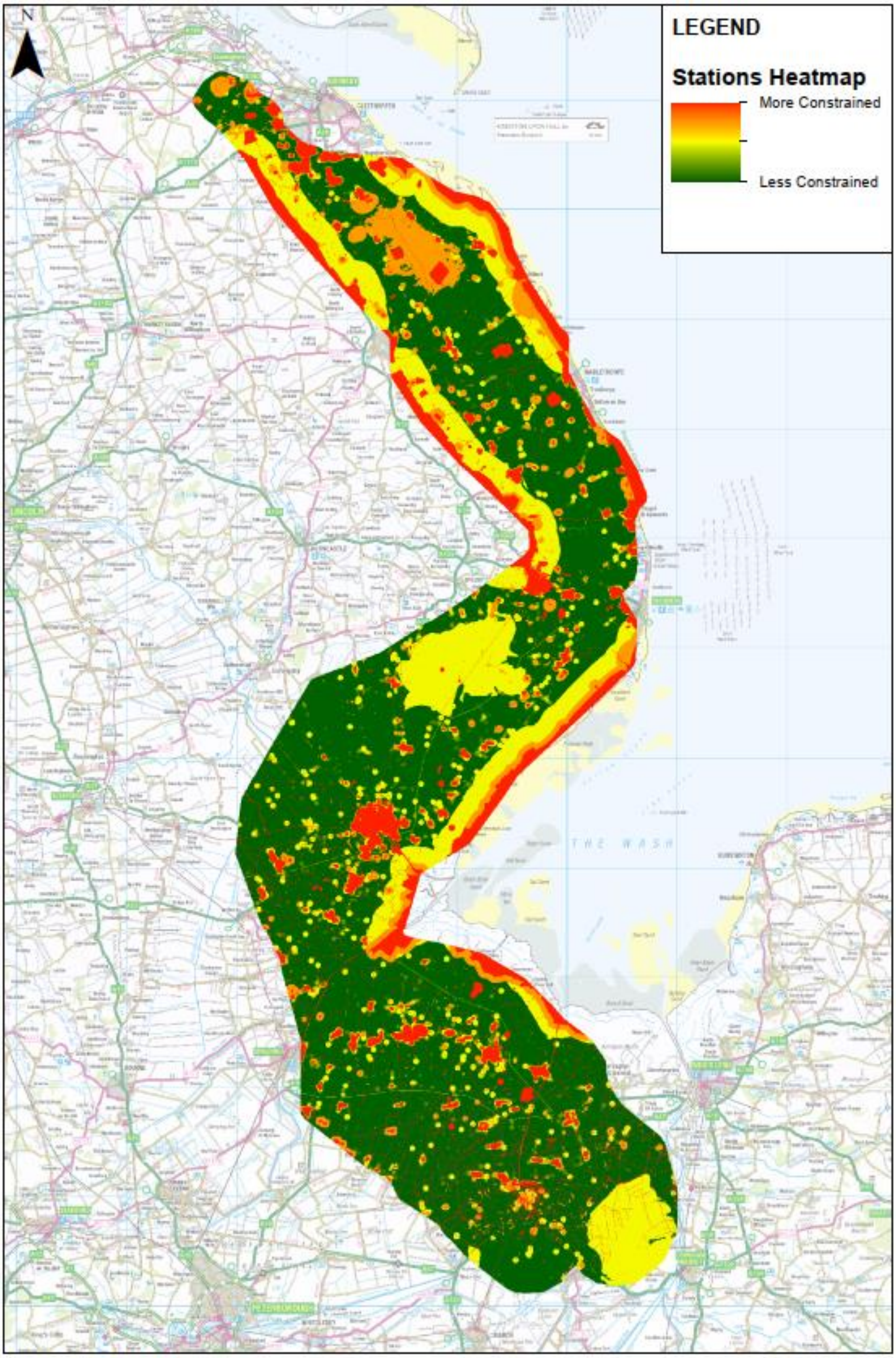


Figure 5-9 Stations Heatmap

SCALE: 1:550,000 0 3 6 9 12 15 km

Figure 5-10 – Underground Cable Heatmap

Figure 5-10 - Underground Cable Heatmap

SCALE:1:550,000 0 3 6 9 12 15 km

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

5.6.1 The heat maps derived for the underground cables and stations informed the identification of options for preliminary corridors, siting zones and siting areas within the Project Study Area.

Underground Cables (Steps 4 to 6)

5.6.2 Following the development of the heat maps at Step 3, early corridors were developed between the potential connection points by environmental specialists working with others as appropriate. The early corridors were identified by applying professional judgement, and their knowledge of routeing considerations. This was to ensure that the corridors identified were technically feasible whilst minimising the potential for adverse impacts on the environment.

5.6.3 The GIS analysis using 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;
- 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 (e.g., 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, as described in **Chapter 3,** in the development of the early corridors was led by environmental specialists because the underlying aim of the rules is, in effect, to guide the design of linear transmission infrastructure to avoid 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 the development of the underground cable 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. Rules 3 to 7 are not applicable to underground cables.

5.6.5 The landscape of the underground cable Study Area is generally very flat and open, with long views, except for within the Lincolnshire Wolds NL. The development of the preliminary corridors was therefore driven by Rules 1 and 2, 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, generally where smaller in size, can be avoided in detailed design, whilst avoiding unnecessary changes of direction.

5.6.6 The identified corridors were then subject to a back-check and review and further analysis by the Project team.

5.6.7 The review considered information gathered from the environment and technical 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:

- Addition of three preliminary corridors from west of Beesby to Stickney which is located within the Lincolnshire Wolds NL. The corridors overlap at the outset and then split into three separate routes once within the boundary of the Lincolnshire Wolds NL. This was added taking into consideration the location of one of the LCS west of Woodthorpe (LCS-A), the distribution of constraints in the areas north and south of Spilsby and areas which have been excluded within the preliminary corridor. Inclusion of these preliminary corridors as an underground cable corridor would avoid these pinch points as it would route into and partially through the Lincolnshire Wolds NL.
- Addition of a preliminary corridor to the west of Boston which would cut through the A1121 and A52. This was added taking into consideration areas of greenspace and priority habitat located at Hubbert's Bridge and Kirton Holme.
- Addition of a preliminary corridor following the A17 road from north of Holbeach to south of Long Sutton. This is following the alignment of the road, and it takes designations into consideration (following the road route is beneficial for avoiding major constraints; however, it may be more visually impactful for certain receptors).
- Cutting out sections of preliminary corridors where clusters of residential properties were present.
- Cutting out sections of preliminary corridors where there were natural and cultural designations (however for some corridors, these could not be avoided).

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

5.6.9 The corridors identified for Options Appraisal are presented in **Figure 5-11** to **Figure 5-13**.

Preliminary Corridors

5.6.10 The corridor identification exercise identified a network of potential corridors. To allow for clear, comparative analysis, these were structured and named. The complexity of the network of corridors is such that no one corridor provides a complete end-to-end solution: hence the dividing of corridors (into sections) allows sections of different corridors to emerge as a preference and be linked to form a complete end-to-end solution. Following Options Appraisal, the corridors emerging as the optimum choices are combined to form an end-to-end corridor.

5.6.11 An overview of the preliminary corridors is shown on **Figure 5-11** and are described below.

Figure 5-11 – Underground Cable Corridors

Figure 5-11 Underground Cable Corridors

SCALE: 1:300,000

0 2 4 6 8 km

Figure 5-12 – Underground Cable Corridors

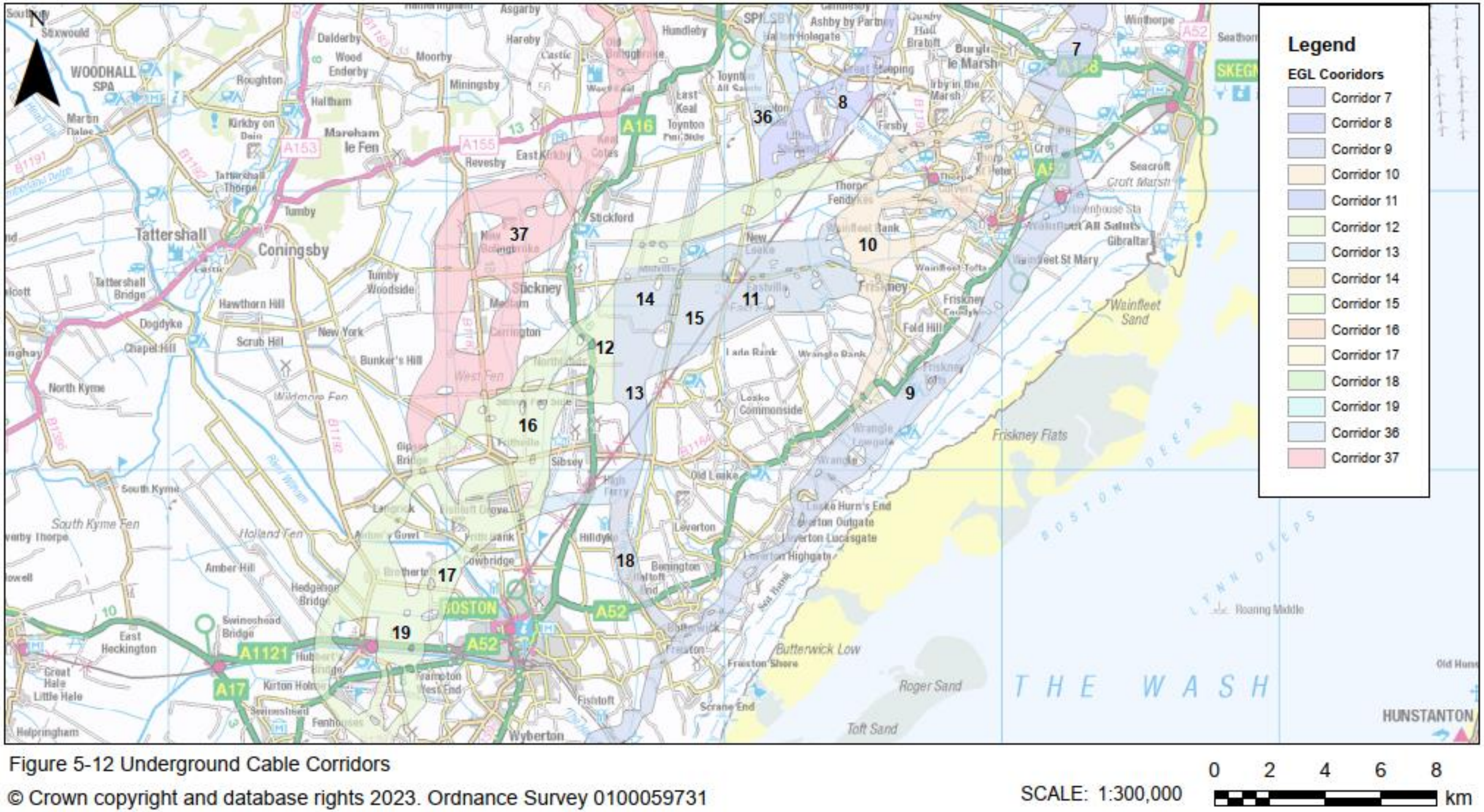


Figure 5-12 Underground Cable Corridors

Figure 5-13 – Underground Cable Corridors

Figure 5-13 Underground Cable Corridors

SCALE: 1:435,000 0 2 4 6 8 10 12 km

5.6.12 The identified preliminary corridors between the landfalls and Farlesthorpe form a complex permutation of options. The separation of the preliminary corridors was primarily driven by the pattern of settlement. Groupings of constraints, and in some instances, individual constraints were avoided and specifically excluded from the preliminary corridors. Between the landfalls and north-west of Mumby, there are six preliminary corridors that make up sections for use between landfalls and the new LCS converter station (if a three-ended connection is required). A corridor routes from the Theddlethorpe landfall area south-west, towards and either side, of Maltby le Marsh. This corridor connects to three corridors; one that routes from east of Maltby le Marsh to south-east towards Hannah, one that routes south of Maltby le Marsh and overlaps with potential areas for siting new stations between Alford, Bilsby and Maltby le Marsh, and one that routes west towards the Lincolnshire Wolds NL. From the Anderby Creek landfall area, a corridor routes west towards Bilsby and either side of Hutoft, each leg of this corridor connects to another corridor which overlap potential areas for siting of the new stations between Willoughby and Hannah.

5.6.13 Broadly speaking, from west of Maltby le Marsh and south of Farlesthorpe to north-east and south-east of Boston, there are several corridors which avoid residential areas. Groupings of constraints, and in some instances, individual constraints were avoided and cut-out of the preliminary corridors. The preliminary corridors predominantly route from north-east to south-west towards Boston. The corridors north-west of Boston overlap. There is a corridor which routes from west of Malby le Marsh west, across the Lincolnshire Wolds NL, passing north-west of Spilsby, Keal Cotes, Stickford and Firthville. From this corridor there are two spurs along its length which provide alternative routes south to connect to other corridors; one routes from Ulceby to Gunby, the other routes from Ulceby, south-east of Spilsby, to Little Steeping. South of Farlesthorpe there are two corridors; one which routes south-west, west of Gunby, to Little Steeping, the other routes south towards the A158 between Burgh le Marsh and Skegness. From the A158 and south-west towards Boston there are broadly two main corridor paths, one to the east parallel to and within 2 km of the coastline, and one to the west further inland with spurs south which provide alternative connections to the corridor along the coastline.

5.6.14 From Boston to Weston Marsh, there are broadly two routes west and east of Boston. The corridor east of Boston routes across The Haven between Boston and The Wash before continuing south-west towards the River Welland. West of Boston the corridor routes across the A121 and South Forty Food Drain. Where it meets the B1391 it splits with a corridor that routes west then south, to the west of Wigtoft, Sutterton and the A17, and a second that routes south, crossing the A16 and A17 towards the River Welland. Each of the corridors coalesce in the vicinity of Fossdkye Bridge.

5.6.15 From Weston Marsh, the broad Central Corridor splits into three corridor paths to Walpole. Groupings of constraints, and in some instances, individual constraints were avoided and cut-out of the preliminary corridors. The broad corridor at Weston Marsh initially splits out into two corridors (one routeing south-west and one routeing east) to avoid the areas of Weston, Moulton and Holbeach. The one routeing east then splits into three paths; with one continuing east before routeing south (east of Long Sutton) and across the A17; one routeing south (east of Holbeach) and crossing the A17; and one that routes along the A17. There is also a corridor identified that routes along the A17 before heading south at various points to connect into other corridors. South of the A17 between Spalding and the River Nene there is a complex permutation of options through the middle of the Underground Cable Study Area, set back from the NSN and Ramsar sites along the Lincolnshire coastline to the north-east. These corridors route from west to south-east across to the Rive Nene to connect into potential areas for the siting of the Walpole stations. A corridor also routes south before crossing the A141 and then routeing south-west, ending to the south of Wisbech.

Station Siting Zones and Siting Areas

New Walpole Stations

New Walpole Stations – Steps 4 and 5

5.6.16 The identification of potential Walpole siting zones was undertaken taking into consideration the required land take, distribution of environmental, socio-economic and technical constraints, and the Holford and Horlock Rules as detailed below.

5.6.17 As detailed in **Chapter 2**, the new Walpole substation will be a new point on the network where the connections for the new Walpole converter stations would be made. The capacity to accommodate the two new converter stations and a new 400 kV substation (collectively termed 'the Walpole stations') in proximity to each other has been given consideration.

5.6.18 As detailed in **Chapter 2**, the Project infrastructure at Walpole comprises:

- Two new converter stations (one for EGL 3 and one for EGL 4). Each new converter station could extend to approximately 350 m by 300 m (approximately 11 ha); and;
- A new AIS Walpole 400 kV substation which could extend to approximately 800 m by 200 m (approximately 16 ha) dependent upon the number of connections required.

5.6.19 The new stations at Walpole would also require construction compounds, permanent access, together with peripheral landscaping, drainage, and other related works. The area which would be required for these aspects is assumed to be approximately 25% of combined areas of the new Walpole substation, and each of the new Walpole converter stations. For the purposes of the current stage of the Project and to inform the siting work, it is assumed that an area of approximately 9 ha is required.

5.6.20 For the purposes of siting, siting zones have been identified to accommodate a reasonable worst-case as regards required infrastructure taking into consideration other factors detailed in Paragraph 5.6.20.

5.6.21 The identification of potential siting zones sought to identify relatively unconstrained areas of at least 45 ha which provides for the:

- siting of the new Walpole converter stations (approximately 20 ha);
- siting of the new Walpole substation (approximately 16 ha); and
- spacing between each of the individual infrastructure elements to account for factors such as sterilised land by connections between infrastructure, orientation of connections and infrastructure, construction, permanent accesses and likely drainage (approximately 9 ha).

5.6.22 Preliminary examination of the heat maps and the GIS datasets identified a long-list of over 50 relatively unconstrained areas of at least 45 ha. Review of these areas identified that some were contiguous and some very close to each other. Where this was the case, they were grouped. The result was seven strategic areas, see **Figure 5-14**, to assist the environmental specialists in identifying preliminary Walpole siting zones.

Figure 5-14 – Walpole Strategic Areas and Key Environmental Features

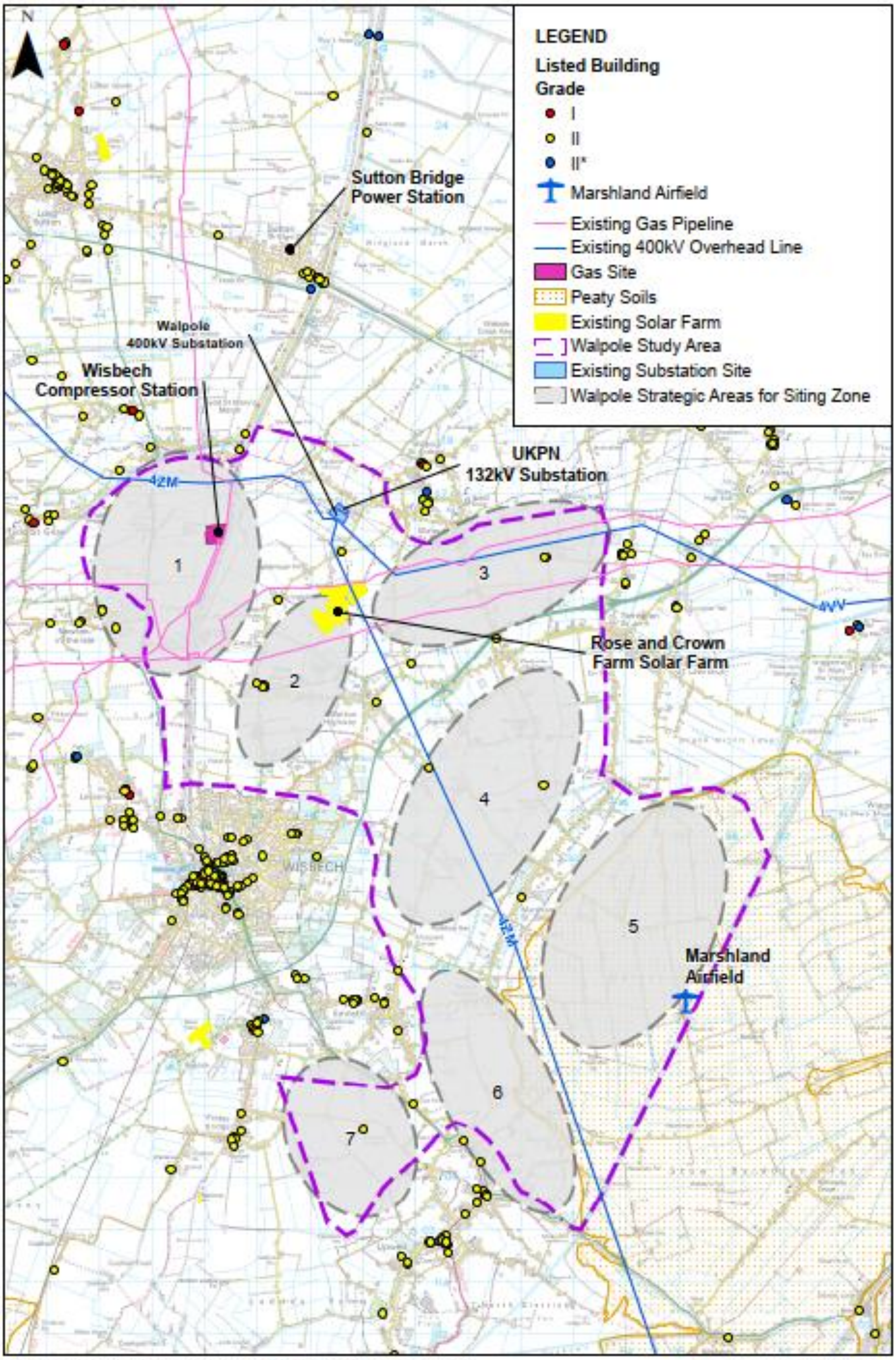


Figure 5-14 Walpole Strategic Areas and Key Environmental Features

5.6.23 Environmental specialists and the FEED Contractor undertook a high-level appraisal to gauge the level of environmental sensitivity and technical complexity likely to be associated with each area. This comparative appraisal is presented in **Table 5-3**. The high-level appraisal took account of factors including:

A. Opportunities to limit the length of 400 kV overhead line required to achieve the required connections of the G2W project;

B. Opportunities to limit the length of underground cable required to achieve the Project connections;

C. Proximity to the A-road and B-road networks to facilitate permanent and temporary construction accesses;

D. Opportunities to site outside of Flood Zone 2 and Flood Zone 3;

E. Opportunities to limit crossings of existing above ground infrastructure (e.g., railways, roads and overhead lines) to achieve the required connections; and

F. Opportunities to limit crossings of existing underground infrastructure (e.g., cables and pipelines) and watercourses to achieve the required connections.

Table 5-3 – Walpole Strategic Areas – Comparative Appraisal

Opportunity	Comparative Appraisal
Opportunity A	The locations of Strategic Areas 1, 2, and 3 to the north and north-west of the Study Area would allow the opportunity to limit the length of the overhead line connections (for the G2W project) from Weston Marsh. Those Strategic Areas located further south and east (Strategic Areas 4 to 7) would likely result in longer overhead line connections from Weston Marsh and therefore do not meet this opportunity. Those Strategic Areas which would likely lead to the longest overhead line connections from Weston Marsh are Strategic Areas 5 and 6.
Opportunity B	The locations of Strategic Areas 1, 2, and 3 to the north and north-west of the Study Area would allow the opportunity to limit the length of the underground cable connections from the Lincolnshire coastline to the north of Skegness (it is assumed that the Project will make landfall between Grimsby and Skegness). Those Strategic Areas located further south and east (Strategic Areas 4 to 7) would likely result in longer underground cable connections from Weston Marsh and therefore do not meet this opportunity.
Opportunity C	Strategic Areas 1, 3, 6 and 7 are located on, or directly adjacent to an A-road or B-road and therefore would allow the opportunity to limit the length of new permanent and/or temporary access road construction. Strategic Areas 2, 4 and 5 are not located on, or directly adjacent to an A-road or B-road. Strategic Area 5 is located furthest from an A-road or B-road.
Opportunity D	All Strategic Areas, except for Strategic Area 7, are situated within areas of Flood Zone 2 and 3. Therefore only Strategic Area 7 offers the opportunity to site outside of Flood Zone 2 and 3.
Opportunity E	All Strategic Areas would require crossing of an existing 132 kV overhead line. Strategic Areas 1 and 2 are likely to require the least crossings of

Opportunity	Comparative Appraisal
	existing above ground infrastructure. Strategic Areas 6 and 7 are likely to require additional crossings compared to Strategic Areas 1 and 2 (crossings of additional A-roads and B-roads and an additional 132 kV overhead line). Strategic Areas 3, 4 and 5 are likely to require the most crossings, including additional A-roads, B-roads, 132 kV overhead lines and the existing 400 kV 4ZM (between Burwell to Walpole) overhead line.
Opportunity F	There are existing pipelines (primarily oil and gas) in the wider area which may require multiple crossings for Strategic Areas 3, 4 and 5. Strategic Area 1, subject to detailed routeing, may not require the crossing of existing pipelines. Strategic Areas 2, 6 and 7 would offer the opportunity to limit the number of existing pipeline crossings. All Strategic Areas require crossing North Level Main drain and all Strategic Areas except for Strategic Area 1 would require crossing the River Nene. The Strategic Areas to the south and east (4, 5, 6 and 7) will increase the number of drain and watercourse crossings as additional lengths of infrastructure will be required.

5.6.24 The outcome of this work identified that Strategic Area 1, Strategic Area 2 and Strategic Area 7 offered comparatively better opportunities than the other Strategic Areas and would therefore be the focus of the siting work for the new Walpole stations. Although they are in Flood Zone 3, Strategic Areas 1 and 2 offer the opportunity to limit the length of 400 kV overhead line, underground cable (both of which would likely be routeing south-east from the north-west), crossings of existing above ground infrastructure, existing underground infrastructure and watercourses when compared to the other strategic areas. Strategic Area 7, although likely to require longer overhead line and underground cable connections than most other strategic areas, it offered the opportunity to site outside of both Flood Zone 2 and Flood Zone 3.

5.6.25 Within the three Strategic Areas taken forward following the high-level appraisal detailed above, a preliminary examination of the heat maps and the GIS datasets identified a list of nine relatively unconstrained areas of at least 45 ha. These were identified to assist the environmental specialists in identifying preliminary siting zones. Environmental specialists undertook a further high-level appraisal to gauge the level of environmental sensitivity likely to be associated with each area. This analysis sought to identify siting zones such that, as far as reasonably possible, they met the following criteria:

- Avoid sites of high amenity, cultural 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 landforming.

5.6.26 In addition, consideration was given to the broad nature of adjacent roads to minimise the risk of off-site effects from road improvements and to the presence of brownfield land. No areas of vacant or available brownfield land suitable for the required infrastructure parameters were identified within the Walpole Study Area.

5.6.27 The identified nine relatively unconstrained areas were identified as potential siting zones and taken forward to Step 6.

New Walpole Stations – Step 6

5.6.28 The identified nine relatively unconstrained areas were then subject to a review and further analysis by the Project team. The review considered information gathered from the environmental and technical 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 removal of two areas and the amendment of two areas, as follows:

- removal of a siting zone located immediately south-west of Walpole Marsh due to the significant technical complexity of siting, and routeing into, the siting zone with four existing 132 kV or 400 kV overhead lines present;
- removal of a siting zone located south-west of West Walton due to the potential significant adverse landscape and visual effects resulting from diversions of the existing 400 kV 4ZM overhead line (which would likely require either encircling West Walton or the addition of two new overhead lines south of West Walton and Walton Highway); and
- Grouping of two identified areas located immediately south of the existing Rose and Crown Farm Solar Farm.

5.6.29 Following this review, the siting zones for the new Walpole stations for consideration at Options Appraisal were identified, as shown on **Figure 5-15**, were taken forward for appraisal.

5.6.30 From north to south the siting zones are:

- Siting zone WLP1 – an area within Strategic Area 1, approximately 1.8 km by 1.4 km, located west of the A1101, south-east of the North Level Main Drain and north of Newton;
- Siting zone WLP2 - an area within Strategic Area 1, approximately 1.3 km by 1.1 km, located west of the River Nene, east of the A1101, north-west of the Wisbech Compressor Station and south-west of Foul Anchor;
- Siting zone WLP3 - an area within Strategic Area 1, approximately 1.7 km by 0.9 km, located west of the River Nene, east of the A1101 and Newton, north-west of the Wisbech Compressor Station and south-west of Foul Anchor;
- Siting zone WLP4 – an area within Strategic Area 2, approximately 2.5 km by 0.9 km, located east of the River Nene, south-east of the existing Walpole substation and north-west of West Walton;
- Siting zone WLP5 - an area within Strategic Area 2, approximately 2.7 km by 1.5 km, located directly south of the Rose and Crown Farm solar farm, north of Walton Highway and West Walton, the existing 400 kV 4ZM between Burwell and Walpole routes north south through the centre of the siting zone; and
- Siting zone WLP6 - an area within Strategic Area 7, approximately 2.5 km by 1.6 km, located south-west of Emneth, north-east of Outwell and east of Friday Bridge.

Figure 5-15 – Walpole Siting Zones and Key Environmental Features

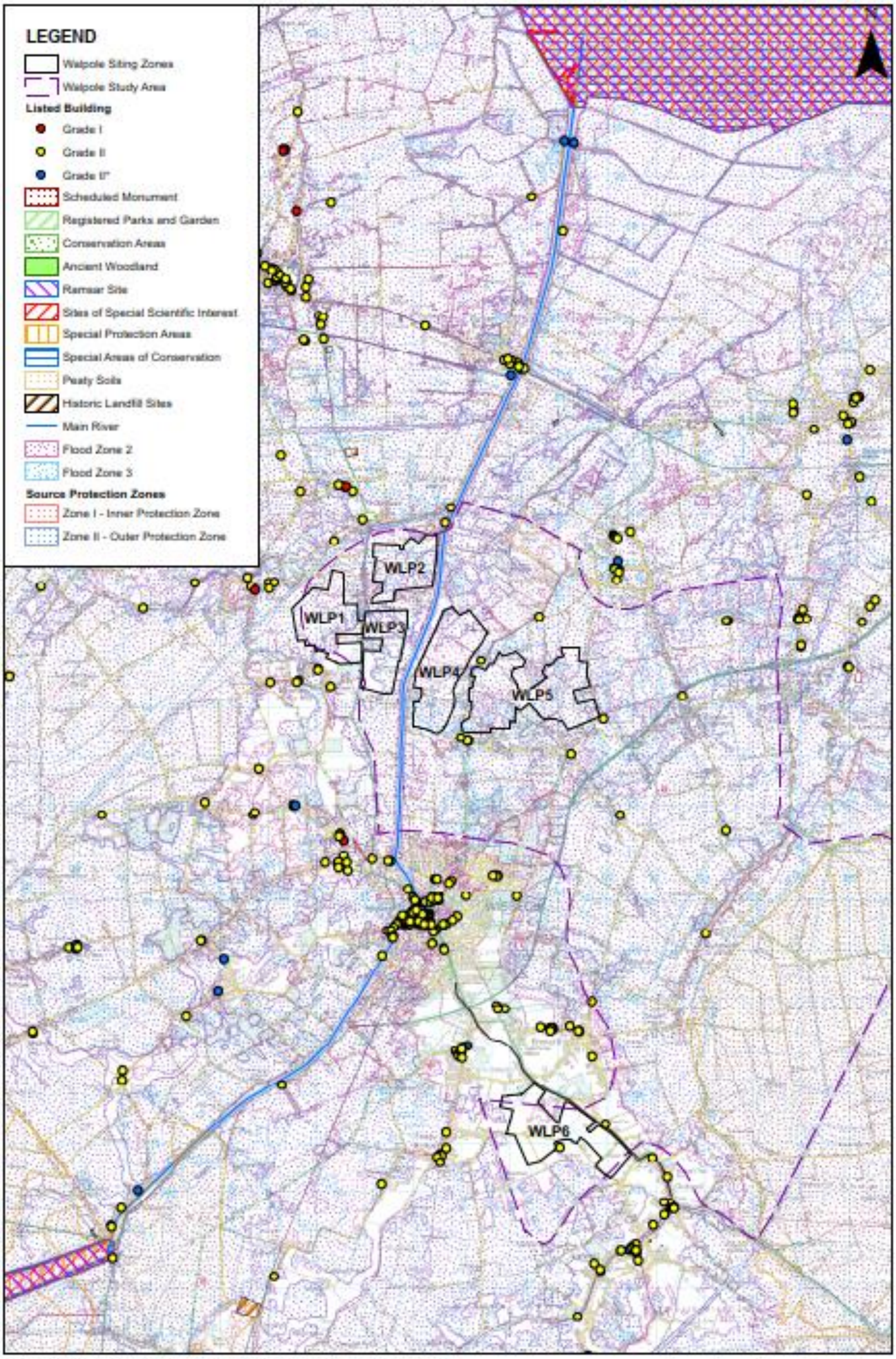


Figure 5-15 Walpole Siting Zones and Key Environmental Features

New LCS Converter Station

LCS Converter Station – Step 4 and 5

5.6.31 The identification of potential siting zones for the new LCS converter station (including the DCSS), was undertaken, taking into consideration the land take required to accommodate the required infrastructure; the distribution of environmental, socio-economic and technical constraints; and the Horlock Rules as detailed below.

5.6.32 As detailed in **Chapter 2**, Paragraph 2.5.12, engineering solutions are available to locate the DCSS and the LCS converter station within the same or adjoining structures. However, for the purposes of the current stage of the Project it has been assumed that the new LCS converter station and DCSS would not be within the same or connected structures but would be in proximity to each other. Therefore the Project infrastructure at the LCS converter station comprises:

- A new converter station. The new converter station could extent approximately 350 m by 300 m (approximately 11 ha); and;
- A new DCSS. The new DCSS could extend approximately 190 m by 100 m (approximately 2 ha).

5.6.33 The converter station and DCSS for either EGL 3 or EGL 4 at the LCS Substation would also require construction compounds, permanent access, together with peripheral landscaping, drainage, and other related works. The area which would be required for these aspects is assumed to be approximately 25% of the combined areas. For the purposes of the current stage of the Project and to inform the siting work, it is assumed that an area of approximately 3 ha is required.

5.6.34 Preliminary examination of the heat maps and the GIS datasets identified a long-list of 20 relatively unconstrained areas within the LCS Converter Station Study Area. These were identified to assist the environmental specialists in identifying preliminary siting zones. Environmental specialists undertook a high-level appraisal to gauge the level of environmental sensitivity likely to be associated with each area. This analysis took account of factors including:

- the presence of any potentially valuable landscape features;
- the presence of sites of high amenity, cultural or environmental value;
- the proximity of adjacent settlements and residential properties and, where relevant, listed buildings;
- the availability of existing local screening features (e.g., woodland) to reduce the degree of visual intrusion;
- the presence of sensitive surface or ground water sources, and sites at risk of flooding;
- the broad nature of adjacent roads to minimise the risk of off-site effects from road improvements; and
- the scope for mitigation planting and/or landform.

5.6.35 The presence of brownfield land was considered as NGET seek areas of previously developed land ahead of greenfield sites where possible. No areas of vacant or available brownfield land suitable for all the required infrastructure were identified within the Study Area. However, some areas of previously developed land were identified and included where practicable as part of identified siting zones.

5.6.36 Review of the 20 relatively unconstrainted areas identified that some were contiguous and some very close to each other. Where this was the case, the relatively unconstrained areas were grouped. This exercise and the preliminary environmental appraisal exercise resulted in 13 siting zones in total for consideration at Options Appraisal. From north to south these are:

- Siting zone DC10 – an area, approximately 1 km by 0.5 m, located north of Mablethorpe on the site of Theddlethorpe Gas Terminal;
- Siting zone DC11 - an area, approximately 0.5 km by 0.5 km, located immediately north of Woodthorpe;
- Siting zone DC1 - an area, approximately 0.5 km by 0.3 km, located east of Woodthorpe;
- Siting zone DC12 – an area, approximately 2.8 km by 1 km, located south-west of Woodthorpe and north of Ailby;
- Siting zone DC2 - an area, approximately 1 km by 0.5 km, located north-east of Beesby;
- Siting zone DC3 - an area, approximately 2.1 km by 0.8 km, located south of Beesby;
- Siting zone DC4 – an area, approximately 1 km by 0.5 km, located south of Galley Hill and west of Saleby;
- Siting zone DC13 - an area, approximately 0.9 km by 0.6 km, located east of Greenfield Wood/Mother Wood and west of Saleby;
- Siting zone DC5 - an area, approximately 3.1 km by 0.8 km, located north-east of Bilsby spanning the A1111 Sutton Road;
- Siting zone DC6 – an area, approximately 1.4 km by 0.5 km, located north-west of Huttoft;
- Siting zone DC7 - an area, approximately 0.7 km by 0.6 km, located east of Huttoft;
- Siting zone DC8 - an area, approximately 0.4 km by 0.5 km, located south-east of Bilsby; and
- Siting zone DC9 – an area, approximately 0.6 km by 0.5 km, located south-east of Bilsby.

LCS Converter Station – Step 6

5.6.37 Following site visits, further information was received on the availability of land within Siting Zone DC10. This land, the site of the disused Theddlethorpe Gas Terminal, is to be used by the Viking CCUS NSIP as part of its 2023 DCO submission. The siting zones for consideration at Options Appraisal are shown in **Figure 5-17**.

Figure 5-16 – LCS Converter Station Siting Zones and Key Environmental Features

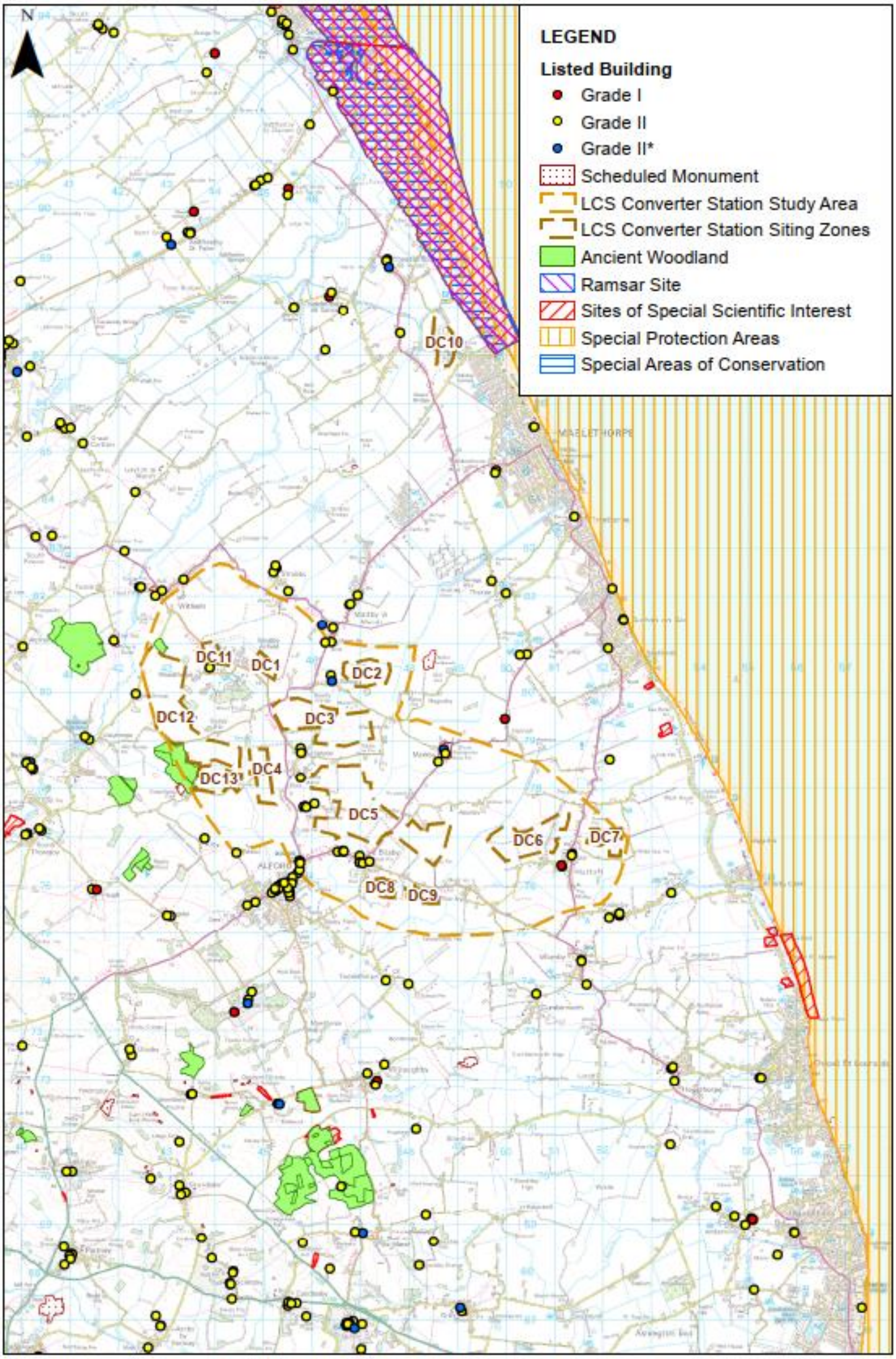


Figure 5-16 LCS Converter Station and DCSS Siting Zones and Key Environmental Features

SCALE:1:125,000 0 1 2 3 4 km

5.7 Mitigation of Impacts Through Avoidance

5.7.1 The Study Area, preliminary corridors, siting zones and siting areas are effectively the first two stages of an iterative process looking at features which represent constraints at an increasingly smaller scale and finer grain. 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 preliminary corridors, siting zones and siting areas and whether they have been avoided by this process, are listed in Table 5-4.

Table 5-4 – Major Features Representing Constraints within the Study Area

Topic	Constraint Type and Name	Avoided by Corridors, Siting Zones, and Siting Areas
Ecology	Site of Special Scientific Interest (SSSI): Tetney Blow Wells, Muckton Wood SSSI, Willoughby Meadow, Bratoft Meadows, The Wash, Sea Bank Clay Pits and Chapel Point to Wolla Bank	Primarily avoided, however Sea Bank Clay Pits and Chapel Point to Wolla Bank SSSI are within the Corridor connecting to the Anderby Creek landfall study area. Additionally, the corridor that connects to the Theddlethorpe Landfall overlaps with the Saltfleetby-Theddlethorpe Dunes SSSI.
	Ancient woodland (47)	Avoided
	Important Bird Areas	Two are partially within the study area - The Wash and Humber Estuary Important Bird Area.
	RSPB Reserves - Frampton Marsh and Freiston Shore	Frampton Marsh is partially within one Corridor. Freiston Shore is avoided
Economic Activity	Wind Farms (14)	All are avoided, however there are some within proximity south of Sutton Bridge, south of Holbeach St Matthews and east of Maltby le Marsh.
	Solar Farms (17)	Avoided (14), partially within corridors (3 – Rose and Crown Solar Farm, Kirton Solar, Nowhere Farm)
	Golf Courses (15)	Avoided (14), partially within corridors (1 – Sandilands Golf Course)
	Nationally Significant Infrastructure Project (3)	Partially within corridors and siting zones/areas (3 – Viking CCUS and Outer Dowsing OWF, G2W Project)
	MoD Properties: Theddlethorpe Range, Donna Nook Range and RAF Wainfleet	Avoided by the corridors

Topic	Constraint Type and Name	Avoided by Corridors, Siting Zones, and Siting Areas
Historic Environment	Registered Park and Gardens (3)	Avoided
	Conservation Area (22)	Avoided
	Scheduled Monuments (88)	Avoided
Landscape and Visual	Lincolnshire Wolds NL	Within corridors (underground cable)
	Urban areas	Avoided
	Country Park (2)	Avoided (1), within corridors (Witham Way)
Water	Statutory Main Rivers	Within corridors and three LCS Converter Station siting zones
	WFD surface waters	Within corridors and one LCS converter station siting zone.
	IDB surface waters	Within corridors, siting zones and siting areas.
	Risk of Flooding from Reservoirs	Within several corridors but not within siting zones.
	Flood Zone 2 & 3	Within corridors, siting zones and siting areas
	Groundwater Source Protection Zones – Inner/Zone 1	Within corridors and siting zones.

5.8 Introduction to the Cost and Programme Model

NGET's Cost Estimates

5.8.1 Costs have been developed by NGET's cost estimating team using consistent assumptions such that route lengths are based on a route produced from a desktop exercise that is representative of the likely constraints to routeing. 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 are consistent in relative terms. The scope of work for the new stations (the two converter stations at Walpole, the 400 kV substation at Walpole and (if required) the LCS converter station and DCSS) 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.

5.8.2 The costs included were estimated based on prices from the financial year 2022/23 and as such would need adjustment for inflation with time. However, they provide a consistent cost point for comparison of options at this stage. Lifecycle costs of assets have been calculated and represent a cost for operation and maintenance and fault restoration over a 60-year lifecycle but do not account for electrical losses.

NGET's Programme Estimates

5.8.3 To inform the Options Appraisal (Step 7), a logic linked activity schedule was built based on a generic build process for underground cables using assumptions such as cable type, cable length and crossing methods to standardise any unknown parameters, offering consistency across the corridors. Any variables determined by the corridors, such as construction discipline and corridor length were inputted to the schedule, producing estimates of construction duration and provision of an earliest operational date for each corridor.

5.9 Next Step - Options Appraisal (Step 7)

5.9.1 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 focussed on those sub-topics which assist in distinguishing between options.

5.9.2 Through the definition of study areas and preliminary options as areas that seek to comply with Holford Rules 1 and 2 and Horlock Rule 2 (seeking to minimise environmental effects from the outset), the preliminary 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 Forest Inventory Woodland. Large blocks of National Forest Inventory Woodland have been avoided through the definition of the corridors, siting zones or siting areas. Although smaller blocks of woodland are present, they can generally be avoided through careful routeing and siting.
- BMV agricultural land (ALC Grades 1, 2, 3a). BMV agricultural land is present across the identified study areas, apart from those defined as urban areas.
- Local Landscape Designations. None are directly affected by the corridors, siting zones or siting areas.
- Viewpoints. None are located within 2 km of the corridors, siting zones or siting areas.
- Groundwater Dependent Terrestrial Ecosystems (GWDTE). GWDTE present within the defined study areas overlap with SSSIs.
- Cycle Routes (Sustrans National) stretch across the corridors and are absent from siting areas they are not considered to be a differentiating factor.

5.9.3 The Options Appraisal, undertaken for each Project component, described in **Chapters 6 to 10** below include the environmental and socio-economic sub-topics and constraints shown in **Table 5-5**.

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

Sub-topic	Constraint Name
Ecology	Ancient Woodland
	National Nature Reserves
	Ramsar
	SAC
	SPA
	SSSI
	Important Bird Area
	Local Nature Reserves
	Priority Habitat Inventory
	Traditional Orchard
Historic Environment	Scheduled Monuments
	Listed Buildings
	Registered Parks and Gardens
	Conservation Areas
Landscape	Lincolnshire Wolds NL
Visual	Residential settlements and individual dwellings
	Formal recreational areas
	Formal outdoor recreational facilities including golf courses, canals and caravan parks
Water	Statutory Main Rivers
	Sensitive Bathing Areas
	WFD surface waters
	Flood Zones 2 & 3 excluding ‘Areas Benefitting from Flood Defences’
	Artificial Sources of Flooding – Reservoir

Sub-topic	Constraint Name
	Groundwater Source Protection Zones – Inner/Zone 1
	Aquifers
	Groundwater vulnerability
	Drinking Water Safeguard Zones (surface water and groundwater)
Air Quality, Noise and Vibration	Residential areas
	Education establishments (e.g., Schools and Colleges)
	Health care facilities (e.g., hospitals, hospices, clinics)
	Places of worship
Economic Activity	Business parks/Retail and shopping centres/Industrial estates
	Solar Farms
	Wind farms and wind turbines
	Planning Applications/Consents (only for Nationally Significant Infrastructure Projects registered with the Planning Inspectorate and Large Scale Housing or Infrastructure application registered with the relevant Local Authority)
	Local Plan Allocations
Aviation and Defence	Licensed Airfield/Aerodrome
	Unlicensed Airfield/Aerodrome
	MoD Land
Traffic and Transport	Cycle Routes (Sustrans National)
	Major and Minor Roads
	Railways and Transport Routes
	Public Rights of Way
Geology and Soils	Peaty Soils
	Historic Landfill Sites
	Authorised Landfill Sites

5.9.4 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. Where impacts cannot be avoided or mitigated by careful routeing or siting, other forms of mitigation have been considered. 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).

5.9.5 As discussed in **Paragraph 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. 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. Outside of these defined buffers significant effects are less likely and therefore receptors outside these areas are unlikely to be a differentiating factor. These distances are illustrated within the options appraisals chapters summary tables for each environmental topic (**Chapters 6** to **10**).

5.9.6 The environmental, socio-economic and technical appraisals for the landfalls are described in **Chapter 6**, the appraisals for the underground cable corridors are described in **Chapter 7 to Chapter 8,** the appraisals for the stations siting zones and siting areas are described in **Chapter 9 to Chapter 10,** with the cost and programme implications outlined in **Chapter 12**.

6. Options Appraisal - Landfalls

6. Options Appraisal - Landfalls

6.1 Introduction

6.1.1 As outlined in **Chapter 5**, three preferred Landfall Study Areas were identified and taken forward into the Options Appraisal following a preliminary landfall assessment of a 90 km section of coastline in Lincolnshire from the Humber Estuary in the north, to the north side of The Wash in the south.

6.1.2 Further information is provided in **Chapter 5** regarding the onshore and offshore constraints which were considered in identifying those sections of coastline which were determined to be less preferred as potential Landfall Study Areas. The three Landfall Study Areas to be progressed for further appraisal are as follows, and are shown on **Figure 6-1**:

- Horseshoe Point: This Landfall Study Area is in a rural setting north-east of the village Marsh Chapel, Grimsby and could be accessed via Sheep Marsh Lane off the A1031. The most prominent coastline features are the tidal flood defence dunes running north-west to south-east, the drainage channels parallel to the west of the dunes with agricultural land beyond, and the saltmarsh and mudflats to the east (towards the North Sea).
- Theddlethorpe: This Landfall Study Area is located approximately 4.5 km north of the town of Mablethorpe on the Lincolnshire coastline. The potential landfall location could be accessed via Crook Bank Road, directly off the A1031. The Landfall Study Area has a rural setting, with the former Theddlethorpe Gas Terminal immediately to the south and west and agricultural land to the west. The most prominent coastline features are the tidal flood defence sand dunes running north to south along the coastline.
- Anderby Creek: Anderby Creek is a small holiday village in Lincolnshire, to the north of Skegness. The potential landfall location could be situated to the north or south of Anderby Creek and accessed via Roman Bank Road. This Landfall Study Area has a mainly rural setting with the most prominent coastline feature being a beach with tidal flood defence/sand dunes running north to south and with agriculture land to the west.

Landfall appraisal parameters

6.1.3 Internationally and nationally important ecological designated sites (described in Section 6.2), as well as Environment Agency tidal flood defences are present along the coastline within and adjacent to all three Landfall Study Areas. Therefore, the options appraisal has been undertaken on the assumption that a trenchless cable installation method (partial or wholly) would be used (where possible) to avoid or limit effects on the ecological designated sites, and the species for which these sites are designated for, and to protect the integrity of the tidal flood defences. Further information on the types of trenchless methods which could be used is provided in **Chapter 2**. For the purposes of this Report, it is assumed that a partial or wholly trenchless cable installation method would be applied to the design of the Project at the landfall location. Further information is provided below regarding the assumptions made at each of the three Landfall Study Areas and in Paragraph 6.2.2 below.

- Horseshoe Point: It is assumed that a complete trenchless cable installation method between the marine and terrestrial environments would be used (where possible) at this location, noting that further work would be needed to determine if this would be feasible from engineering perspective (Section 6.3). A shorter trenchless cable installation method beneath the Environment Agency tidal flood defences has also been considered. This would require an exit point within the saltmarsh followed by an open cut installation through the salt marsh and intertidal zone. However, as this option would have direct impacts on the statutory ecological designations present, it is not preferred and has not been considered any further within the environmental appraisal.
- Theddlethorpe: It is assumed a long trenchless cable installation method would be used (where possible, subject to engineering feasibility). The objective of which would be to install the underground cable beneath both the Environment Agency tidal flood defences and a portion of the intertidal zone (distance to be confirmed following detailed ground investigation works) and sand dunes falling within the ecological designated sites. This could potentially reduce the extent of access requirements to the beach for installation activities, thereby by reducing potential impacts. A shorter cable installation method beneath the Environment Agency tidal flood defences has also been considered (details of which are provided within Section 6.3). This method would require an exit point on the beach (outside of the Saltfleetby-Theddlethorpe Dunes & Gibraltar Point SAC but within the Humber Estuary SPA and Ramsar, within the Greater Wash SPA, and within the Saltfleetby - Theddlethorpe Dunes SSSI and the Lincolnshire Coronation Coast NNR); and therefore, suitable access to the beach for installation activities, or access from offshore (via a flat bottomed vessel) would be required. As such, this method is possible but currently not preferred and therefore, the environmental appraisal has assumed a complete trenchless solution, unless specifically stated otherwise.
- Anderby Creek: It is assumed that one trenchless cable installation method would be used (where possible, subject to engineering feasibility) to install the underground cable beneath the intertidal zone, sand dunes and tidal flood defences. Using this method of installation would avoid the requirement to take access to the beach for installation activities thereby reducing impacts, specifically on beach visitors.

6.1.4 As described in **Chapter 2** the permanent infrastructure at the preferred landfall location would be minimal and entirely below ground, comprised of the incoming offshore DC cables, the outgoing DC onshore cables and a Transition Joint Bay(s) (TJB) which would connect the two. Once construction works are complete the land would be reinstated to pre-existing conditions and the only permanent above ground infrastructure visible would be the cover of the TJB (located on the landward side of the Environment Agency tidal flood defences, an example is shown in **Figure 2-1**). The potential for adverse environmental effects such as setting effects on designated heritage assets, landscape character effects or effects on views from the presence of above ground infrastructure at the preferred landfall location during the operational stage of the Project would be minimal. Therefore, the options appraisal has focused on the potential effects likely to occur during the temporary construction period in identifying the preferred Landfall Study Area.

6.1.5 The Options Appraisal below has considered environmental, socio-economic and technical topics for each Landfall Study Area and was informed by data gathered as outlined in **Table 5-1** and **Table 5-2**. Cost and programme performance are considered separately for all Project options in **Chapter 12**. For the current Project stage, relevant data comprises desk study information, supplemented by site visits to selected locations and at important receptors.

Figure 6-1 - Landfall siting areas

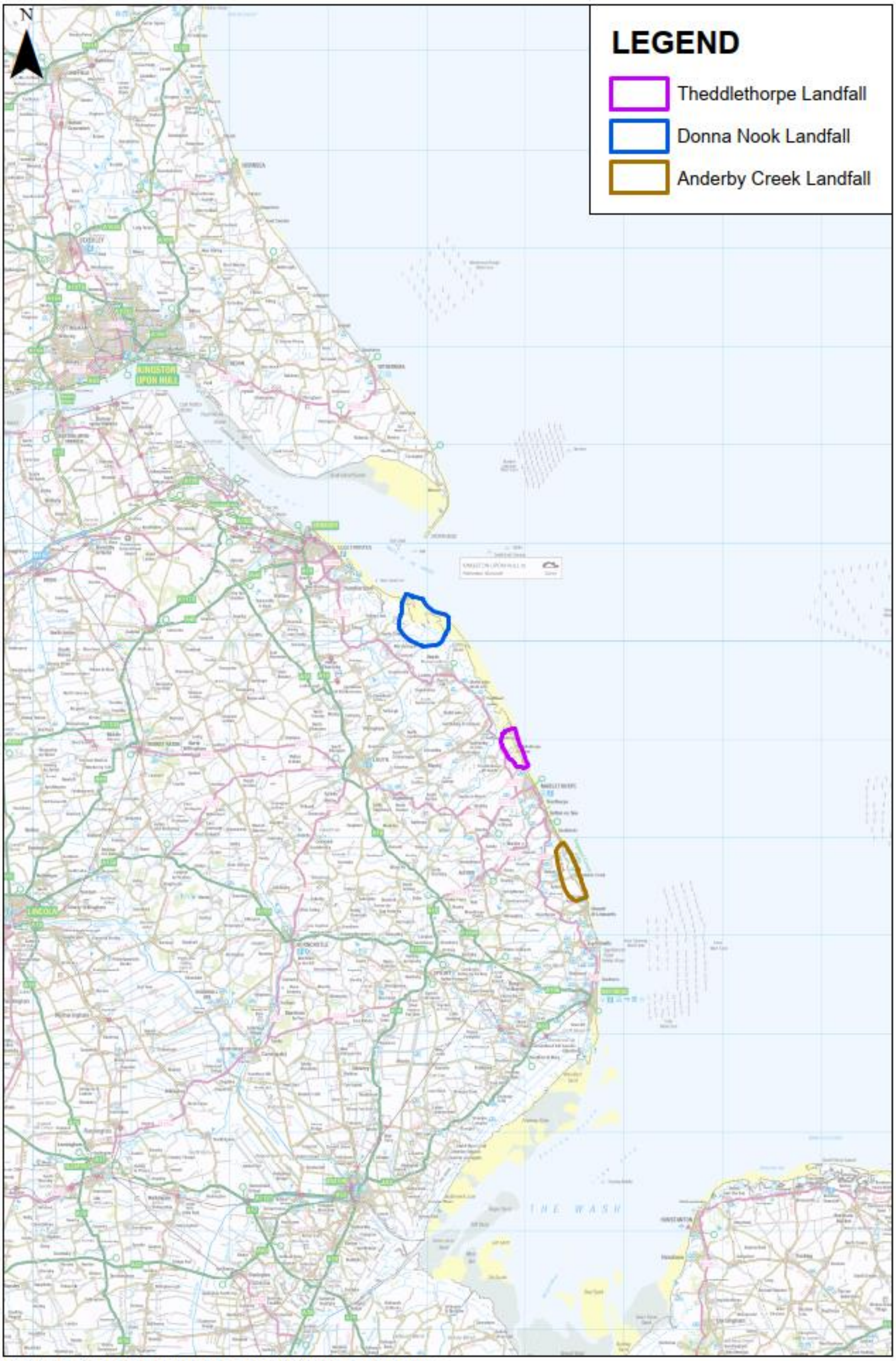


Figure 6-1 Landfall siting areas and offshore cable routing

SCALE:1:615,000

0 3 6 9 12 15 18 km

6.2 Environmental Factors

Ecology

6.2.1 At all three Landfall Study Areas, cable installation works, both terrestrial and marine have the potential to:

- directly impact upon protected species within and connected to/dependent upon the associated statutory ecological designations, and;
- result in a loss of habitat, disruption to the formation of shifting dunes and impact upon marine and terrestrial protected species during surveys, seabed preparations and cable installation.

6.2.2 The ecological features present at the landfalls are shown in **Figure 6-2.**

6.2.3 As outlined above, it is assumed that a partial or wholly trenchless cable installation method would be used to avoid direct impacts upon ecologically designated sites. In addition, it is also considered that numerous mitigations could be applied to avoid and minimise ecological impacts, including, but not limited to, the following:

- Careful routeing and siting of infrastructure within the selected preferred Landfall Study Area, as well in relation to the onshore and offshore cable corridors and routes, to avoid areas of priority habitat and ecological designations;
- Implementation of standard construction management measures by way of a Construction Environmental Management Plan (CEMP) which would set out specific procedures for the protection of habitats and species, including pollution prevention measures (safe storage of chemicals and materials, silt fencing, pollution/spill response plan (including a Frac-out Emergency Plan) etc), toolbox talks, biodiversity protection zone fencing etc;
- Adherence to policies and measures included within relevant marine management plans, such as the East Inshore and East Offshore Marine Plan[42]; following the plans to guide development and ensuring that proposals are consistent with existing legislation and policy; and
- Implementation of marine and ecological management plans, such as Marine Environmental Management Plans which would set out specific procedures for protection of marine and bird life, including seasonal restrictions to construction and installation.

[42] HM Government (April 2014) East Inshore and East Offshore Marine Plans. Available at: https://assets.publishing.service.gov.uk/media/5a7ec0eced915d74e33f2342/east-plan.pdf

Figure 6-2 – Statutory Ecological Designations at the Landfall Locations

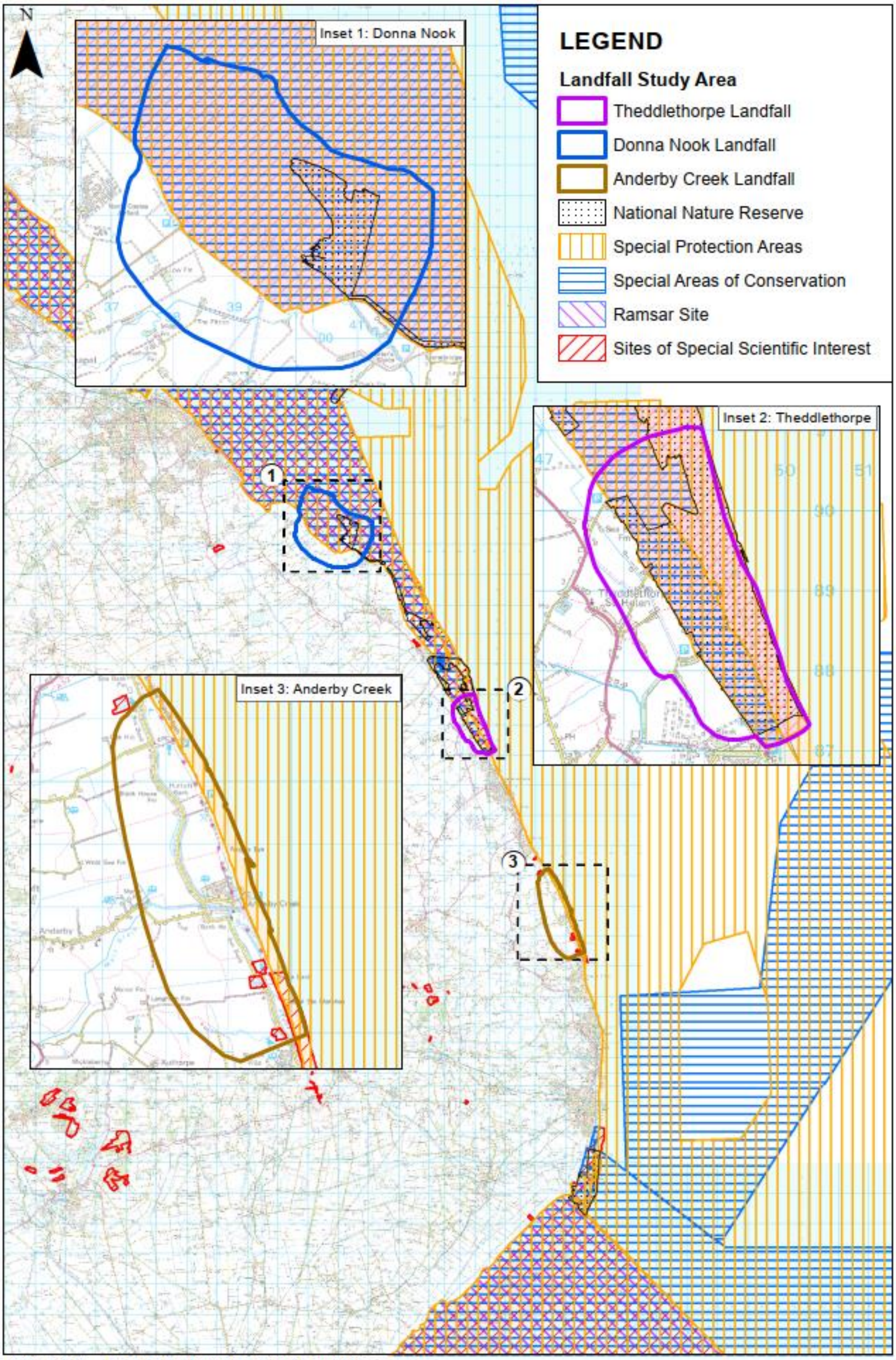


Figure 6-2 – Ecological features at the Landfall Locations

Horseshoe Point

6.2.4 A number of important ecological areas and ecologically designated sites are located across and within 20 km of the Landfall Study Area at Horseshoe Point. Most notably, the Landfall Study Area is situated on the Lincolnshire coastline, along which numerous National Site Network (NSN) sites (comprising of Special Protection Areas (SPA) and Special Areas of Conservation (SAC)) and Ramsar sites are present. The ecologically designated areas identified within or adjacent to the Landfall Study Area are as follows.

- ‘Humber Estuary designated sites’ comprising the Humber Estuary SAC, Humber Estuary SPA, Humber Estuary Ramsar and Humber Estuary Site of Special Scientific Interest (SSSI) sites. The Humber Estuary designated sites are identified for their extensive wetland and coastal habitats that support migratory and wintering waterbirds in addition to breeding populations of bittern, marsh harrier, avocet and little tern. The Humber Estuary SSSIs are also a Ground Water Dependent Terrestrial Ecosystem (GWDTE). The Humber Estuary designated sites also fall within the Humber Estuary Management Scheme; a scheme developed to facilitate the sustainable management of the Humber Estuary European Marine Site, overseen and administered by the Humber Nature Partnership;
- Greater Wash SPA, classified for the protection of red-throated diver, common scoter, and little gull during the non-breeding season, and for breeding Sandwich tern, common tern and little tern. The area includes a range of marine habitats, including intertidal mudflats and sandflats, subtidal sandbanks and biogenic reef.
- Lincolnshire Coronation Coast National Nature Reserve (NNR), which includes and extends the protected area of the Donna Nook National Nature Reserve (NNR); home to a colony of grey seals which utilise the Lincolnshire beaches during winter months for breeding. The reserve contains important mudflat, saltings, sand dunes, slacks and inter-tidal areas.

6.2.5 Combined, the above sites cover approximately 90% of the Landfall Study Area as shown on **Figure 6-2**. Priority habitats, including coastal saltmarsh and floodplain grazing marsh habitats are located to the centre and south of the Landfall Study Area. These habitats are critical for marine biodiversity; however, in 2012 the estuary’s conservation status was downgraded to unfavourable, attributed to habitat loss, the decline of precious habitats and commercial development. In response, a five-year programme launched in April 2023, known as Wilder Humber[43], has been established in the wider area around this Landfall Study Area to restore marine habitats and species throughout the Humber estuary. The Wilder Humber programme will combine sand dune, saltmarsh, seagrass, and native oyster restoration to maximise conservation and biodiversity benefits across the estuary and will be implemented by Ørsted in combination with Yorkshire Wildlife Trust and Lincolnshire Wildlife Trust. The programme will include land within the Landfall Study Area at Horseshoe Point.

6.2.6 As outlined above, a trenchless cable installation method is proposed with a TJB located on the landward (west) side of the Environment Agency tidal flood defences and boundary of the ecological designations (as detailed in paragraph 6.2.4). This would require a substantial length of trenchless cable installation (which could result in an over-tensioning of the cable whilst it is being pulled through the pre-installed cable ducts, thereby damaging the cable). The distance from the mean low water springs (MLWS) to the

[43] https://storymaps.arcgis.com/stories/f69c396076db426b9e1882a99bfeb0f7

Environment Agency tidal flood defences, all of which lies within the Humber Estuary designated sites is approximately 2.6 km. Further discussion is provided on the feasibility of this length of cable in Section 6.4. Even with a completely trenchless cable installation, works within the priority habitats within the intertidal area (and Humber Estuary designated sites) could still be required to complete geotechnical investigation works to further inform the engineering design.

Theddlethorpe

6.2.7 The Landfall Study Area at Theddlethorpe is in proximity to important ecological areas and ecologically designated sites. The Landfall Study Area is situated within the Lincolnshire Coronation Coast NNR and numerous NSN and Ramsar sites are present. The ecologically designated and important ecological areas identified within or adjacent to the Landfall Study Area are as follows.

- Saltfleetby – Theddlethorpe Dunes and Gibraltar Point SAC: This site comprises tidal sand and mudflats, salt and freshwater marshes and sand dunes. The dunes support migrant birds May – October and wildfowl in the winter months. The dunes also provide habitat for the natterjack toad, a European Protected Species. The Saltfleetby - Theddlethorpe Dunes SSSI which overlaps with this SAC is also a GWDTE.
- Saltfleetby – Theddlethorpe Dunes SSSI: This site is designated primarily for its Annex I habitats, comprising ‘white dunes’ (shifting dunes along the shoreline with Marram Grass, *Ammophilia arenaria*), ‘grey dunes’ (fixed coastal dunes with herbaceous vegetation), dunes with *Hippophae rhamnoides,* and Humid dune slacks.
- The Lincolnshire Coronation Coast NNR, as described in Paragraph 6.2.4, which includes and extends the protected area of the Saltfleetby - Theddlethorpe Dunes NNR: This site is designated for the tidal sand and mudflats, salt and freshwater marshes and sand dunes that it contains and the flora and fauna that use these habitats.
- ‘The Humber Estuary SPA and Ramsar sites as described in Paragraph 6.2.4 above.
- Greater Wash SPA as described in Paragraph 6.2.4 above.

6.2.8 Combined, these designated sites cover approximately 90% of the Landfall Study Area as shown on **Figure 6-2**. Priority habitats within the Landfall Study Area include tidal sands and mudflats, coastal lagoons, salt and freshwater marshes and sand dunes (including the Annex I dune habitats outlined in Paragraph 6.2.47 above). Land within and adjacent to the Landfall Study Area also falls within the Lincolnshire Coastal Grazing Marshes Project[44] which supports local farmers and landowners to conserve the remaining traditional grazing marsh by providing access to grants, advice and training as well as help to local people and visitors to access, enjoy and understand the full range of heritage features found in the Grazing Marshes[45].

6.2.9 As outlined above, a trenchless cable installation method would be used (where possible), with the TJB located on the landward (west) side of the Environment Agency tidal flood defences and outside of the statutory ecological designations to avoid these nationally and

[44] https://www.lincsmarshes.org.uk/

[45] https://www.lincsmarshes.org.uk/about-the-project

internationally designated sites. To avoid direct impacts on the statutory ecological designations and tidal flood defences, a trenchless cable installation would need to be between 0.9 and 1.4 km in surface length. An alternative approach would be to combine both open cut and trenchless cable installation methods. This would entail the construction of the landfall using open cut methods (an open cut trench) of between 300 m and 600 m from the MLWS to the exit point on the beach (outside the SAC sites but within the SSSI and NNR) to the east of the defences. The remainder of the DC cables would be installed via trenchless cable installation of between 600 m and 700 m beneath the Environment Agency tidal flood defences with an exit point on the landward (west) side of the Environment Agency tidal flood defences. This could avoid direct impacts on the Saltfleetby - Theddlethorpe Dunes and Gibraltar Point SAC but would still require intrusive works within the Humber Estuary Ramsar and SPA and Saltfleetby - Theddlethorpe Dunes SSSI and the Lincolnshire Coronation Coast NNR. Further discussion is provided on the feasibility of this length of cable in Section 6.4.

Anderby Creek

6.2.10 The ecologically designated and important ecological areas identified within the Landfall Study Area comprise the following.

- Greater Wash SPA (as described in Paragraph 6.2.4 above). The eastern extent of the Landfall Study Area, generally comprising the beach area and land seaward of mean high-water springs (MHWS) (as shown on **Figure 6-2**) falls within the Greater Wash SPA.
- Small areas of land at the southern end of the Landfall Study Area fall within the Sea Bank Clay Pits SSSI and Chapel Point to Wolla Bank SSSI. Sea Bank Clay Pits SSSI comprises a series of isolated clay workings. The pits are a GWDTE and support rare aquatic plant communities and invertebrate fauna such as nationally scarce species of beetles. Chapel Point to Wolla Bank SSSI is designated as a geological SSSI for its nationally important geological features. The habitats here include reedbeds and coarse grassland.

6.2.11 There are no SACs or Ramsar sites within 2 km of the Landfall Study Area. The Greater Wash SPA covers approximately 50% of the Landfall Study Area as indicated on **Figure 6-2.** Priority habitats include coastal sand dunes which are located sporadically along the entire coastline within the Landfall Study Area. There are mudflats in the southern section of the Landfall Study Area. Land within and adjacent to the Landfall Study Area also falls within the Lincolnshire Coastal Grazing Marshes Project (Paragraph 6.2.8). In addition, in the northern part of the Landfall Study Area, the National Trust is currently undertaking a recently approved[46] project to create new habitat for a variety of wildlife, especially migrating birds, along with breeding birds, at the former Sandilands golf course[47], expected to be complete in 2025.

6.2.12 As outlined above, a trenchless cable installation method would be used, with the TJB located on the landward (west) side of the Environment Agency tidal flood defences and would be located to avoid the beach area and therefore the Greater Wash SPA. The trenchless cable installation would be approximately 800 m from the MLWS to the landward side of the Environment Agency tidal flood defences. Furthermore, there is

[46] https://www.bbc.co.uk/news/uk-england-lincolnshire-67707961

[47] https://www.nationaltrust.org.uk/visit/nottinghamshire-lincolnshire/sandilands

sufficient flexibility to carefully site infrastructure within the northern part of the Landfall Study Area and avoid the SSSIs in the south of the Landfall Study Area.

Landscape and Visual

Horseshoe Point

6.2.13 As shown in **Figure 6-3**, the Landfall Study Area is located within Landscape Character Area (LCA) Lincolnshire Coast and Marshes (National Character Area (NCA) 42[48]) which is characterised by a wide coastal plain extending from Barton-upon-Humber in the north, across to Grimsby at the mouth of the Humber and south to Skegness. The landscape within the Landfall Study Area is characterised by a flat, open coastal landscape and seascape. It includes a wide beach and the North Sea in the east of the Landfall Study Area. Within the Landfall Study Area itself landscape features comprise open arable farmland with tidal flood defences comprising dykes and along the coastline extensive stretches of intertidal habitats including salt marsh, coastal dunes and wetlands which are subject to continuous erosion and accretion. The area is sparsely populated with only scattered properties and small clusters of residential areas.

6.2.14 The loss of landscape character features from the DC cables installation at the landfall could be avoided with the employment of trenchless cable installation. Trenchless cable installation (where possible) would limit the effects on landscape character features from the construction phase to the area around the TJB installation (as well as the onshore cable installation which is appraised in **Chapter 7**). These effects would be temporary for the duration of construction and post-construction when reinstatement of any vegetation removed would re-establish. Careful siting of the TJB, construction compounds and onshore cable routeing at the next phase of the Project would also minimise the loss of any such features.

6.2.15 The closest nationally designated landscape area is the Lincolnshire Wolds National Landscape (hereafter referred to as the ‘Lincolnshire Wolds NL’, and formerly known as the Lincolnshire Wolds Area of Outstanding Natural Beauty (AONB)), located approximately 11 km to the west of the Landfall Study Area. Given the distance of the Lincolnshire Wolds NL from the Landfall Study Area, the temporary nature of the construction works and that there will be no permanent above ground infrastructure (except for the TJB cover) at the landfall, potential adverse visual effects on the Lincolnshire Wolds NL are not considered likely to occur.

6.2.16 The potential key visual receptors surrounding the Landfall Study Area are the settlements of North Cotes, Marshchapel, Wragholme, Grainthorpe, Conisholme and North Somercotes which are all located more than 3 km to the west, south-west and south. Scattered properties are also located in the vicinity of the Landfall Study Area, to the north, west and south, with the closest property located more than 500 m from the Landfall Study Area boundary. In addition to these residential receptors, recreational receptors would include those using Public Rights of Way (PRoW) which cross the Landfall Study Area.

[48] Natural England, January 2014, NCA Profile: 42 Lincolnshire Coast and Marshes (NE521) https://publications.naturalengland.org.uk/publication/6596660822016000?category=587130

Figure 6-3 – Landscape and Visual Features at the Landfall Locations

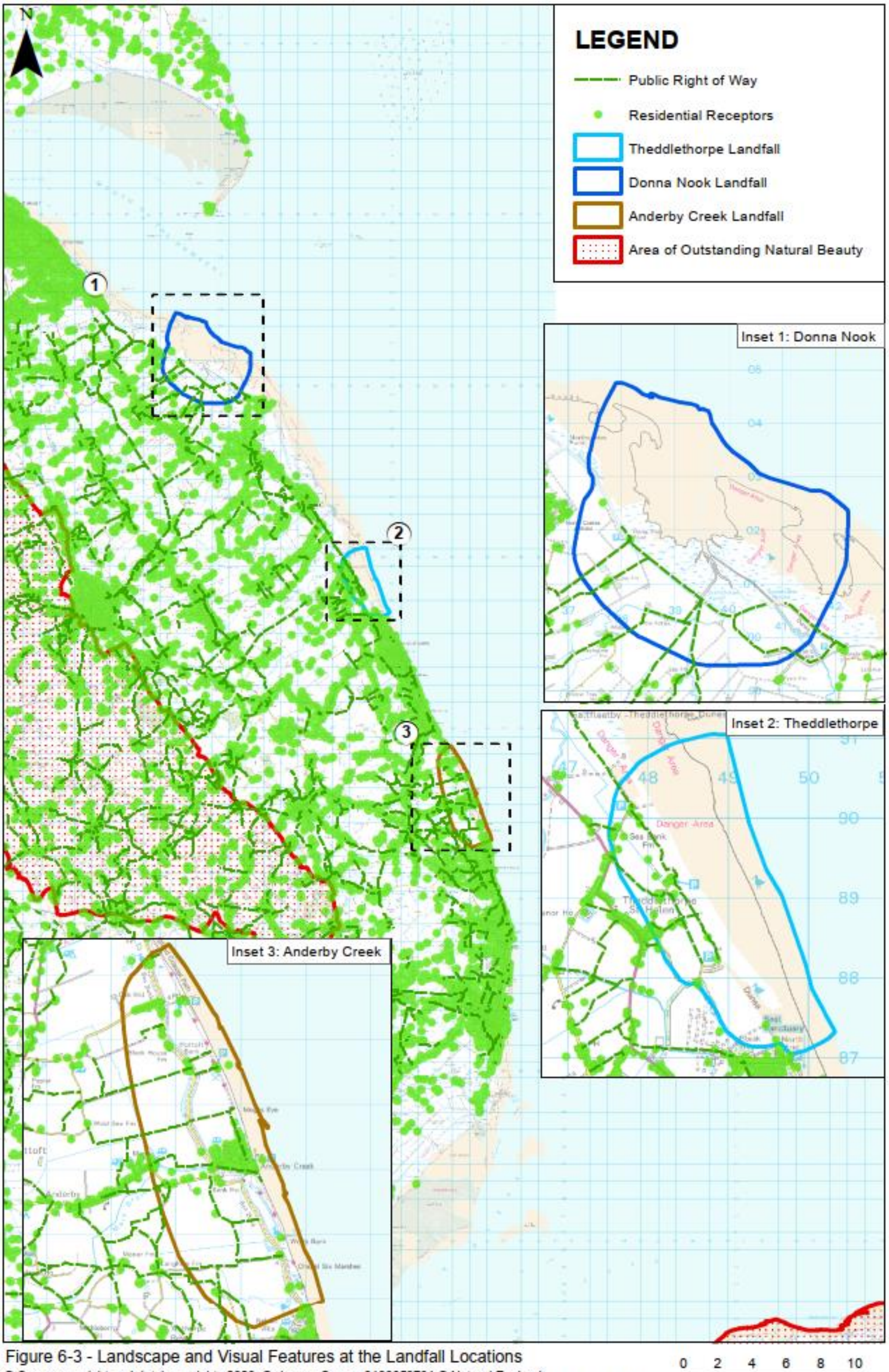


Figure 6-3 - Landscape and Visual Features at the Landfall Locations

6.2.17 The presence of construction plant and equipment, and associated activity, could have temporary adverse impacts on the visual amenity of these key receptors. Potential effects would also be limited due to the low number of receptors and the intervening distance between receptors and the Landfall Study Area. Careful siting (of the landfall infrastructure) during the next phase of the Project and routeing (of the connecting DC cables) would also help to limit effects on visual amenity. Longer term, as there would be no permanent above ground infrastructure (except for the cover of the TJB) at the landfall, permanent effects on visual amenity are considered unlikely to occur.

Theddlethorpe

6.2.18 As shown in **Figure 6-3**, the Landfall Study Area is located within Lincolnshire Coast and Marshes LCA (NCA 42) as described in Paragraph 6.2.13. It is characterised by a flat, open coastal landscape including a wide sandy beach to the east and the North Sea to the centre and east of the Landfall Study Area. At the centre and west of the Landfall Study Area the landscape is characterised by sand dunes, open farmland and residential coastal properties (Duneside Cottages and Haven Cottage) with the village of Theddlethorpe St Helen to the west. Although predominantly rural in character, a former Gas Terminal (Theddlethorpe Gas Terminal) is located to the south of the Landfall Study Area. Potential effects on landscape character from infrastructure at the Landfall Study Area would be limited to temporary effects during installation of the TJB and onwards DC cables due to the use of trenchless cable installation (where possible) with no above ground infrastructure once construction is completed (except for the cover of the TJB).

6.2.19 The closest nationally designated landscape area is the Lincolnshire Wolds NL, located approximately 13 km west. Given the distance of the Lincolnshire Wolds NL from the Landfall Study Area, the temporary nature of the construction works and that there will be no permanent above ground infrastructure (except for the cover of the TJB) at the landfall, potential adverse visual effects on the Lincolnshire Wolds NL are considered unlikely.

6.2.20 The potential key visual receptors surrounding the Landfall Study Area are the settlements of Theddlethorpe St Helens (500 m west); Mablethorpe (900 m south with Trusthorpe and Sutton-on-Sea further south along the coastline) and Saltfleet (4 km north). Scattered properties are also located in the vicinity of the Landfall Study Area, to the north, west and south and there are approximately five residential properties within the boundary of the Landfall Study Area. In addition to these residential receptors, recreational receptors include those using PRoW within and around the Landfall Study Area as well as much of the land west of the Landfall Study Area, which is open access land under Section 16 of the Countryside and Rights of Way (CRoW) Act 2000, and those utilising commercial businesses, specifically holiday parks. Recreational receptors also include those using the beach (which is a designated bathing water area).

6.2.21 The presence of construction plant and equipment and associated activities within the Landfall Study Area could have temporary adverse impacts on the visual amenity of these key receptors. Visual amenity may also be affected for receptors at a greater distance, however those closer to the landfall would be likely to experience a greater effect. Any construction infrastructure within the Landfall Study Area may lead to temporarily decreased visual amenity for residential and recreational receptors within the settlement of Theddlethorpe St Helens depending on the final location of the landfall.

6.2.22 Careful siting and routeing at the next phase of the Project would help to limit potential effects on visual amenity. Longer term, as there would be no permanent above ground infrastructure (except for the cover of the TJB) at the landfall, permanent effects on visual amenity are considered unlikely to occur.

Anderby Creek

6.2.23 As shown in **Figure 6-3**, the Landfall Study Area and surrounding area is located within Lincolnshire Coast and Marshes LCA as described in Paragraph 6.2.13. Much of the land within the eastern section of the Landfall Study Area is open access land and comprises sand dunes and beach. From the centre to the west of the Landfall Study Area, the landscape is characterised by tidal flood defences, open farmland and marshland and scattered residential properties. The village of Anderby Creek including Beachside Caravan Park and Ravenna Holiday Park, sits within the Landfall Study Area boundary. Approximately 150 m south of Landfall Study Area boundary are residential properties and a holiday park on the northern outskirts of Chapel St Leonards as well as the North Sea Observatory 700m south. Other landscape character features within and around the Landfall Study Area include pumping stations, public access car parks, restaurants and cafes and scattered residential properties.

6.2.24 Potential effects on landscape character from infrastructure at the Landfall Study Area would be limited to temporary effects during installation of the TJB and onwards DC cables due to the use of trenchless cable installation (where possible), with no above ground infrastructure once construction is completed (except for the cover of the TJB).

6.2.25 Given the distance of the closest nationally designated landscape (the Lincolnshire Wolds NL at 9 km west), the temporary nature of the construction works and the fact there will be no permanent above ground infrastructure (except for the cover of the TJB) at the landfall, potential adverse visual effects of the construction works on the Lincolnshire Wolds NL are considered unlikely.

6.2.26 The potential key visual receptors surrounding the Landfall Study Area are the settlements of Anderby, Hutoft and Mumby between 1.7 km and 3.6 km to the west and Alford (9 km west), Hogsthorpe (2.3 km south-west), Chapel St Leonards 200 m south with Ingoldmells and Addlethorpe further to the south; and Sutton-on-Sea (1.5 km) and Mablethorpe (5 km) to the north. Scattered properties are also located in the vicinity of the Landfall Study Area, to the north, west and south as well as properties within Anderby Creek which is within the boundary of the Landfall Study Area. In addition to these residential properties, recreational receptors include those using PRoW and commercial businesses (holiday parks). Recreational receptors are also those using the beach (which is a designated bathing water area).

6.2.27 The presence of construction plant and equipment and associated activities within the boundary of the Landfall Study Area could have temporary adverse impacts on the visual amenity of these key receptors. Visual amenity may also be affected for receptors at a greater distance however those closer to the landfall location would be likely to experience a greater effect. Any construction infrastructure within the Landfall Study Area may lead to temporarily decreased visual amenity within the settlement of Anderby Creek depending on the final location of the landfall.

6.2.28 Careful siting and routeing at the next phase of the Project would help to limit potential for effects on visual amenity. Longer term, as there would be no permanent above ground infrastructure (except for the cover of the TJB) at the landfall, permanent effects on visual amenity are considered unlikely to occur.

Historic Environment

6.2.29 There are few designated heritage assets identified within and in proximity to the Landfall Study Areas; however, those identified are appraised below. The potential for unknown below ground archaeological remains will be considered during the next phase of the

Project once a preferred landfall location has been selected. Information from historic environment records will be used to inform the siting of the landfall and routeing of the onwards DC cables to avoid or minimise effects on any such potential remains identified. There would be no permanent above ground infrastructure (except for the cover of the TJB) at the landfall, and therefore permanent setting effects on the features outlined below are considered unlikely.

Horseshoe Point

6.2.30 As shown in **Figure 6-4**, there are no designated heritage assets within 2 km of the Landfall Study Area at Horseshoe Point. Therefore, potential adverse impacts upon the setting of any designated assets are considered unlikely.

Theddlethorpe

6.2.31 As shown in **Figure 6-4**, within 2 km of the Theddlethorpe Landfall Study Area designated heritage assets comprise one Grade II* (*Church of St Helen*) and three Grade II (*Stable Block At The Hall*, *The Hall and Ashleigh Farm*) Listed Buildings, all of which are located over 700 m to the west and/or south-west of the Landfall Study Area, respectively. Therefore, potential adverse impacts upon these designated heritage assets would be limited to temporary impacts upon their setting during the construction phase. However, given the distance of the identified assets from the Landfall Study Area, and the presence of existing vegetation and the intervening settlement at Theddlethorpe St Helen, construction at the landfall site is likely to be adequately screened by these intervening features. Therefore, it is considered that potential adverse effects during construction, upon the setting of the identified heritage assets, would be both temporary and limited.

Anderby Creek

6.2.32 As shown in **Figure 6-4,** within 2 km of the Anderby Creek Landfall Study Area the designated heritage assets comprise four Grade II Listed Buildings (*Stain Glebe Farm, Dairy Farm, Church of St Leonard, and War Memorial*), all of which are located over 1 km west/south-west of the Landfall Study Area, respectively. Therefore, potential effects upon these designated heritage assets are limited to those upon their setting during construction. However, given the distance of the identified assets from the Landfall Study Area, and the presence of existing vegetation and settlement at Chapel St Leonards, as well as scattered properties along Sea Lane, construction of the landfall is likely to be adequately screened. Therefore, it is considered that potential adverse impacts during construction, upon the setting of the identified heritage assets, would be both temporary and limited.

Figure 6-4 –Designated Heritage Assets at the Landfall Locations

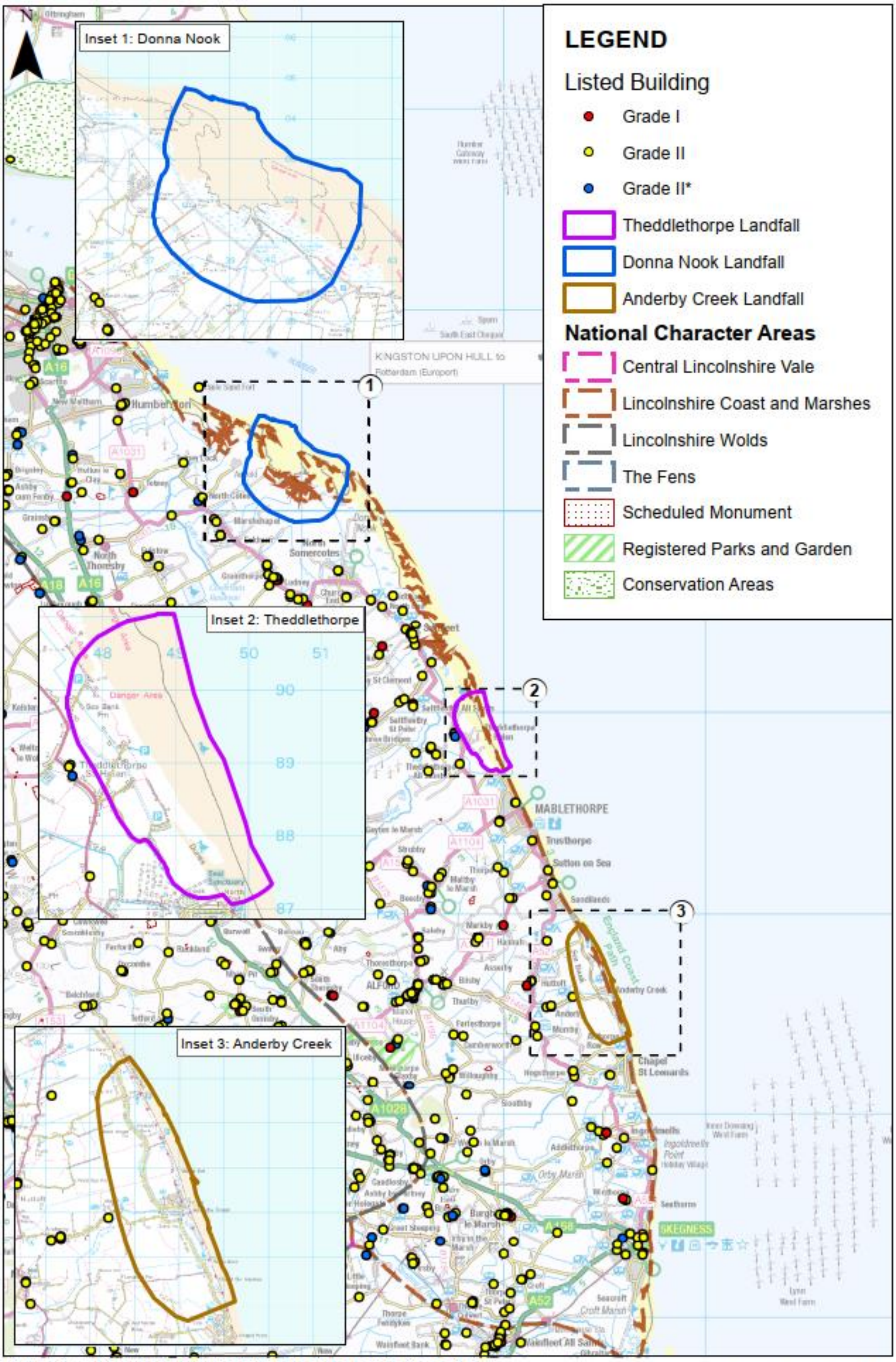


Figure 6-4 - Designated Heritage Assets at the Landfall Locations

Water Environment

6.2.33 This section considers potential effects on the terrestrial water (freshwater) environment. Potential effects on the offshore (marine) water environment have been considered as part of the EGL 3 and EGL 4 marine route options appraisal process.

6.2.34 The potential impacts of the construction in the Landfall Study Area include:

- changes to the surface and groundwater flow and patterns;
- pollution (including frac-out) and runoff (sediment and turbidity) to the surface and groundwater environments;
- physical disturbance to watercourses;
- impacts to water resource availability from dewatering; and
- potential damage to Environment Agency tidal flood defences.

6.2.35 As outlined above, it is assumed that a trenchless cable installation method would be used to avoid direct impacts to Environment Agency tidal flood defences along the coastline as well as to ecologically designated sites. In addition, it is also assumed that several standard construction management measures would be implemented to avoid and minimise effects on the water environment. Such measures would be likely to include silt fencing, settlement lagoons and pollution control measures (including a Frac-out Emergency Response Plan) which would be implemented by way of a CEMP and/or Drainage Management Plan. In addition, careful siting of the landfall infrastructure and routeing of the onwards DC cables would be undertaken at the next phase of the Project to avoid effects on and limit impacts to water environment features, including GWDTEs.

6.2.36 Additionally, given the assumption of a trenchless cable installation method, potential changes to coastal morphology and erosion patterns within any of the Landfall Study Areas were not considered to be a differentiating factor in this appraisal. This is because a trenchless cable installation method would avoid any direct disturbance to the coastline surface structure or morphology. Furthermore, due to the absence of any infrastructure (except for the cover of the TJB) at the surface, there is unlikely to be any impact upon coastal processes unless the cable becomes exposed during natural sediment transportation processes. However, should another installation method other than a wholly trenchless cable installation method be taken forward, the outcomes of this appraisal will be reviewed taking into consideration potential impacts on coastal morphology and erosion patterns.

Horseshoe Point

6.2.37 Flood Zones 2 and 3 are present on the landward (west) side of the Environment Agency tidal flood defences running along the entire coastline within the Horseshoe Point Landfall Study Area and extending approximately 2 km inland in all directions. Coastal flood defences within the Landfall Study Area include tidal flood defence dunes (which are also designated as a GWDTE as part of the Humber Estuary SSSIs, see Paragraph 6.2.4), man-made drains and a sea wall. Land within the Landfall Study Area was also subject to a managed realignment during 2013, the purpose of which was to provide improved flood defences and help reproduce valuable intertidal habitats to account for losses in the Humber Estuary designated sites. The managed realignment comprised the creation of approximately 100 ha of new intertidal habitat which involved moving the line of flood defences inland and manufacturing a breach in the sea wall[49], allowing the sea to flow in and naturally create more habitat.

6.2.38 The entirety of the Humber Estuary SSSI is a GWDTE and an area of high groundwater vulnerability (**Figure 6-2** and **Figure 6-5**). The Landfall Study Area falls within an area of medium-high risk for groundwater vulnerability and the onshore DC cables would have to route through areas of medium-high, medium and low groundwater vulnerability[50]. The entirety of the Landfall Study Area is located above a principal bedrock aquifer.

6.2.39 Several drains are located within the Landfall Study Area, including Seven Towns North Eau Drain, a Water Framework Directive (WFD) river water body, and Seven Towns South Eau Drain, which both flow into the North Sea.

6.2.40 Use of trenchless cable installation methods would likely avoid any permanent impact to the existing tidal flood defences and any impact to groundwater flow patterns, and the implementation of standard construction management measures, as stated above, would minimise the risk of affecting water quality during construction and installation.

Theddlethorpe

6.2.41 Flood Zones 2 and 3 are present on the landward (west) side of the Environment Agency tidal flood defences running along the entire coastline within the Theddlethorpe Landfall Study Area and extending approximately 2 km inland in all directions. Coastal flood defences include dunes, man-made drains and a sea wall which are present in proximity to Mablethorpe. The Landfall Study Area falls within Environment Agency's Saltfleet to Gibraltar Point Beach Management Strategy 2021-2024[51], through which beaches between Mablethorpe and Ingoldmells, including Theddlethorpe, are nourished annually with sand to provide additional flood protection. The strategy explains how current beach nourishment will not continue to be sustainable in the future due to the effects of climate change. As such, the strategy sets out a plan to change the management regime, to form a sustainable flood management approach for the next 100 years.

6.2.42 Areas within the Theddlethorpe Landfall Study Area form part of the Saltfleetby – Theddlethorpe Dunes SSSI, which is a GWDTE (see Paragraph 6.2.4). The Landfall Study Area falls within an area of medium-high risk regarding groundwater vulnerability, and the onshore DC cables would need to route through areas of medium-high, medium and low groundwater vulnerability. Furthermore, the entirety of the Landfall Study Area is located above a principal bedrock aquifer.

6.2.43 The Landfall Study Area is within a surface water drinking water protected area and safeguarding zone. Many drains are located within the Landfall Study Area, including The Cut and numerous unnamed drains, which flow into the North Sea. It is also noted that the water bathing quality at Mablethorpe Town Beach, south of the Landfall Study Area, is classified as 'excellent' and the waters are used by swimmers and beach goers.

[49] https://www.gov.uk/government/publications/humber-flood-risk-management-strategy

[50] Groundwater Vulnerability Maps show the vulnerability of groundwater to a pollutant discharged at ground level based on the hydrological, geological, hydrogeological and soil properties within a single square kilometre. The map has five risk categories (High, Medium-High, Medium, Medium-Low and Low) based on the likelihood of a pollutant reaching the groundwater (i.e., the vulnerability), the type of aquifer present and the potential impact (i.e. the aquifer designation status).

[51] Saltfleet to Gibraltar Point Strategy Enhancing the Lincolnshire Coast. Available online at: https://consult.environment-agency.gov.uk/lincolnshire-and-northamptonshire/sgp-lbm/. Accessed 30 June 2023.

6.2.44 The use of trenchless cable installation methods would be likely to avoid permanent impacts to the tidal flood defences and impacts to groundwater flow patterns. It is also considered that trenchless cable installation would minimise the potential for impacts upon Theddlethorpe beach, thereby reducing the potential to conflict with the Environment Agency's Saltfleet to Gibraltar Point Beach Management Strategy 2021-2024. Furthermore, the implementation of standard construction management measures would minimise the risk of water quality effects during construction.

Figure 6-5 –Water Environment Features at the Landfall Locations

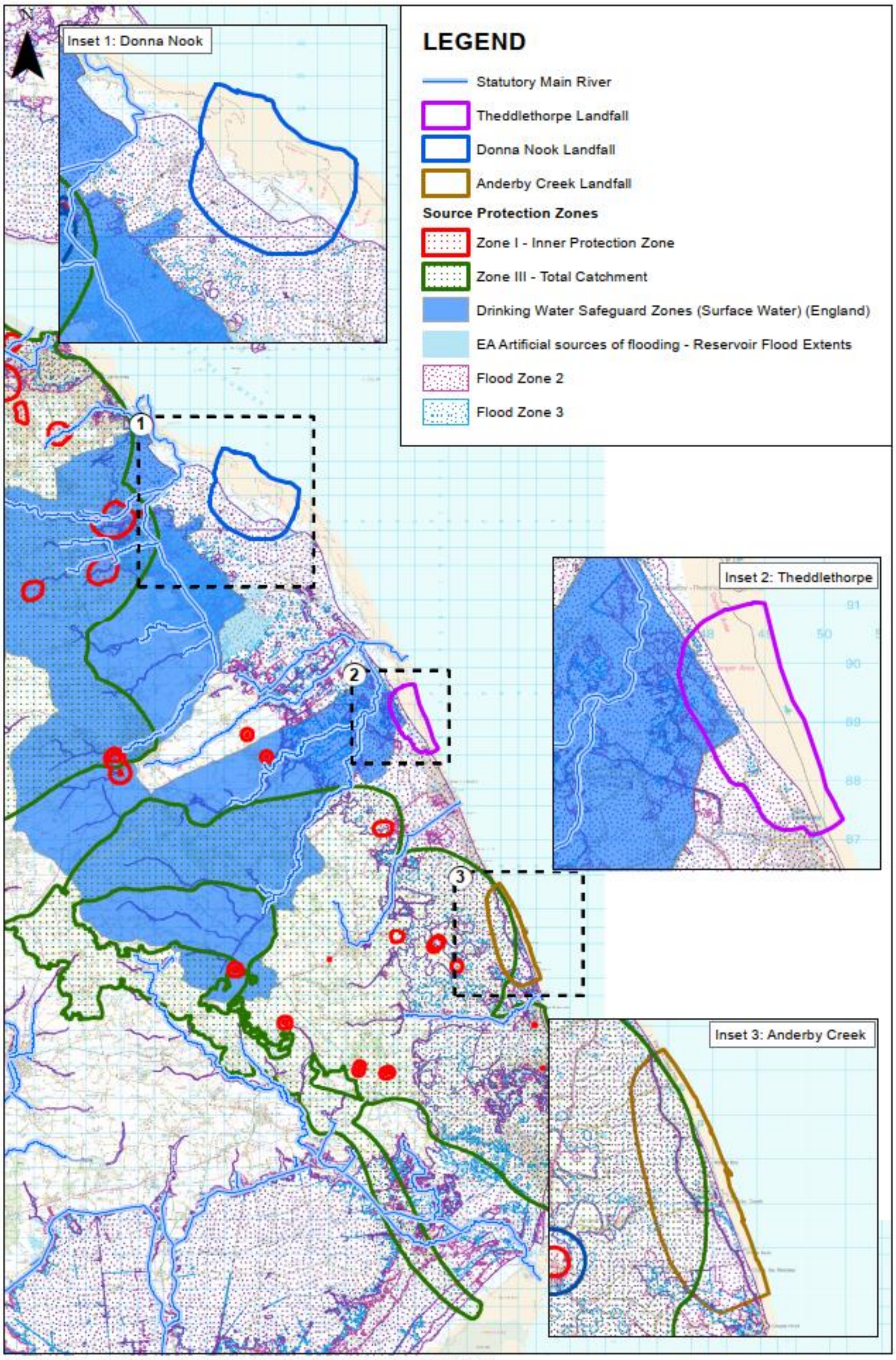


Figure 6-5 – Water Environment features at the Landfall Locations

Anderby Creek

6.2.45 Flood Zones 2 and 3 are present on the landward (west) side of the Environment Agency tidal flood defences running along the entire coastline within the Anderby Creek Landfall Study Area and extending approximately 1 km inland. This Landfall Study Area also falls within the Saltfleet to Gibraltar Point Beach Management Strategy 2021-2024 area as discussed in Paragraph 6.2.41, with the beaches at Wolla Bank, in the southern part of the Landfall Study Area undergoing beach nourishment. The strategy explains how current beach nourishment will not continue to be sustainable in the future due to the effects of climate change. As such, the strategy sets out a plan to change the management regime, to form a sustainable flood management approach for the next 100 years.

6.2.46 Sea Bank Clay Pits SSSI forms part of the southern extent of the Landfall Study Area and it is a GWDTE. The onshore DC cables would need to route through areas of medium-high, medium and low risk regarding groundwater vulnerability from the Landfall Study Area within which the immediate coastline is a medium-high risk for groundwater vulnerability. Furthermore, the entirety of the Landfall Study Area is located above a principal bedrock aquifer.

6.2.47 It is also noted that the water bathing quality at Moggs Eye Beach and Anderby Beach, which are within the northern and central parts of the Landfall Study Area, are classed as 'excellent' and are used by swimmers and beach goers.

6.2.48 Numerous drains are located within the Landfall Study Area, including the Anderby Main Drain (centrally, south of Anderby Creek), North Outmarsh Drain (in the north), Mousewater Drain (north of Wolla Bank Pit) and Cockingpit Drain (in the south), which flow into the North Sea.

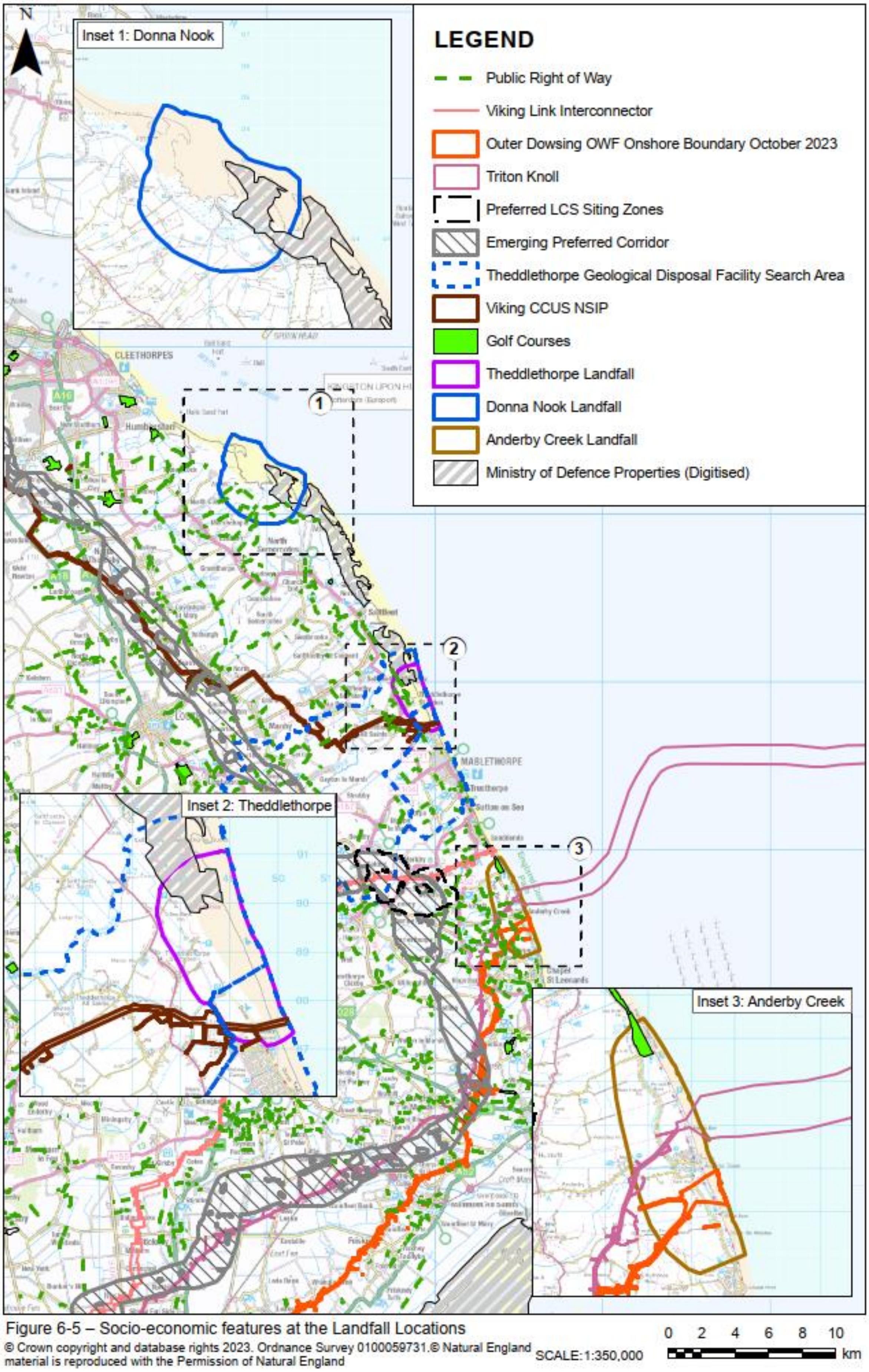
6.2.49 The use of a trenchless cable installation method would likely avoid permanent impacts to the tidal flood defences and to groundwater flow patterns and the implementation of standard construction management measures would minimise the risk of water quality effects during construction and installation. It is also considered that trenchless cable installation would reduce the potential for impacts upon the beaches at Wolla Bank, thereby reducing the potential to conflict with the Environment Agency’s Saltfleet to Gibraltar Point Beach Management Strategy 2021-2024. Measures may also be required to mitigate effects on bathing water areas, such as construction programme restrictions to avoid the bathing water season (May to September), depending on the final location of the landfall.

Socio-economics

Horseshoe Point

6.2.50 As shown in **Figure 6-6**, socio-economic receptors within the Horseshoe Point Landfall Study Area include RAF Donna Nook, located to the east and south-east and predominantly covering the intertidal area; and three PRoW which route parallel to the south-west boundary of the area. RAF Donna Nook is currently used as an active firing/bombing range and extends approximately 8 km south-east from the boundary of the Landfall Study Area. Development within this area would be avoided. Development near this area would impact upon MoD operations and would require comprehensive consultation with the MoD to determine the type and location of potential unexploded ordnance. RAF Donna Nook could be avoided by routeing further to the north within the Landfall Study Area; however, this would limit the available space for routeing.

Figure 6-6 – Socio-economic Features at the Landfall Locations



6.2.51 The Lincolnshire Coronation Coast NNR (which includes and extends the Donna Nook NNR) is a popular 10 km stretch of coastline where visitors travel to spot grey seals in the months of November and December. There is the nature reserve car park and access to the seal colony viewing area located approximately 1.5 km south-east of the Landfall Study Area. A landfall here has the potential to adversely impact upon the recreational use of the area. As outlined in the section on ecology (Paragraph 6.2.6) the use of a trenchless cable installation method would limit effects on the ecological designations minimising impact upon the recreational use of the area.

6.2.52 Careful siting and routeing of the next phase of the Project would minimise effects on the identified socio-economic receptors. In addition, standard construction management measures included within a CEMP or construction traffic management plan (CTMP) would also minimise effects on PRoW and access to local facilities.

Theddlethorpe

6.2.53 As shown in **Figure 6-6,** the relevant socio-economic receptors within the boundary of the Theddlethorpe Landfall Study Area are RAF Theddlethorpe (a bombing and gunnery range which was closed down in 1973 due to its proximity to the Theddlethorpe gas terminal); Harbour Energy's proposed Viking Carbon Capture and Storage (CCS) Project (hereafter referred to as the 'the Viking CCS Project', which had its Development Consent Order application accepted by the Planning Inspectorate during November 2023); the proposed Theddlethorpe Geological Disposal Facility (GDF) and designated bathing waters. In addition, several PRoW are located within the far western extent of the Landfall Study Area, along Crook Bank, Sea Lane and Brickyard Lane.

6.2.54 RAF Theddlethorpe intersects the north of the Landfall Study Area and although closed, consultation with the MoD would be required to obtain detailed plans and locations of potential unexploded ordnance. The proposed Viking CCS Project is seeking to re-purpose existing gas pipelines from the terminal to transport carbon-dioxide to geological storage facilities out at sea. This project occupies the south of the Landfall Study Area.

6.2.55 The Theddlethorpe Landfall Study Area also falls entirely within the search area for the Nuclear Waste Services (formerly known as Radioactive Waste Management) proposed Theddlethorpe GDF. The former Theddlethorpe Gas Terminal site has been identified as a potential location to provide access for an underground nuclear GDF offshore.

6.2.56 The water bathing quality at Mablethorpe Town Beach to the south of the Theddlethorpe Landfall Study Area is classified as 'excellent' and attracts swimmers and beach goers to the area. There are three car parks and PRoWs from which access to the coastline, and to the beach can be taken within the Landfall Study Area. These comprise Churchill Lane Car Park to the north, a car park off Brickyard Lane in the centre, and Crook Bank Car Park to the south. There is a camping site located 750 m west of the Landfall Study Area in Theddlethorpe St Helen, and the Swallow Park Caravan Site is located 800 m south of the Landfall Study Area.

6.2.57 Careful siting and routeing of the next phase of the Project would minimise adverse effects on the identified socio-economic receptors. In addition, standard construction management measures included within a CEMP or CTMP plan would also minimise effects on local PRoW and access to local facilities. Construction works for the landfall could result in the need to temporarily close one of the car parks within Landfall Study Area and as a result beach users may need to divert and travel a greater distance to other car parks depending on the final location of the landfall. Impacts on the operation of the Viking CCS Project, assuming it is consented, would need to be avoided or mitigated through careful routeing and siting of the Project infrastructure.

Anderby Creek

6.2.58 As shown in **Figure 6-6,** the relevant socio-economic receptors within the boundary of the Anderby Creek Landfall Study Area are the former Sandilands Golf Course (where the National Trust is currently undertaking a recently approved project to create a nature reserve at the site of the former golf course), the Outer Dowsing Offshore Wind Farm Project (described in this Report as the Outer Dowsing OWF), the North Sea Observatory (700 m south of the Landfall Study Area), and bathing waters associated with Moggs Eye and Anderby Beaches. In addition, six PRoW are located across the Landfall Study Area, primarily to the west.

6.2.59 To the north of the landfall is the former Sandilands Golf Course, for which the National Trust has received a grant of planning permission for a wetland nature reserve and multi-purpose visitor hub. The development is proposed to commence late Summer 2024[52], expected to be complete in 2025. The former golf course is open to visitors for access only.

6.2.60 The North Sea Observatory is 700 m south of the Landfall Study Area boundary, and functions as an exhibition and art space, and has a café. Construction of the landfall at the south of the Anderby Creek Landfall Study Area has the potential to temporarily disrupt visitors to and the operations of the observatory depending on construction traffic flows. There are also several campsites as well as holiday parks, within and adjacent to the Landfall Study Area. These are concentrated around Anderby Creek.

6.2.61 The Outer Dowsing OWF (currently at pre-application stage) proposes to make landfall to the south of Anderby Creek, therefore marine, intertidal and onshore interactions may occur.

6.2.62 The quality of bathing water at the Moggs Eye and Anderby beaches is classed as 'excellent' and attracts swimmers and beach goers to the area. It is a designated bathing water area. The bathing water season in England is generally from May to September (inclusive) and should development of a landfall not be able to avoid works during this period, this would have the potential to disrupt use of the beach and sea. There are five car parks from which access to the coastline, PRoW and the beach can be taken within the Landfall Study Area. These are accessed via Huttoft Bank/Roman Bank/Anderby Road which runs parallel to the coastline and comprise Hufftoft Car Terrace and Marshes Yard (Moggs Eye) in the north, Anderby Creek in the centre and Wolla Bank Beach and Chapel Six Marshes in the south of the Landfall Study Area. Further car parks are available to the north in Sandilands and south in Chapel St Leonards. Construction and installation works at the landfall could result in the need to temporarily close one of the car parks within the Landfall Study Area and as a result beach users may need to temporarily divert and travel a greater distance to other car parks, although this will depend on the final location of the landfall.

6.2.63 Careful siting and routeing of the next phase of the Project, together with close collaboration with other developers and projects, would minimise adverse effects on the identified socio-economic receptors. In addition, standard construction management measures included within a CEMP would also minimise effects on socio-economic receptors and could include measures around the timing of works to minimise effects on beach users, specifically during the bathing water season. Measures implemented by way of the CTMP would also help minimise disruption on local roads which could impact visitors to local facilities and holiday makers as well as those using PRoW within and

[52] https://www.nationaltrust.org.uk/visit/nottinghamshire-lincolnshire/sandilands/sandilands-planning-submission-press-release

around the Landfall Study Area. Careful routeing and siting at the next phase of the Project would be needed to:

- avoid the former golf course/proposed National Trust nature reserve at the northern end of the Landfall Study Area and avoid effects on those visiting this site; and
- avoid effects on the construction and operation of the Outer Dowsing OWF should it be consented.

Other environmental considerations

6.2.64 Other environmental topics were also considered as part of the options appraisal and include air quality, noise and geology.

Horseshoe Point

6.2.65 No relevant geological features are identified for the Horseshoe Point Landfall Study Area.

6.2.66 As shown in **Figure 6-3**, there are no residential properties within the Horseshoe Point Landfall Study Area boundary. There are scattered individual properties surrounding the Landfall Study Area, but all are more than 500 m from the boundary. The Landfall Study Area is of sufficient size to allow for careful siting and routeing of the Project infrastructure and construction compounds to maximise the intervening distance to an acceptable level between any construction works and these receptors. Furthermore, the implementation of standard construction management measures such as construction working hours, acoustic screening and dust management measures, by way of a CEMP, as well as traffic management measures by way of a CTMP, would further reduce and manage construction impacts.

Theddlethorpe

6.2.67 No relevant geological features are identified for the Theddlethorpe landfall.

6.2.68 As shown in **Figure 6-3**, there are five residential properties within the western area of the Landfall Study Area, near Theddlethorpe St Helen which is 500 m to the west. These receptors could experience temporary air quality (dust) and noise and vibration impacts from construction activities. The Landfall Study Area is of sufficient size to allow for the careful siting and routeing of the Project infrastructure and construction compounds to maximise the intervening distance to an acceptable level between construction works and these receptors. Furthermore, the implementation of standard construction management measures such as construction working hours, acoustic screening and dust management measures, by way of a CEMP, as well as traffic management measures by way of a CTMP, would further reduce and manage construction impacts.

Anderby Creek

6.2.69 Chapel Point to Wolla Bank SSSI, as shown in **Figure 6-2**, falls within the Anderby Creek Landfall Study Area. The site was designated for its geological interest as it contains important intertidal sediments that aid with the interpretation of sea level changes in the early Holocene. The SSSI is situated within the southern part of the Landfall Study Area and as such, there is sufficient flexibility to avoid the SSSI by carefully siting infrastructure within the north of the Landfall Study Area.

6.2.70 As shown in **Figure 6-3**, there are residential properties associated within the village of Anderby Creek located in the centre of the Landfall Study Area. In addition, residential properties are located 150 m to the south of the Landfall Study Area towards the northern part of Chapel St Leonard, and scattered individual properties are located to the west. These receptors could potentially experience temporary air quality (dust) and noise and vibration impacts during construction. However, the Landfall Study Area is sufficient in size to allow for careful siting and routeing of the Project infrastructure and construction compounds to maximise the intervening distance to an acceptable level between construction works and these receptors. Furthermore, the implementation of standard construction management measures such as construction working hours, acoustic screening and dust management measures, by way of a CEMP, as well as traffic management measures by way of a CTMP, would further reduce and manage construction impacts.

6.3 Engineering and System Factors

6.3.1 When considering a preferred landfall, the key engineering factors include a site which is relatively free from technical and infrastructure constraints (including those arising from environmental and socio-economic factors).

Horseshoe Point

6.3.2 The technical constraints within the Landfall Study Area include the Environment Agency tidal flood defences, an open drain, Flood Zones 2 and 3, the Hornsea 1 and 2 Windfarm Export cables, RAF Donna Nook, and the Humber Estuary designated sites, Greater Wash SPA, Lincolnshire Coronation Coast NNR, as well as priority habitat saltmarsh. The extent of the ecologically designated sites is such that they are considered unavoidable, thus significantly constraining the routeing of the DC cables.

6.3.3 At the Horseshoe Point landfall, the preferred cable installation method from an engineering perspective would comprise a short trenchless cable installation method of approximately 250 m under the existing open drain and Environment Agency tidal flood defence dunes. The exit point for this cable installation would be within the saltmarsh and ecological designated sites present (described in Paragraph 6.2.4) within the Landfall Study Area. Using this method is likely to require a crossing of the saltmarsh and/or intertidal zone using an open-cut installation method. A temporary bridge would also need to be constructed over the existing open drain to the west of the Environment Agency tidal flood defence mounds to give construction access. This is based on the same method used to landfall the Hornsea 1 and 2 OWF export cables. Routeing in proximity to the Hornsea 1 and 2 OWF export cables will also pose additional engineering challenges. These export cables are likely to have used the most suitable landfall location, such that routeing of the DC cables would need to be undertaken in areas less suitable.

6.3.4 Given the need to avoid direct loss of or impacts on ecological designated sites, saltmarsh habitat and other constraints, an alternative construction method would be to utilise an entirely trenchless cable installation method between the marine and terrestrial environments. The feasibility of an entirely trenchless cable installation method is currently unknown. The key challenge associated with an entirely trenchless cable installation method would primarily be the length of the installation (potentially over 2 km). Sufficient geotechnical investigatory information would also be required to fully evaluate and assess the feasibility of an entirely trenchless cable installation method within this Landfall Study Area. Additionally, the location of RAF Donna Nook would mean that detailed consultation with the MoD would be required to obtain detailed plans and locations of potential unexploded ordnance, however this could be avoided by routeing further north within the Landfall Study Area.

6.3.5 Whichever method is undertaken (one utilising a partial or one utilising an entirely trenchless cable installation method), the disturbance of the statutory ecological designations and priority habitat saltmarsh/mudflats would be unavoidable during construction due to access requirements and/or geotechnical investigations (similar to the works described in Paragraph 6.3.3). Geophysical and geotechnical investigations would be undertaken and mitigation measures to minimise the potential for frac-out will be implemented. A CEMP (including an emergency response plan and contingency plan/procedure) will be adopted which will include standard mitigation measures that would need to be adhered to during construction.

Theddlethorpe

6.3.6 The key technical constraints within and adjacent to the Landfall Study Area include the existing Environment Agency tidal flood defences, Flood Zones 2 and 3, the proposed Viking CCS Project, Theddlethorpe Range (a closed RAF firing range), national and international statutory ecological designations (SAC, SPA, Ramsar, SSSI, NNR) as well as important (Annex I) ecological habitats, including mudflats, freshwater marshes and sand dunes. The extent of the statutory ecological designations is such that they are considered unavoidable, thus significantly constraining the routeing of DC cables.

6.3.7 If consented, the Viking CCS Project seeks to use existing pipelines from the gas terminal which route east to west (marine to terrestrial) at the south of the Landfall Study Area. It is likely that a crossing of the Viking CCS Project would be required which would increase the technically complexity of the design at this Landfall Study Area. Furthermore, numerous drains are located within the Landfall Study Area, including The Cut and numerous unnamed drains, which are unlikely to be avoidable and would require crossing.

6.3.8 A complete open-cut installation method is considered technically feasible from an engineering perspective at the Theddlethorpe Landfall Study Area; however, it would require excavations and earthworks through the Environment Agency tidal flood defences, sand dunes and statutory ecological designations, therefore this engineering solution is not preferred. An alternative engineering solution would be to utilise a shorter trenchless cable installation method of approximately 600 m to 700 m to an exit point on the beach (outside of the SAC but within the SPA, Ramsar, SSSI and NNR); however, this would require suitable access to the beach for installation activities, or access from offshore (via a flat bottomed vessel) and therefore this method is possible but currently not preferred.

6.3.9 The preferred cable installation method would comprise a longer trenchless crossing of up to 1.4 km into deeper water, allowing the DC cables to be installed beneath the Environment Agency tidal flood defences, inter-tidal zone, sand dunes and statutory ecological designations. The primary benefit of this from an engineering and environmental perspective is that it may not require access to the beach for construction equipment and as such impacts reduced. Therefore, a long trenchless cable installation method is currently considered the most advantageous means of landfalling DC cables at Theddlethorpe, subject to further detailed evaluation/assessment.

6.3.10 Geophysical and geotechnical investigations would be undertaken to better understand the potential of frac-outs. The results of these investigations would be used to develop mitigation measures that would seek to minimise the potential for frac-outs. Recourse would also be had to industry best practice, and other like project experiences in similar locations. A CEMP (including an emergency response plan and contingency plan/procedure) will also be adopted which will include standard mitigation measures that would need to be adhered to during construction.

Anderby Creek

6.3.11 The Landfall Study Area at Anderby Creek contains holiday parks and residential receptors within the wider Landfall Study Area which would need to be avoided. In addition, there are two SSSIs to the south of the Landfall Study Area and one adjacent to the north. The SSSIs within the Landfall Study Area could be avoided by siting the landfall infrastructure towards the centre of the Landfall Study Area. The Greater Wash SPA covers approximately 50% of the Landfall Study Area, situated in the marine and intertidal environment. Other infrastructure within the Landfall Study Area includes the existing Viking Link Interconnector, located immediately south of Sandilands, the existing Triton Knoll OWF export cables, located immediately north of Anderby Creek and the proposed Outer Dowsing OWF export cables, which if consented, would be located immediately south of Anderby Creek. This infrastructure would need to be avoided terrestrially but may require more near-shore crossings in the marine environment[15][16], increasing the technical complexity of the landfall. Terrestrially, these projects could be avoided by routeing the DC cables to a landfall north of the Triton Knoll cables but south of the former Sandilands Golf Course.

6.3.12 A complete open-cut construction method from the onshore and through the sand dunes and Environment Agency tidal flood defence is technically feasible, however, this engineering solution is unlikely to be consented due to the impacts on the tidal flood defences and therefore not preferrable.

6.3.13 There is no advantage of using a short trenchless crossing under the sand dunes and Environment Agency tidal flood defences as the beaches are quite narrow. Therefore, at the Anderby Creek Landfall Study Area, the preferred engineering solution is currently considered to be the same cable installation method undertaken for both the Viking Link Interconnector and Triton Knoll OWF projects, which both used a trenchless cable installation method. A longer trenchless crossing, of approximately 800 m would allow the DC cables to be installed under both the intertidal zone, sand dunes and statutory ecological designations. The key advantage of this method means that there is no requirement for access to the beach, thereby avoiding any disturbance or inconvenience to beach users during the landfall works.

6.3.14 Geophysical and geotechnical investigations would be undertaken and mitigation measures to minimise the potential for frac-out will be implemented. A CEMP (including an emergency response plan and contingency plan/procedure) will be adopted which will include standard mitigation measures that would need to be adhered to during construction.

6.4 Comparative Appraisal and Summary

6.4.1 From an engineering and environmental perspective, the Horseshoe Point Landfall Study Area is the least preferred. Regardless of the method of installation at the landfall it is likely that there would be some disturbance to the statutory ecological designations and priority habitat of saltmarsh and mudflats. A shorter trenchless cable installation method would still require some sections of open cut in the intertidal area, with the potential to damage or disturb important habitats in the area. A completely trenchless cable installation method would materially reduce disturbance, but the length of trenchless cable installation required to do this may not be technically feasible, may serve to over tension the cable comprising its integrity and performance, and would still require access to the saltmarsh and mudflat priority habitats for geotechnical investigations and would increase the potential for frac-out events.

6.4.2 Offshore, the Marine Route Options Report[15][16] also identified the Horseshoe Point Landfall Study Area as least preferred. The presence of the Hornsea 1 and 2 OWF export cables, which also make landfall in this area to the north and are likely to have used the most suitable landfall location and would make the immediate nearshore extremely constrained as regards available physical space. To approach the landfall, the offshore cable route alignment would need to cross the Humber Approaches Channel (the main shipping channel into the Humber Estuary and Ports of Grimsby, Immingham, Hull and Goole), and interact with the associated Traffic Separation Scheme (TSS). Therefore, this option would be less preferred due to the potential impact on navigational safety, access to significant operational port facilities and the need to safeguard navigation depth. The water depth surrounding the navigation channels is very shallow (<10 m) for the first 5 km of the marine DC cable route alignment offshore, which could require the use of an anchored barge for DC cable installation, increasing the potential for disruption to shipping. Offshore the marine DC cable route alignments would also need to cross the Holderness Offshore Marine Conservation Zone and the nearshore approach would also lie within the Humber Estuary SAC and SPA, the Greater Wash SPA, and the Humber Estuary SSSI. Therefore, from a marine perspective, the Horseshoe Landfall Study Area was not taken forward for further appraisal.

6.4.3 Therefore, Horseshoe Point is the least preferred Landfall Study Area and has not been considered any further at this phase of the Project. As such, onward terrestrial underground cable routeing from Horseshoe Point has not been considered within **Chapter 7** of this Report.

6.4.4 Of the remaining Landfall Study Areas, from an engineering perspective, Anderby Creek is the preferred option. The Theddlethorpe Landfall Study Area is located near the Viking CCS Project; therefore, it is likely that this would need to be crossed terrestrially, increasing the technical complexity of the Project at the crossing location. However, discussions are on-going with Harbour Energy, the project’s promoter, in relation to both the detailed design of its project, and any physical separation requirements that would need to be adhered to. In addition, to avoid disturbing the environmental constraints completely at this location (specifically the statutory ecological designations and tidal flood defences) a trenchless cable installation method of more than 1.4 km would be required. A shorter trenchless cable installation method could be implemented to avoid disturbance to the SAC and tidal flood defences, but this would still require open cut trenches across the beach area which is still located within other statutory ecological designations (Ramsar, SPA, SSSI, NNR).

6.4.5 Disturbance to environmental constraints within the Anderby Creek Landfall Study Area (priority habitats and the Environment Agency tidal flood defences) could be avoided using a much shorter wholly trenchless crossing (approximately 800 m) than that required at Theddlethorpe. This would also have the benefit of avoiding the need to access the beach area thereby minimising installation impacts. In addition, a landfall at Anderby Creek would avoid potential impacts upon MoD assets and require comparatively fewer crossings of existing drains than within Theddlethorpe Landfall Study Area. However, regardless of which option is taken forward, careful routeing and implementation of mitigation measures following geophysical and geotechnical investigations would be required to minimise impacts from the landfall.

6.4.6 With regards to ecological constraints, Anderby Creek is the more preferred Landfall Study Area. Fewer designated sites are present and direct effects on those that fall within the Study Area could be avoided through careful routeing and siting (Greater Wash SPA, Sea Bank Clay Pits SSSI and Chapel Point to Wolla Bank SSSI) and through a trenchless cable installation method (Greater Wash SPA). Although the potential exists to avoid direct disturbance of the ecological designations at Theddlethorpe Landfall Study Area, the length of trenchless cable installation required to do this is also likely to be less feasible from an engineering perspective. A shorter length of trenchless cable installation at Theddlethorpe would avoid disturbance to some ecological designations (Saltfleetby – Theddlethorpe Dunes and Gibraltar Point SAC) but disturbance would still occur within the other designations present (Saltfleetby – Theddlethorpe Dunes SSSI, Humber Estuary SPA, Humber Estuary Ramsar, Greater Wash SPA and Lincolnshire Coronation Coast NNR).

6.4.7 There are few factors to differentiate between the Theddlethorpe and Anderby Creek Landfall Study Areas when considering other terrestrial environmental receptors.

6.4.8 From a landscape and visual perspective both Landfall Study Areas are likely to result in temporary adverse visual impacts for those receptors nearest to the construction works. While both Landfall Study Areas are remote from visual receptors, Anderby Creek is in proximity to a comparatively greater number of visual receptors. At Theddlethorpe, depending on the final location of the landfall, construction works would be seen in the context of the former Theddlethorpe Gas Terminal. Therefore, Theddlethorpe Landfall Study Area would be marginally preferred. However, once construction works are complete, the potential for adverse landscape and visual impacts (following careful routeing and siting) would be limited given that there would be no permanent above ground infrastructure (except for the TJB cover) at the landfall, thus there is no strong preference for ether location.

6.4.9 As the works at the Landfall Study Areas would be primarily underground with no permanent above ground infrastructure (except for the TJB cover), most impacts with the potential to affect the setting of designated heritage assets are related to construction. Overall, there are few designated heritage assets in proximity to either of the Landfall Study Areas and therefore there is no preference for either option in relation to heritage assets.

6.4.10 Both Landfall Study Areas are located within areas of Flood Zones 2 and 3 which are also at risk of tidal flooding and contain Environment Agency tidal flood defences, primarily sand dunes. For either area the use of trenchless cable installation methods would be required (in line with advice received from the Environment Agency following introductory engagement with the Project) to avoid direct impacts to the tidal flood defences. Theddlethorpe Landfall Study Area would require comparatively longer lengths of trenchless cable installation which is likely to be less feasible from an engineering perspective compared to Anderby Creek. Theddlethorpe also has comparatively more drains than Anderby Creek. Therefore, from a freshwater perspective, Anderby Creek is the preferred Landfall Study Area.

6.4.11 From a socio-economic perspective there is little to differentiate between the Landfall Study Areas. Both areas have the potential to interact with planned developments (Viking CCS Project at Theddlethorpe and Outer Dowsing OWF south of Anderby Creek). Both also have several recreational receptors in and around their Landfall Study Areas including PRoW, campsites, holiday parks and beach car parks which provide access to the beaches in these areas. Overall, there is a slight preference for Anderby Creek due to the presence of Theddlethorpe Range (a closed RAF firing range) within the Theddlethorpe

Landfall Study Area and therefore there is a greater potential for unexploded ordnance at this location. However, it is noted that the density of beachside facilities and car parks south of Sandilands indicates a greater use of the beaches within the Anderby Creek Landfall Study Area by beach-goers.

6.4.12 Overall, when considering air quality, noise and geology, there is little to differentiate between the Landfall Study Areas and therefore there is no preference for either Theddlethorpe or Anderby Creek in relation to these aspects of the environment.

6.4.13 In terms of the marine environment, Phase 1 of the Marine Route Options Reports[15][16] identified Anderby Creek as the less preferred Landfall Study Area primarily due to the need for offshore cable route alignments to cross the Inner Dowsing, Race Bank and North Ridge SAC and a greater number of crossings of other marine infrastructure such as existing cables and pipelines, although several constraints were present for both options. Following further work at Phase 2 of the Marine Route Options Reports and the identification of offshore DC cable route alignments which could avoid the Inner Dowsing, Race Bank and North Ridge SAC it was concluded that routes to landfalls at Anderby Creek and Theddlethorpe were finely balanced. Although a landfall at Theddlethorpe would result in a shorter length of marine DC cable and involve relatively fewer offshore constraints, the landfall location was considered to have comparatively more constraints than Anderby Creek with regards to environmental designations, and a longer length of cable required to be installed through a trenchless cable installation method, if those designations were to be substantively avoided.

6.4.14 Overall, Anderby Creek Landfall Study Area is preferred over the Theddlethorpe Landfall Study Area as it has fewer statutory ecological designations, and is likely to be more feasible in terms of the length of trenchless cable that would need to be installed to avoid direct disturbance to the statutory ecological designations as well as tidal flood defences present at all the Landfall Study Areas. However, it is noted that due to the presence of multiple existing and proposed landfalls at Anderby Creek, a proposed Project landfall in this area has the potential for cumulative effects upon the ecological environment and communities. In addition, further engineering studies may identify a suitable design solution at Theddlethorpe that mitigates the potential impacts upon the statutory designated ecological sites and tidal flood defences. Therefore, both the Theddlethorpe and Anderby Creek Landfall Study Areas are being taken forward as emerging preferences to determine the most suitable onshore DC cable route.

6.4.15 Onshore DC cable routeing from both Anderby Creek and Theddlethorpe is considered in **Chapter 7** of this Report.

7. Options Appraisal – Underground Cables: Landfalls to LCS Corridors

7. Options Appraisal – Underground Cables: Landfalls to the River Welland

7.1 Introduction

7.1.1 This Chapter details the outcomes of the Options Appraisal (Step 7 as described in **Chapter 4)** for the underground cable Corridors between the Landfall Study Areas for Theddlethorpe and Anderby Creek (described within this Chapter as 'the landfalls') and the River Welland. If there is a future requirement for either EGL 3 or EGL 4 projects to form a three-ended connection with the Lincolnshire Connection Substations (LCS) proposed by the Grimsby to Walpole (G2W) Project (as described in **Chapter 1**), this connection will be made through a new and additional LCS converter station and switching station ('the LCS converter station') for either EGL 3 or EGL 4 (see **Figure 1-7**). The Corridors have been developed through definition of a study area (Step 1), mapping and weighting of features (Step 2 and Step 3), and an iterative identification, review and refinement process (Steps 4, 5 and 6). Twenty-six cable Corridors between the Theddlethorpe and Anderby Creek landfalls and the River Welland have been appraised (shown on **Figure 7-1** to **Figure 7-4**).

Figure 7-1 - Corridors between the Theddlethorpe and Anderby Creek Landfall Study Areas and the River Welland

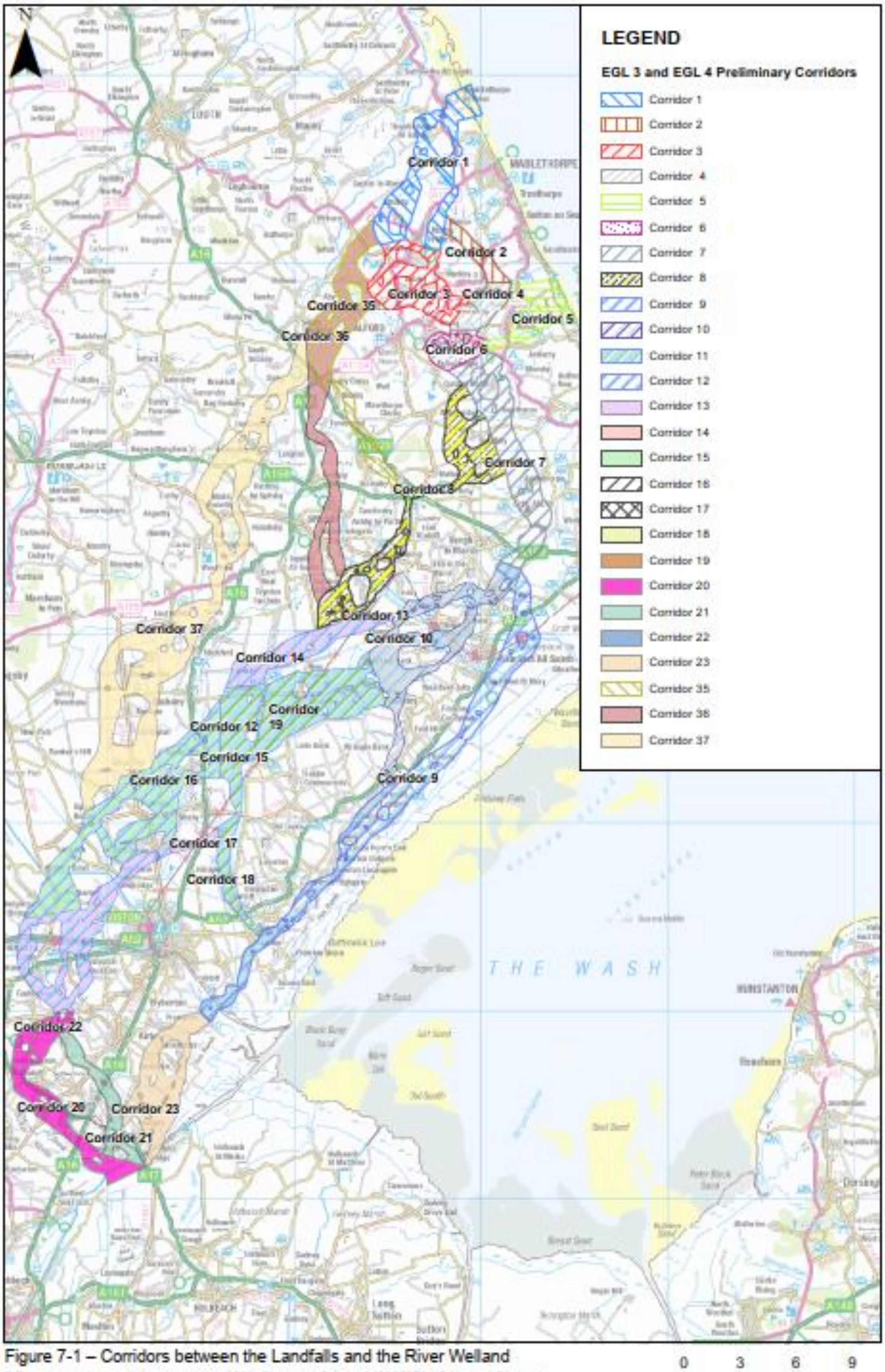


Figure 7-1 – Corridors between the Landfalls and the River Welland

Figure 7-2 - Corridors between the Theddlethorpe and Anderby Creek Landfall Study Areas and Welton le Marsh

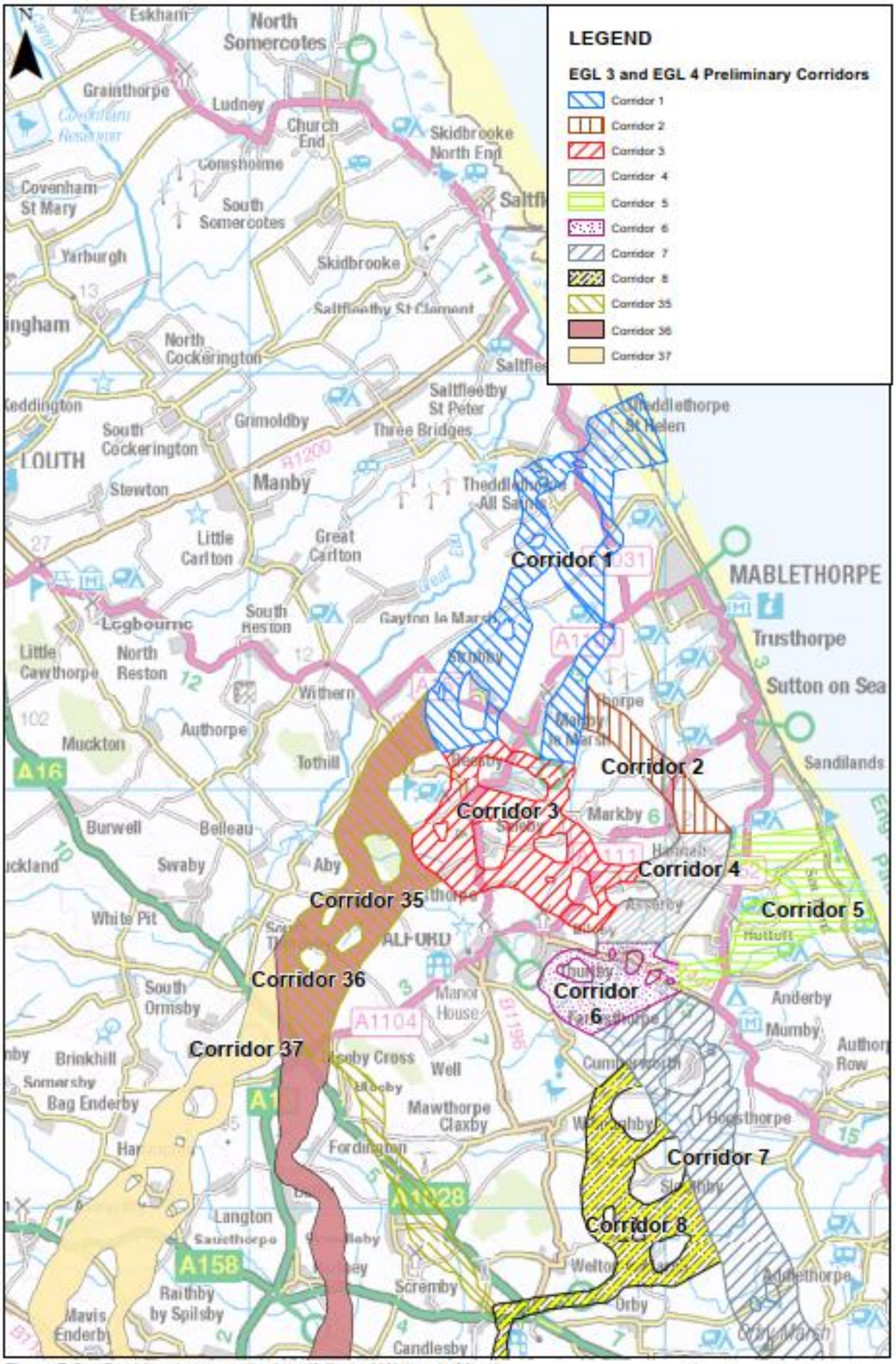


Figure 7-2 – Corridors between the Landfalls and Welton le Marsh

SCALE: 1:145,000 0 1 2 3 4 km

Figure 7-3 - Corridors between Welton le Marsh and Frithville

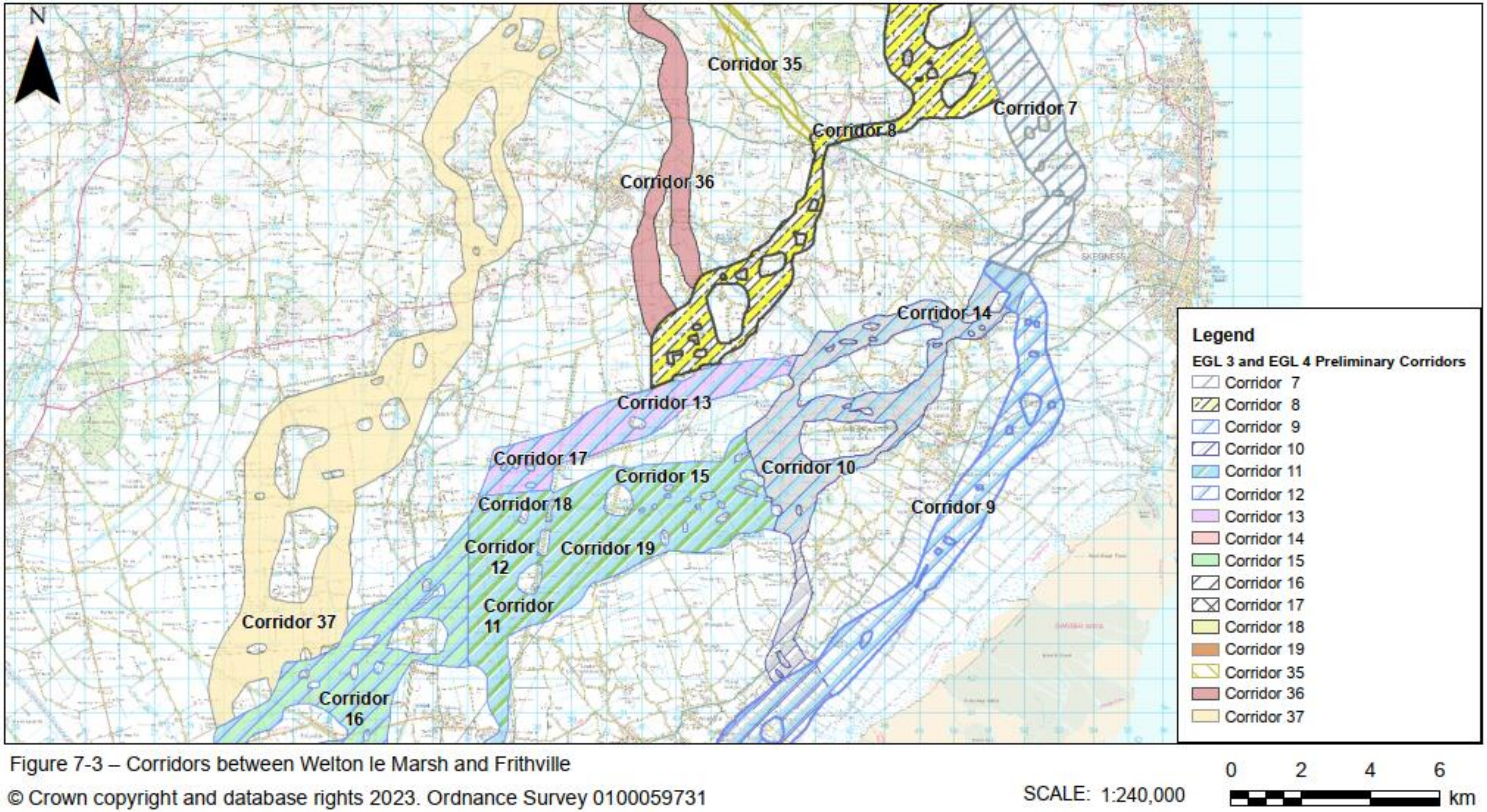


Figure 7-3 – Corridors between Welton le Marsh and Frithville

SCALE: 1:240,000

Figure 7-4 - Corridors between the Landfalls and the River Welland

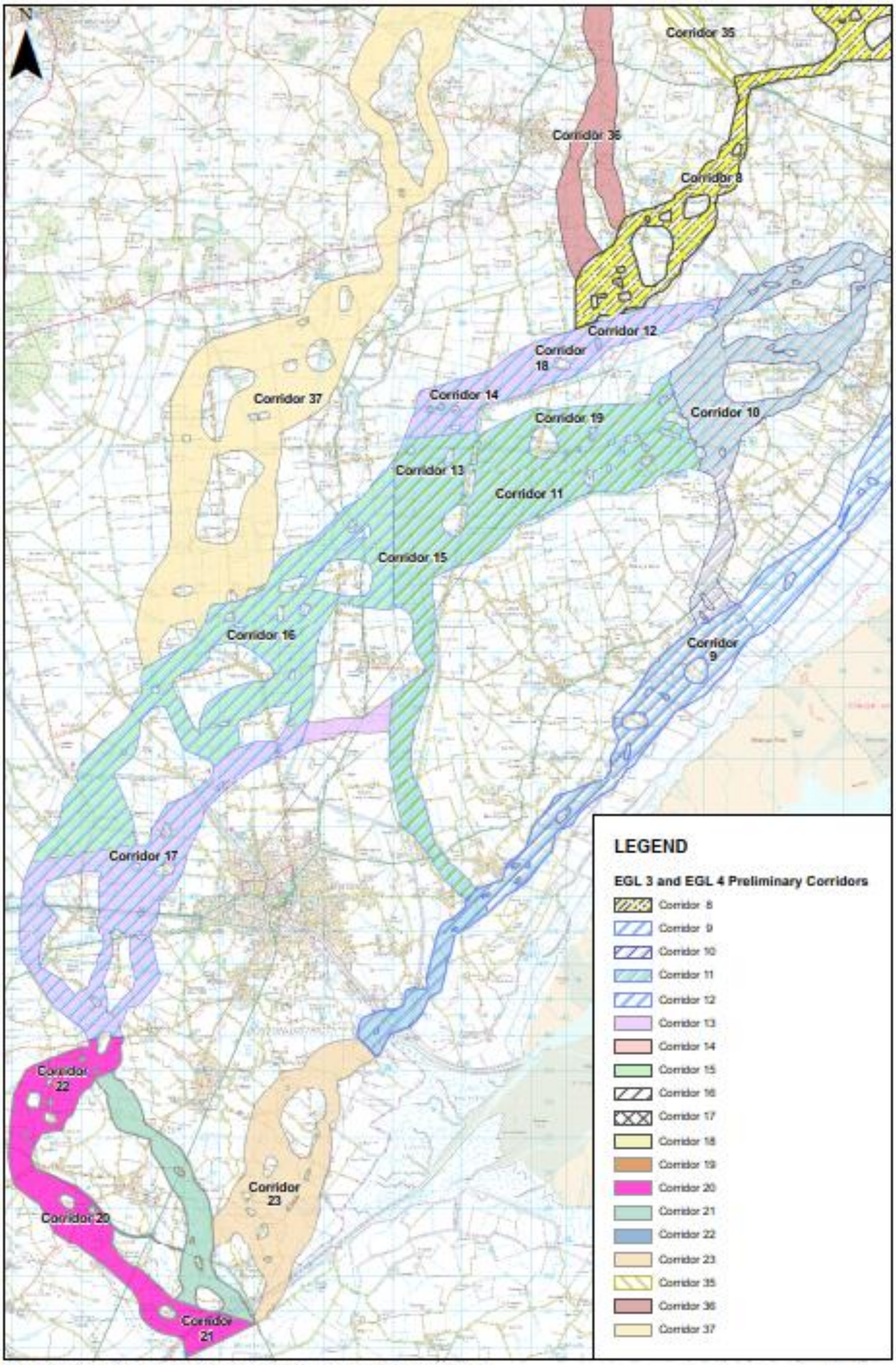


Figure 7-4 – Corridors between Frithville and the River Welland

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7.1.2 For the reasons set out in **Chapter 6**, (paragraph 6.4.1) relating to technical and environmental considerations and constraints, the Horseshoe Point landfall has been determined to be the least preferred. Therefore, only Corridors from landfalls at Anderby Creek and Theddlethorpe have been considered.

Underground Cable Corridors

7.1.3 The Corridors for proposed underground DC cables for the EGL 3 and EGL 4 projects from the Theddlethorpe and Anderby Creek landfalls to the River Welland are described below:

- Corridor 1 (see **Figure 7-2**): This Corridor begins at the connection with the Theddlethorpe landfall, east and south of Theddlethorpe St Helens, and routes south-west towards Maltby le Marsh. It splits into two legs to avoid Maltby le Marsh, one west and north of Maltby le Marsh and one east and south of Maltby le Marsh. Underground cable routes within this Corridor would be approximately 9.6 km in length.
- Corridor 2 (see **Figure 7-2**): This Corridor starts east of Maltby le Marsh and routes south-east to finish east of Hannah. Underground cable routes within this Corridor would be approximately 4.4 km in length.
- Corridor 3 (see **Figure 7-2**): This Corridor begins west and south of Maltby le Marsh. It routes south-east and is split to avoid the settlements of Beesby, Saleby, Thoresthorpe and Asserby. Underground cable routes within this Corridor would be approximately 4.1 km in length.
- Corridor 4 (see **Figure 7-2**): This Corridor begins east of Hannah and routes south-west to the south-west of Asserby and to the north of Huttoft. Underground cable routes within this Corridor would be approximately 3.5 km in length.
- Corridor 5 (see **Figure 7-2**): This Corridor begins at the connection with the Anderby Creek Landfall. It then splits into two legs – one routes west and connects to Corridor 4 to the north of Huttoft and the other follows the coast southwards to the north of Anderby before routeing west and towards Huttoft. Underground cable routes within this Corridor would be approximately 2.9 km in length.
- Corridor 6 (see **Figure 7-2**): This Corridor begins to the north of Thurlby and routes to the south-east of Thurlby. Underground cable routes within this Corridor would be approximately 1.8 km in length.
- Corridor 7 (see **Figure 7-2 and 7-3**): This Corridor starts west of Mumby and continues south, crossing the A158 and finishes south-east of Burgh le Marsh. Underground cable routes within this Corridor would be approximately 13.2 km in length.
- Corridor 8 (see **Figure 7-2 and 7-3**): This Corridor starts east of Willoughby, and passes near to the villages of Sloothby, Hasthorpe and Habertoft. It then routes west, crossing the A158 to the north and north-west of Gunby Park, before it continues south finishing at Thorpe Bank. Underground cable routes within this Corridor would be approximately 18.0 km in length.
- Corridor 35 (see **Figure 7-2 and 7-3**): This Corridor begins west of Maltby le Marsh, and routes south-east past Ulceby and Skendleby Psalter, before finishing north of Gunby Park. Underground cable routes within this Corridor would be approximately 13.6 km in length.

- Corridor 36 (see **Figure 7-2 and 7-3**): This Corridor begins west of Maltby le Marsh and continues south. It continues south at Ulceby, and passes east of Dalby, before finishing north-east of Little Steeping. Underground cable routes within this Corridor would be approximately 17.6 km in length.
- Corridor 37 (see **Figure 7-2 and 7-3**): This Corridor begins west of Maltby le Marsh, and continues south, passing north and south of Sutterby and east and west of Mavis Enderby, before crossing the A155. It then continues east, past (east and west of) New Bolingbroke and Carrington before finishing north of Boston. Underground cable routes within this Corridor would be approximately 34.8 km in length.
- Corridor 9 (see **Figure 7-2 and 7-3**): This Corridor starts south-east of Burgh le Marsh, at Billgate Lane and routes south-west, between the A52 and the coast. It crosses The Haven river and ends at Wyberton Roads. Underground cable routes within this Corridor would be approximately 32.5 km in length.
- Corridor 10 (see **Figure 7-2 and 7-3**): This Corridor starts south-east of Burgh le Marsh, at Billgate Lane, routes south-west and splits into three legs. The three legs then merge to the west of Wainfleet Bank and the Corridor proceeds to route south, crossing the A52 and ending south-east of Wrangle. Underground cable routes within this Corridor would be approximately 32.2 km in length.
- Corridor 11 (see **Figure 7-2 and 7-3**): This Corridor starts south-east of Burgh le Marsh, at Billgate Lane and routes south-west, splitting into two legs between Firsby and Wainfleet All Saints. The two Corridor legs combine and the Corridor routes to east of Stickney before routeing south. The Corridor continues south of Butterwick before routeing south-west and finishing at Wyberton Roads. Underground cable routes within this Corridor would be approximately 36.5 km in length.
- Corridor 12 (see **Figure 7-2 and 7-3**): This Corridor starts south-east of Burgh le Marsh, at Billgate Lane and routes south-west, splitting into several Corridor legs north-west of Boston. This Corridor finishes west of Kirton End at Donington Road. Underground cable routes within this Corridor would be approximately 40.3 km in length.
- Corridor 13 (see **Figure 7-2 and 7-3**): This Corridor starts south-east of Burgh le Marsh, at Billgate Lane and routes west towards Stickney. It then routes south to Silsby and then south-west, where it finishes at Donington Road. Underground cable routes within this Corridor would be approximately 41.0 km in length.
- Corridor 14 (see **Figure 7-2 and 7-3**): This Corridor starts south-east of Burgh le Marsh, at Billgate Lane and routes south-west to Stickney before continuing south, where the Corridor then routes south-west at Butterwick and ends at Wyberton Roads. Underground cable routes within this Corridor would be approximately 38.0 km in length.
- Corridor 15 (see **Figure 7-2 and 7-3**): This Corridor starts south-east of Burgh le Marsh, at Billgate Lane and routes south-west, between Stickney and Sibsey. The Corridor then routes south, passing the west of Boston before finishing at Donington Road. Underground cable routes within this Corridor would be approximately 38.9 km in length.
- Corridor 16 (see **Figure 7-2 and 7-3**): This Corridor starts south-west of Firsby, at Thorpe Bank road. It then routes south-west to Stickney, and from here continues

south-west past Boston and finishes at Donington Road. Underground cable routes within this Corridor would be approximately 30.3 km in length.

- Corridor 17 (see **Figure 7-2 and 7-3**): This Corridor begins south-west of Firsby, at Thorpe Bank road. The Corridor then routes south-west towards Stickney before heading south to the east of Sibsey. The Corridor then routes south-west again at Frith Bank and finally routes south to finish at Donington Road. Underground cable routes within this Corridor would be approximately 40.0 km in length.
- Corridor 18 (see **Figure 7-2 and 7-3**): This Corridor begins south-west of Firsby, at Thorpe Bank road. The Corridor then routes south-west towards Stickney before heading south to the east of Sibsey. However, at Sibsey, the Corridor routes south to Butterwick and then routes south-west and finishes at Wyberton Road, south-east of Boston. Underground cable routes within this Corridor would be approximately 28.0 km in length.
- Corridor 19 (see **Figure 7-2 and 7-3**): This Corridor starts south-east of Burgh le Marsh, at Billgate Lane and splits into three separate legs as it routes south-west towards Stickney. The Corridor then routes south before turning south-west at Sibsey and finishes at Donington Road. Underground cable routes within this Corridor would be approximately 39.4 km in length.
- Corridor 20 (see **Figure 7-4**): The Corridor starts at the B1391, west of Kirton End. The Corridor initially routes south-west to the A17. From here it turns and follows the southern edge of A17 to the south-east. The Corridor then continues south-east where it crosses the A16 and River Welland before terminating to the south-west of Fosdyke Bridge. Underground cable routes within this Corridor would be approximately 12.9 km in length.
- Corridor 21 (see **Figure 7-4**): This Corridor starts at the B1391, west of Kirton End. The Corridor routes south-south-east, crossing the A16 to avoid the settlements of Sutterton and Algarkirk. The Corridor then routes south and crosses the A17 heading south before terminating south-west of Fosdyke bridge. Underground cable routes within this Corridor would be approximately 9.7 km in length.
- Corridor 22 (see **Figure 7-4**): This Corridor starts at the B1391, west of Kirton End. This Corridor routes south-west before turning to follow the A17 south-east. The Corridor narrows as it follows the A17 directly through Sutterton Roundabout until east of Marsh Lane where the Corridor takes a sharp turn to the south and widens. The Corridor then terminates at Moulton Marsh. Underground cable routes within this Corridor would be approximately 13.4 km.
- Corridor 23 (see **Figure 7-4**): The Corridor starts south-east of Wyberton at Wyberton Roads. The Corridor routes south-west from this point, passing the settlements of Frampton, Kirton, Sutterton and Algarkirk to the south-east. The Corridor then splits into two arms to pass around Fosdyke and Fosdyke Bridge, the arms crossing the A17 to the east and west of these settlements respectively. The arms then cross the River Welland to the south of Fosdyke Bridge, before terminating at Moulton Marsh. Underground cable routes within this Corridor would be approximately 10.8 km.

7.2 Options Appraisal

7.2.1 The Options Appraisal below has considered environmental, socio-economic and technical topics for each Corridor option and was informed by data gathered as set out within **Table 5-1** and **Table 5-2**. For the current Project stage, relevant data comprised desk-based study information, supplemented by site visits to select locations, in proximity to important receptors.

7.2.2 As detailed in **Chapter 5**, for the environmental, socio-economic and technical topics, the appraisal considers the potential impact on relevant receptors, and whether such effects could be avoided or mitigated through careful routeing or siting. Where impacts cannot be avoided or mitigated by careful routeing or siting, other forms of mitigation have been considered. The main cable installation method is assumed to be open-cut as this is the most economic and efficient installation method. Therefore, the application of trenchless cable installation, as a means of crossing main rivers, major roads and railways, and substantive areas of environmental sensitivity is regarded as an additional means of mitigating impacts. The residual impacts considered in this Options Appraisal do not take account of further detailed project-specific environmental, socio-economic or technical mitigations which are likely to be developed later through the EIA process to be undertaken at the project's Defined Proposal and Statutory Consultation Stage (Stage 3).

Environmental Factors

Landscape and Visual

7.2.3 There are four National Character Areas (NCAs) occupying the area between the landfalls and the River Welland, as follows: the Lincolnshire Coast and Marshes NCA (No 42), the Lincolnshire Wolds NCA (No 43), the Central Lincolnshire Vale NCA (No 44) and The Fens NCA (No 46) (see **Figure 7-5**).

7.2.4 The Lincolnshire Coast and Marshes NCA (No 42) is characterised by a wide coastal plain extending from Barton-upon-Humber in the north, across to Grimsby at the mouth of the Humber and south to Skegness. The Corridors located within this NCA are Corridors 1 to 15, Corridor 19 and Corridors 35, 36 and 37.

7.2.5 The Lincolnshire Wolds NCA (No 43) is characterised by a range of varied yet unified features including open, arable plateau hill tops, chalk escarpments, deep dry valleys with sinuous beech woods and isolated ash trees punctuating the skyline. The Corridors located within this NCA are Corridors 8 (a small section at Candlesby), 35, 36 and 37.

7.2.6 The Central Lincolnshire Vale NCA (No 44) is a predominantly broad, low-lying, very gently undulating arable vale lying between the higher ground of the Northern Lincolnshire Edge with Coversands NCA to the west and the Lincolnshire Wolds NCA to the east. The area is characterised by a rural and sparsely settled landscape, largely used for agricultural production, mainly for the growing of arable crops. The Corridors located within this NCA are Corridors 35, 36 and 37.

7.2.7 The Fens NCA (No 46) is characterised by a large, low-lying, flat landscape with many drainage ditches, dykes and rivers that slowly drain towards the Wash. The area is notable for its large-scale, flat, open landscape with extensive vistas to level horizons. The Corridors located within this NCA are Corridor 8 through to Corridor 23.

7.2.8 The closest nationally designated landscape area is the Lincolnshire Wolds National Landscape (NL). Only Corridors 8 (a small section at Candlesby), 35, 36 and 37 route through the Lincolnshire Wolds NL. The Lincolnshire Wolds NL is split into different Local Landscape Character Areas (LCAs). Between the landfalls and the River Welland, Corridors 8, 35, 36 and 37 route through The Ridges and Valleys of the South-West LCA and Corridors 35, 36 and 37 route through the South Eastern Claylands LCA. The key characteristics of these LCAs are described below:

- The Ridges and Valleys of the South-West LCA
  - *"Dramatic views south Bluestone Heath Road and Nab Hill – Hoe Hill ridge"* – enables wide open views of the landscape.
  - *"Mixed pattern of arable and pastoral farming"* – typical features of a rural landscape evident in views.
  - *"Old mixed hedgerows"* and *"Herb rich roadside verges"* – provides an opportunity to improve the connectivity of green infrastructure assets as part the mitigation.
- South Eastern Claylands LCA
  - *"Views across the Middle Marsh to the coast"* –Corridors will be visible within views of the wider area.
  - *"Extensive oak-ash woodland"* – provides an opportunity to improve the connectivity of green infrastructure assets as part the mitigation.
  - *"Ridge top roads and their associated archaeology"* – enables views of the wider landscape.

7.2.9 The proximity to the Lincolnshire Wolds NL and the character of the landscape within each of the Corridors is detailed within **Table 7-1**.

7.2.10 For all Corridors, there is a risk that installation of the underground cables could influence the character of the area, including that of the Lincolnshire Wolds NL, where hedgerows, trees and woodland within the Corridors cannot be avoided and therefore would require removal. Careful routeing would help to limit the potential for significant adverse impacts on landscape character by seeking to limit impacts upon woodland, tree planting, hedgerows, and by seeking more direct routes where possible. As the permanent works are underground (excluding marker posts), impacts with the potential to cause significant adverse effects to the landscape character of the area would be limited to the construction and installation phase. Careful siting of temporary construction and installation sites and facilities together with the control of site working measures and practices will further mitigate and help to reduce the severity of any potential adverse effects.

Figure 7-5 – Landscape and Visual features between the Landfalls and the River Welland

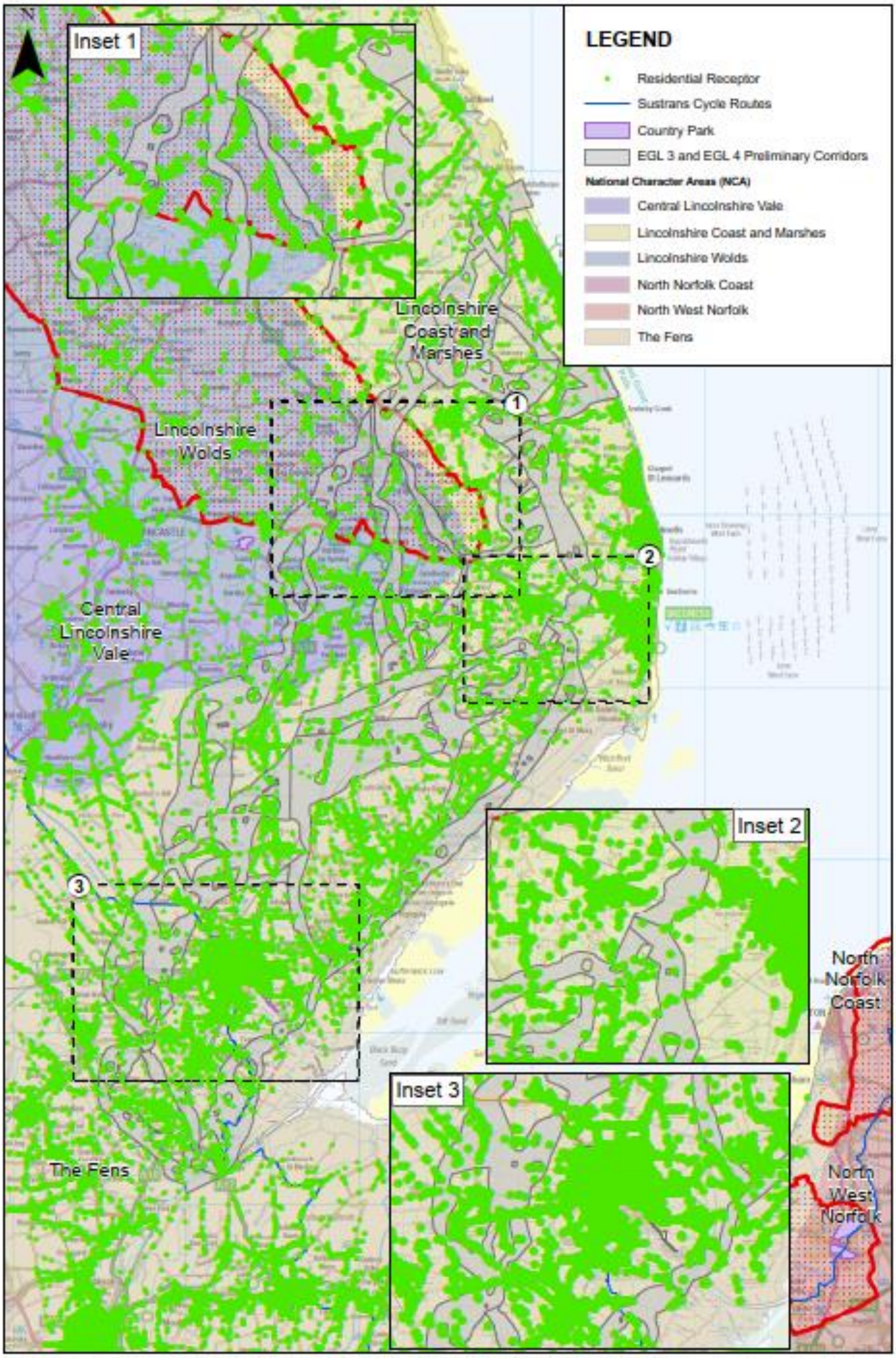


Figure 7-5 - Landscape and Visual features between the Landfalls and the River Welland

SCALE 1:350,000 0 2 4 6 8 10 km

7.2.11 Visual receptors in proximity to each of the Corridors comprise residential properties (either within or at the edge of settlements or scattered properties) and recreational receptors (people using PRoW, roads and cycle routes including those within the Lincolnshire Wolds NL). The main settlements in this area are: Alford, Burgh le Marsh, Skegness, Boston, Stickford, Stickney, Swineshead, Kirkton and Sutterton. The most densely settled areas are those in proximity to Burgh le Marsh and Boston which has resulted in narrower Corridors and/or Corridors with a greater number of potential residential receptors. In the other areas between the landfalls and the River Welland, settlement comprises smaller linear settlements or scattered properties. The potential likelihood and severity of effects upon visual amenity is greater for receptors in closer proximity to the Corridors. Identified receptors within 250 m of the Corridor are likely to experience temporary effects upon their visual amenity of a greater magnitude than those outside of 250 m, as detailed in **Table 7-1**.

7.2.12 There is a risk that installation of the underground cables within the Corridors will have an adverse effect upon visual amenity of the identified key receptors. As the permanent works are underground, impacts with the potential to cause significant adverse effects upon visual amenity are temporary and related only to the construction and installation phase. Careful routeing would seek to limit impacts upon woodland, tree planting, hedgerows, and would also seek to increase or maximise distances from residential properties. In addition, careful siting of temporary construction and installation sites and facilities together with the control of site working measures and practices will further mitigate and help to reduce the severity of any potential adverse effects.

Table 7-1 - Landscape character and key visual receptors.

Corridor	Landscape Character of the Corridor	Proximity to the Lincolnshire Wolds NL	Key visual receptors
Corridor 1	Characterised by seascape, beaches, sand dunes adjacent to the north-east of the Corridor (i.e., where the Corridor meets the Theddlethorpe landfall) and by open farmland, scattered settlements and holiday parks within the remainder of the Corridor. At the northern extent of the Corridor the disused Theddlethorpe Gas Terminal (to the south and east of the Corridor) and the Bambers Farm wind farm and sewage works (to the east, where the Corridor connects to Corridor 2) are notable features in the landscape. Strubby Glider and Airfield fall within the southern extent of the Corridor, south of Strubby. The vegetation within the Corridor comprises scattered treelines and hedgerows which border agricultural fields and small woodland blocks around the disused Theddlethorpe Gas Terminal.	Approximately 5.3 km east of the Lincolnshire Wolds NL.	Within the Corridor there are approximately seven residential receptors. These are located to the east of Theddlethorpe St Helens and can be avoided by careful routeing. Outside of the Corridor, but within 250 m of the Corridor there are approximately 257 residential receptors. These are primarily located at the settlements of Theddlethorpe St Helens (north/west), Theddlethorpe All Saints (north), Strubby (specifically excluded from the western leg of the Corridor) and Maltby le Marsh (west of the eastern leg). Within the wider area are the settlements of Mablethorpe (east), Woodthorpe (south) and Beesby (south). In addition to residential receptors other key visual receptors include recreational receptors (users of identified features). Those identified within 250 m of the Corridor include approximately 12 PRoW, located across the Corridor mostly near Theddlethorpe, and two holiday parks (Applebough Camp Site and Grange Leisure Park). Other recreational receptors in the wider area are those using major and minor roads which cross or route parallel to the Corridor. Narrower areas of the Corridor (where receptors would be closer to construction) are along the A1031 Mablethorpe Road, A1104 Alford Road, Thacker Bank (south of Theddlethorpe All Saints) and A157 Peter’s Lane/Strubby Road.

Corridor	Landscape Character of the Corridor	Proximity to the Lincolnshire Wolds NL	Key visual receptors
Corridor 2	Characterised by open farmland and scattered farmsteads. The Bambers Farm wind farm and sewage works to the east the Corridor, where the Corridor joins Corridor 1 are notable features in the landscape. The vegetation within the Corridor comprises scattered treelines and hedgerows.	Approximately 8 km east of the Lincolnshire Wolds NL.	There are no residential properties identified within the Corridor however within 250 m of the Corridor there are approximately 78 residential receptors. These receptors are primarily located at Hannah and adjacent to the A1111. Within the wider area are the settlements of Thorpe (east), and Hagnaby (west). In addition to residential receptors other key visual receptors include recreational receptors (users of identified features). Those identified within 250 m of the Corridor include four PRoW, located to the north of the Corridor and near the A1111, and Lakeside Springs Caravan Park, located to the east of the Corridor (north of the A1111 Alford Road). Other recreational receptors in the wider area are those using major and minor roads which cross or route parallel to the Corridor. Narrower areas of the Corridor (where receptors would be closer to construction) is present along the A1111 Alford Road, where the Corridor splits to avoid residential properties along Alford Road.
Corridor 3	Characterised by Strubby Airfield, open farmland and scattered farmsteads. The vegetation within the Corridor comprises scattered treelines and hedgerows although larger woodland blocks are present adjacent to the Corridor at Woodthorpe, Saleby and Beesby.	Approximately 3 km east of the Lincolnshire Wolds NL.	Four residential properties are present within the Corridor; three west of the A1104 Alford Road and one along Mill Lane (east of Saleby). These properties can be avoided by careful routeing. Outside of the Corridor, but within 250 m of the Corridor there are approximately 101 residential receptors. These are primarily located at the settlements of Maltby le Marsh (north), Beesby (specifically excluded from Corridor), Saleby (specifically excluded from Corridor), Thoresthorpe (south), and along the A1111. Within the wider area are the settlements of Markby, Bilsby, Alford, Asserby and Woodthorpe. In addition to residential receptors other key visual receptors include recreational receptors (users of identified features). Those identified within 250 m of the Corridor include four PRoW located at Strubby Airfield and south of Saleby. Other recreational receptors identified are Woodthorpe Hall

Corridor	Landscape Character of the Corridor	Proximity to the Lincolnshire Wolds NL	Key visual receptors
			Caravan/Leisure Park and golf course and The Galley Hill Caravanning Club (both located approximately 250 m north-west of the Corridor). Other recreational receptors in the wider area are those using major and minor roads which cross or route parallel to the Corridor. No materially narrow areas are present within the Corridor.
Corridor 4	Characterised by small settlements and scattered individual dwellings and open farmland arranged in an established small to medium field pattern with their boundaries defined by mature hedgerow and mature trees or drainage ditches. A well vegetated dismantled railway is located east of the Corridor near Hutoft.	Approximately 4 km east of the Lincolnshire Wolds NL.	Eight residential properties are present within the Corridor (between Hannah and the A52 Station Road). These properties can be avoided by careful routeing. Outside of the Corridor, but within 250 m of the Corridor there are approximately 30 residential receptors. These are primarily scattered properties between Hannah and the A1111 or those located at Asserby (west). Within the wider area are the settlements of Thurlby (south), Huttoft (east) and Hannah (west). In addition to residential receptors, other key visual receptors include recreational receptors (users of identified features). Those identified within 250 m of the Corridor are five PRoW mostly located between Asserby and Hutoft. Other recreational receptors in the wider area are those using major and minor roads which cross or route parallel to the Corridor. The properties within the Corridor (between Hannah and the A52 Station Road) to the north create narrower areas (where receptors would be closer to construction) for routeing.
Corridor 5	Characterised by small settlements, holiday parks, scattered dwellings and open farmland of irregular sizes and shapes. The established field pattern has boundaries which vary from vegetated with mature hedgerow, mature hedgerow	Approximately 6 km east of the Lincolnshire Wolds NL.	Approximately 40 residential properties are present within the Corridor. These properties are primarily located along Hutoft Bank and Sea Lane to the east of the Corridor, however scattered properties are also present to the west of the Corridor east of the A52 and Hutoft. Outside of the Corridor, but within 250 m of the Corridor there are approximately 104 residential receptors. These are primarily located adjacent to the A52 and at Hutoft (west). Within the wider area are the settlements of Anderby (south), and Anderby Creek (south).

Corridor	Landscape Character of the Corridor	Proximity to the Lincolnshire Wolds NL	Key visual receptors
	trees and drainage ditches to open boundaries.		In addition to residential receptors, other key visual receptors include recreational receptors (users of identified features). Those identified within 250 m of the Corridor include nine PRoW, which predominantly route east towards the coast and the Sustrans South Wolds and Skegness cycle route (‘the South Wolds Cycle Route’) which intersects the Corridor. Other recreational receptors identified include five caravan parks/holiday homes at Huttoft and Anderby, and the disused Sandilands golf course (now a nature reserve) which marginally overlaps with the most north easternly extent of the Corridor, adjacent to Huttoft Bank. Other recreational receptors in the wider area are those using major and minor roads which cross or route parallel to the Corridor. The properties within the Corridor along the A52 create narrower areas (where receptors would be closer to construction) for routeing.
Corridor 6	Characterised by small settlements, open farmland with large fields pattern with a mix of open boundaries, and those with linear belts of tree planting or drainage ditches.	Approximately 3.2 km east of the Lincolnshire Wolds NL.	Four residential properties are present within the Corridor along the B1449. Outside of the Corridor, but within 250 m of the Corridor there are approximately 42 residential receptors. These are primarily located along the B1449 which includes the settlements of Bilsby and Thurlby. In the wider area are the settlements of Farlesthorpe and Hutoft. In addition to residential receptors, other key visual receptors include recreational receptors (users of identified features). Those identified within 250 m of the Corridor include four PRoW, which route to and from the B1449, and the South Wolds cycle route, which intersects the Corridor. Other recreational receptors identified include Orchard Leaze Caravan Site, located approximately 150 m north of the Corridor. Other recreational receptors in the wider area are those using major and minor roads which cross or route parallel to the Corridor. Narrower areas of the Corridor (where receptors would be closer to construction) are present within the Corridor along the B1449.

Corridor	Landscape Character of the Corridor	Proximity to the Lincolnshire Wolds NL	Key visual receptors
Corridor 7	Characterised by open farmland interspersed with the small settlements of Mumby, Cumberworth, Ashington End, Burgh le Marsh and Skegness. Field pattern varies from small rectangular fields in the south to larger irregular shaped fields in the north. Field boundaries are largely defined by ditches/watercourses or hedgerows and hedgerow trees. Woodland planting is sparse throughout the Corridor.	Approximately 3 km from the Lincolnshire Wolds NL.	There are seven residential properties located within the Corridor. These are primarily located towards the south of the Corridor along Mill Road and Younger's Lane. Outside of the Corridor, but within 250 m of the Corridor there are approximately 132 residential receptors. These are primarily located at the settlements of Mumby (east) and Cumberworth (specifically excluded from the Corridor) at the north of the Corridor and towards the A158 at the south of the Corridor. In the wider area are the settlements of Helsey, Burgh Le Marsh and Skegness, as well as scattered properties surrounding the Corridor. In addition to residential receptors, other key visual receptors include recreational receptors (users of identified features). Those identified within 250 m of the Corridor include four PRoW, located at the northern and southern extents of the Corridor, and the South Wolds cycle route, which intersects at the north and south of the Corridor. Other recreational receptors identified include four camp sites/caravan parks located in areas specifically excluded from the Corridor at Addlethorpe, Burgh le Marsh, Mumby and Hogsthorpe. Other recreational receptors in the wider area are those using major and minor roads which cross or route parallel to the Corridor. Narrow areas are present within the Corridor (where receptors would be closer to construction); most notably at the north of the Corridor between Cumberworth and Mumby, and at the south of the Corridor along Younger's Lane.
Corridor 8	Characterised by the small settlements of Willoughby, Sloothby, Habertoft, Gunby, Great Steeping, Firsby, Little Steeping and Halton Fenside. The Corridor predominantly comprises open arable farmland	Corridor crosses part of the Lincolnshire Wolds NL between Candlesby	There are 13 residential properties located within the Corridor. These are primarily located along Mill Lane to the west of Sloothby, west of Habertoft and near Little Steeping. Outside of the Corridor, but within 250 m of the Corridor there are approximately 245 residential receptors. These are primarily located at the settlements of Sloothby, Hasthorpe, Habertoft, Great Steeping and Little Steeping. In the wider area are the settlements of Willoughby, Firsby and Halton Fenside.

Corridor	Landscape Character of the Corridor	Proximity to the Lincolnshire Wolds NL	Key visual receptors
	comprising irregular shaped field boundaries bound by hedgerows with hedgerow trees. Woodland planting is sparse, however there are occasional small blocks of woodland and tree belts both in the Corridor, and in the wider landscape, particularly around Gunby Hall, a Grade II Registered Park and Garden adjacent to the Corridor. A dismantled railway and the infrastructure of the active railway line approaching Firsby to the south are present in the Corridor and are notable features in the landscape. The Corridor crosses the Steeping River in the south and drainage features are present throughout the Corridor.	and Gunby (approximately 800 m)	In addition to residential receptors, other key visual receptors include recreational receptors (users of identified features). Those identified within 250 m of the Corridor include 12 PRoWs, including paths to, from and within the Lincolnshire Wolds NL and the South Wolds Cycle Route intersects the Corridor several times at its eastern and western extents. Other recreational receptors identified include Lakeside Holiday Park, Gunby Lake Caravan Park, and Twit Twoos Camping Site (located adjacent to the Corridor at Little Steeping, Gunby and Orby respectively), as well as Gunby Estate Hall and Gardens and Steeping River. Other recreational receptors in the wider area are those using major and minor roads which cross or route parallel to the Corridor and the Poacher Railway Line which routes parallel to the Corridor. Narrow areas are present (where receptors would be closer to construction) within the Corridor, north/west of Gunby Estate Hall and Gardens, along the B1196 Station Road, to the west of Hunger Hill, and surrounding Little Steeping.
Corridor 35	Characterised by undulating arable farmland interspersed with small villages set in a wider landscape with scattered blocks of woodland. Field boundaries vary from sparsely vegetated open fields, to well vegetated mature hedgerows and hedgerow trees in places. Views	Corridor passes through Lincolnshire Wolds NL for approximately 10 km	There are four residential properties located within the Corridor. These are primarily located near Swinn Wood and Mother Wood. Outside of the Corridor, but within 250 m of the Corridor there are approximately 83 residential receptors. These are primarily located at the settlements of Woodthorpe, Haugh and Candlesby, as well as settlement adjacent to the A1028. In the wider area are the settlements of Rigsby, Claythorpe, Ulceby Cross, Ulceby and Skendleby. In addition to residential receptors other key visual receptors include recreational receptors (users of identified features). Those identified within

Corridor	Landscape Character of the Corridor	Proximity to the Lincolnshire Wolds NL	Key visual receptors
	vary from intimate to expansive, depending on the combination of topography and vegetation.		250 m of the Corridor include seven PRoW which route to, from and within the Lincolnshire Wolds NL, the Lincolnshire Wolds NL, and the South Wolds Cycle Route which intersects the Corridor twice. Other recreational receptors identified include Galley Hill Caravanning Club, Woodthorpe Hall Golf Course, Strubby Airfield, Woodthorpe Caravan and Leisure Park, Rigsby Wood Nature Reserve and Gunby Estate Hall and Gardens. All of which are outside the Corridor. Other recreational receptors in the wider area are those using major and minor roads which cross or route parallel to the Corridor. There is a narrow area (where receptors would be closer to construction) north of Ulceby where the Corridor has been tapered to avoid residential properties at Ulceby Grange and Dadley's Stone Wood and larger woodland blocks within the Lincolnshire Wolds NL.
Corridor 36	Characterised by arable farmland located on undulating land, becoming flatter in the south. The wider landscape contains numerous small woodlands. It is crossed by small streams and the River Lymn. Small villages are present at intervals throughout the Corridor, and the town of Spilsby is located to the west. Field boundary vegetation varies from being sparse, with open ditches, common particularly in the north and south, to pockets of mature hedgerows with hedgerow trees.	Corridor passes through Lincolnshire Wolds NL for approximately 9 km	There are 13 residential properties located within the Corridor. These are primarily located at Ulceby Cross, along the B1195 Hole Gate/Spilsby road and near Swinn Wood and Mother Wood. Outside of the Corridor, but within 250 m of the Corridor there are approximately 301 residential receptors. These are primarily located at the settlements of Woodthorpe, Haugh, Ulceby Cross, Halton Holegate, Halton Fenside and Toynton St Peter. In the wider area are the settlements of Claythorpe, Partney, Ashby by Partney, Spilsby, Great Steeping and Little Steeping. In addition to residential receptors other key visual receptors include recreational receptors (users of identified features). Those identified within 250 m of the Corridor include 13 PRoW which primarily route to, from and within the Lincolnshire Wolds NL, the Lincolnshire Wolds NL, and the South Wolds Cycle Route. Other recreational receptors identified include Galley Hill Caravanning Club and Deers Leap Camp Site (located at Galley Hill and Ulceby, respectively), and Woodthorpe Hall Golf Course, Strubby Airfield, Woodthorpe Caravan and Leisure Park and Rigsby Wood Nature

Corridor	Landscape Character of the Corridor	Proximity to the Lincolnshire Wolds NL	Key visual receptors
	Views vary from intimate to expansive depending on the combination of topography and vegetation.		Reserve. Other recreational receptors in the wider area are those using major and minor roads which cross or route parallel to the Corridor. Narrow areas exist (where receptors would be closer to construction) within both the western and eastern limbs of the Corridor near Hutton Holegate where residential properties are located along the B1195 Spilsby/Hole Gate Road.
Corridor 37	Characterised by arable fields set in a wider wooded landscape. The fields are generally undulating in the north and more regular and flatter in the south. Watercourses include the River Lymn, several meandering streams, with drains and straight ditches common in the south. Field boundary vegetation varies from being sparse, with open ditches common particularly in the north and south, to mature hedgerows with hedgerow trees. Small villages and scattered isolated settlement are common. Views vary from intimate to expansive depending on the combination of topography and vegetation.	Corridor passes through Lincolnshire Wolds NL for approximately 8 km	There are 40 residential properties located within the Corridor. These are scattered throughout the Corridor with the main clusters located near Swinn Wood and Mother Wood. Outside of the Corridor, but within 250 m of the Corridor there are approximately 447 residential receptors. These are primarily located at the settlements of Woodthorpe, Haugh, Sutterby, Aswardby, Raithby by Spilsby, Mavid Enderby, Kirkby Fenside, Hagnaby Lock, New Bolingbroke, Sausthorpe and Carrington. In the wider area are the settlements of Old Bolingbroke, West Keal, East Kirkby, Stickford, Revesby Bridge, Fen Side, Stickney, Medlam, and Newnham. In addition to residential receptors other key visual receptors include recreational receptors (users of identified features). Those identified within 250 m of the Corridor include 14 PRoW which primarily route to, from and within the Lincolnshire Wolds NL, the Lincolnshire Wolds NL, and the South Wolds Cycle Route, Galley Hill Caravanning Club and Deers Leap Camp Site (located at Galley Hill and Ulceby, respectively), and Woodthorpe Hall Golf Course, Strubby Airfield, Woodthorpe Caravan and Leisure Park, Rigsby Wood Nature Reserve, Furze Hill Nature Reserve, Sow Dale Nature Reserve and Lincolnshire Aviation Heritage Centre. Other recreational receptors in the wider area are those using major and minor roads which cross or route parallel to the Corridor. Narrow areas exist (where receptors would be closer to construction) throughout the Corridor in areas where residential properties are located at Sutterby, Aswardby, Raithby, and throughout the southern extent of the Corridor where clusters of properties have been excluded from the Corridor.

Corridor	Landscape Character of the Corridor	Proximity to the Lincolnshire Wolds NL	Key visual receptors
Corridor 9	Characterised by the small settlements of Burgh le Marsh, Wainfleet All Saints, Wainfleet St Mary, Friskney, Wrangle, Leverton, Benington, Butterwick, Freiston and scattered development. The Corridor has a very open linear field pattern with boundaries corresponding with drainage features which run in and east-west direction. A sewage treatment works and railways are present within and adjacent to the Corridor and are notable features in the landscape.	Approximately 5.6 km from the Lincolnshire Wolds NL.	Approximately 12 residential properties are present within the Corridor. These are primarily located at the eastern (near Croft and Burgh le Marsh) and western (near Boston and Frieston) extents of the Corridor. Outside of the Corridor, but within 250 m of the Corridor there are approximately 420 residential receptors. These are primarily located at the settlements of Butterwick and Freiston. Within the wider area are the settlements of Burgh le Marsh, Wainfleet All Saints, Wainfleet St Mary, Friskney, Wrangle, Leverton and Benington. In addition to residential receptors, other key visual receptors include recreational receptors (users of identified features). Those identified within 250 m of the Corridor include nine PRoW mostly routeing to and from The Wash, including the Macmillan Way Long Distance Footpath (described as the Macmillan Way in this report). Other recreational receptors identified include Rivulet Golf Course, Green Haven Holidays and The Hawthorns Camp Site (all located approximately 100 m west of the Corridor at Croft), and Havenside Country Park, Hobhole Bank Nature Reserve, Wainfleet Haven/Steeping River and South Forty Foot Drain. Other recreational receptors in the wider area are those using major and minor roads, which cross or route parallel to the Corridor, and the Poacher Railway Line (including Havenhouse Station) which crosses the Corridor. There are narrower areas (where receptors would be closer to construction) at the Wainfleet Haven and Wainfleet Relief Channel and because of clusters of residential properties south-east of Butterwick.
Corridor 10	Characterised by the small settlements of Wainfleet All Saints, Friskney, Wrangle, Butterwick, Freiston and scattered development. The Corridor has a very open irregular field pattern of small to	Approximately 5.4 km from the Lincolnshire Wolds NL.	Approximately 36 residential properties are present within the Corridor. These are primarily located at the eastern (near Burgh le Marsh, Wainfleet St Mary, Thorpe St Mary and Friskney) and western (near Boston and Frieston) extents of the Corridor. Outside of the Corridor, but within 250 m of the Corridor there are approximately 697 residential receptors. These are primarily located at the settlements of Croft, Wainfleet All Saints, Friskney,

Corridor	Landscape Character of the Corridor	Proximity to the Lincolnshire Wolds NL	Key visual receptors
	medium sized fields, but the regular field pattern is particularly distinctive east of Wrangle. A sewage works, railway and existing NGED 132 kV and 33 kV overhead lines (near Wainfleet Bank) are present in and adjacent to the Corridor and are notable features in the landscape.		Wrangle, Butterwick and Freiston. Within the wider area are the settlements of Burgh le Marsh, Wainfleet St Mary, Leverton and Benington. In addition to residential receptors, other key visual receptors include recreational receptors (users of identified features). Those identified within 250 m of the Corridor include 12 PRoW, including the Macmillan Way, which route mostly near rivers and drains, and the South Wolds Cycle Route which intersects the Corridor multiple times between Croft and Wainfleet St Mary. Other recreational receptors identified include Havenside Country Park, Hobhole Bank Nature Reserve, Wainfleet Haven/Steeping River, South Forty Foot Drain alongside 13 caravan parks located at Croft, Wainfleet, Thorpe St Peter, and Friskney. Other recreational receptors in the wider area are those using major and minor roads which cross or route parallel to the Corridor and of the Poacher Railway Line which crosses the Corridor near the River Steeping. There are narrower areas (where receptors would be closer to construction) at Croft, the Wainfleet Haven and River Steeping, south of Wainfleet Bank, west of Friskney, and because of clusters of residential properties south-east of Butterwick.
Corridor 11	Characterised by the small settlements of Burgh le Marsh, Wainfleet All Saints, Sibsey, Butterwick, Freiston and scattered development. The Corridor has a regular field pattern of medium to large sized square fields. Field boundaries vary with some woodland and hedgerow present. A sewage works, railway, and existing NGED 132 kV and 33 kV	Approximately 5.1 km from the Lincolnshire Wolds NL.	Approximately 63 residential properties are present within the Corridor. These are primarily located at the eastern (near Burgh le Marsh, Wainfleet St Mary, and Thorpe St Mary) and western (near Boston and Frieston) extents of the Corridor. Outside of the Corridor, but within 250 m of the Corridor there are approximately 891 residential receptors. These are primarily located at the settlements of Croft, Wainfleet All Saints, Wainfleet St Mary, and Thorpe St Mary, New Leake, Hatoft End and Freiston. Within the wider area are the settlements of Burgh le Marsh, Sibsey and Butterwick. In addition to residential receptors, other key visual receptors include recreational receptors (users of identified features). Those identified within 250 m of the Corridor include seven PRoW, including the Macmillan Way,

Corridor	Landscape Character of the Corridor	Proximity to the Lincolnshire Wolds NL	Key visual receptors
	overhead lines (near Wainfleet Bank) are present in and adjacent to the Corridor and are notable features in the landscape.		which route mostly near rivers and drains at the eastern and western extents of the Corridor and the South Wolds Cycle Route which intersects the Corridor multiple times between Croft and Wainfleet St Mary. Other recreational receptors identified include Havenside Country Park, Hobhole Bank Nature Reserve, Hobhole Drain, Wainfleet Haven/Steeping River and South Forty Foot Drain alongside 14 caravan parks and leisure centres located at Croft, Thorpe St Peter, New Leake and Wainfleet. Other recreational receptors in the wider area are those using major and minor roads which cross or route parallel to the Corridor and the Poacher Railway line which crosses the Corridor near the River Steeping, near New Leake and near Sibsey. There are narrower areas (where receptors would be closer to construction) at Croft, the Wainfleet Haven and River Steeping, south of Wainfleet Bank, west of Friskney, and because of clusters of residential properties south-east of Butterwick.
Corridor 12	Characterised by flat, open arable landscape drained by a network of straight drains, sparse woodland and hedge cover and a dispersed settlement pattern. The field pattern is generally of medium size and very regular. Views are generally expansive, towards low horizons comprising layered field and settlement boundary trees. Existing NGED 132 kV and 33 kV overhead lines (near Wainfleet Bank), the A1121, solar and wind farms south of	Approximately 5.1 km from the Lincolnshire Wolds NL.	Approximately 104 residential properties are present within the Corridor. These are primarily located at the eastern (near Burgh le Marsh), at the centre (near Sibsey Northlands, Frithville and New Leake) and western (near Boston) extents of the Corridor. Outside of the Corridor, but within 250 m of the Corridor there are approximately 925 residential receptors. These are primarily located at the settlements of Croft, Sibsey Northlands, Frithville, and Kirton Holme. Within the wider area are the settlements of Burgh le Marsh, Stickney, Sibsey, Gypsey Bridge, Langrick, Hubbert’s Bridge, Kirton End and Boston. In addition to residential receptors, other key visual receptors include recreational receptors (users of identified features). Those identified within 250 m of the Corridor include 11 PRoW which route mostly near rivers and drains at the eastern and western extents of the Corridor, the South Wolds Cycle Route which intersects the Corridor multiple times between Croft and Thorpe Fendykes and National Cycle Route 1 which crosses the Corridor

Corridor	Landscape Character of the Corridor	Proximity to the Lincolnshire Wolds NL	Key visual receptors
	Burgh le Marsh and railway line south of Firsby are present within and adjacent to the Corridor and are notable features within the landscape.		adjacent to the River Witham. Other recreational receptors identified include Wainfleet Haven/Steeping River and South Forty Foot Drain alongside 14 caravan parks and/or leisure centres located at Croft, Frithville, New Leake and Midville. Other recreational receptors in the wider area are those using major and minor roads which cross or route parallel to the Corridor, and the Poacher Railway Line (including Hubbert's Bridge Station) which crosses the Corridor near the River Steeping, near Thorpe Fendykes and near Hubbert's Bridge. There are narrower areas (where receptors would be closer to construction) at Croft, north and south of Sibsey Northlands, at the River Witham/Firth Bank Drain, and between South Forty Foot Drain and the B1391.
Corridor 13	Characterised by flat, open arable landscape drained by a network of straight drains, sparse woodland and hedge cover and a dispersed settlement pattern. The field pattern is generally of medium size and very regular. Views are generally expansive towards distant low horizons layered with trees. Solar and wind farms south of Burgh le Marsh, a railway line, the A1121 and existing NGED 132 kV and 33 kV overhead lines are present within and adjacent to the Corridor and are notable features within the landscape.	Approximately 5.1 km from the Lincolnshire Wolds NL	Approximately 104 residential properties are present within the Corridor. These are primarily located at the eastern (near Burgh le Marsh), at the centre (near New Leake and Sibsey) and western (near Boston) extents of the Corridor. Outside of the Corridor, but within 250 m of the Corridor there are approximately 651 residential receptors. These are primarily located at the settlements Croft, Frithville, Anton's Gowt and Kirton Holme. Within the wider area are the settlements of Burgh le Marsh, Stickney, Sibsey, Sibsey Northlands, Hubbert's Bridge, Kirton End and Boston. In addition to residential receptors other key visual receptors include recreational receptors (users of identified features). Those identified within 250 m of the Corridor include seven PRoW which route mostly near rivers and drains at the eastern and western extents of the Corridor, the South Wolds Cycle Route which intersects the Corridor multiple times between Croft and Thorpe Fendykes and National Cycle Route 1 which crosses the Corridor adjacent to the River Witham. Other recreational receptors identified include Wainfleet Haven/Steeping River and South Forty Foot Drain alongside 12 caravan parks and/or leisure centres located at Croft, Thorpe St Peter, New Leake and Midville. Other recreational receptors in the wider area are those using major and minor roads which cross or route

Corridor	Landscape Character of the Corridor	Proximity to the Lincolnshire Wolds NL	Key visual receptors
			parallel to the Corridor and the Poacher Railway Line (including Hubbert's Bridge Station) which crosses the Corridor near the River Steeping, near Thorpe Fendykes, near Sibsey and near Hubbert's Bridge. The whole Corridor is generally narrow with exception of the area at Stickney and Hubbert's Bridge. There are narrower areas (where receptors would be closer to construction) north of Thorpe St Peter, east of Sibsey at Station Road, Frith Bank and Hubbert's Bridge where clusters of properties have been excluded from the Corridor.
Corridor 14	Characterised by flat, open arable landscape drained by a network of straight drains, sparse woodland and hedge cover and a dispersed settlement pattern. The field pattern is generally of medium size and very regular, becoming more irregular in the south. Views are generally expansive and of strong rural character, however existing NGED 132 kV overhead lines are prominent on the skyline in the south.	Approximately 5.1 km from the Lincolnshire Wolds NL	Approximately 24 residential properties are present within the Corridor. These are primarily located at the eastern (near Burgh le Marsh), at the centre (near Midville) and western (near Boston) extents of the Corridor. Outside of the Corridor, but within 250 m of the Corridor there are approximately 656 residential receptors. These are primarily located at the settlements including Croft, Midville, Haltoft End and Frieston. Within the wider area are the settlements of Burgh le Marsh, New Leake, Sibsey and Butterwick. In addition to residential receptors other key visual receptors include recreational receptors (users of identified features). Those identified within 250 m of the Corridor include seven PRoW, including the Macmillan Way, which route mostly near rivers and drains at the eastern and western extents of the Corridor and the South Wolds Cycle Route which intersects the Corridor multiple times between Croft and Thorpe Fendykes. Other recreational receptors identified include Wainfleet Haven/Steeping River and Havenside Country Park alongside eight caravan parks and/or leisure centres located at Croft, Thorpe St Peter, New Leake and Midville. Other recreational receptors in the wider area are those using major and minor roads which cross or route parallel to the Corridor and the Poacher Railway Line which crosses the Corridor near the River Steeping, near Thorpe Fendykes and near Sibsey.

Corridor	Landscape Character of the Corridor	Proximity to the Lincolnshire Wolds NL	Key visual receptors
			The whole Corridor is generally narrow with exception of the area at Stickney. There are narrower areas (where receptors would be closer to construction) north of Thorpe St Peter, east of Sibsey at Station Road, and from Butterwick to Wyberton Roads.
Corridor 15	Characterised by flat, open arable landscape drained by a network of straight drains, sparse woodland and hedge cover and a dispersed settlement pattern. The field pattern is generally of medium size and very regular. Views are generally expansive and of strong rural character. Existing NGED 132 kV and 33 kV overhead lines in the south, the railway line and solar/wind farms south of Burgh le Marsh are present within and adjacent to the Corridor and are notable features within the landscape.	Approximately 5.1 km from the Lincolnshire Wolds NL	Approximately 24 residential properties are present within the Corridor. These are primarily located at the eastern (near Burgh le Marsh, Wainfleet St Mary), at the centre (near Sibsey Northlands, Frithville and New Leake) and western (near Boston) extents of the Corridor. Outside of the Corridor, but within 250 m of the Corridor there are approximately 1160 residential receptors. These are primarily located at the settlements of Croft, New Leake, Sibsey Northlands, Frithville, and Kirton Holme. Within the wider area are the settlements of Burgh le Marsh, Thorpe St Peter, Stickney, Wainfleet All Saints, Frithville, Kirton End and Boston. In addition to residential receptors other key visual receptors include recreational receptors (users of identified features). Those identified within 250 m of the Corridor include nine PRoW which route mostly near rivers and drains at the eastern and western extents of the Corridor, the South Wolds Cycle Route which intersects the Corridor multiple times between Croft and Thorpe Fendykes and National Cycle Route 1 which crosses the Corridor adjacent to the River Witham. Other recreational receptors identified include Wainfleet Haven/Steeping River and South Forty Foot Drain alongside 17 caravan parks and/or leisure centres located at Croft, Thorpe St Peter, New Leake, Wainfleet St Mary and Boston. Other recreational receptors in the wider area are those using major and minor roads which cross or route parallel to the Corridor and the Poacher Railway Line (including Hubbert's Bridge Station) which crosses the Corridor near the River Steeping, near Thorpe Fendykes and near Hubbert's Bridge. There are narrower areas (where receptors would be closer to construction) at Croft, at the crossings of the Bell Water Drain/Wainfleet Channel/Wainfleet Haven, south of Wainfleet Bank, north and south of

Corridor	Landscape Character of the Corridor	Proximity to the Lincolnshire Wolds NL	Key visual receptors
			Sibsey Northlands, at the River Witham/Firth Bank Drain, and between South Forty Foot Drain and the B1391.
Corridor 16	Characterised by open arable fields bound by a network of drainage ditches, interspersed with small, generally linear settlements or isolated farms. Vegetation is sparse, comprising occasional field or settlement boundary trees. Horizons are distant and low, comprising layered boundary trees. The field pattern is distinctive, and very regular in places, and generally of small to medium size. The A1150, a railway line on the edge of the north-east and existing NGED 132 kV and 33 kV overhead lines in the south are notable features within the landscape.	Approximately 6.4 km from the Lincolnshire Wolds NL	Approximately 100 residential properties are present within the Corridor. These are primarily located at the eastern (near Little Steeping), at the centre (near Sibsey Northlands, Frithville and New Leake) and western (near Boston) extents of the Corridor. Outside of the Corridor, but within 250 m of the Corridor there are approximately 816 residential receptors. These are primarily located at the settlements of Sibsey Northlands, Frithville, and Kirton Holme. Within the wider area are the settlements of Little Steeping, Stickney, Sibsey, Gypsey Bridge, Langrick, Hubbert's Bridge, Kirton End and Boston. In addition to residential receptors other key visual receptors include recreational receptors (users of identified features). Those identified within 250 m of the Corridor include six PRoW which route mostly near rivers and drains at the western extent of the Corridor and National Cycle Route 1 which crosses the Corridor adjacent to the River Witham. Other recreational receptors identified include South Forty Foot Drain alongside five caravan parks located at Frithville, New Leake and Midville. Other recreational receptors in the wider area are those using major and minor roads which cross or route parallel to the Corridor and the Poacher Railway Line (including Hubbert's Bridge Station) which crosses the Corridor near Thorpe Fendykes and near Hubbert's Bridge. There are narrower areas (where receptors would be closer to construction) north and south of Sibsey Northlands, at the River Witham/Firth Bank Drain, and between South Forty Foot Drain and the B1391.
Corridor 17	Characterised by open arable fields bound by a network of drainage ditches, interspersed with small, generally linear	Approximately 6.4 km from the	Approximately 37 residential properties are present within the Corridor. These are primarily located at the eastern (near Little Steeping), at the centre (near Sibsey) and western (near Boston) extents of the Corridor. Outside of the Corridor, but within 250 m of the Corridor there are

Corridor	Landscape Character of the Corridor	Proximity to the Lincolnshire Wolds NL	Key visual receptors
	settlements or isolated farms. Vegetation is sparse, comprising occasional field or settlement boundary trees. Horizons are distant and low, comprising layered boundary trees. The field pattern is distinctive, and very regular in places, and generally of small to medium size. The A1150, a railway line on the north-eastern edge and existing NGED 132 kV and 33 kV overhead lines in the south are notable features within the landscape.	Lincolnshire Wolds NL.	approximately 541 residential receptors. These are primarily located at the settlements Frithville, Anton's Gowt and Kirton Holme. Within the wider area are the settlements of Stickney, Sibsey, Sibsey Northlands, Hubbert's Bridge, Kirton End and Boston. In addition to residential receptors other key visual receptors include recreational receptors (users of identified features). Those identified within 250 m of the Corridor include five PRoW which route mostly near rivers and drains at the western extent of the Corridor and National Cycle Route 1 which crosses the Corridor adjacent to the River Witham. Other recreational receptors identified include South Forty Foot Drain alongside four caravan parks and/or leisure centres located at New Leake, Midville and Boston. Other recreational receptors in the wider area are those using major and minor roads which cross or route parallel to the Corridor and the Poacher Railway Line (including Hubbert's Bridge Station) which crosses the Corridor near Thorpe Fendykes, near Sibsey and near Hubbert's Bridge. The whole Corridor is generally narrow with exception of the area east of Stickney and west of Hubbert's Bridge. There most notable narrower areas (where receptors would be closer to construction) are east of Sibsey at Station Road, Frith Bank and Hubbert's Bridge where clusters of properties are excluded from the Corridor.
Corridor 18	Characterised by open arable fields bound by a network of drainage ditches, interspersed with small, generally linear settlements or isolated farms. Vegetation is sparse, comprising occasional field or settlement boundary trees. Horizons are distant and low, comprising layered boundary	Approximately 6.4 km from the Lincolnshire Wolds NL.	Approximately 20 residential properties are present within the Corridor. These are primarily located at the eastern (near Little Steeping), at the centre (near Midville) and western (near Boston) extents of the Corridor. Outside of the Corridor, but within 250 m of the Corridor there are approximately 547 residential receptors. These are primarily located at the settlements including Midville, Haltoft End and Frieston. Within the wider area are the settlements of New Leake, Sibsey and Butterwick. In addition to residential receptors other key visual receptors include recreational receptors (users of identified features). Those identified within 250 m of the Corridor include four PRoW, including the Macmillan Way,

Corridor	Landscape Character of the Corridor	Proximity to the Lincolnshire Wolds NL	Key visual receptors
	trees. The field pattern is distinctive, and very regular in places, and generally of small to medium size. The railway line crossing the Corridor and existing NGED 132 kV and 33 kV overhead lines in the south are notable features within the landscape.		which route mostly near rivers and drains at the western extent of the Corridor. Other recreational receptors identified include Havenside Country Park alongside two caravan parks located at Midville and New Leake. Other recreational receptors in the wider area are those using major and minor roads which cross or route parallel to the Corridor and the Poacher Railway Line which crosses the Corridor near Thorpe Fendykes and near Sibsey. The whole Corridor is generally narrow with exception of the area east of Stickney. The most notable narrower areas (where receptors would be closer to construction) are east of Sibsey at Station Road, and from Butterwick to Wyberton Roads.
Corridor 19	Characterised by open arable fields bound by a network of drainage ditches, interspersed with small, generally linear settlements or isolated farms. Vegetation is sparse, comprising occasional field or settlement boundary trees. Horizons are distant and low, comprising layered boundary trees and small blocks of woodland. The field pattern is distinctive, and very regular in places, and generally of small to medium size. A solar farm and wind farm in the north, a railway line, the A1121, and several existing NGED 132 kV and 33 kV overhead lines are notable features within the landscape.	Approximately 5.4 km from the Lincolnshire Wolds NL.	Approximately 82 residential properties are present within the Corridor. These are primarily located at the eastern (near Burgh le Marsh, Wainfleet St Mary, and Thorpe St Mary), at the centre (near Sibsey) and western (near Boston) extents of the Corridor. Outside of the Corridor, but within 250 m of the Corridor there are approximately 886 residential receptors. These are primarily located at the settlements of Croft, Wainfleet All Saints, Wainfleet St Mary, and Thorpe St Mary, New Leake, Frithville, Anton’s Gowt and Kirton Holme. Within the wider area are the settlements of Burgh le Marsh, Sibsey, Sibsey Northlands, Hubbert’s Bridge, Kirton End and Boston. In addition to residential receptors other key visual receptors include recreational receptors (users of identified features). Those identified within 250 m of the Corridor include 10 PRoW which route mostly near rivers and drains at the eastern and western extents of the Corridor, the South Wolds Cycle Route which intersects the Corridor multiple times between Croft and Wainfleet Bank and National Cycle Route 1 which crosses the Corridor adjacent to the River Witham. Other recreational receptors identified include Hobhole Drain, Wainfleet Haven/Steeping River and South Forty Foot Drain alongside 11 caravan parks and/or leisure centres located at Croft, Thorpe St Peter, New Leake, Midville and Boston. Other recreational receptors in

Corridor	Landscape Character of the Corridor	Proximity to the Lincolnshire Wolds NL	Key visual receptors
			the wider area are those using major and minor roads which cross or route parallel to the Corridor and the Poacher Railway Line which crosses the Corridor near the River Steeping, near New Leake, near Sibsey and near Hubbert's Bridge. There are narrower areas (where receptors would be closer to construction) at Croft, the Wainfleet Haven and River Steeping, south of Wainfleet Bank, west of Friskney, and south-east of Butterwick due to clusters of properties excluded from the Corridor.
Corridor 20	Characterised by open, irregular arable fields with occasional hedgerows and boundary trees. Scattered settlement is generally small scale and linear. Urban features include the settlements of Wigtoft and Sutterton along the A16 and A17 in the centre of the Corridor, both well screened by mature trees. The Nowhere Farm Solar Farm, east of Asperton, and NGET 4ZM 400 kV overhead line to the south-west of the Corridor are notable features within the landscape.	Over 26 km from the Lincolnshire Wolds NL.	Approximately 15 residential properties are present within the Corridor. These are primarily located near Asperton and between the B1397 and the Risegate Eau. These can be avoided by careful routeing. Outside of the Corridor, but within 250 m of the Corridor there are approximately 210 residential receptors. These are primarily located at the settlements of Kirton End, Asperton, Wigtoft and Burtoft. Within the wider area are the settlements of Sutterton and Fosdyke. In addition to residential receptors other key visual receptors include recreational receptors (users of identified features). Those identified within 250 m of the Corridor include three PRoW, including The Macmillan Way and Cross Britain Way Long Distance Footpaths. Other recreational receptors in the wider area are those using major and minor roads which cross or route parallel to the Corridor. There are narrower areas (where receptors would be closer to construction) at the B1391 and Asperton due to residential properties.
Corridor 21	Characterised by open, irregular arable fields with occasional dense hedgerows and boundary trees. The NGED 132 kV pylons	Over 26 km from the Lincolnshire Wolds NL.	Approximately eight residential properties are present within the Corridor. These are primarily located near the A16 and A17. These can be avoided by careful routeing. Outside of the Corridor, but within 250 m of the Corridor

Corridor	Landscape Character of the Corridor	Proximity to the Lincolnshire Wolds NL	Key visual receptors
	north of Strugg's Hill, Nowhere Farm Solar Farm located west of the Corridor, glasshouses and polytunnels, east of the Corridor at Kirton End and Kirton Solar PV Farm west of Fishmere End are notable features within the landscape. Scattered settlement is generally small scale and linear, associated with the A16 and A17 roads that cut across the Centre of the Corridor.		there are approximately 147 residential receptors. These are primarily located at the settlements of Strugg's Hill and Fosdyke Bridge. In addition to residential receptors other key visual receptors include recreational receptors (users of identified features). Those identified within 250 m of the Corridor include four PRoW, including the The Macmillan Way and Cross Britain Way Long Distance Footpaths. Other recreational receptors in the wider area are those using major and minor roads which cross or route parallel to the Corridor. There are narrower areas (where receptors would be closer to construction) at the B1391, B1397, the A16 and A17 due to avoiding properties.
Corridor 22	Characterised by open, irregular arable fields with occasional hedgerows and boundary trees. Views are generally expansive, to distant flat horizons with trees and small woodlands. The A17 which the Corridor travels along, large scale agricultural glasshouses, existing NGED 33 kV overhead lines to the north of Blackjack and south-west of Wigtoft Marsh, and a solar farm at Nowhere Farm north-east of Asperton are notable features within the landscape.	Over 26 km from the Lincolnshire Wolds NL.	Approximately 15 residential properties are present within the Corridor. These are primarily located near Asperton, near the B1397 and near Risegate Eau. These can be avoided by careful routeing. Outside of the Corridor, but within 250 m of the Corridor there are approximately 246 residential receptors. These are primarily located at the settlements of Kirton End, Asperton, Wigtoft and Burtoft. Within the wider area are the settlements of Sutterton and Fosdyke. In addition to residential receptors other key visual receptors include recreational receptors (users of identified features). Those identified within 250 m of the Corridor include two PRoW, including The Macmillan Way and Cross Britain Way Long Distance Footpaths. Other recreational receptors identified include Walnut Lake Holiday Park adjacent to the Corridor at Algarkirk. Other recreational receptors in the wider area are those using major and minor roads which cross or route parallel to the Corridor. There are narrower areas (where receptors would be closer to construction) at the B1391 and Asperton. In addition, the route along the A17 to the River Welland is also narrower compared to other areas of the Corridor.

Corridor	Landscape Character of the Corridor	Proximity to the Lincolnshire Wolds NL	Key visual receptors
Corridor 23	Characterised by open, irregular arable fields with occasional hedgerows and boundary trees. Scattered settlement is generally small scale and linear associated with the A17 and other minor roads which cross the centre of the Corridor. Existing NGED 33 kV overhead lines both to the east and west of the Corridor, and the settlement of Fosdyke (specifically excluded from the Corridor) in the south of the Corridor are notable features within the landscape.	Over 26 km from the Lincolnshire Wolds NL.	Approximately 11 residential properties are present within the Corridor. These are primarily located near Skeldyke, Fosdyke and Risgate Eau. These can be avoided by careful routeing. Outside of the Corridor, but within 250 m of the Corridor there are approximately 265 residential receptors. These are primarily located at the settlements Frampton, Skeldyke, Seadyke and Fosdyke. In addition to residential receptors other key visual receptors include recreational receptors (users of identified features). Those identified within 250 m of the Corridor include six PRoW, including The Macmillan Way and Cross Britain Way Long Distance Footpaths. Other recreational receptors identified include Roundland Caravan Park and Slade House Caravan Site (located outside the Corridor at Algarkirk and Kirton, respectively) and National Cycle Route 1 which crosses the Corridor between Frampton and the River Welland. Other recreational receptors in the wider area are Frampton Marsh Nature Reserve and those using major and minor roads which cross or route parallel to the Corridor.

Ecology

7.2.13 **Table 7-2** below provides a summary of all statutory ecological designations which occur within 2 km of the Corridors, and International/European statutory ecological designations which occur within 10 km of the Corridors. The Table also details the priority habitats and other designated sites within each Corridor. Designated sites of ecological importance identified are shown in **Figure 7-6**.

7.2.14 All Corridors between the landfalls and the River Welland are located within 10 km of National Site Network (NSN) sites (formerly Natura 2000 sites, comprising SPA and SACs) and/or Ramsar sites, all of which are located along the Lincolnshire coastline. The NSN and Ramsar sites located closest to the Corridors are: the Saltfleet-by-Theddlethorpe Dunes & Gibraltar Point SAC, the Humber Estuary SPA and Ramsar, the Greater Wash SPA, The Wash and Norfolk Coast SAC and The Wash SPA and Ramsar site.

7.2.15 The Saltfleet-by-Theddlethorpe Dunes & Gibraltar Point SAC and the Humber Estuary SPA and Ramsar are designated for their specific wetland and coastal habitats, which comprise tidal sand and mudflats, salt and freshwater marshes and sand dunes. These habitats support migrant birds between May and October and wildfowl during the winter months, in addition to breeding populations of bittern, marsh harrier, avocet and little tern, as well as providing habitat for European Protected Species (EPS), including the natterjack toad (*Epidalea calamita)*. Corridor 1 is closest to these statutory ecological designations, which are located approximately 100 m to the east of the Corridor at their closest point.

7.2.16 The Greater Wash SPA is designated for its range of marine habitats comprising intertidal mudflats and sandflats, subtidal sandbanks and biogenic reef, including Sabellaria reefs and mussel beds. The site is also designated for the protection of red-throated diver (*Gavia stellata*), common scoter (*Melanitta nigra*), and little gull (*Hydrocoloeus minutus*) during the non-breeding season, and for breeding Sandwich tern (*Sterna sandvicensis*), common tern (*Sterna hirundo*) and little tern (*Sternula albifrons*). This area supports the largest breeding populations of little terns within the UK NSN by protecting important foraging areas, and supports the second largest aggregations of non-breeding red-throated diver and little gull. The closest Corridor is Corridor 5 (which connects to the Anderby Creek landfall), located approximately 400 m to the west of this statutory ecologically designated site; and Corridor 1 (which connects to the Theddlethorpe landfall), approximately 600 m to the west of this statutory ecological designated site.

7.2.17 The Wash and Norfolk Coast SAC and The Wash SPA and Ramsar site, termed collectively ‘The Wash designated sites’, are a vast intertidal embayment incorporating estuarine mudflats, sandbanks and saltmarsh. They are identified for numerous species of wintering waterbirds, an important area for passage birds, notable waders, supporting various breeding birds, an important shell fishery, and a breeding colony of seals. The closest Corridors are Corridors 9, 10, 11, 14 and 18, approximately 50 m north-east of the Wash and Norfolk Coast SAC.

Figure 7-6 – Ecological features between the Theddlethorpe and Anderby Creek Landfall Study Areas and River Welland

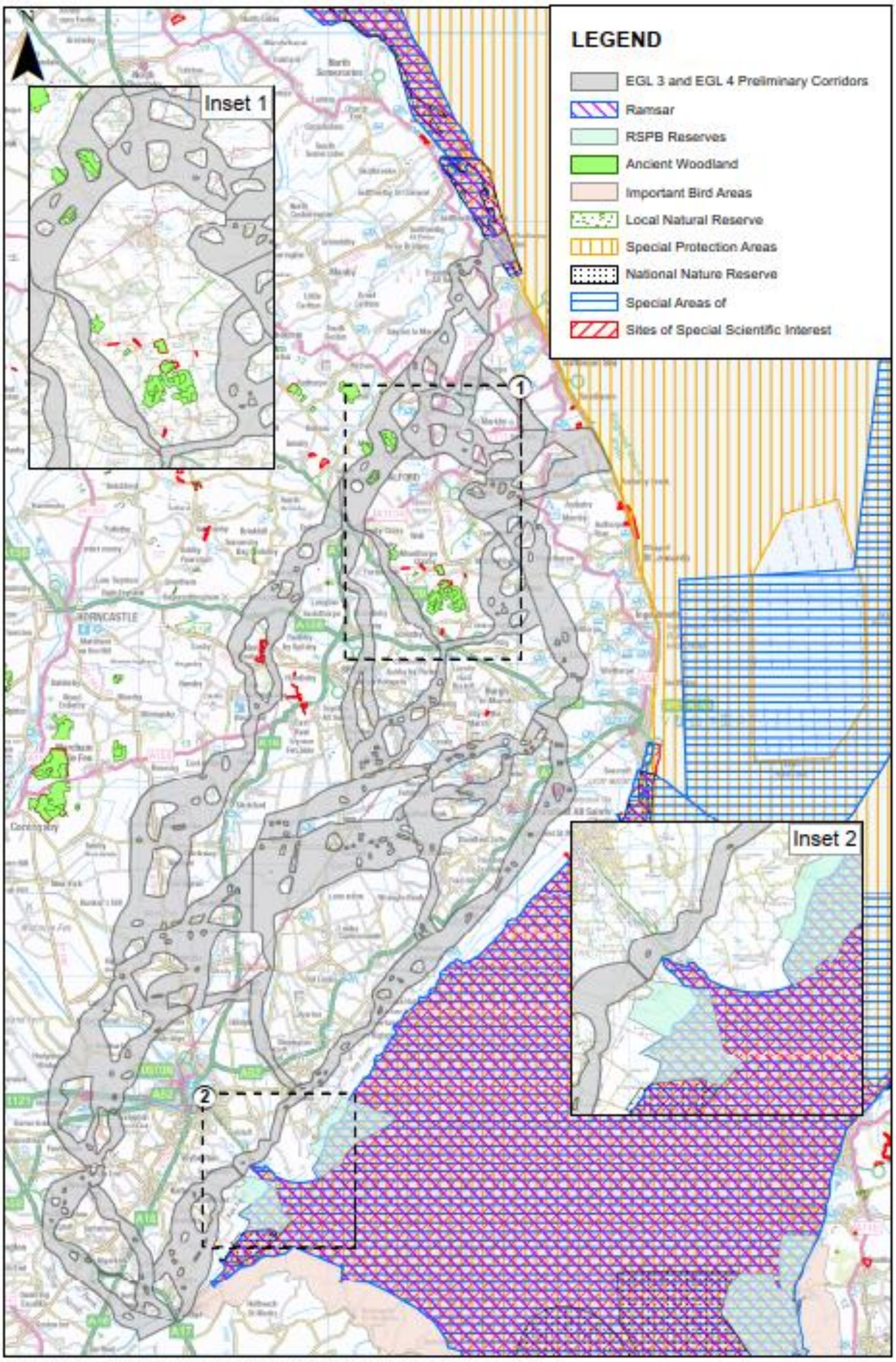


Figure 7-6 - Ecological features between the Landfalls and River Welland

SCALE:1:320,000 0 2 4 6 8 10 km

7.2.18 Impacts on NSN and Ramsar sites are predominantly limited to potential pollution pathways and disturbance of functionally connected habitats, resulting in the risk of injury and mortality for vulnerable bird species, if present. These impacts are associated with temporary construction and installation activities as there are no permanent above ground-structures or operational activities from the underground HVDC cables. The potential effects upon NSN and Ramsar sites will be considered in detail within a Habitats Regulations Assessment (HRA) (conducted in the absence of mitigation), as the Project development progresses. However, for the purposes of Options Appraisal, the Corridors located furthest from the NSN and Ramsar sites are considered to have the least likelihood of experiencing adverse environmental effects. With the implementation of careful routeing and standard construction measures, all Corridors except for Corridors 1 and Corridor 5, and those Corridors which route east and south of Boston, are considered capable of being acceptable when considering the potential impacts on identified NSN and Ramsar sites. Given the proximity of Corridors 1 and 5 and those Corridors which route east and south of Boston, to the NSN and Ramsar sites, the need for further mitigation and/compensation measures would need to be considered (following detailed ecological assessments) as a means of determining whether the impacts of underground cable installation along these Corridors (especially when considering potential cumulative impacts) are acceptable. Should the work done in support of a HRA identify adverse effects on the integrity of the NSN and Ramsar sites, the emerging preferences identified will be revisited.

7.2.19 Within 2 km of the Corridors are the following SSSI or NNR sites:

- The Saltfleetby - Theddlethorpe Dunes SSSI and Lincolnshire Coronation Coast NNR (which includes and extends the protected area of the Saltfleetby - Theddlethorpe Dunes NNR) – designated for its Annex I habitats, comprising ‘white dunes’ (shifting dunes along the shoreline with marram grass (*Ammophilia arenaria*)), ‘grey dunes’ (fixed coastal dunes with herbaceous vegetation), dunes with *Hippophae rhamnoides* and humid dune slacks. These sites overlap with the Saltfleet-by-Theddlethorpe Dunes & Gibraltar Point SAC and the Humber Estuary SPA and Ramsar site and are within 100 m of Corridor 1;
- Sea Bank Clay Pits SSSI – a series of isolated clay workings. The pits are a GWDTE and support rare aquatic plant communities and invertebrate fauna such as nationally scarce species of beetles. This site is within 20 m of Corridor 5;
- Willoughby Meadow SSSI designated for its rich assemblage of meadow plants, including cowslip, great burnet, pepper saxifrage, adder's-tongue, devil's-bit scabious, saw-wort, betony and green-winged orchid. Bugle and lady's mantle, more usually associated with woodland rides, also occur. The site also presents good boundary hedges and old hedgerow trees attractive to whitethroat and lesser whitethroat. This site is within 2 km of Corridor 8;
- Willoughby Wood SSSI designated for its semi-natural woodland included in the Nature Conservancy Council's 'Inventory of Ancient Woodland'. This site is within 2 km of Corridors 8 and 35;
- Hoplands Wood SSSI designated for its plant species comprising ferns, mosses, oak and ash are the dominant trees. There is a varied bird population including woodcock, tawny owl, treecreeper, great spotted woodpecker, spotted flycatcher and nuthatch, as well as six species of summer warbler. Barn owls occasionally hunt in the rides. A pond in the glade also attracts spawning frogs. This site is within 2 km of Corridors 8 and 35;

- Candlesby Hill SSSI designated for its habitats comprising tall hawthorn and ash wood, and open grassland area. The site supports several breeding birds including garden warbler, whitethroat, spotted flycatcher and several species of finch. Butterflies are also abundant. This site is within 2 km of Corridors 8 and 35;
- Calceby Marsh SSSI designated as an outstanding example of a base-rich marsh, containing areas of calcareous marsh, grazed grass, marsh-marigold, ragged robin, yellow flag and orchids in spring and summer. This site is within 2 km of Corridors 35, 36 and 37;
- Swaby Valley SSSI designated as this glacial overflow valley supports two habitats now scarce in Lincolnshire – floristically diverse, lime-rich marsh and unimproved chalk turf. This site is within 2 km of Corridors 35, 36 and 37;
- Skendleby Psalter Banks SSSI designated for representing one of the best examples of species-rich unimproved grasslands, now rare and fragmented in Lincolnshire. This site is within 2 km of Corridor 35;
- Claxby Chalk Pit SSSI designated for being a fine example of Lincolnshire Wolds chalk grassland, which only survives in disused quarries or on steep, unploughable slopes. Breeding birds including spotted flycatcher, tawny owl and pied wagtail. Woodcock occurs. Both pipistrelle and long-eared bats are also regularly seen within this site. This site is within 2 km of Corridor 35;
- Dalby Hill SSSI designated due to its local geological importance as the only exposure of the Roach Stone. The site is also significant in having been the source of an interesting brachiopod fauna. This site is within 2 km of Corridor 36;
- Mavis Enderby Valley SSSI designated for its habitats which make the site valuable for a wide range of fauna, small mammals, lepidoptera and dragonflies in particular. It is of County importance for its breeding birds, especially summer migrants and those associated with the woods – sparrowhawk, kestrel, woodcock, turtle dove, tawny, owl, greater and lesser spotted woodpeckers and tree pipit. This site is within 2 km of Corridor 37;
- Keal Carr SSSI designated as an example of a base-rich spring line alder woodland, especially characteristic of the southern Lincolnshire Wolds. This site supports several breeding birds, including all three species of woodpecker, willow tit and garden warbler. In winter the area is used as a feeding ground by siskin. This site is within 2 km of Corridor 37;
- Jenkins Carr SSSI designated as a species rich example of alder carr, a habitat now rare in the area, with stream and swamp communities of regional importance. This site is within 2 km of Corridor 37;
- Hundleby Clay Pit SSSI designated due to its geological importance as the only remaining exposure of, the rock unit known as the Hundleby Clay, an important part of the Lower Cretaceous sequence of eastern England. This site is within 2 km of Corridor 37;
- The Wash SSSI and NNR which overlaps with The Wash designated sites as described above. This site is within 2 km of Corridors 9, 10, 11, 18 and 23; and
- Bratoft Meadows SSSI designated for being the best example of species rich neutral grassland in North Lincolnshire and one of the remaining areas of permanent grassland not dominated by plants associated with chalk and limestone. The site

attracts large numbers of butterflies, and 18 species of terrestrial mollusc are recorded. This site is within 2 km of Corridors 10, 11, 12, 13, 14, 15 and 19.

7.2.20 Impacts on the identified SSSI and NNR sites are predominantly limited to potential pollution pathways and functionally connected habitats. Corridors located further from the SSSIs and NNR sites are considered to have a lower likelihood of adverse environmental effects on the SSSI and NNR sites. Except for the SSSIs and NNRs which overlap with the NSN and Ramsar sites above, all Corridors are considered capable of being acceptable when considering the potential impacts on identified SSSIs and NNRs following the implementation of careful routeing and standard construction practices and measures.

7.2.21 Other important sites and habitats identified within the Corridors comprise Frampton Marsh RSPB Reserve and priority habitats. The installation of the underground cables has the potential to result in habitat loss/degradation and impacts to protected species. The implementation of the following will help to reduce the magnitude of impact on the statutory ecological designations, species and priority habitats within the Corridors:

- careful routeing and siting of both temporary and permanent infrastructure to avoid statutory ecological designations and areas of priority habitat; and
- implementation of a CEMP setting out specific procedures for the protection of habitats and species; including pollution prevention measures (safe storage of chemicals and materials, silt fencing, pollution/spill response plan), toolbox talks, biodiversity protection zone fencing etc.

7.2.22 In addition, the provision of compensation and enhancement measures would be made. It is also noted that the consideration of BNG will be included in the later stages of the Project.

Table 7-2 - Sites designated for Nature Conservation and Priority habitats

Corridor	NSN and Ramsar sites within 10 km	National statutory designated sites within 2 km	Other designated ecological sites and priority habitats within the Corridor
Corridor 1	Saltfleetby-Theddlethorpe Dunes & Gibraltar Point SAC and the Humber Estuary SPA and Ramsar site – approximately 100 m east of the Corridor. Greater Wash SPA - approximately 400 m east. Humber Estuary SAC - approximately 4.8 km north-east.	The Saltfleetby - Theddlethorpe Dunes SSSI and Lincolnshire Coronation Coast NNR (within 100 m of the Corridor).	Priority habitats of coastal and floodplain grazing marsh throughout the Corridor
Corridor 2	Greater Wash SPA - approximately 2.3 km east. Saltfleetby-Theddlethorpe Dunes & Gibraltar Point SAC and the Humber Estuary SPA and Ramsar site - approximately 4.8 km north-east.	None	Priority habitats include river habitats headwater areas at the south of the Corridor.
Corridor 3	Greater Wash SPA - approximately 4.5 km east. Saltfleetby-Theddlethorpe Dunes & Gibraltar Point SAC and the Humber Estuary SPA and Ramsar - approximately 6.7 km north-east.	None	None
Corridor 4	Greater Wash SPA - approximately 2.1 km east. Saltfleetby-Theddlethorpe Dunes & Gibraltar Point SAC and the Humber Estuary SPA and Ramsar - approximately 8.2 km north-east.	None	Priority habitats include river habitats headwater areas at the south, and coastal and floodplain grazing marsh at the north.
Corridor 5	Greater Wash SPA – approximately 400 m east of the Corridor.	Sea Bank Clay Pits SSSI - within 20 m of the Corridor.	Priority habitats include coastal and floodplain grazing marsh at the west.

Corridor	NSN and Ramsar sites within 10 km	National statutory designated sites within 2 km	Other designated ecological sites and priority habitats within the Corridor
	Saltfleetby-Theddlethorpe Dunes & Gibraltar Point SAC and the Humber Estuary SPA and Ramsar - approximately 8.5 km north-west. Inner Dowsing, Race Bank and North Ridge SAC – approximately 7.2 km south-east		
Corridor 6	Greater Wash SPA - approximately 4.7 km east Inner Dowsing, Race Bank and North Ridge SAC – approximately 9.2 km south-east	None	Priority habitats within Corridor 6 include River Habitat Headwater Areas
Corridor 7	Saltfleetby-Theddlethorpe Dunes & Gibraltar Point SAC - approximately 4.4 km south-east. Greater Wash SPA- approximately 4.6 km east. Gibraltar Point SPA and Ramsar - approximately 5 km south-east. Inner Dowsing, Race Bank and North Ridge SAC - approximately 5.6 km east. The Wash and Norfolk Coast SAC - approximately 5.9 km south. The Wash SPA and Ramsar - approximately 6.5 km south-east.	None	Priority habitats including River Habitat Headwater Area located within the northern extent of the Corridor and Coastal Floodplain Grazing Marsh located at various locations within the Corridor.
Corridor 8	Greater Wash SPA and Ramsar - approximately 6.1 km east. Inner Dowsing, Race Bank and North Ridge SAC- approximately 7.7 km east. Gibraltar Point SPA and Ramsar - approximately 9.5 km south-east.	Candlesby Hill SSSI - approximately 400 m north of the Corridor, north-west of Candlesby. Willoughby Meadow SSSI - approximately 800 m west of the Corridor, south of Willoughby.	Priority habitats including River Habitat Headwater Area located within the northern extent of the Corridor and Coastal Floodplain Grazing Marsh located at various locations within the Corridor.

Corridor	NSN and Ramsar sites within 10 km	National statutory designated sites within 2 km	Other designated ecological sites and priority habitats within the Corridor
	Saltfleetby-Theddlethorpe Dunes & Gibraltar Point SAC - approximately 8.5 km south-east; The Wash & North Norfolk Coast SAC - approximately 9.6 km south-east.	Willoughby Wood SSSI - approximately 1.5 km west of the Corridor, off Dawber Lane. Hoplands Wood SSSI - approximately 1.9 km west of the Corridor, east of Claxby.	
Corridor 35	Greater Wash SPA - approximately 7.2 km east. Humber Estuary SAC, SPA and Ramsar site - approximately 7.2 km north-east. Saltfleetby-Theddlethorpe Dunes & Gibraltar Point SAC - approximately 7.2 km north-east.	Candlesby Hill SSSI - approximately 350 m east of the Corridor, near Candlesby. Skendleby Psalter Banks SSSI located approximately 400 m north-east the vicinity of Skendleby Psalter. Calceby Marsh SSSI - approximately 1 km north-west, in the vicinity of South Thoresby. Claxby Chalk Pit SSSI - approximately 1.2 km north-east, in the vicinity of Claxby. Willoughby Wood SSSI - approximately 1.5 km north-east of the Corridor, off Dawber Lane. Swaby Valley SSSI - approximately 1.8 km north-west, in the vicinity of Swaby. Hoplands Wood SSSI - approximately 1.8 km north-east of the Corridor, east of Claxby.	Priority habitats including Deciduous Woodland. Ancient Woodland including: Hornby/Mother Woods; Swinn Wood; Rigsby Wood and Fordington Wood, each of which lie directly adjacent to the Corridor. Withern Wood ancient woodland falls within the western edge of the Corridor, at the northern extent; however, it could be avoided with careful routeing.

Corridor	NSN and Ramsar sites within 10 km	National statutory designated sites within 2 km	Other designated ecological sites and priority habitats within the Corridor
Corridor 36	Greater Wash SPA- approximately 7.2 km east. Humber Estuary SAC, SPA and Ramsar site - approximately 7.2 km north-east. Saltfleetby-Theddlethorpe Dunes & Gibraltar Point SAC - approximately 7.2 km north-east.	Calceby Marsh SSSI - approximately 1 km north-west of the Corridor in the vicinity of South Thoresby. Swaby Valley SSSI - approximately 1.8 km north-west of the Corridor in the vicinity of Swaby. Dalby Hill SSSI - approximately 600 m west of the Corridor, south of Dalby	Priority habitats including Deciduous Woodland. Ancient Woodland including: Hornby/Mother Woods; Swinn Wood; and Rigsby Wood, each of which lie directly adjacent to the Corridor. Withern Wood ancient woodland falls within the western edge of the Corridor, at the northern extent; however, it could be avoided with careful routeing.
Corridor 37	Greater Wash SPA - approximately 7.2 km east. Humber Estuary SAC, SPA and Ramsar site located approximately 7.2 km north-east. Saltfleetby-Theddlethorpe Dunes & Gibraltar Point SAC - approximately 7.2 km north-east.	Calceby Marsh SSSI - 1 km north-west of the Corridor in the vicinity of South Thoresby. Swaby Valley SSSI - approximately 1.8 km north-west of the Corridor in the vicinity of Swaby. Mavis Enderby Valley SSSI - at the edge of the Corridor, north of Mavis Enderby. Keal Carr SSSI - approximately 260 m east of the Corridor, north of East Keal. Jenkins Carr SSSI - approximately 1 km east of the Corridor, west of Toyton All Saints.	Priority habitats including Deciduous Woodland, Coastal and floodplain grazing marsh and good quality semi-improved grassland. Ancient Woodland including: Hornby/Mother Woods; Swinn Wood; and Rigsby Wood, each of which lie directly adjacent to the Corridor. Withern Wood ancient woodland falls within the western edge of the Corridor, at the northern extent; however, it could be avoided with careful routeing.

Corridor	NSN and Ramsar sites within 10 km	National statutory designated sites within 2 km	Other designated ecological sites and priority habitats within the Corridor
		Hundleby Clay Pit SSSI - approximately 700 m east of the Corridor, south of Hundleby.	
Corridor 9	The Wash SPA and Ramsar - approximately 50 m south-east. Gibraltar Point SPA and Ramsar site - approximately 3.0 km east. Saltfleetby-Theddlethorpe Dunes & Gibraltar Point SAC - approximately 3.0 km east. Greater Wash SPA - approximately 5.2 km east. Inner Dowsing, Race Bank and North Ridge SAC - approximately 10 km north-east. The Wash and Norfolk Coast SAC - approximately 50 m south-east.	The Wash SSSI - approximately 50 m south-east.	Priority habitats, including Coastal and floodplain grazing marsh located in small clusters throughout the Corridor. An RSPB Reserve (Frampton Marsh) is located at adjacent south of the Corridor to the west of The Haven. Havenside Nature Reserve is located along the eastern bank of The Haven within the Corridor.
Corridor 10	The Wash SPA and Ramsar - approximately 50 m south-east. Gibraltar Point SPA and Ramsar site - approximately 3.0 km east. Saltfleetby-Theddlethorpe Dunes & Gibraltar Point SAC - approximately 3.0 km east. Greater Wash SPA - approximately 5.2 km east. Inner Dowsing, Race Bank and North Ridge SAC - approximately 10 km north-east. The Wash and Norfolk Coast SAC - approximately 50 m south-east.	The Wash SSSI - approximately 50 m south-east. Bratoft Meadows SSSI - approximately 1.2 km north of the Corridor.	Priority habitats, including Coastal and floodplain grazing marsh located in small clusters throughout the Corridor. An RSPB Reserve (Frampton Marsh) is located at adjacent south of the Corridor to the west of The Haven. Havenside Nature Reserve is located along the eastern bank of The Haven within the Corridor.

Corridor	NSN and Ramsar sites within 10 km	National statutory designated sites within 2 km	Other designated ecological sites and priority habitats within the Corridor
Corridor 11	The Wash SPA and Ramsar - approximately 50 m south-east. Gibraltar Point SPA and Ramsar site - approximately 3.0 km east. Saltfleetby-Theddlethorpe Dunes & Gibraltar Point SAC - approximately 3.0 km east. Greater Wash SPA - approximately 5.2 km east. Inner Dowsing, Race Bank and North Ridge SAC - approximately 10 km north-east. The Wash and Norfolk Coast SAC - approximately 50 m south-east.	The Wash SSSI - approximately 50 m south-east. Bratoft Meadows SSSI - approximately 1.2 km north of the Corridor.	Priority habitats, including Coastal and floodplain grazing marsh located in small clusters through the Corridor. However, there is a large cluster at the north of the Corridor- north-west of Croft. An RSPB Reserve (Frampton Marsh) is located at adjacent south of the Corridor to the west of The Haven. Havenside Nature Reserve is located along the eastern bank of The Haven within the Corridor.
Corridor 12	Saltfleetby-Theddlethorpe Dunes & Gibraltar Point SAC - approximately 5 km east. Greater Wash SPA - approximately 5.3 km east. Gibraltar Point SPA and Ramsar - approximately 5.5 km south-east. Inner Dowsing, Race Bank and North Ridge SAC - approximately 7.1 km east. The Wash and Norfolk Coast SAC - approximately 7.0 km south-east. The Wash SPA and Ramsar - approximately 7.0 km south-east.	Bratoft Meadows SSSI - approximately 1.2 km north of the Corridor.	Priority habitats, including Coastal and floodplain grazing marsh and River Habitat Headwater Area located in small clusters through the Corridor. However, there is a large cluster at the north of the Corridor- north-west of Croft.
Corridor 13	Saltfleetby-Theddlethorpe Dunes & Gibraltar Point SAC - approximately 5 km east. Greater Wash SPA - approximately 5.3 km east.	Bratoft Meadows SSSI - approximately 1.2 km north of the Corridor.	Priority habitats, including Coastal and floodplain grazing marsh and River Habitat Headwater Area located in small clusters through

Corridor	NSN and Ramsar sites within 10 km	National statutory designated sites within 2 km	Other designated ecological sites and priority habitats within the Corridor
	Gibraltar Point SPA and Ramsar - approximately 5.5 km south-east. Inner Dowsing, Race Bank and North Ridge SAC - approximately 7.1 km east. The Wash and Norfolk Coast SAC - approximately 7.0 km south-east.		the Corridor. However, there is a large cluster at the north of the Corridor- north-west of Croft.
Corridor 14	The Wash SPA and Ramsar - approximately 50 m south-east. The Wash and Norfolk Coast SAC - approximately 50 m south-east Saltfleetby-Theddlethorpe Dunes & Gibraltar Point SAC - approximately 5 km east. Greater Wash SPA - approximately 5.3 km east. Gibraltar Point SPA and Ramsar - approximately 5.5 km south-east. Inner Dowsing, Race Bank and North Ridge SAC - approximately 7.1 km east.	Bratoft Meadows SSSI - approximately 1.2 km north of the Corridor. The Wash SSSI - approximately 50 m south-east.	Priority habitats, including Coastal and floodplain grazing marsh and River Habitat Headwater Area located in small clusters through the Corridor. However, there is a large cluster at the north of the Corridor- north-west of Croft. An RSPB Reserve (Frampton Marsh) is located at adjacent south of the Corridor to the west of The Haven. Havenside Nature Reserve is located along the eastern bank of The Haven within the Corridor.
Corridor 15	Saltfleetby-Theddlethorpe Dunes & Gibraltar Point SAC - approximately 5 km east. Inner Dowsing, Race Bank and North Ridge SAC - approximately 7.1 km east. Greater Wash SPA - approximately 5.3 km east. Gibraltar Point SPA and Ramsar - approximately 5.5 km south-east.	Bratoft Meadows SSSI - approximately 1.2 km north of the Corridor.	Priority habitats, including Coastal and floodplain grazing marsh and River Habitat Headwater Area located in small clusters through the Corridor. However, there is a large cluster at the north of the Corridor- north-west of Croft.

Corridor	NSN and Ramsar sites within 10 km	National statutory designated sites within 2 km	Other designated ecological sites and priority habitats within the Corridor
	The Wash and Norfolk Coast SAC - approximately 7.0 km south-east. The Wash SPA and Ramsar - approximately 7.0 km south-east.		
Corridor 16	The Wash and Norfolk Coast SAC - approximately 7.0 km south-east. The Wash SPA and Ramsar- approximately 7.0 km south-east.	None identified	Priority habitats, including Coastal and floodplain grazing marsh and River Habitat Headwater Area located in small clusters through the Corridor.
Corridor 17	The Wash and Norfolk Coast SAC - approximately 7.0 km south-east. The Wash SPA and Ramsar - approximately 7.0 km south-east.	None identified	Priority habitats, including Coastal and floodplain grazing marsh and River Habitat Headwater Area located in small clusters through the Corridor.
Corridor 18	The Wash and Norfolk Coast SAC - approximately 50 m south-east. The Wash SPA and Ramsar - approximately 50 m south-east.	The Wash SSSI - approximately 50 m south-east.	Priority habitats, including Coastal and floodplain grazing marsh and River Habitat Headwater Area located in small clusters through the Corridor. An RSPB Reserve (Frampton Marsh) is located at adjacent south of the Corridor to the west of The Haven. Havenside Nature Reserve is located along the eastern bank of The Haven within the Corridor.

Corridor	NSN and Ramsar sites within 10 km	National statutory designated sites within 2 km	Other designated ecological sites and priority habitats within the Corridor
Corridor 19	Saltfleetby-Theddlethorpe Dunes & Gibraltar Point SAC - approximately 5 km east. The Wash and Norfolk Coast SAC - approximately 5 km south-east. The Wash SPA and Ramsar - approximately 5 km south-east. Greater Wash SPA - approximately 5.3 km east. Gibraltar Point SPA and Ramsar - approximately 5.5 km south-east. Inner Dowsing, Race Bank and North Ridge SAC - approximately 7.1 km east.	Bratoft Meadows SSSI - approximately 1.2 km north of the Corridor.	Priority habitats, including Coastal and floodplain grazing marsh located in small clusters through the Corridor. However, there is a large cluster at the north of the Corridor- north-west of Croft.
Corridor 20	The Wash and Norfolk Coast SAC - approximately 2.9 km east. The Wash SPA and Ramsar - approximately 2.9 km east.	None	Priority Habitats including Deciduous Woodland and Coastal and Floodplain Grazing Marsh.
Corridor 21	The Wash and Norfolk Coast SAC - approximately 2.5 km east. The Wash SPA and Ramsar - approximately 2.5 km east.	None	Priority Habitats including Traditional Orchards and Coastal and Floodplain Grazing Marsh.
Corridor 22	The Wash and Norfolk Coast SAC - approximately 2.5 km east. The Wash SPA and Ramsar - approximately 2.5 km east.	None	None
Corridor 23	The Wash SPA and Ramsar - approximately 0.5 km east.	The Wash SSSI and NNR - approximately 0.5 km east	Priority Habitats including River Habitat Headwater Area, Deciduous Woodland, Coastal

Corridor	NSN and Ramsar sites within 10 km	National statutory designated sites within 2 km	Other designated ecological sites and priority habitats within the Corridor
	The Wash and Norfolk Coast SAC - approximately 1.0 km east.		saltmarsh, Lowland Calcareous Grassland and Floodplain Grazing Marsh. Frampton Marsh RSPB Reserve- directly adjacent to northern end of the Corridor.

Historic Environment

7.2.23 Designated heritage assets are present within Corridors 5, 8, 37, 10, 12, 13, 15, 16, 17 and 19 (see **Figure 7-7**). These are all Grade II Listed Buildings (one in Corridor 5, two in Corridor 8, one in Corridor 37, one in Corridor 10, five in Corridor 12, three in Corridor 13, five in Corridor 15, five in Corridor 16, three in Corridor 17 and three in Corridor 19), with the majority being located at the edges of the Corridors. There is considered sufficient space within the Corridors to avoid any direct impacts on these identified designated heritage assets through the application of careful routeing. Therefore, the impact on these designated heritage assets would be limited to effects upon their settings which would be temporary and only during the construction and installation phase.

7.2.24 Between the landfalls and the River Welland, there are numerous designated heritage assets within 1 km of the Corridors, the majority of which comprise scattered Grade II listed buildings. The designated heritage assets within 1 km of each Corridor are detailed in **Table 7-3** and shown in **Figure 7-7.**

7.2.25 There may be adverse effects upon the setting of designated heritage assets from construction and installation activities where routeing is in proximity and has an increased potential to disturb buried archaeology due to an assumed greater presence. However, due to the width of the Corridors there is sufficient flexibility to materially reduce impacts through careful routeing and the implementation of standard construction and installation practices and measures.

7.2.26 In addition to the identified designated heritage assets, there is a risk of unrecorded archaeology within all Corridors. The presence and extent of unrecorded archaeology would be determined through surveys at a later stage of the Project following consultation with relevant stakeholders. Careful routeing will seek to avoid known non-designated heritage assets. Where direct construction impacts on below ground archaeological remains (either known or previously unrecorded) cannot be avoided, these may be managed through standard mitigation measures such as preservation by record.

Figure 7-7 – Heritage features between the Theddlethorpe and Anderby Creek Landfall Study Areas and River Welland

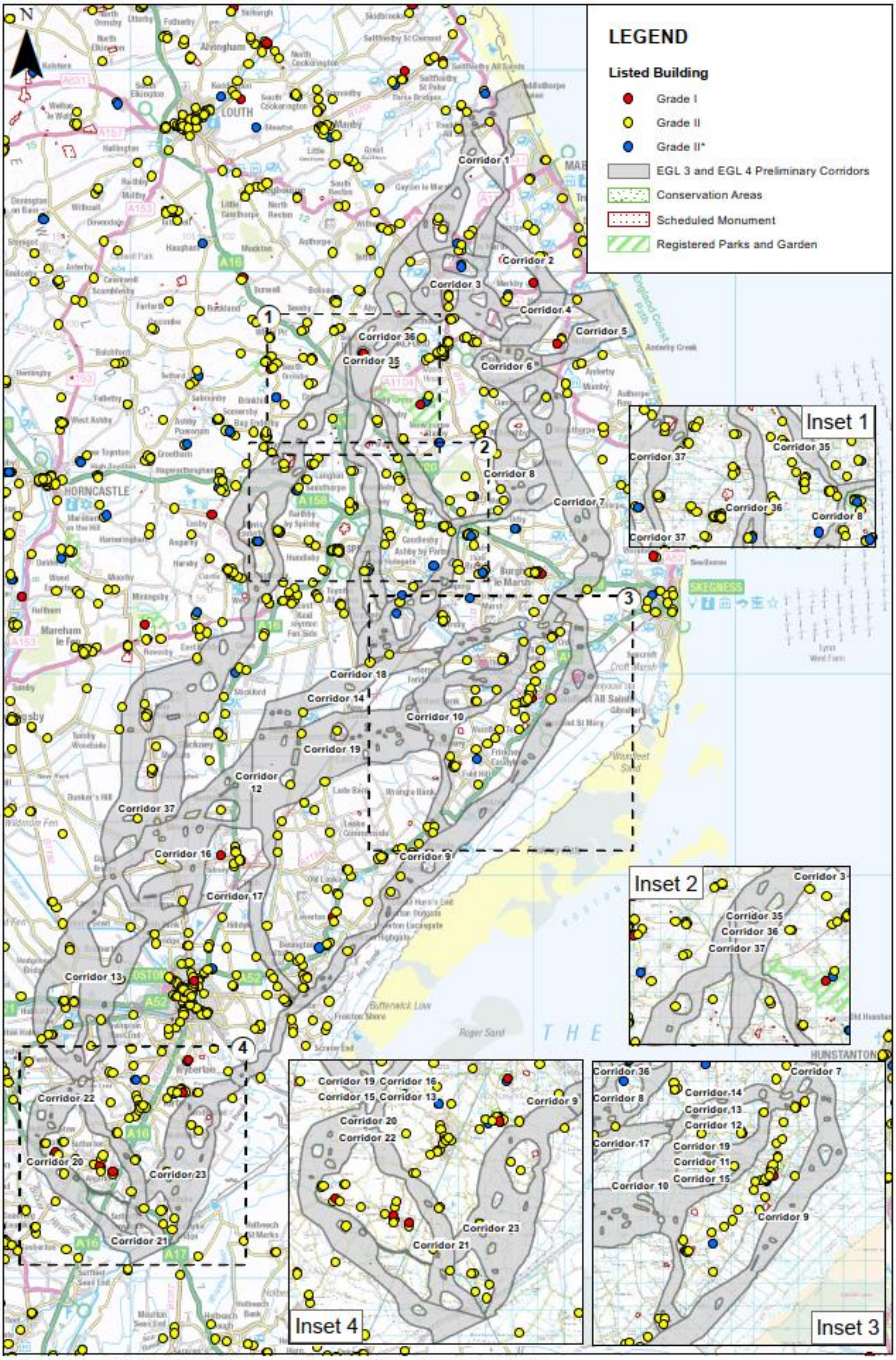


Figure 7-7 – Heritage features between the Landfalls and River Welland

Table 7-3 - Identified Designated Heritage Assets identified within 1 km

Corridor	Designated heritage assets within 1 km
Corridor 1	Two Scheduled Monuments within 500 m of the Corridor – the closest being *Moated site 100 m south of Stain Farm* approximately 310 m east of the Corridor, situated between Stain Hill Farm and Stain Lane. One Grade I Listed Building (*Church of All Saints)* located 500 m north of the Corridor, in the vicinity of Theddlethorpe All Saints. Four Grade II* Listed Buildings predominantly located near the south of the Corridor near Beesby Road, Field Lane and Church Lane – the closest being *Church of St Oswald* approximately 130 m away and is within one of the areas specifically excluded from the Corridor, north of Strubby. 16 Grade II Listed Buildings surround the Corridor, the closest being *The Old Vicarage* which is approximately 100 m away from the Corridor and north-west of Strubby.
Corridor 2	One Scheduled Monument, *Hagnaby Abbey,* located approximately 400 m south of the Corridor, north of Hagnaby. One Grade I Listed Building, *Church of St Andrew*, located approximately 230 m west of the southern extent of the Corridor, north of Hannah, in the vicinity of Hill Farm. Four Grade II Listed Buildings located east/north-east of the Corridor, respectively, the closest being *Wind Pump at Brick Yard* located approximately 100 m away in the vicinity of Lakeside Springs Caravan Park.
Corridor 3	Five Scheduled Monuments surrounding the Corridor, the closest being *Churchyard cross, St Margaret's churchyard*, Saleby which is approximately 340 m away and is in Saleby. *Markby Priory* Scheduled Monument is also located approximately 340 m east of the Corridor, in the vicinity of Markby. Four Grade II* Listed Buildings scattered across the north and east side of the Corridor. The closest is *Church of All Saints* and is approximately 250 m north of the Corridor, south-west of Maltby Le Marsh. 25 Grade II Listed Buildings surrounding the Corridor. The closest is *The Old Chapel* and is approximately 17 m north, along the A1104 Beesby Road, between Beesby and Maltby Le Marsh.
Corridor 4	One Scheduled Monument, *Markby Priory*, located 780 m north-west of the Corridor, near Markby. Two Grade I Listed Buildings, located to the north and south-east of the Corridor. The closest is *Church of St Andrew*, and is located approximately 620 m north of Corridor, near Hannah. One Grade II* Listed Building, *Church of St Peter*, located approximately 940 m north of the Corridor, near Markby. Six Grade II Listed Buildings surrounding the Corridor, the closest is *Stain Glebe Farm* and is approximately 620 m east of the Corridor, east of the A52 Sutton Road.

Corridor	Designated heritage assets within 1 km
Corridor 5	One Scheduled Monument, *Churchyard cross, St Andrew's churchyard*, located 320 m south of the Corridor, off Sea Road, near Anderby. One Grade I Listed Building, *Church of St Margaret*, located 490 m north of the southern extent of the Corridor, near Huttoft. Nine Grade II Listed Buildings, one of which falls within the Corridor; the remaining are located mainly to the south and south-west of the Corridor in the vicinity of Anderby and Huttoft. *Stain Glebe Farm* Grade II Listed Building is within the northern limb of the Corridor; however, it could be avoided with careful routeing.
Corridor 6	One Scheduled Monument, *Churchyard cross*, *Holy Trinity churchyard* located approximately 1 km north-west of the Corridor, in the vicinity of Bilsby. One Grade II* Listed Building, *Church of the Holy Trinity*, located approximately 1 km north-west of the Corridor, near Bilsby. Nine Grade II Listed Buildings located north-west and south-west of the Corridor. The closest is a Brick Kiln and is located 300 m south of the Corridor, south-east of Farlesthorpe.
Corridor 7	Two Scheduled Monuments including *Churchyard cross, St Thomas of Canterbury's churchyard* located approximately 450 m east of the Corridor, north of Mumby; and *Butterbump round barrow cemetery* located 300 m west of the Corridor, south-east of Bonthorpe. One Grade I Listed Building, *Church of St Thomas of Canterbury*, located 450 m east of Corridor, north of Mumby. Eight Grade II Listed Buildings, mainly clustered to the northern extent and southern extent of the Corridor.
Corridor 8	Six Scheduled Monuments, scattered around the Corridor. The closest of which include: *Churchyard cross, Old Church* located approximately 70 m north of the Corridor, south-west of Great Steeping; *Churchyard cross, St Andrew's churchyard* specifically excluded from the Corridor between Great Steeping and Little Steeping, 70 m from the Corridor at its closest point. One Grade II Registered Park and Garden, *Gunby Hall* located directly adjacent to the south of the Corridor, at Gunby. Nine Grade II* Listed Buildings, the closest of which is *Church of St Andrew* specifically excluded from the Corridor between Great Steeping and Little Steeping, 70 m from the Corridor at its closest point. 37 Grade II Listed Buildings of which two are located within the Corridor, these include: *Hogsbeck House,* Grade II Listed Building, located within the northern extent of the Corridor, west of Sloothby; and, *Clarey's Bridge*, Grade II Listed Building, located within the southern tip of the Corridor along Thorpe Bank road.
Corridor 35	10 Scheduled Monuments, the closest of which is *Site of St Mary's Priory, Greenfield* specifically excluded from the Corridor, 90 m away at its closest point, located to the south of Mother Wood in the northern extent of the Corridor. Two Grade II Registered Parks and Gardens, the closest of which is *Well Hall* located directly adjacent to the Corridor, north of Ulceby.

Corridor	Designated heritage assets within 1 km
	Two Grade I Listed Buildings, the closest of which is the *Church of St Leonard* specifically excluded from the Corridor, 240 m away at its closest point, within the settlement of Hough. Four Grade II* Listed Buildings, the closest of which is the *Church of St Andrew*, 860 m west of the Corridor, in the vicinity of South Thorseby. 48 Grade II Listen Buildings, the closest of which is *Skendleby Lodge*, 100 m west of the Corridor, north of Skendleby.
Corridor 36	17 Scheduled Monuments, the closest of which is the *Site of St Mary's Priory, Greenfield* specifically excluded from the Corridor, 90 m away at its closest point, located to the south of Mother Wood in the northern extent of the Corridor. One Grade II Registered Park and Garden *Well Hall* located directly adjacent to the Corridor, north of Ulceby. One Conservation Area (*Spilsby*) located 700 m west of the Corridor at the settlement of Spilsby. One Grade I Listed Building, the *Church of St Leonard* specifically excluded from the Corridor, 240 m away at its closest point, within the settlement of Hough. Six Grade II* Listed Buildings, the closest of which is the *Church of St Andrew*, located 50 m west of the Corridor. 56 Grade II Listed Buildings, the closest of which is *The Old Rectory*, 50 m east of the Corridor.
Corridor 37	11 Scheduled Monuments, the closest of which is *Settlement site* which is directly adjacent, but specifically excluded from the Corridor in the vicinity of Aswardby. Two Grade II Registered Parks and Gardens, the closest of which is *Well Hall*, located directly east of the Corridor, north of Ulceby. Two Conservation Areas, the closest of which is *Raithby*, located directly east of the Corridor at the settlement of Raithby. Seven Grade I Listed Buildings, the closest of which is the *Church of St Leonard* specifically excluded from the Corridor, 240 m away at its closest point, within the settlement of Hough. 11 Grade II* Listed Buildings, the closest of which is the *Church of St Helen*, located 215 m south-west of the Corridor in the vicinity of Stickford. 95 Grade II Listed Buildings, in which *Bridge over Twenty Foot Drain*, located at the south of the Corridor, along Northlands Road. The closest outside the Corridor is *Skykes Farm Cottage*, located 20 m west of the Corridor, west of New Bolingbroke.
Corridor 9	One Scheduled Monument, *Medieval Salt Workings*, approximately 270 m west from the Corridor at Wainfleet St Mary. Two Conservation Areas, *Wainfleet All Saints* 760 m west and *Wrangle* approximately 900 m west. Seven Grade I Listed Buildings, the closest being *Church of St James* approximately 300 m north-west from the Corridor, south of Freiston. Three Grade II* Listed Buildings, the closest being *The Priory* which is approximately 230 m from the Corridor, south of Freiston.

Corridor	Designated heritage assets within 1 km
	47 Grade II Listed Buildings, the closest being *The Old Rectory*, approximately 60 m in an area specifically excluded from the Corridor at Sea End.
Corridor 10	Eight Scheduled Monuments, the closest being *Decoy Wood Decoy Pond* approximately 160 m south-east of the Corridor, north of Friskney. Two Conservation Areas, *Wainfleet All Saints* (740 m east) and *Wrangle* approximately 900 m west. Nine Grade I Listed Buildings, the closest being *Church of All Saints* approximately 70 m south-east at Croft. Five Grade II* Listed Buildings the closest being *The Priory* which is approximately 230 m from the Corridor, just south of Freiston. 83 Grade II Listed Buildings, in which *Mile Post*, north-east of Jude Gate, located within the Corridor north-east of Wangle. The closest outside the Corridor is *Lymm Bank Farmhouse*, which is in an area specifically excluded from the Corridor at Lymn Bank East and approximately 20 m away from the Corridor.
Corridor 11	Five Scheduled Monuments, closest is *Decoy Wood Decoy Pond* approximately 140 m south-east of the Corridor, north of Friskney. One Conservation Area (*Wainfleet*), approximately 760 m east of the Corridor. Four Grade I Listed Buildings, the closest being *Church of All Saints*, approximately 74 m south-east from the Corridor at Croft. Three Grade II* Listed Buildings, the closest being *The Priory* which is approximately 230 m from the Corridor, south of Freiston. 86 Grade II Listed Buildings the closest being *Lymm Bank Farmhouse*, which is in an area specifically excluded from the Corridor at Lymn Bank East and approximately 20 m away from the Corridor.
Corridor 12	One Scheduled Monument, *Sibsey Trader Mill* which is approximately 690 m east from the Corridor at Sibsey. One Grade I Listed Building, *Church of All Saints* which is approximately 70 m south-east at Croft. 46 Grade II Listed buildings, in which there are five located within the Corridor (*Frith Bank Bridge*, located at the south of the Corridor at Frith Bank; *Church of St Gilbert*, located at the south of the Corridor west of Brothertoft; *Brothertoft Hall*, located at the south of the Corridor at Brothertoft; *Milestone* near junction with Fenhouses Drove, located at the south of the Corridor west of Kirton Holme; and *Milestone* east of Baker’s Bridge, located at the south of the Corridor, east of Kirton Holme). The closest outside the Corridor is *Clarey’s Bridge* which is approximately 20 m north of the Corridor at Thorpe Bank. One Conservation Area, *Kirton Holme*, which is approximately 220 m from the Corridor in an area specifically excluded.
Corridor 13	One Grade I Listed Building, *Church of All Saints* which is approximately 66 m south-east of the Corridor at Croft. 41 Grade II Listed Buildings, in which there are three within the Corridor (*Frith Bank Bridge*, located at the south of the Corridor at Frith Bank; *Milestone* east of Baker’s Bridge, located at the south of the Corridor, east of Kirton Holme; and *Milestone* near junction with Fenhouses Drove, located at the south of the

Corridor	Designated heritage assets within 1 km
	Corridor, west of Kirton Holme. The closest outside the Corridor is *Clarey's Bridge* which is approximately 20 m north at Thorpe Bank. One Conservation Area, *Kirton Holme* which is approximately 220 m from the Corridor in an area specifically excluded.
Corridor 14	One Scheduled Monument, *Churchyard Cross, St James's Churchyard* which is approximately 420 m south-west in Freiston. Four Grade I Listed Buildings, the closest being *Church of All Saints* which is approximately 70 m south-east of the Corridor at Croft. One Grade II* Listed Building, *The Priory* which is approximately 230 m west in Freiston. 48 Grade II Listed Buildings, *Clarey's Bridge* which is approximately 20 m north at Thorpe Bank.
Corridor 15	Five Scheduled Monuments, the closest is *Decoy Wood Decoy Pond,* which is approximately 140 m south-east of the Corridor, North of Friskney. Three Grade I Listed Buildings, the closest being *Church of All Saints*, approximately 70 m south-east from the Corridor at Croft. Two Grade II* Listed Buildings, the closest being *Church of St Mary*, located south of Wainfleet Bank and is approximately 290 m away in an area specifically excluded from the Corridor. 84 Grade II Listed Buildings, in which there are five within the Corridor (*Frith Bank Bridge*, located at the south of the Corridor at Frith Bank; *Church of St Gilbert*, located at the south of the Corridor at Brothertoft; *Brothertoft Hall*, located at the south of the Corridor at Brothertoft; *Milestone* near junction with Fenhouses Drove, located at the south of the Corridor at Kirton Holme; and *Milestone* east of Baker's Bridge, located at the south of the Corridor at Kirton Holme). The closest outside the Corridor is *Clarey's Bridge* which is approximately 20 m north of the Corridor at Thorpe Bank. Two Conservation Areas, *Wainfleet* (approximately 760 m east) and *Kirton Holme* (approximately 220 m from the Corridor in an area specifically excluded).
Corridor 16	Two Scheduled Monuments, the closest is *Sibsey Trader Windmill* which is approximately 690 m east from the Corridor at Sibsey. One Conservation Area, *Kirton Holme* (approximately 220 m away in an area specifically excluded from the Corridor). One Grade I Listed Building, *Sibsey Trader Mill*, which is approximately 690 m east from the Corridor at Sibsey. 34 Grade II Listed Buildings, in which there are five within the Corridor (*Frith Bank Bridge*, located at the south of the Corridor at Frith Bank; *Church of St Gilbert*, located at the south of the Corridor at Brothertoft; *Brothertoft Hall*, located at the south of the Corridor at Brothertoft; *Milestone* near junction with Fenhouses Drove, located at the south of the Corridor at Kirton Holme; and *Milestone* east of Baker's Bridge, located at the south of the Corridor at Kirton Holme). The closest outside the Corridor is *Clarey's Bridge* which is approximately 20 m north at Thorpe Bank.

Corridor	Designated heritage assets within 1 km
Corridor 17	One Conservation Area, *Kirton Holme* (approximately 220 m away in an area specifically excluded from the Corridor). 30 Grade II Listed Buildings, in which there are three within the Corridor (*Frith Bank Bridge*, located at the south of the Corridor at Frith Bank; *Milestone* near junction with Fenhouses Drove, located at the south of the Corridor at Kirton Holme; and *Milestone* east of Baker's Bridge, located at the south of the Corridor at Kirton Holme). The closest outside the Corridor is *Clarey's Bridge* which is approximately 20 m north at Thorpe Bank.
Corridor 18	One Scheduled Monument (*Cross Shaft in Churchyard of Church of St James*), which is approximately 410 m west of the Corridor at Freiston. Two Grade I Listed Buildings, the closest is *Church of St James* which is approximately 290 m north-west at Freiston. One Grade II* Listed Building, *The Priory* which is approximately 230 m north-west at Freiston. 35 Grade II Listed Buildings, the closest is *Clarey's Bridge* which is approximately 20 m north at Thorpe Bank.
Corridor 19	Four Scheduled Monuments, the closest is *Decoy Wood Decoy Pond* which is approximately 140 m south-east. Two Conservation Areas, *Wainfleet* (approximately 760 m east) and *Kirton Holme* (approximately 220 m away in an area specifically excluded from the Corridor). Three Grade I Listed Buildings, the closest is *Church of All Saints* which is approximately 70 m south-east at Croft. Two Grade II* Listed Buildings, the closest being *Church of St Mary*, located south of Wainfleet Bank and is approximately 290 m away in an area specifically excluded from the Corridor. 84 Grade II Listed Buildings, in which there are three within the Corridor (*Frith Bank Bridge*, located at the south of the Corridor at Frith Bank; *Milestone* near Junction with Fenhouses Drove, located at the south of the Corridor at Kirton Holme; and *Milestone* east of Baker's Bridge, located at the south of the Corridor at Kirton Holme). The closest outside the Corridor is being *Lymm Bank Farmhouse*, which is in a cut out section within the Corridor at Lymn Bank East and approximately 20 m away.
Corridor 20	One Conservation Area, Wigtoft, located approximately 220 m east of the Corridor. One Grade I Listed Building, *Church of St Peter and St Paul*, located approximately 380 m north-east of the Corridor at Wigtoft. 18 Grade II Listed Buildings, the closest of which being *Burtoft Manor Farmhouse*, located approximately 100 m from the Corridor in a specifically excluded area south of Wigtoft.
Corridor 21	The Grade II Listed Building *Farm Buildings and Mounting Block at Dean's Farm* is located within the central section of the Corridor east of Algarkirk. The Grade II Listed Building *Milepost, east of Waste Green Lane* is located within the southern section of the Corridor west of Fosdyke. Two Scheduled Monuments. The closest of which is *Shrunken medieval village* located 470 m west of the Corridor at Algarkirk.

Corridor	Designated heritage assets within 1 km
	Two Grade I Listed Buildings. The closest of which being the *Church of St Peter and St Paul* located approximately 500 m west of the Corridor at Wigtoft. 16 Grade II Listed Buildings, the closest of which being *Dean's Farmhouse* located approximately 50 m west of the Corridor on Archer's Lane.
Corridor 22	The Grade II Listed Building Milepost, east of Waste Green Lane is located within the southern section of the Corridor west of Fosdyke. Two Scheduled Monuments. The closest of which is *Churchyard Cross at All Saint's Churchyard* located 400 m east of the Corridor at Fosdyke. One Conservation Area, Wigtoft, is located 110 m north of the Corridor. One Grade I Listed Building, *Church of St Peter and St Paul*; is located approximately 150 m north of the Corridor at Wigtoft. 24 Grade II Listed Buildings, the closest of which being Burtoft Manor Farmhouse, located approximately 100 m from the Corridor in a specifically excluded area south of Wigtoft.
Corridor 23	The Grade II Listed Building *Milepost, east of Waste Green Lane* is located within the southern section of the Corridor west of Fosdyke. Two Scheduled Monuments. The closest of which is *Multon Hill Moated Site* located 60 m west of the Corridor south-east of Frampton in an area specifically excluded from the Corridor. One Conservation Area, Frampton, is located approximately 250 m north-west of the Corridor. One Grade I Listed Building is, *Church of St Mary,* is located 300 m north-west of the Corridor at Frampton. Three Grade II* Listed Buildings are located within 1 km of the Corridor, the closest of which being *Gates, Screen, Piers and Wall to Frampton Hall*, located 430 m north-west of the Corridor at Frampton. 32 Grade II Listed Buildings, the closest of which being *Manor House*, located 30 m west of the Corridor on Washdike Road.

Water Environment

7.2.27 There are several surface water and groundwater features within and adjacent to the Corridors. Potential effects on these features include:

- Turbid run-off which could enter the water environment during construction;
- Changes to surface water runoff patterns affecting flood risk during construction;
- Potential damage to flood defences or surface water drainage infrastructure during construction;
- Pollution or flow disruption of groundwater caused through excavation or piling as part of construction work;
- Changes to surface water drainage at identified features during operation;
- Potential risk that infrastructure could result in the release of sediment-laden runoff and pollution to controlled water bodies (surface water and groundwater), changes to hydrological regime and physical disturbance to watercourses; and

- Potential risk of impacts on water resource availability, including impacts to groundwater levels from any dewatering required during construction.

7.2.28 Careful routeing will seek to avoid areas sensitive to the water environment (e.g., environmentally designated sites, sources of water use/abstractions), Flood Zones 2 and 3, and minimise watercourse and drain crossings. Appropriate construction methods would be considered at sensitive locations and development and adherence to appropriate management measures would be required. Further detailed assessments of impacts would be undertaken including both a Flood Risk Assessment (FRA) and Water Framework Directive (WFD) assessment. Water environment features are shown in **Figure 7-8** and detailed in **Table 7-4**. Other watercourses and drains, including Internal Drainage Board (IDB) watercourses, are present within each of the Corridor and are also likely to require crossing in addition to the features listed in **Table 7-4**.

Figure 7-8 – Water environment features between the Theddlethorpe and Anderby Creek Landfall Study Areas and River Welland

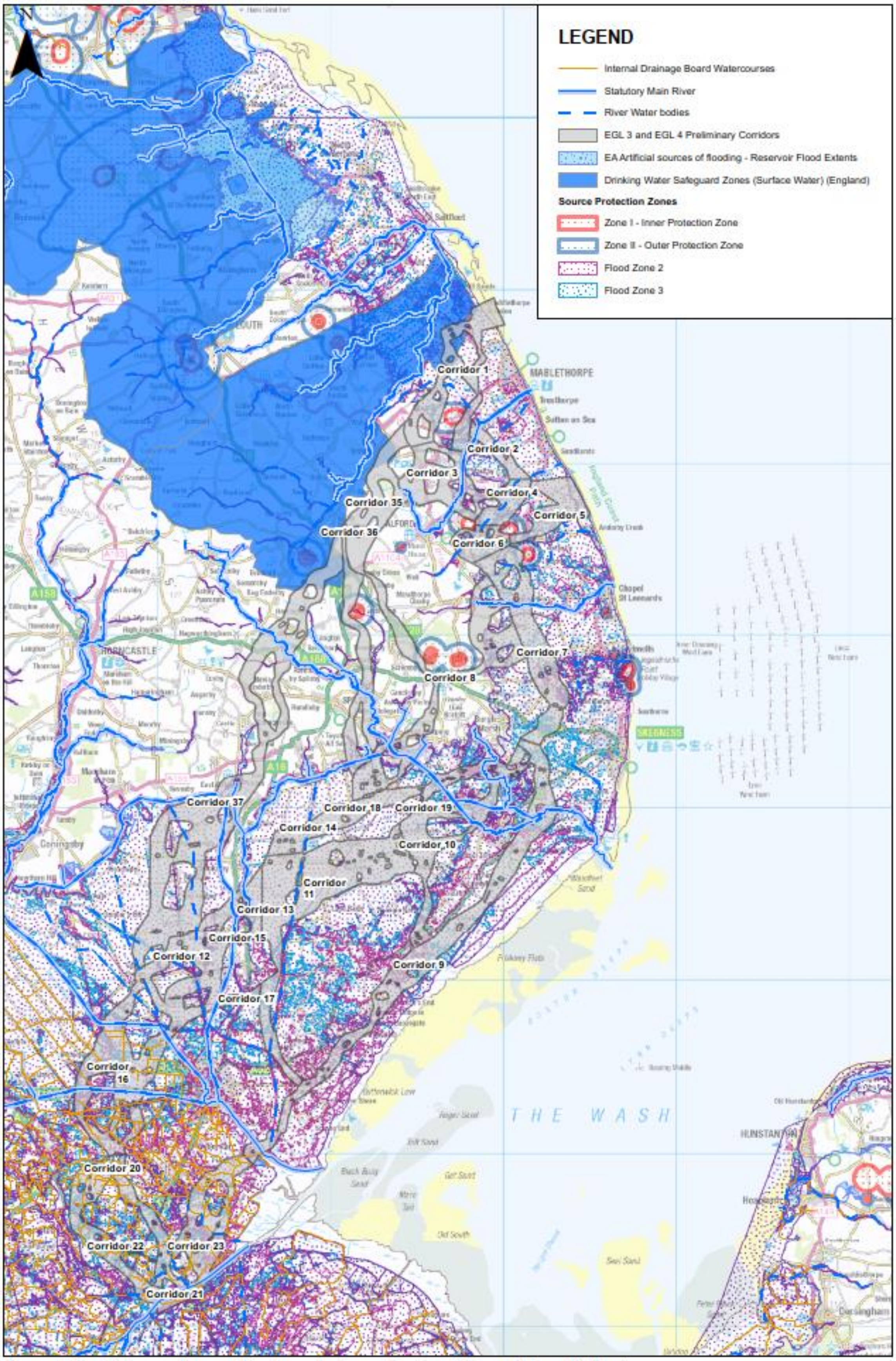


Figure 7-8 – Water environment features between the Landfalls and River Welland

0 3 6 9 km

SCALE:1:350,000

Table 7-4 - Water environment features within and adjacent to Corridor

Corridor	Water Environment Features Within and Adjacent to Corridor
Corridor 1	The Corridor is above a principal bedrock aquifer. Within the Corridor groundwater vulnerability is high at the landfall with areas of medium vulnerability at Maltby Le Marsh. The Corridor is above a surface water drinking water safeguard zone, located west of Mablethorpe Road between the landfall and Maltby le Marsh. A source protection zone (Zone I) (SPZ1) lies within the centre of the of the Corridor’s eastern leg, north of Maltby Le Marsh, but could be avoided. Flood Zones 2 and 3 (FZ2 and FZ3 respectively) are present across the Corridor, covering approximately 73% and 71% respectively and cannot be avoided. WFD river waterbodies are present (such as Trusthorpe Pump Drain (upper end)) within the Corridor and are likely to require crossing. The Saltfleetby - Theddlethorpe Dunes SSSI is a Groundwater dependent terrestrial ecosystem (GWDTE) and located approximately 100 m east of the Corridor.
Corridor 2	The Corridor is above a principal bedrock aquifer. Within the Corridor groundwater vulnerability sections of medium-high vulnerability are present at the centre of the Corridor. FZ2 and FZ3 present across the Corridor and cover approximately 100% of the Corridor and cannot be avoided. Main Rivers within the Corridor are Wold Grift Drain, near Maltby Le Marsh, which will require crossing. WFD river waterbodies are present and includes the Wold Grift Drain and Trusthorpe Pump Drain (lower end), which will both require crossing.
Corridor 3	The Corridor is above a principal bedrock aquifer. Within the Corridor, Groundwater vulnerability is medium-high across the Corridor. A SPZ1 lies within the Corridor in its south-east corner and can be avoided by routeing north of the area. FZ2 and FZ3 are present across the Corridor and cover approximately 17% and 15% of the Corridor, respectively, however cannot be avoided due to their distribution within the Corridor. Main Rivers include the Wold Grift Drain, which is required to be crossed as it flows through the east and west of the Corridor. This river flows from Hagnaby to Alford. WFD river waterbodies are present and include the Woldgrift Drain which will require crossing.
Corridor 4	The Corridor is above a principal bedrock aquifer.

Corridor	Water Environment Features Within and Adjacent to Corridor
	Within the Corridor, Groundwater vulnerability is predominantly medium throughout the Corridor. A SPZ1 lies within the Corridor in the south-western corner which can be avoided. FZ2 and FZ3 are present across the Corridor and cover approximately 74% and 79% of the Corridor, respectively, and cannot be avoided. WFD river waterbodies are present and include the Boygrift Drain, which can be avoided if routed from the Theddlethorpe landfall. If routed from Anderby Creek landfall, this will require a crossing.
Corridor 5	The Corridor is above a principal bedrock aquifer. Within the Corridor, Groundwater vulnerability is medium-high vulnerability at a section at the coastline landfall. A SPZ1 lies within the Corridor in its south-western corner, which can be avoided. FZ2 and FZ3 are present across the Corridor and cover approximately 89% and 84% of the Corridor, respectively, and cannot be avoided. WFD river waterbodies are present and include Anderby Main Drain which can be avoided. Sea Bank Clay Pits SSSI is a GWDTE and is directly adjacent to the northern extent of the Corridor and as such can be avoided.
Corridor 6	The Corridor is above a principal bedrock aquifer. Within the Corridor, Groundwater vulnerability is medium-high vulnerability at a section of the coastline landfall. Two SPZ1 lie within the Corridor; one in its south-eastern corner, which can be avoided, and the other located at the northern tip of the Corridor, south-east of Bilsby, which can also be avoided. FZ2 and FZ3 are present across the Corridor and cover approximately 89% and 84% of the Corridor, respectively, which cannot be avoided. WFD river waterbodies are present and include Anderby Main Drain which can be avoided.
Corridor 7	The Corridor is above a principal bedrock aquifer. Within the Corridor, groundwater vulnerability is high in the north of the Corridor. A SPZ1 and a source protection zone (Zone II) (SPZ2) are in the north of the Corridor near Mumby. FZ2 and FZ3 are present across the Corridor and cover approximately 95% and 90% of the Corridor, respectively, which cannot be avoided. Main Rivers include Willoughby High Drain, which flows between Chapel St Leonards and Willoughby. WFD river waterbodies include Boygrift Drain, Anderby Main Drain, Willoughby High Drain, Ingoldmells Main Drain and Cowbank Drain.
Corridor 8	The Corridor is above a principal bedrock aquifer.

Corridor	Water Environment Features Within and Adjacent to Corridor
	Within the Corridor, groundwater vulnerability is a mixture of low, medium and high. A SPZ2 is present at the centre of the Corridor. FZ2 and FZ3 are present across the Corridor and both cover approximately 50% the Corridor, which cannot be avoided. Main Rivers include Willoughby High Drain, just north of Sloothby, Steeping River, near Little Steeping, East Fen catchwater Drain, north-west of Little Steeping and Lady Wath’s Beck which intercepts south-west of Great Steeping. WFD river waterbodies include river water bodies such as Willoughby High Drain, Ingoldmells Main Drain, River Lymn/Steeping and Bell Water Drain.
Corridor 35	Within the Corridor, groundwater vulnerability is predominantly medium throughout the north of the Corridor and then is unproductive towards the southern end of the Corridor. The Corridor is above a surface water drinking water safeguard zone, located in the north of the Corridor. FZ2 and FZ3 are not present within the Corridor. Main Rivers include the Great Eau river and Wold Grift Drain, located adjacent to the Corridor. WFD river waterbodies adjacent to the Corridor include the Great Eau and Wold Grift Drain.
Corridor 36	Within the Corridor, groundwater vulnerability is predominantly medium throughout the north of the Corridor and then is unproductive towards the south end of the Corridor. A surface water drinking water safeguard zone is present in the north of the Corridor and in the vicinity of Ulceby Cross. A SPZ1 is present within the Corridor in the vicinity of Fordington. FZ2 and FZ3 are present within the Corridor, and both cover approximately 5% of the Corridor but cannot be avoided due to their distribution. Main Rivers include River Lymn and East Fen Catchwater Drain which run across the south end of the Corridor and cannot be avoided. WFD river waterbodies adjacent to the Corridor include the Great Eau and Woldgrift Drain. The River Lymn/Steeping cross the entire width of the Corridor; as does the East Fen Catchwater Drain in the south.
Corridor 37	Within the Corridor, groundwater vulnerability is predominantly medium throughout the north of the Corridor and then is unproductive towards the southern end of the Corridor. The Corridor is above a surface water drinking water safeguard zone, located near Ulceby Cross/Driby Top. FZ2 and FZ3 are present across the Corridor, and both cover approximately 20% of the Corridor but cannot be avoided due the distribution of FZ2 and FZ3 in the Corridor.

Corridor	Water Environment Features Within and Adjacent to Corridor
	Main Rivers include River Lymn which runs across the centre and West Fen Catchwater Drain and Hagnaby Beck in the south section of the Corridor. WFD river waterbodies adjacent to the Corridor include the Great Eau and Woldgrift Drain. Numerous WFD river waterbodies also fall within the Corridor, including; River Lymn/Steeping, Maud Foster and Fen Catchwater Drains, East & West Fen Drains and Newham Drain.
Corridor 9	The Corridor is above a principal bedrock aquifer located underneath the Corridor in the north between Burgh le Marsh and Wainfleet All Saints. Within the Corridor, groundwater vulnerability is medium-high (in the north). FZ2 and FZ3 are present across the Corridor covering approximately 98% and cannot be avoided. Main Rivers include the Haven near Boston, Wainfleet Relief Channel and Steeping River near Wainfleet St Mary and Croft Marsh, which intersect at the northern and southern areas of the Corridor. WFD river waterbodies, including Tributary of Hobhole Drain, Leake Gride, Tributary of Steeping River, River Lymn and Little River Lymn.
Corridor 10	The Corridor is above a principal bedrock aquifer located underneath the Corridor in the north between Burgh le Marsh and Wainfleet All Saints. Within the Corridor, groundwater vulnerability is medium-low (in the north). FZ2 and FZ3 are present across the Corridor covering approximately 98% and cannot be avoided. Main Rivers include The Haven in the south near Boston and Steeping River, Wainfleet, The Lymn and Cowcroft Drain in the north near Wainfleet All Saints, and these cannot be avoided and will need a crossing. WFD river waterbodies include River water bodies River Lymn, Bell Water Drain, Fodder Dike, Lade Bank drain, Tributary of Steeping River, Leake Gride and Tributary of Hobhole Drain and it cannot be avoided as the drains are throughout the Corridor.
Corridor 11	The Corridor is above a principal bedrock aquifer located underneath the Corridor in the north between Burgh Le Marsh and Wainfleet All Saints. FZ2 and FZ3 are present across the Corridor covering approximately 98% and cannot be avoided. Main Rivers include four intersections at the north near Wainfleet All Saints (The Lymn, Steeping River, Wainfleet Relief Channel and Cowcroft Drain) and one intersection at the south near Boston (The Haven). These are unavoidable and will need to be crossed. WFD river waterbodies include River Lymn, Bell Water Drain, Fodder Dike, Wyberton March Drain and Tributary of Hobhole Drain. All will need to be crossed as these waterbodies are distributed throughout the Corridor.

Corridor	Water Environment Features Within and Adjacent to Corridor
Corridor 12	The Corridor is above a principal bedrock aquifer located underneath the Corridor in the north between Burgh le Marsh and Wainfleet All Saint. FZ2 and FZ3 are present across the Corridor covering approximately 98% and cannot be avoided. Main Rivers include eight that cross the Corridor (The Lymn, Steeping River and Cowcroft Drain in the north near Thorpe St Peter and East Fen Catchwater Drain, West Fen Catchwater Drain, Stone Bridge Drain, River Witham and South Forty Foot Drain in the south near Boston) and these cannot be avoided and will need a crossing. WFD river waterbodies include River water bodies; River Lymn, Bell water Drain, Hobhole Drain, Maud Foster Drain, West Fen catchwater Drain, Lower Witham, North Forty Foot Drain, South Forty Foot Drain and Old Hammond Beck and these cannot be avoided and will need crossed.
Corridor 13	The Corridor is above a principal bedrock aquifer located underneath the Corridor in the north between Burgh Le Marsh and Wainfleet All Saint. FZ2 and FZ3 are present across the Corridor covering approximately 98% and cannot be avoided. Main Rivers include three in the north and three in the south (Wainfleet Relief Channel, Steeping River and Cowcroft Drain between Little Steeping and Wainfleet All Saints and Trader Bank, River Witham and South Forty Foot Drain near Boston). All of which will need crossed and cannot be avoided. WFD river waterbodies include Tributary of Hobhole Drain, North Forty Foot Drain, South Forty Foot Drain, Old Hammond Beck, Bell water drain, River Lymn and Little River Lymn. All will need to be crossed as these are throughout the Corridor.
Corridor 14	The Corridor is above a principal bedrock aquifer located underneath the Corridor in the north, between Burgh le Marsh and Wainfleet All Saints. FZ2 and FZ3 are present across the Corridor covering approximately 98% and cannot be avoided. Main Rivers include three that the Corridor intercepts and they must be crossed. There are two in the northern section (Steeping River and The Lymn/Cowcroft Drain near Wainfleet All Saints) and one in the southern area (The Haven), near Boston, of the Corridor. WFD river waterbodies are present throughout the Corridor, including Little River Lymn, River Lymn, Bell Water Drain, Hobhole Drain and Tributary of Hobhole Drain. All of which will need to be crossed.
Corridor 15	The Corridor is above a principal bedrock aquifer located underneath the Corridor in the north between Burgh le Marsh and Wainfleet All Saints. FZ2 and FZ3 are present across the Corridor covering approximately 98% and cannot be avoided. Main Rivers include nine which all intersect the Corridor and will need crossing. There are four in the north (Steeping River, Wainfleet Relief Channel, The Lymn

Corridor	Water Environment Features Within and Adjacent to Corridor
	and Cowcroft Drain between Little Steeping and Wainfleet All Saints), three in the middle just south of Stickney (West Fen Catchwater Drain, East Fen Catchwater Drain and Stone Bridge Drain) and two in the south (River Witham and South Forty Foot Drain), just north-west of Boston. WFD river waterbodies are throughout the whole Corridor and cannot be avoided. These include River Lymn, Fodder Dike, Maud Foster Drain, West Fen Catchwater Drain and South Forty Foot Drain.
Corridor 16	FZ2 and FZ3 are present across the Corridor covering approximately 98% and cannot be avoided. Main Rivers include five which are West Fen Catchwater Drain, East Fen Catch Water Drain and Stone Bridge Drain just south of Stickney Trader Bank, River Witham and South Forty Foot Drain north and north-west of Boston. All of which will need to be crossed. WFD river waterbodies include Bellwater Drain Hobhole Drain, West Fen Catchwater Drain, Lower Witham and South Forty Foot Drain. All WFD waterbodies will need to be crossed as they are throughout the Corridor.
Corridor 17	FZ2 and FZ3 are present across the Corridor covering approximately 98% and cannot be avoided. Main Rivers include Stone Bridge Drain, River Witham and South Forty Foot Drain which flow north and north-west of Boston all of which will need to be crossed. WFD river waterbodies are present throughout the whole Corridor. These include Bell Water Drain, Tributary of Hobhole Drain, North Forty Foot Drain and Old Hammond Beck.
Corridor 18	FZ2 and FZ3 are present across the Corridor covering approximately 98% and cannot be avoided. Main Rivers include The Haven which flows past Boston which requires crossing in the south of the Corridor. WFD river waterbodies include Bell Water Drain, Hobhole Drain, and Tributary of Hobhole Drain. All of which need to be crossed as they are throughout the Corridor.
Corridor 19	The Corridor is above a principal bedrock aquifer located underneath the Corridor in the north between Burgh le Marsh and Wainfleet All Saints. FZ2 and FZ3 are present across the Corridor covering approximately 98% and cannot be avoided. Main Rivers include The Lymn, Wainfleet Relief Channel and Steeping River in the north between Firsby and Wainfleet All Saints and River Witham, South Forty Foot Drain and Stone Bridge Drain which flow north and north-west of Boston. All of which will need to be crossed.

Corridor	Water Environment Features Within and Adjacent to Corridor
	WFD river waterbodies are present throughout the whole Corridor including River Lymn, Fodder Dike, Tributary of Hobhole Drain, Maud Foster Drain, Old Hammond Beck and North Forty Foot Drain. All of which will need to be crossed.
Corridor 20	FZ2 and FZ3 are present across the Corridor covering approximately 98% and cannot be avoided. Main Rivers include the River Welland which intersects in the southern area of the Corridor and west of Moulton Marsh and this will likely need to be crossed. WFD river waterbodies, including Tributary of Hammond Beck, Fosdyke Bridge Outfall and Risegate Eau. These will require crossing and care must be taken to ensure that pollution during construction does not impact their WFD status.
Corridor 21	FZ2 and FZ3 are present across the Corridor covering approximately 98% and cannot be avoided. Main Rivers include the River Welland which intersects in the southern area of the Corridor and west of Moulton Marsh and this will likely need to be crossed. WFD river waterbodies, including Tributary of Hammond Beck, Old Hammond Beck, Fosdyke Bridge Outfall, Risegate Eau and Whaplode River. These will require crossing and care must be taken to ensure that pollution during construction does not impact their WFD status.
Corridor 22	FZ2 and FZ3 are present across the Corridor covering approximately 98% and cannot be avoided. Main Rivers include the River Welland, in the southern area of the Corridor near Moulton Marsh and this will need to be crossed. WFD river waterbodies, including Tributary of Hammond Beck, Fosdyke Bridge Outfall and Risegate Eau. These will require crossing and care must be taken to ensure that pollution during construction does not impact their WFD status.
Corridor 23	FZ2 and FZ3 are present across the Corridor covering approximately 98% and cannot be avoided. Main Rivers include the River Welland in the southern area of the Corridor near Moulton Marsh, and this will need to be crossed. WFD river waterbodies, including Wyberton Marsh Drain, Frampton Town Drain, Fosdyke Bridge Drain and Whaplode River. These will require crossing and care must be taken to ensure that pollution during construction does not impact their WFD status.

Socio-Economic

7.2.29 Except for recreational paths, including PRoW which can be found within **Table 7-1** for each Corridor there are few socio-economic features identified within or immediately adjacent to each of the Corridors. Community features (e.g., golf courses, caravan sites and holiday parks) are located within or adjacent to Corridors 1, 3, 5, 7, 9, 23, and 36. Aviation and defence features (i.e. Strubby Airfield) are located within or adjacent to Corridors 1 and 35 to 37. Key allocations identified within local plans and major planning applications and proposals are located within or adjacent to Corridors 1 to 3, 7 to 15, 18 to 23, and 35 to 37. The socio-economic features identified within the Corridors are detailed in **Table 7-5** and illustrated in **Figure 7-9**.

7.2.30 There is a potential risk that the Project, could result in temporary effects upon amenity and operations of identified features and temporary closures and disruption to recreational activities, routes and roads. This includes cumulative effects upon common receptors from other proposed large-scale developments (such as the Viking CCS, G2W and Outer Dowsing OWF projects) within the wider area. Following careful routeing potential permanent effects upon identified features could be limited.

7.2.31 Careful routeing and design of construction access is likely to reduce, and where possible avoid effects on identified receptors. In addition, standard mitigation and management measures would be implemented via a CEMP to reduce the potential risks identified for each Corridor. Further discussion with relevant stakeholders in the area should take place to fully understand the scale of the risks and their potential effects.

Figure 7-9 – Socio-economic features between the Landfalls and River Welland

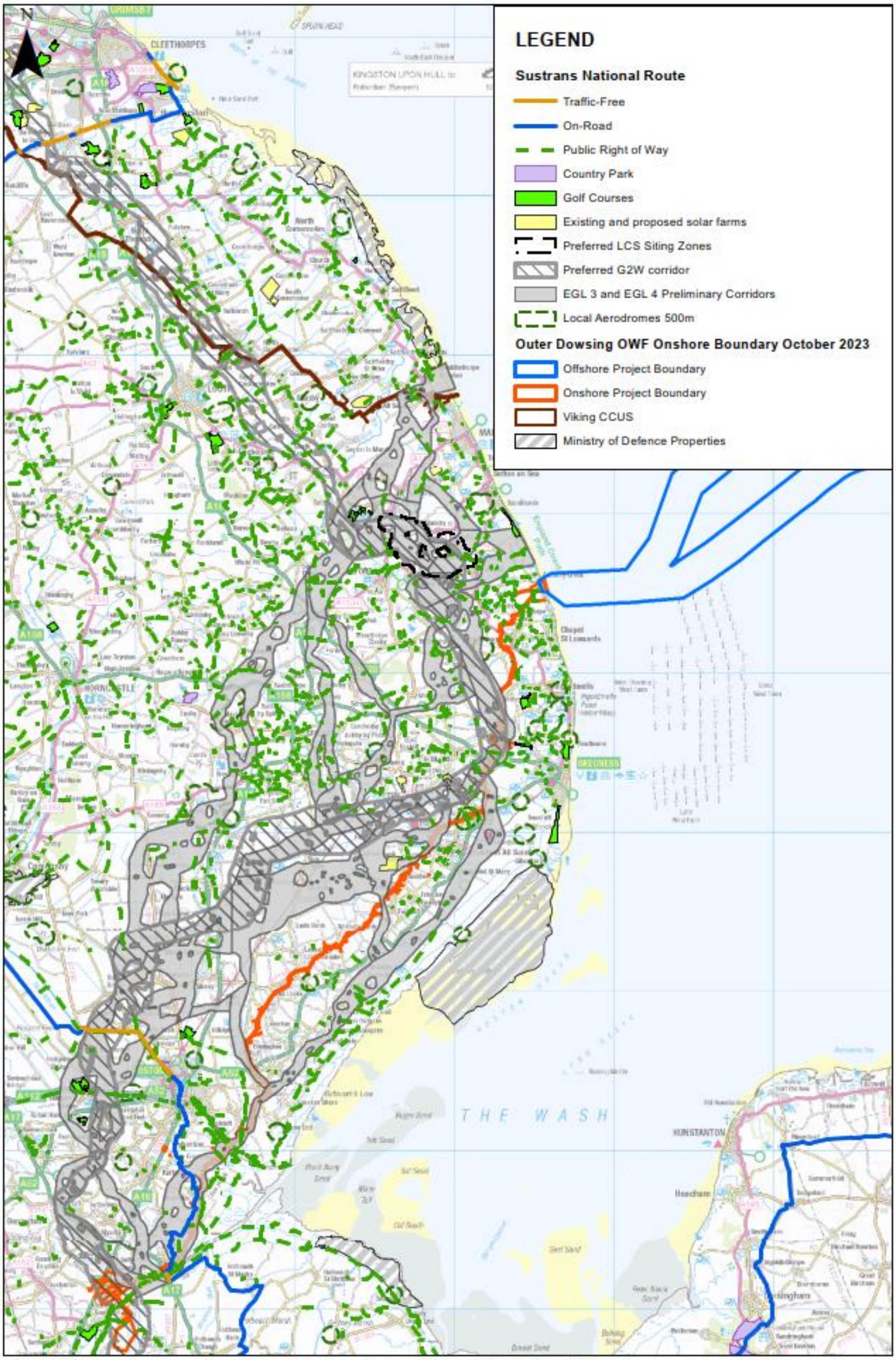


Figure 7-9 – Socioeconomic features between the Landfalls and the River Welland

SCALE: 1:380,000 0 2 4 6 8 10 12 km

Table 7-5 - Socio Economic features identified within the Corridors.

Corridor	Community receptors and recreational routes	Aviation and defence features	Proposed development (allocations and applications)
Corridor 1	Community receptors are Applebough Camp Site and Grange Leisure Park located adjacent to Corridor near Mablethorpe. These could be avoided with careful routeing. Recreational routes including approximately 12 PRoW, located across the Corridor mostly near Theddlethorpe.	Strubby Airfield, which overlaps the western leg of Corridor 1. Discussion and agreement with the airfield owner and operators on potential impacts to operations during construction and operation would be required.	Viking CCS cable which crosses north of the Corridor from west to east connecting into Theddlethorpe Gas Terminal and routeing onwards to the North Sea. The Corridor overlaps with the search area for the proposed Theddlethorpe Geological Disposal Facility.
Corridor 2	Community receptors at the Lakeside Springs Caravan Park located immediately east of the Corridor. This could be avoided with careful routeing. Recreational routes including four PRoW located to the north of the Corridor and near the A1111.	None	The Corridor overlaps with the search area for the proposed Theddlethorpe Geological Disposal Facility.
Corridor 3	Recreational routes including four PRoW located at Strubby Airfield and south of Saleby.	None	The Corridor overlaps with the search area for the proposed Theddlethorpe Geological Disposal Facility.
Corridor 4	Recreational routes including five PRoW mostly located between Asserby and Huttoft.	None	None
Corridor 5	Community receptors are those at the disused golf course (now a nature reserve), and five holiday parks and five caravan parks/holiday homes scattered throughout the Corridor at Huttoft and Anderby. These could be avoided with careful routeing.	None	None

Corridor	Community receptors and recreational routes	Aviation and defence features	Proposed development (allocations and applications)
	Recreational routes including nine PRoW, which predominantly route east towards the coast and the Sustrans South Wolds and Skegness cycle route ('the South Wolds Cycle Route') intersects the Corridor.		
Corridor 6	Recreational routes including four PRoW, which route to and from the B1449, and the South Wolds Cycle Route, which intersects the Corridor.	None	None
Corridor 7	Recreational routes, including four PRoW, located at the northern and southern extents of the Corridor, and the South Wolds Cycle Route, which intersects at the north and south of the Corridor.	None	Outer Dowsing OWF intersects the Corridor between Ashington End and Croft. G2W Project overlaps with most of the Corridor between Farlesthorpe and Croft.
Corridor 8	Community receptors identified include Lakeside Holiday Park and Gunby Lake Caravan Park located immediately adjacent to the Corridor at Little Steeping and Gunby respectively. These could be avoided with careful routeing. Recreational routes, including 12 PRoWs, including paths to, from and within the Lincolnshire Wolds NL, users of the Lincolnshire Wolds NL, and the South Wolds intersects the Corridor several times at its eastern and western extents.	None	G2W Project overlaps with the eastern limit of the Corridor at Hasthorpe.
Corridor 35	Community receptors located in Woodthorpe, Ailby and Skendleby including Woodthorpe Hall Golf Course, Strubby Airfield, Woodthorpe Caravan and Leisure Park, Rigsby Wood Nature Reserve and Gunby Estate Hall and Gardens, located in or immediately adjacent to the Corridor. These could be avoided with careful routeing. Recreational routes, including seven PRoW which route to, from and within the Lincolnshire Wolds NL, users of the	Strubby Airfield and Strubby Glider Club Field. Discussion and agreement with the airfield owner and operators on potential impacts to operations during construction and operation would be required.	G2W Project intersect the Corridor between Woodthorpe and Ailby.

Corridor	Community receptors and recreational routes	Aviation and defence features	Proposed development (allocations and applications)
	Lincolnshire Wolds NL, and users of the South Wolds Cycle Route which intersects the Corridor twice.		
Corridor 36	Community receptors located in Woodthorpe, Ailby and Skendleby including Woodthorpe Hall Golf Course, Strubby Airfield, Woodthorpe Caravan and Leisure Park and Rigsby Wood Nature Reserve located in or immediately adjacent to the Corridor. These could be avoided with careful routeing. Recreational routes, including 13 PRoW which primarily route to, from and within the Lincolnshire Wolds NL, users of the Lincolnshire Wolds NL, and users of the South Wolds Cycle Route.	Strubby Airfield and Strubby Glider Club Field. Discussion and agreement with the airfield owner and operators on potential impacts to operations during construction and operation would be required.	G2W Project intersect the Corridor between Woodthorpe and Ailby.
Corridor 37	Community receptors located in Woodthorpe, Ailby and Skendleby including Woodthorpe Hall Golf Course, Strubby Airfield, Woodthorpe Caravan and Leisure Park, Rigsby Wood Nature Reserve Furze Hill Nature Reserve, Sow Dale Nature Reserve and Lincolnshire Aviation Heritage Centre located in or immediately adjacent to the Corridor. These could be avoided with careful routeing. Recreational routes, including 14 PRoW which primarily route to, from and within the Lincolnshire Wolds NL, users of the Lincolnshire Wolds NL, and users of the South Wolds Cycle Route.	Strubby Airfield and Strubby Glider Club Field and the Lincolnshire Aviation Heritage Centre. Discussion and agreement with the airfield owner and operators on potential impacts to operations during construction and operation would be required.	G2W Project intersect the Corridor between Woodthorpe and Ailby and between Carrington and Gipsey Bridge
Corridor 9	Community receptors located at the north of the Corridor at Wainfleet All Saints and Wainfleet St Marys, and the central and southern sections at Friskney, Butterwick. Those within the Corridor include Rivulet Golf Course driving range, Havenside Country Park and Hobhole Bank Nature Reserve. Except for Havenside Country Park, these could be avoided with careful routeing.	None	Outer Dowsing OWF intersects in the north at Croft and south between Freiston and Wyberton Roads.

Corridor	Community receptors and recreational routes	Aviation and defence features	Proposed development (allocations and applications)
	Recreational Routes including nine PRoW mostly routeing to and from The Wash, including the Macmillan Way.		
Corridor 10	Community receptors located at Wainfleet All Saints, Fishtoft, Friskney and Butterwick. Those within the Corridor include Havenside Country Park and Hobhole Bank Nature Reserve. Except for Havenside Country Park, these could be avoided with careful routeing. Recreational Routes including 12 PRoW, including the Macmillan Way, which route mostly near rivers and drains, and the South Wolds Cycle Route which intersects the Corridor multiple times between Croft and Wainfleet St Mary.	None	Outer Dowsing OWF intersects north of Croft, in the Corridor area south of Thorpe St Peter), west of Friskney and south between Freiston and Wyberton Roads.
Corridor 11	Community receptors located at Eastville and Wainfleet Bank. Those within the Corridor include Havenside Country Park and Hobhole Bank Nature Reserve. Except for Havenside Country Park, these could be avoided with careful routeing. Recreational routes include seven PRoW, including the Macmillan Way, which route mostly near rivers and drains at the eastern and western extents of the Corridor and the South Wolds Cycle Route which intersects the Corridor multiple times between Croft and Wainfleet St Mary.	None	Outer Dowsing OWF intersects north of Croft, in the Corridor area south of Thorpe St Peter), west of Friskney and south between Freiston and Wyberton Roads.
Corridor 12	Community receptors located at the south of the Corridor, those within the Corridor include two caravan parks and leisure centres located at Frithville and Boston. These could be avoided with careful routeing. Recreational routes identified include 11 PRoW which route mostly near rivers and drains at the eastern and western extents of the Corridor, the South Wolds Cycle Route which intersects the Corridor multiple times between	None	Outer Dowsing OWF intersects in the northern area of the Corridor, north of Croft.

Corridor	Community receptors and recreational routes	Aviation and defence features	Proposed development (allocations and applications)
	Croft and Thorpe Fendykes and National Cycle Route 1 which crosses the Corridor adjacent to the River Witham.		
Corridor 13	Recreational routes identified include seven PRoW which route mostly near rivers and drains at the eastern and western extents of the Corridor, the South Wolds cycle route which intersects the Corridor multiple times between Croft and Thorpe Fendykes and National Cycle Route 1 which crosses the Corridor adjacent to the River Witham.	None	Outer Dowsing OWF intersects in the northern area of the Corridor, north of Croft.
Corridor 14	Community receptors within the Corridor are Havenside Country Park and Hobhole Bank Nature Reserve. Havenside Country Park is unavoidable through careful routeing. Recreational routes including seven PRoW, including the Macmillan Way, which route mostly near rivers and drains at the eastern and western extents of the Corridor and the South Wolds Cycle Route which intersects the Corridor multiple times between Croft and Thorpe Fendykes.	None	Outer Dowsing OWF intersects in the northern area of the Corridor, north of Croft and south between Butterwick and Wyberton Roads.
Corridor 15	Community receptors located throughout the route (main areas are Frithville, Eastville, New Leake and Hubbert's Bridge). Those within the Corridor include two caravan parks and leisure centres located at Frithville and Boston. These could be avoided with careful routeing. Recreational routes including nine PRoW which route mostly near rivers and drains at the eastern and western extents of the Corridor, the South Wolds Cycle Route which intersects the Corridor multiple times between Croft and Thorpe Fendykes and National Cycle Route 1 which crosses the Corridor adjacent to the River Witham.	None	Outer Dowsing OWF intersects north of Croft and in the Corridor area south of Thorpe St Peter.

Corridor	Community receptors and recreational routes	Aviation and defence features	Proposed development (allocations and applications)
Corridor 16	Community receptors located within the Corridor include two caravan parks and leisure centres located at Frithville and Boston. These could be avoided with careful routeing. Recreational routes include six PRoW which route mostly near rivers and drains at the western extent of the Corridor and National Cycle Route 1 which crosses the Corridor adjacent to the River Witham.	None	None
Corridor 17	Recreational routes five PRoW which route mostly near rivers and drains at the western extent of the Corridor and National Cycle Route 1 which crosses the Corridor adjacent to the River Witham.	None	None
Corridor 18	Those within the Corridor include Havenside Country Park and Hobhole Bank Nature Reserve. Except for Havenside Country Park, these could be avoided with careful routeing. Recreational routes including four PRoW, including the Macmillan Way, which route mostly near rivers and drains at the western extent of the Corridor.	None	Outer Dowsing OWF intersects south between Butterwick and Wyberton Roads.
Corridor 19	Community receptors within the Corridor include a caravan park at Boston. These could be avoided with careful routeing. Recreational routes including 10 PRoW which route mostly near rivers and drains at the eastern and western extents of the Corridor, the South Wolds Cycle Route which intersects the Corridor multiple times between Croft and Wainfleet Bank and National Cycle Route 1 which crosses the Corridor adjacent to the River Witham.	None	Outer Dowsing OWF intersects north of Croft and in the Corridor area south of Thorpe St Peter.

Corridor	Community receptors and recreational routes	Aviation and defence features	Proposed development (allocations and applications)
Corridor 20	Recreational routes include three PRoW, including The Macmillan Way and Cross Britain Way Long Distance Footpaths.	None	Outer Dowsing OWF intersects the Corridor at the River Welland. G2W Project overlaps with the Corridor between Kirton End and the River Welland.
Corridor 21	Recreational routes include four PRoW, including the Macmillan Way and Cross Britain Way Long Distance Footpaths.	None	Outer Dowsing OWF intersects the Corridor at the River Welland. G2W Project overlaps with the Corridor between Kirton End and the A17.
Corridor 22	Recreational routes including two PRoW, including The Macmillan Way and Cross Britain Way Long Distance Footpaths.	None	Outer Dowsing OWF intersects the Corridor at the River Welland. G2W Project overlaps with the Corridor between Kirton End and the A17.
Corridor 23	Community receptors located primarily in the south of the Corridor at Fosdyke, Algarkirk and Kirton. Those within the Corridor include three caravan parks and leisure centres located at Fosdyke, Algarkirk and Kirton. These could be avoided with careful routeing. Recreational Routes including six PRoW, including The Macmillan Way and Cross Britain Way Long Distance Footpaths	None	Outer Dowsing OWF intersects the Corridor at the River Welland.

Other Considerations

7.2.32 Other environmental topics were also considered as part of the options appraisal and include air quality, noise and geology.

7.2.33 Geological features identified within and immediately adjacent to the Corridors are outlined in **Table 7-6** below.

Table 7-6 - Geological Features within and Adjacent to the corridors

Corridor	Geological Features Within and Adjacent to Corridor
Corridor 1	None identified
Corridor 2	None identified
Corridor 3	None identified
Corridor 4	None identified
Corridor 5	Sea Bank Clay Pits SSSI geological site is located adjacent the north of the Corridor, and can be avoided through careful routeing.
Corridor 6	None identified
Corridor 7	None identified
Corridor 8	Historic landfills are present adjacent to the Corridor along Gunby Road, which can be avoided. A Petroleum Exploration and Development Licence (PEDL) Block within the south of the Corridor, between Thorpe St Peter and Revesby. An area of peaty soils at the south of the Corridor, near Firsby, Stickney and Friskney, which cannot be avoided.
Corridor 35	A historic landfill site is located within the Corridor, next to the A1028 (Land off Bluestone Heath Road). This can be avoided through careful routeing.
Corridor 36	A historic landfill site (Fordington Top) is located within the centre of the Corridor, north-east of Dalby, and can be avoided through careful routeing. Areas of peaty soils within the south of the Corridor, which cannot be avoided. A PEDL block to the south of the Corridor.
Corridor 37	A historic landfill site lies (Harrington Lane) directly adjacent to the Corridor, west of Ulceby Cross, which can be avoided. Peaty soils within and to the south of the Corridor, between East Kirkby and New Bolingbroke, which cannot be avoided. A PEDL to the south of the corridor, between East Kirkby and New Bolingbroke.
Corridor 9	None identified
Corridor 10	An area of peaty soils is located to the north of the Corridor near Firsby, Stickney and Friskney, which cannot be avoided. A PEDL is located within the north of the Corridor south of Firsby, which cannot be avoided.

Corridor	Geological Features Within and Adjacent to Corridor
Corridor 11	An area of peaty soils is located to the north of the Corridor near Firsby, Stickney and Friskney, which cannot be avoided. A PEDL is located within the north of the Corridor south of Firsby, which cannot be avoided.
Corridor 12	An area of peaty soils is located to the north of the Corridor near Firsby, Stickney and Friskney, which cannot be avoided. A PEDL is located within the north of the Corridor south of Firsby, which cannot be avoided.
Corridor 13	An area of peaty soils is located to the north of the Corridor near Firsby, Stickney and Friskney, which cannot be avoided. A PEDL is located within the north of the Corridor south of Firsby, which cannot be avoided.
Corridor 14	An area of peaty soils is located to the north of the Corridor near Firsby, Stickney and Friskney, which cannot be avoided. A PEDL is located within the north of the Corridor south of Firsby, which cannot be avoided.
Corridor 15	An area of peaty soils is located to the north of the Corridor near Firsby, Stickney and Friskney, which cannot be avoided. A PEDL is located within the north of the Corridor south of Firsby, which cannot be avoided.
Corridor 16	An area of peaty soils is located to the north of the Corridor near Firsby, Stickney and Friskney, which cannot be avoided. A PEDL is located within the north of the Corridor south of Firsby, which cannot be avoided.
Corridor 17	An area of peaty soils is located to the north of the Corridor near Firsby, Stickney and Friskney, which cannot be avoided. A PEDL is located within the north of the Corridor south of Firsby, which cannot be avoided.
Corridor 18	An area of peaty soils is located to the north of the Corridor near Firsby, Stickney and Friskney, which cannot be avoided. A PEDL is located within the north of the Corridor south of Firsby, which cannot be avoided.
Corridor 19	An area of peaty soils is located to the north of the Corridor near Firsby, Stickney and Friskney, which cannot be avoided. A PEDL is located within the north of the Corridor south of Firsby, which cannot be avoided.
Corridor 20	None identified
Corridor 21	None identified
Corridor 22	None identified
Corridor 23	None identified

7.2.34 Potential impacts resulting from construction and installation activities include: mobilisation of, and spills of, contaminants (including those that may be associated with historic landfalls and petroleum exploration activities); sterilisation of mineral deposits; and disturbance of peat leading to loss of peaty soils. However, for all Corridors, further investigation into soil type and ground conditions would be undertaken as part of future design stages and standard mitigation measures regarding pollution and contaminated materials would be implemented. Careful routeing reflecting the outcomes of these investigations will reduce the potential for adverse effects.

7.2.35 Overall, there are residential properties and other receptors sensitive to air quality and noise and vibration impacts within and/or adjacent to the Corridors. There are residential properties associated with numerous settlements and villages, including Anderby, Chapel St Leonard, Ailby, Mumby, Halton Holegate, Wainfleet All Saints, Friskney, Frithney, Frith Bank, Butterwick, Sibsey, Fishtoft and Hubbert's Bridge; as well as numerous individual dwellings scattered throughout the Corridors. There is a potential risk of temporary effects upon receptors within and adjacent to the Corridor, limited to localised changes in air quality and noise and vibration during construction and installation activities. However, all Corridors are considered sufficient in size to allow for careful siting and routeing and to reduce the likelihood and magnitude of these effects. These construction effects could then be further reduced through implementation of a CEMP. No potential adverse air quality, noise or vibration impacts are anticipated during operation.

7.3 Engineering

7.3.1 All Corridors have engineering and system factors to consider when routeing underground cables between the landfalls and the River Welland. Features relevant to engineering are shown in **Figure 7-10.**

Figure 7-10 – Features relevant to Engineering between the Theddlethorpe and Anderby Creek Landfall Study Areas and River Welland

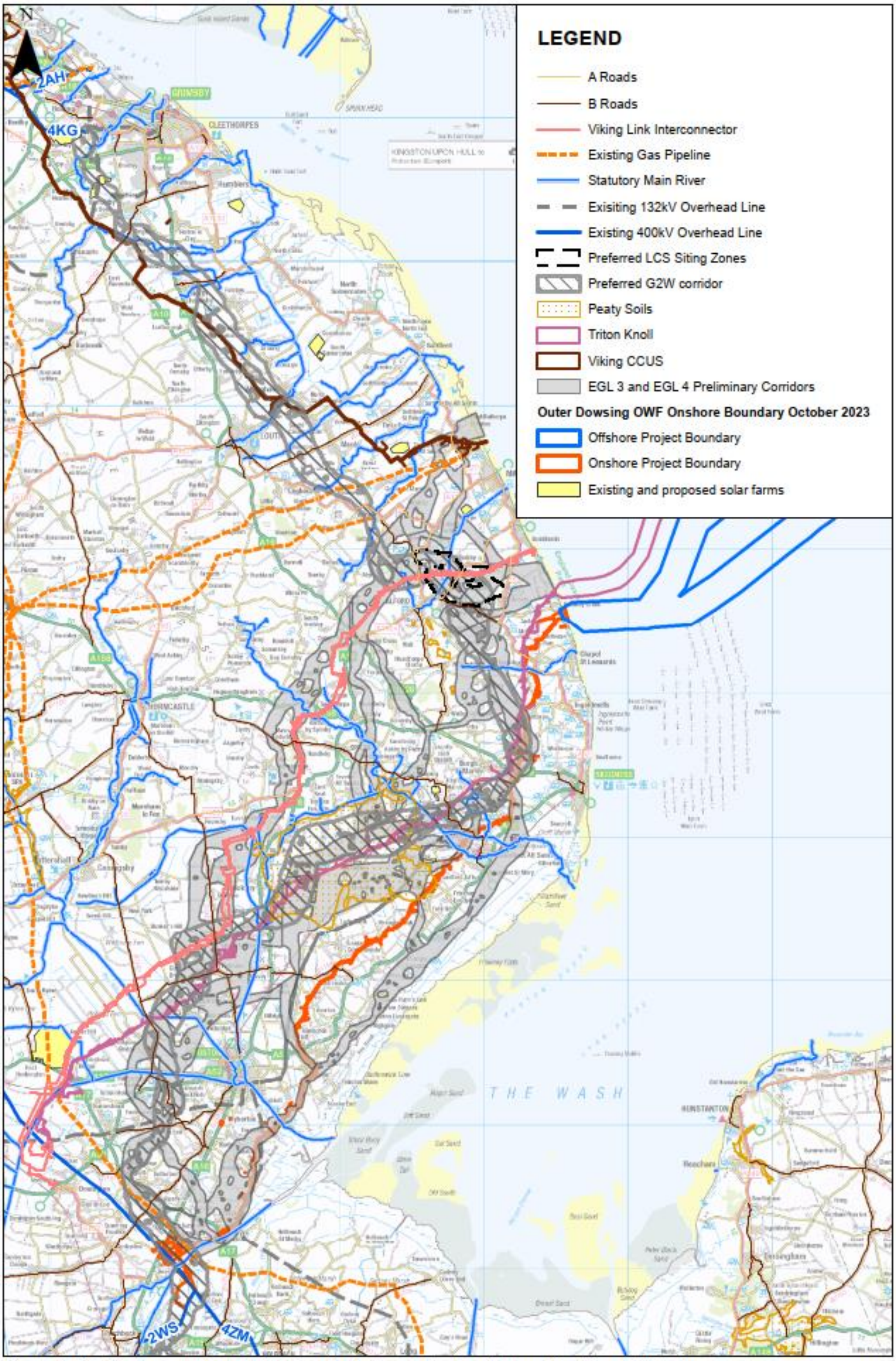


Figure 7-10 – Features relevant to Engineering between the Landfalls and the River Welland

Routeing Flexibility

7.3.2 Overall, routeing flexibility is generally good along the Corridors due their width and the lack of major engineering constraints for large sections. However, at certain locations within the Corridors there are narrower areas (caused by features such as settlement and woodland) where flexibility of routeing the DC cables is decreased. Within these more constrained areas there is a potential for increased technical complexity which may result in additional costs and construction and installation durations. The routeing flexibility identified for the Corridors are:

- Corridor 1: Generally good flexibility within the Corridor. There is a narrowing of Corridor located east of the A1031, due in part to the location of the Viking CCS Project limiting the available options for routeing. The Viking CCS Project will need to be crossed west of the A1031. There seems to be sufficient space within the Corridor to mitigate this, as there are alternative routes available to the west of the A1031 and crossing Mill Road. Another narrowing within the Corridor is at the A1104 Alford Road crossing adjacent to Lincolnshire Aquapark and Grange Leisure Park. However, there are alternative routeing options west of Maltby le Marsh.
- Corridor 2: Good wide Corridor with sufficient flexibility for routeing.
- Corridor 3: Good wide Corridor with sufficient flexibility for routeing.
- Corridor 4: Generally good flexibility within the Corridor. Slight narrowing within the Corridor north of Asserby due to Viking Link, however an alternative route is available towards to the south.
- Corridor 5: Good wide Corridor with sufficient flexibility for routeing.
- Corridor 6: Good wide Corridor with sufficient flexibility for routeing.
- Corridor 7: Poor flexibility within the Corridor caused by several specific narrower areas where no alternative options for routeing are available. This includes where crossings are required at Marsh Lane, Ingoldmells Road and Younger’s Lane where the existing Triton Knoll OWF underground cables and the proposed G2W and Outer Dowsing OWF projects are located. This provides limited space for routeing.
- Corridor 8: Generally wide Corridor with sufficient flexibility for routeing, although no flexibility for alternative route options are available. Slight narrowing of the Corridor between north of Orby past Gunby Park up to the east of Monkshorpe. The Corridornarrows where a crossing is required at the Station Road, but alternative routeing options are available.
- Corridor 9: Poor flexibility to the north of the Corridor up to Croft Bank where the Outer Dowsing OWF Project is located limiting space or flexibility for installation. Beyond Croft Bank up to Shore Road, south of Butterwick, the Corridor is wider, with localised narrowing where a crossing is required at Sea Lane, limiting flexibility. Past Shore Road, space and flexibility becomes poor due to the Outer Dowsing OWF Project overlapping the Corridor. This is exacerbated at Cut End Road, Hobhole drain and The Haven where crossings are required at these features.
- Corridor 10: Generally good flexibility within the Corridor. Narrower areas are present where a crossing is required at Croft Lane, however alternative routeing options are available. The Corridor narrows where the B1195 Wainfleet Road would require crossing and the, existing Triton Knoll OWF underground cables and proposed G2W Project also cross the Corridor, limiting space and flexibility. An

alternative route option south of Thorpe St Peter where Wainfleet Road, Wainfleet Relief Channel, Poacher Railway and Steeping River cross the Corridor, would also be restricted as the Outer Dowsing OWF Project overlaps with the Corridor at this location as well as the location where Mill Hill crosses the Corridor. Between Mill Hill and Howgarth Lane the Corridor narrows with no alternative route. Between the A52 and Shore Road, south of Butterwick, the Corridor is relatively wide. South-west of Shore Road, space and flexibility becomes limited as the Outer Dowsing OWF Project overlaps with the Corridor and is further constrained by the presence of Cut End Road, Hobhole drain and The Haven which cross the entire width of the Corridor.

- Corridor 11: Generally good flexibility within the Corridor. The Corridor narrows where Croft Lane crosses the corridor, however alternative routeing options are available. Further narrower areas are located where the B1195 Wainfleet Road, existing Triton Knoll OWF underground cables and proposed G2W Project also cross the corridor, limiting space and flexibility. Alternative route options would be available south of Thorpe St Peter where crossings are required at the Wainfleet road, Wainfleet Relief Cannel, Poacher Railway and Steeping River crossing, however, this route is also restricted where it overlaps with the Outer Dowsing OWF Project. Further west the Corridor widens providing good flexibility past the Poacher railway line, Hobhole bank up to Moor Bank, and east of Sibsey Fen Side. South of Moor Bank, the Corridor narrows where a crossing is required at Station Road, east of Sibsey, with no alternative routeing options limiting flexibility. South of the Hobhole Drain, space and flexibility within the corridor is limited as the Outer Dowsing OWF Project overlaps with the Corridor, which is further constrained by the presence of Cut End Road, Hobhole drain and The Haven which cross the entire width of the Corridor.
- Corridor 12: Poor flexibility within the Corridor. Narrower areas are present where Croft Lane crosses the Corridor, however alternative routeing options are available. Further narrower areas are located where the B1195 Wainfleet Road, existing Triton Knoll OWF underground cables and proposed G2W Project also cross the Corridor, limiting space and flexibility with no alternative route available. West of the crossing, which is required at the Poacher Railway, there is good flexibility within the Corridor up to where the A16 and Trader Bank cross the Corridor, north of Sibsey Fen Side, where the Corridor narrows. Alternative routeing options to the north are available, though restricted by the existing Triton Knoll OWF underground cables and proposed G2W Project. There is a narrower area just north of Boston Golf Course where the Boston Road and West Fen Drain cross the Corridor, however, there are alternative routeing options available. A further narrower area is located west of Frith Bank where the Frith Bank Drain and River Witham cross the Corridor. However alternative routeing options are available further west just south of Gipsey Bridge. Past the River Witham the Corridor is wide with various routeing options and flexibility available.
- Corridor 13: Poor flexibility within the Corridor. Narrower areas are present where Croft Lane crosses the Corridor, however alternative routeing options are available. Further narrower areas are located where crossings are required at the B1195 Wainfleet Road, and where the existing Triton Knoll OWF underground cables and proposed G2W Project also overlap with the Corridor, limiting space and flexibility with no alternative route available. West of the crossing, which is required at the Poacher Railway, good flexibility within the Corridor up to Moors Bank, east of Sibsey Fen Side, where the Corridor narrows crossing the railway line twice. No alternative routeing options are available. There is a narrower area just north of

Boston Golf Course where a crossing is required at the Boston Road and West Fen Drain, however, there are alternative routeing options available. A further narrower area is located west of Frith Bank, where a crossing is required at Frith Bank Drain and River Witham. However alternative routeing options are available further west just south of Gipsey Bridge. South-east of the River Witham the Corridor is wide with various routeing options and flexibility available.

- Corridor 14: Poor flexibility within the Corridor. Narrower areas are present where Croft Lane crosses the Corridor, however alternative routeing options are available. Further narrower areas are located where crossings are required at the B1195 Wainfleet Road, and where the existing Triton Knoll OWF underground cables and proposed G2W Project overlap with the Corridor, limiting space and flexibility with no alternative route available. West of the crossing, which is required at the Poacher Railway, there is good flexibility within the Corridor up to Moors Bank, east of Sibsey Fen Side. South of Moor Bank, the Corridor narrows where a crossing is required at Station Road, east of Sibsey, with no alternative routeing options limiting flexibility. South of the crossing at Hobhole Drain, space and flexibility becomes poor with the Outer Dowsing OWF Project overlapping the Corridor, which is further constrained by the presence of Cut End Road, Hobhole drain and The Haven which cross the entire width of the Corridor.
- Corridor 15: Generally good flexibility within the Corridor. Narrower areas are present where Croft Lane crosses the Corridor, however alternative routeing options are available. Further narrower areas located where crossings are required at the B1195 Wainfleet Road within the northern leg of the Corridor, and where the existing Triton Knoll OWF underground cables and proposed G2W Project overlap with the Corridor, limiting space and flexibility. An alternative route option is available south of Thorpe St Peter where crossings are required at the Wainfleet road, Wainfleet Relief Cannel, Poacher Railway and Steeping River, which is also restricted where it overlaps with the Outer Dowsing OWF project. Further west, the Corridor widens providing good flexibility beyond the Poacher Railway line, Hobhole bank up to Moor Bank, and east of Sibsey Fen Side. West of the crossing with the Poacher Railway line there is good flexibility within the Corridor up to the A16 and Trader Bank where crossings are required, north of Sibsey Fen Side, where the Corridor narrows. Alternative routeing options to the north are available, though restricted by existing Triton Knoll OWF underground cables and proposed G2W Project. There is a narrower area just north of Boston Golf Course where crossings are required at the Boston Road and West Fen Drain, however, there are alternative routeing options available. A further narrower area is located west of Frith Bank where a crossing is required at the Frith Bank Drain and River Witham. However alternative routeing options are available further west just south of Gipsey Bridge. Past the River Witham the Corridor is wide with various routeing options and flexibility available.
- Corridor 16: Generally good flexibility within the Corridor from the Poacher Railway line at most north-eastern extent of the Corridor up to the A16 and Trader Bank where crossings are required, north of Sibsey Fen Side, where the Corridor narrows. Alternative routeing options to the north are available, though restricted by existing Triton Knoll OWF underground cables and proposed G2W Project. There is a narrower area just north of Boston Golf Course where crossings are required at the Boston Road and West Fen Drain, however, there are alternative routeing options available. A further narrower area is located west of Frith Bank where a crossing is required at the Frith Bank Drain and River Witham. However alternative routeing options are available further west just south of Gipsey Bridge. Past the River Witham the Corridor is wide with various routeing options and flexibility available.

- Corridor 17: Generally good flexibility within the Corridor from the Poacher Railway line at most north-eastern extent of the Corridor up to Moors Bank, east of Sibsey Fen Side, though restricted by the G2W Project and the Triton Knoll OWF underground cables. East of Sibsey Fen Side the Corridor narrows crossing the Poacher Railway line twice and where a crossing is required at the Station Road. No alternative routeing options are available. There is a narrower area just north of Boston Golf Course, where a crossing is required at Boston Road and West Fen Drain, however, there are alternative routeing options available. A further narrower area is located west of Frith Bank where a crossing is required at Frith Bank Drain and River Witham. However alternative routeing options are available further west just south of Gipsey Bridge. South-east of the River Witham the Corridor is wide with various routeing options and flexibility available.
- Corridor 18: Generally good flexibility within the north of the Corridor from the Poacher Railway line at most north-eastern extent of the Corridor up to Moors Bank, east of Sibsey Fen Side, though restricted by existing Triton Knoll OWF underground cables and proposed G2W Project. South of Moor Bank, the Corridor narrows where a crossing is required at the Station Road with no alternative routeing options limiting flexibility. South of the crossing, which is required at Hobhole Drain, space and flexibility becomes poor with Outer Dowsing OWF Project overlapping the Corridor. Flexibility is further constrained due to the presence of Cut End Road, Hobhole drain and The Haven which cross the Corridor at the south-western extent of the Corridor.
- Corridor 19: Generally good flexibility within the Corridor. Narrower areas are present where Croft Lane crosses the north-eastern extent of the Corridor, however alternative routeing options are available. Further narrower areas located where crossings are required at the B1195 Wainfleet Road, and where the existing Triton Knoll OWF underground cables and proposed G2W Project also overlap with the Corridor, limiting space and flexibility. An alternative route option is available south of Thorpe St Peter where crossings are required at the Wainfleet road, Wainfleet Relief Cannel, Poacher Railway line and Steeping River, however this route is also restricted where it overlaps with the Outer Dowsing OWF Project. Further west the Corridor widens providing good flexibility beyond the Poacher Railway line and Hobhole bank, up to Moor Bank, and east of Sibsey Fen Side. South of Moors Bank, east of Sibsey Fen Side, the Corridor narrows crossing the Poacher Railway line twice and where a crossing is required at the Station Road. No alternative routeing options are available. There is a narrower area just north of Boston Golf Course where a crossing is required at Boston Road and West Fen Drain, however, there are alternative routeing options available. A further narrower area is located west of Frith Bank where a crossing is required at Frith Bank Drain and River Witham. However alternative routeing options are available further west just south of Gipsey Bridge. South-west of the River Witham the Corridor is wide with various routeing options and flexibility available.
- Corridor 20: Generally good flexibility within the Corridor from the B1391 Donington Road up to the A17. The proposed G2W Project is also present within this section of the Corridor but there is sufficient space and flexibility for routeing. South of the A17 flexibility reduces due the Gosberton to Tydd St Giles high pressure gas main running parallel in the south of the Corridor up to the River Welland where a crossing is required, along with the proposed G2W Project.
- Corridor 21: Generally wide Corridor with sufficient flexibility for routeing, although no alternative route options are available. Slight narrowing of the Corridor at the B1397 Boston Road where a crossing is required. Crossings of the River Welland

and the Outer Dowsing OWF Project would be required at the southern extent of the Corridor.

- Corridor 22: Generally good flexibility within the Corridor from the B1391 Donington Road up to the A17. The proposed G2W project is also present within this section of the Corridor but there is sufficient space and flexibility for routeing. When routeing along the A17, flexibility reduces as the cable route would need to cross Sutterton Roundabout and no alternative route options are available. Crossings of the River Welland and the Outer Dowsing OWF Project would be required at the southern extent of the Corridor.
- Corridor 23: Generally wide Corridor with sufficient flexibility for routeing. The section of the Corridor east of Sandholme is limited due to the presence of the Outer Dowsing OWF Project, however alternative route options are available to the west, south of Frampton. The Outer Dowsing OWF Project also limits the options for crossing the River Welland and therefore these would be restricted to crossing the A17 north of Fosdyke. However, this location has flexibility for alternative routeing options.
- Corridor 35: Generally wide Corridor with sufficient flexibility in the north of the Corridor from the west of Strubby and south to Ulceby Cross. The presence of the Viking Link Interconnector does limit flexibility, however alternative routeing options are available. Poor flexibility is present south of Ulceby with a narrow Corridor restricted further by steep terrain and no alternative routeing options available. Notable narrower areas are present as a track crosses the Corridor just north of Ulceby and Chalk Pit Lane crosses the Corridor just north of Candlesby.
- Corridor 36: Generally wide Corridor with sufficient flexibility in the north of the Corridor from the west of Strubby and south to Ulceby Cross. The presence of the Viking Link Interconnector does limit flexibility, however alternative routeing options are available. Poor flexibility is present south of Ulceby Cross with a narrow Corridor restricted further by steep terrain and no alternative routeing options available. Notable narrower areas include the area east of Dalby and the A158. Where the B1195 crosses the Corridor, narrower areas are present limiting flexibility.
- Corridor 37: Generally wide Corridor with sufficient flexibility in the north of the Corridor from the west of Strubby and south to Ulceby Cross. The presence of the Viking Link Interconnector does limit flexibility, however alternative routeing options are available. South of Ulceby Cross the Corridor continues to be wide with good flexibility up to the crossing which is required at the A158 and where Viking Link re-enters the Corridor restricting routeing options. South of the A155 the Corridor widens providing good flexibility; however, the Corridor is restricted by steep terrain restricting routeing options, particularly where the Viking Link Interconnector uses areas with the least onerous gradients.

Access

7.3.3 Accessibility for construction and installation of the HVDC underground cables varies between Corridors, as well as within the Corridors themselves. Most Corridors are accessible from existing A-roads, B-roads and various minor inter-connecting roads. However, there are also several Corridors which contain constraints or limited access points from major roads and therefore this may necessitate more circuitous and inefficient access or the construction of new access and haul roads. These are detailed in **Table 7-7**.

Table 7-7 – Access Constraints between the Landfalls and the River Welland

Corridor	Access Constraints
Corridor 1	Access is generally good with access available from the A1031, A1104, B1449 and various minor connecting roads. Long haul roads would be required to access the centre of the Corridor which is over 3 km from the nearest A-road.
Corridor 2	Access can be taken from the A1111 in the centre of the Corridor with no major restrictions to haul road construction.
Corridor 3	Access can be taken from the A1111 and A1104 with no major restrictions to haul road construction.
Corridor 4	Access is available from the A52 or A1111 and various minor connecting roads with no major restrictions to haul road construction.
Corridor 5	Access is available from the B1449 and A52 and various minor connecting roads. There are no major restrictions for a construction haul road within the Corridor.
Corridor 6	Access is available from the B1449 and various minor connecting roads. There are no major restrictions for a construction haul road within the Corridor.
Corridor 7	Long haul roads would be required to avoid routeing through settlements between Cumberworth and Ashington End as in this area the Corridor is located over 3 km from the nearest A-roads.
Corridor 8	Long haul roads would be required in multiple areas within the Corridor near Little Steeping and between Willoughby and Hasthorpe. These may also be required near Gunby Park, despite the presence of the A1028 and A158 as access may be limited or restricted.
Corridor 35	There is steep topography between Ulceby and Skendleby Psalter, and between Skendleby and Candlesby. This may limit the use of a continuous haul road. Therefore, long haul roads may be required to access the top and bottom of the slopes and specialist vehicles to operate in the steepest areas
Corridor 36	There is steep topography between Ulceby and Skendleby Psalter, and between Skendleby and Candlesby. This may limit the use of a continuous haul road. Therefore, long haul roads may be required to access the top and bottom of the slopes and specialist vehicles to operate in the steepest areas
Corridor 37	Access in most of the Corridor would be constrained due to the presence of large watercourses and steep topography which would restrict vehicle movements and may require specialised construction vehicles. This is likely to necessitate vehicle numbers to be split between an increased number of secondary access points using minor roads, where long haul roads may be required.
Corridor 9	Long haul roads would be required throughout the Corridor. Access would be constrained as the Corridor would be encircled by The Haven and Hobhole Drain. Access from minor roads would be required to avoid new haul roads crossing large watercourses.

Corridor	Access Constraints
Corridor 10	Poor access between Wainfleet Relief Channel and Cranberry Lane due to encirclement of the Corridor by railways and large watercourses, including The Haven and Hobhole Drain. Access in this area will require the use of minor roads and existing railway crossings, leading to the use of longer haul roads. Long haul roads would be required throughout the Corridor. Access from minor roads would be required to avoid new haul roads crossing large watercourses.
Corridor 11	Poor access between Wainfleet Relief Channel and Hobhole Drain due to encirclement by railways and large watercourses. Access in this area will require the use of minor roads and existing railway crossings, leading to the use of longer haul roads. Long haul roads would be required throughout the Corridor. Accessibility constraints such as encirclement due to the presence of The Haven and Hobhole Drain. Access from minor roads would be required to avoid new haul roads crossing large watercourses.
Corridor 12	Poor access between the Railway adjacent to River Steeping and Royalty Drain, due to encirclement by railways and large watercourses and the lack of A or B roads. Access in this area will require the use of minor roads and existing railway crossings, leading to the use of longer haul roads. Long haul roads required for access between Stickney and Royalty Drain, which requires the use of minor access roads due to large watercourse crossings and the distance from A-roads.
Corridor 13	Poor access between the Railway adjacent to River Steeping and Royalty Drain, due to encirclement by railways and large watercourses and the lack of A or B roads. Access in this area will require the use of minor roads and existing railway crossings, leading to the use of longer haul roads. Long haul roads required for access between Stickney and Royalty Drain, which requires the use of minor access roads due to large watercourse crossings and the distance from A-roads.
Corridor 14	Poor access between the Railway adjacent to River Steeping and Royalty Drain, due to encirclement by railways and large watercourses and the lack of A or B roads. Accessibility constraints such as encirclement due to the presence of The Haven and Hobhole Drain. Access in this area will require the use of minor roads and existing railway crossings, leading to the use of longer haul roads. Long haul roads required for access between Stickney and Royalty Drain, which requires the use of minor access roads due to large watercourse crossings and the distance from A-roads.
Corridor 15	Long haul roads would be required to access central and southern areas of the Corridor due to the presence of the Poacher railway, River Witham and South Forty Foot Drain (which encircle these areas). Access from minor roads would be required to avoid new haul roads crossing large watercourses.
Corridor 16	Long haul roads would be required to access to central and southern areas of the Corridor due to the presence of the Poacher railway, River Witham and South Forty Foot Drain (which encircle these areas). Access from minor roads would be required to avoid new haul roads crossing large watercourses.
Corridor 17	Long haul roads would be required to access central and southern areas of the Corridor due to the presence of the Poacher railway, River Witham and South

Corridor	Access Constraints
	Forty Foot Drain (which encircle these areas). Access from minor roads would be required to avoid new haul roads crossing large watercourses.
Corridor 18	Long haul roads would be required to access central and southern areas of the Corridor due to the presence of The Poacher railway, the Haven and Wainfleet Relief Channel watercourses (which encircle these areas). Access from minor roads would be required to avoid new haul roads crossing large watercourses.
Corridor 19	Long haul roads would be required to access to central southern areas of the Corridor due to the presence of the Poacher railway, River Witham and South Forty Foot Drain (which encircle these areas). Access from minor roads would be required to avoid new haul roads crossing large watercourses.
Corridor 20	Whilst access is generally good across the Corridor, long haul roads would be required between the A17 and the area surrounding Asperton Road.
Corridor 21	Access is generally good across the Corridor and long haul roads would not be required.
Corridor 22	Whilst access is generally good across the Corridor, long haul roads would be required between the A17 and the area surrounding Asperton Road.
Corridor 23	Long haul roads would be required between Wyberton Road and Mill Lane, with only minor road access off the A16 available.

7.3.4 Access for construction and installation within Corridors 35, 36 and 37 is limited by the steep topography of the area located within the Lincolnshire Wolds NL. As such, access would be limited to either end (top or bottom) of the steepest slopes within the Corridor and would require specialist vehicles to undertake construction and installation activities.

7.3.5 The long haul roads within the Corridors specified above would increase the construction and installation programme and impact vehicle movement. As the haul road is limited by 1 or 2 access points, the length will dictate how quickly the road can be built. Only once the road in installed will the cable installation be able to commence. Therefore, a longer haul road will lengthen the construction and installation programme. Furthermore, long haul roads also prevent efficient and timely access to certain areas along the cable installation route, causing construction vehicles to travel long distances along the haul road before reaching their destination. Long haul roads will also increase construction vehicle movements at the access points.

7.3.6 As the Corridors listed above are constrained by key features such as large water courses, there may be a need to overcome these through installation of large culverts or bridges. This will increase technical complexity, cost and programme. Alternatively, the use of minor roads may require alteration and upgrade also increasing technical complexity, cost and construction duration.

Existing and Proposed Infrastructure

7.3.7 All the Corridors between the landfalls and the River Welland would interact with both existing and proposed infrastructure developments which have the potential to constrain cable routeing. Those currently identified (being major roads, railways, major gas pipelines, and those required for energy supply and transmission) are detailed below.

7.3.8 Although proximity to major roads would be beneficial to the Project as they would enable ease of access to sites, cable routeing within proximity to major roads increases the likelihood of road crossings. This would increase the complexity of construction as alternate construction methods, such as trenchless cable installation methods, may need to be used increasing the cost and duration of construction. Additionally, crossing railways would also likely require alternative construction and installation methods which would also increase the complexity, cost and duration of construction. The number of major roads and railways which have been identified as requiring a crossing are shown in **Table 7-8**.

Table 7-8 – Major Road and Rail Crossings between the Landfalls and the River Welland

Corridor	Road Crossings	Railway Crossings
Corridor 1	2	0
Corridor 2	1	0
Corridor 3	1	0
Corridor 4	0	0
Corridor 5	1	0
Corridor 6	1	0
Corridor 7	1	0
Corridor 8	4	0
Corridor 35	2	0
Corridor 36	4	0
Corridor 37	6	0
Corridor 9	1	1
Corridor 10	2	1
Corridor 11	3	3
Corridor 12	8	3
Corridor 13	8	4
Corridor 14	3	3
Corridor 15	8	2
Corridor 16	7	1
Corridor 17	7	3

Corridor	Road Crossings	Railway Crossings
Corridor 18	2	1
Corridor 19	8	5
Corridor 20	4	0
Corridor 21	4	0
Corridor 22	2	0
Corridor 23	1	0

7.3.9 Corridors 1, 20, 21 interact with existing high pressure gas pipelines, which would need to be crossed within these Corridors. Crossings of all existing and proposed pipelines would need to be at a sufficient depth to avoid impacts to the HVDC underground cables and upon the gas pipelines, this may impact upon the cable system design. Of these Corridors, Corridor 1 would be the most constrained as it contains the proposed Viking CCS Project CO2 pipeline together with high pressure gas pipelines associated with the former and disused Theddlethorpe Gas Terminal. Careful routeing and additional technical solutions and investigation including cathodic protection studies would be required to avoid impacts on these assets and to avoid potential safety risks to site staff from accidentally striking these assets.

7.3.10 Corridors 2, 3, 35, 36, 37 interact with the existing Viking Link Interconnector which routes from its landfall south of Sandilands in a south-westerly direction towards its converter station and connecting substation, at Bicker Fen. Whilst the route of the Viking Link Interconnector can largely be avoided within Corridors 2, 3, 35 and 36 through careful routeing, the existing Viking underground cables would need to be crossed multiple times within Corridor 37. Crossings would likely require trenchless solutions which would further increase the complexity, cost, land requirements and duration of construction and installation. Furthermore, the existing Viking Link Interconnector cable route currently uses those areas within Corridors 35, 36 and 37 (i.e. within the Lincolnshire Wolds NL) with the most favourable topography for the routeing of underground cables, limiting the available space to areas which are steeper and less preferable. This would further increase the technical complexity of routeing within these Corridors. Routeing within these Corridors would require close coordination and collaboration with National Grid Ventures as operators of the Viking Link Interconnector, specifically in relation to crossings and proximity routeing, and any paralleling of assets.

7.3.11 Corridors 2, 3, 5, and Corridors 9 to 23 would interact with at least one existing low voltage (220 kV or lower) overhead line. Where these existing assets would require crossing, modification (such as the undergrounding or diverting of the existing assets) may be required to facilitate routeing. This would increase the technical complexity and cost of construction and installation and the duration of the programme.

7.3.12 Corridor 7 and Corridors 12 to 19 intersect with the existing Triton Knoll OWF DC underground cables which route from a landfall north of Anderby Creek south-west to the River Witham (west of Boston) down to a converter station and connecting substation at Bicker Fen. Given the route of the existing underground cable within each of these Corridors, it would likely require crossing within all Corridors. Crossings of the Triton Knoll cables would likely require trenchless solutions which would increase the complexity, cost, land requirements and duration of construction.

7.3.13 Corridors 7 to 20 interact with the preferred Corridor for NGET's proposed G2W 400 kV overhead line, where it routes south from Burgh Le Marsh to the River Welland. Notably and currently, the preferred overhead line corridor routes through the narrower area between Burgh le Marsh and Skegness. This area also contains both the existing Triton Knoll OWF and proposed Outer Dowsing OWF underground cable routes which significantly reduce the flexibility and increases the technically complex of routeing and construction and installation in this area. Furthermore, given the proposed and preferred corridor of the G2W Project, close interaction and/or crossing of the overhead line route may be required which may pose a technical constraint to routeing within these Corridors. Close co-ordination and collaboration with the G2W Project is ongoing and will be required as both Projects continue to develop. As part of this ongoing engagement, consideration will be given to potential co-ordination and co-location opportunities, as a means of reducing community and environmental impacts, and also of reducing the overall construction and installation programmes. Corridor 7 and Corridors 9 to 15 and 18 to 23 interact with the proposed Outer Dowsing OWF underground cables as they route south from its proposed landfall south of Anderby Creek to a proposed connection point north of the River Witham, and into the proposed Weston Marsh substation[53]. The location of the Outer Dowsing OWF cables would constrain routeing within all of the identified Corridors, increasing the technical complexity of design and construction, and would require crossing within Corridors 9 to 12, and Corridors 14, 18 and 20. Crossing of the Outer Dowsing OWF cables would likely require trenchless solutions which would increase the complexity, cost, land requirements and duration of construction and installation.

Watercourse Crossings and Flooding

7.3.14 As detailed in **Table 7-4,** Flood Zone 2 (FZ2) and Flood Zone 3 (FZ3) are present within all the Corridors apart from Corridor 35. Where FZ2 and FZ3 are present within Corridors, they are completely unavoidable. As such, there is no end-to-end solution (from the Theddlethorpe and Anderby Creek Landfall Study Areas to the River Welland) that provides an opportunity to entirely avoid both FZ2 and FZ3. These areas of FZ2 and FZ3 are attributed to flooding from the sea and from various watercourses including the Great Eau, Wainfleet Relief Channel, Steeping River, Hobhole Drain, River Witham, South Forty Foot Drain and River Welland. Any Project infrastructure required to be routed through or located within FZ2 and FZ3 will be developed and designed accordingly, including any necessary mitigations and compensations.

7.3.15 All Corridors contain watercourses that will require crossing. The construction and installation methods for crossing identified watercourses will be determined as the Project develops, and in close consultation with relevant key stakeholders, specifically the EA and IDBs. However, there are several larger watercourses, some of which are heavily engineered, and crossing of these would be technically complex, and highly likely to require the use of challenging trenchless cable installation methods. All crossings where trenchless cable installation methods are determined to

[53] The proposed Weston Marsh substation is infrastructure currently proposed as part of the Grimsby to Walpole Project.

be required would increase the complexity, cost, land requirements and duration of construction and installation. Larger watercourses (identified, using aerial imagery, as having a width > 10 m from the top of their opposing banks) are the most likely to increase the technical complexity of construction and installation. Watercourses of a moderate width (identified, using aerial imagery, with a width of between 5 m and 10 m from the top of opposing banks) are also likely to increase the technical complexity of construction and installation. Smaller watercourses (identified, using aerial imagery, with a width of less than 5 m in width from the top of opposing banks) are unlikely to increase the complexity of construction and installation. Ground investigation will be carried out at each of these water crossings to determine crossing method including depth, monitoring requirements and bank stability. The number of the large and moderate watercourse crossings for each Corridor are detailed in **Table 7-9** below.

Table 7-9 – Number of Large & Moderate Watercourse Crossings within each Corridor

Corridor	Number of large watercourses likely to require crossing	Number of moderate watercourses likely to require crossing
Corridor 1	2	1
Corridor 2	0	1
Corridor 3	0	1
Corridor 4	4	2
Corridor 5	0	1
Corridor 6	0	0
Corridor 7	0	5
Corridor 8	1	2
Corridor 35	0	0
Corridor 36	0	0
Corridor 37	4	2
Corridor 9	4	12
Corridor 10	5	18
Corridor 11	8	26
Corridor 12	12	28
Corridor 13	12	29
Corridor 14	8	33
Corridor 15	12	22
Corridor 16	10	19
Corridor 17	2	22

Corridor	Number of large watercourses likely to require crossing	Number of moderate watercourses likely to require crossing
Corridor 18	6	22
Corridor 19	12	23
Corridor 20	2	3
Corridor 21	2	8
Corridor 22	2	4
Corridor 23	2	2

Ground Conditions

7.3.16 Ground conditions vary across and within all Corridors. Further study and investigation of soils, land drainage, hydrology and hydrogeology would be undertaken during the next phase of the Project, to determine any necessary mitigations, and any required implementation of good and best practices. All Corridors contain varying material types including but not limited to chalk bedrock, glacial till and tidal flat deposits which would require further geotechnical investigation to better understand ground conditions. Cable installation within and across these material types have the potential to increase overall cost and programme duration of the Project. These geotechnical risks are present throughout all the Corridors and are not considered to present a differentiating factor between them.

7.3.17 A large area of peaty soils is present between Burgh le Marsh and Boston. Therefore, several Corridors which route between Firby, Stickney and Friskney interact with these peaty soils. Routeing in these areas would pose a risk to construction and installation through ground subsidence and water-logging. Further geotechnical investigations and specialised access arrangements may be required in these areas, increasing the complexity, cost and duration of construction. Corridors that route through this are of peaty soils are Corridors 8, and Corridors 10 to 19.

7.4 Comparative Appraisal and Summary

7.4.1 The findings detailed above were considered and the relative merits of the different options for the DC underground cables between the Landfall Study Areas and the River Welland were compared. Each Corridor on its own does not provide an end-to-end solution for this geographical area, and a combination of Corridors will be required. In addition, each Corridor has localised constraints which could be avoided through alternative routeing and therefore, it is likely that a combination of Corridors will be required and used. The defined components of the route between the landfalls and the River Welland were considered in isolation (i.e., without consideration of the emerging preferences for the LCS converter station siting zones and the Corridors from the River Welland to Walpole). The emerging preferences for the Corridors from the River Welland to Walpole and in relation to the LCS converter station siting zones are considered within **Chapter 8** and **Chapter 10**, respectively.

7.4.2 This section sets out the factors that influenced the decision-making process for determining the emerging preferred Corridor between the landfalls and the River

Welland. As the design progresses, regular back-checks and reviews will be undertaken to ensure that the emerging preferred Corridor being taken forward at this stage remains the optimum Corridor when all environmental, socio-economic and technical considerations are taken into account. The steps are graphically shown in **Appendix A**.

7.4.3 Routeing options within this area comprised the use of Corridor 1 or Corridor 5 which connect to the Theddlethorpe and Anderby Creek landfalls respectively. From Corridor 1 (Theddlethorpe), Corridors 2, 3, 35, 36 or 37 could be used to connect to several LCS converter siting zones (DC1 to DC5 and DC11, DC12 and DC13) or used as part of a connection to the other LCS converter siting zones (DC6 to DC9) via Corridors 4, 5 and 6. From Corridor 5 (Anderby Creek) this scenario is reversed.

7.4.4 Once a connection to a LCS converter station siting zone is made, there are several options for reaching the River Welland. There is an option to route north-west of Alford via Corridors 35, 36 and 37 across the easternmost part of the Lincolnshire Wolds NL before connecting into options south and west of the A158 between Candlesby and Hagworthingham, and onward connections to the north and west or south and east of Boston. An alternative is to route south and east of Alford via Corridor 7 or Corridor 8. Prior to reaching Burgh le Marsh Corridor 8 routes west, north of Orby, south of Welton le Marsh and west of National Trust’s Gunby Estate Hall and Gardens before connecting into options south-east or south-west of Little Steeping and onward connections to the north and west or south and east of Boston. Corridor 7 continues south between Burgh le Marsh and Skegness before connecting into options south-east of Burgh le Marsh and onward connections to the north and west or south and east of Boston.

7.4.5 The Corridors which route to the south and east of Boston are Corridors 9, 10, 11, 14 and 18 which all connect into Corridor 23 before continuing to the River Welland. Corridors 12, 13, 15, 16, 17, 19 and 20 route north and west of Boston, connecting into Corridors 21 and 22 before continuing to the River Welland.

Comparative Appraisal

7.4.6 Following a comparative review of the Corridors, those Corridors routeing south and east of Boston are considered to be least preferred. This is primarily due to the limited routeing flexibility, technical complexity and the potential for effects upon the ecological and water environment to the east and west of The Haven. This is because of the following constraints and features in this comparatively narrow part of the Corridor:

- the presence of the Outer Dowsing OWF underground cables;
- the need to cross The Haven (a statutory main river) and Hobhole Drain (a statutory main river), and route through the Havenside Nature Reserve and Country Park;
- the presence of a cluster of properties at Fishtoft; and
- the proximity of The Wash, which comprises multiple national, European and international designated sites.

7.4.7 The presence of the Outer Dowsing OWF underground cables will significantly reduce the flexibility for routeing within the Corridor and increase the technical complexity of construction, especially for crossings of The Haven and Hobhole Drain, both of which are heavily engineered main rivers. Moreover, the presence of the Outer Dowsing OWF together with the Project, has the potential to result in impacts upon The Wash designated sites, and Havenside Nature Reserve and Country Park, which collectively may result in a more substantial cumulative effect upon these locally, nationally and internationally designated sites. For this reason, Corridors 9, 10, 11, 14 and 18 which all connect into Corridor 23 are least preferred.

7.4.8 Corridors 35, 36, and 37 were also not preferred as they require extensive routeing within the Lincolnshire Wolds NL (in accordance with Holford Rule 1[54]), increasing the likelihood of substantive albeit temporary adverse impacts on the character of the Lincolnshire Wolds NL, and on receptors within the Lincolnshire Wolds NL. These Corridors would also cross a comparatively steeper terrain, through the Lincolnshire Wolds NL, which would challenge cable installation, and access for installation, potentially necessitating the use of specialist vehicles, plant and equipment for construction and installation. This may include significant earthworks to reduce gradients and provide a safe working environment. Furthermore, as the Viking Link Interconnector already routes through the Lincolnshire Wolds NL and intersects with these Corridors, it is highly likely that the route of the Viking Link Interconnector has already utilised the most suitable terrain for its cable route within the Lincolnshire Wolds NL (further restricting receptive terrain for cable routeing), and one which limits impact on the character of the Lincolnshire Wolds NL. As such, these Corridors are less preferred. That said, although Corridor 8 routes through the Lincolnshire Wolds NL for approximately 700 m its comparatively fewer technical constraints and its location at the south-easternmost part of the Lincolnshire Wolds NL through flat ground means that it is preferred over Corridors 35, 36 and 37.

7.4.9 Regarding the Corridors that connect to the landfalls, there are few differentiating factors to routeing underground cables. If a landfall at Anderby Creek is taken forward then there is a preference for routeing from the Anderby Creek landfall via Corridors 3, 4 and 5, to potential locations for the LCS converter station. If a landfall at Theddlethorpe is taken forward then there is a preference for routeing via Corridors 1 and 3, to potential locations for the LCS converter station. These Corridor preferences (from each landfall) are in part due to the shorter distance for terrestrial routeing from the Anderby Creek and Theddlethorpe landfall to LCS converter station sites which therefore have the potential to result in fewer adverse environmental effects (i.e., by adopting a shorter route, there is a reduced likelihood of encountering sensitive environmental features) and reduced engineering complexity. This also directly aligns with general principles of Holford Rule 3 (where other things being equal, choose the most direct line). Use of Corridor 2 is less preferred because routeing through the Corridor from either landfall would not represent the shortest, most direct route to potential locations for the LCS converter station.

7.4.10 When considering the remaining Corridors between the LCS converter station sites and the A158, the two remaining Corridors are Corridor 7 and Corridor 8. From the A158, a route from Corridor 7 to the River Welland would connect to either Corridors 12, 13, 15, or 19 before connecting to either Corridors 20, 21 or 22. A route from the same point to the River Welland from Corridor 8 would connect to either Corridors 16 or 17 before connecting to Corridors 20, 21 and 22. The primary differentiator between Corridors 7 and 8 is the presence of the proposed G2W Project and Outer Dowsing OWF Project. The infrastructure required for both these proposed projects route through and overlap with Corridor 7 between Burgh le Marsh and Skegness. This, in addition to the narrow areas along Younger’s Lane and Marsh Lane

[54] Holford Rule 1 - 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.

(because of linear settlement and clusters of properties) and the presence of the existing Triton Knoll OWF underground cables, considerably limiting routeing flexibility within Corridor 7, and posing technical complexities associated with routeing near both proposed projects.

7.4.11 Whilst a direct comparison between Corridors 7 and 8 is difficult as onward routeing from these requires connections to different corridors, overall Corridor 8 is preferred over Corridor 7 because, although it routes through a shorter section of the NL (for approximately 700 m), it is a comparatively shorter route overall, and is at a greater distance from ecologically designated sites (specifically from Bratoft Meadows SSSI and the NSN along the Lincolnshire coastline), with fewer potential physical interactions with the G2W Project and Outer Dowsing OWF Projects. Additionally, Corridor 8 also has a lower potential for interaction with Flood Zones 2 and 3, and avoids the heavily constrained and technically complex area for cable routeing, north of the A158. As such, Corridor 8 is preferred when compared to Corridor 7.

7.4.12 Of the remaining Corridors between the A158 and Kirton End (Corridors 12, 13, 15, 16, 17, and 19) there is little to materially differentiate between the Corridors. However, Corridors which connect to Corridor 7, Corridors 12, 13, 15 and 19 are less preferred as they would not assist in providing an end-to-end solution between the landfalls and the River Welland. Corridor 16 is likely to require more watercourse crossings than Corridor 17, but Corridor 17 is comparatively more constrained, where it routes through narrower areas, as at Sibsey. Corridor 17 would also require two additional crossings of the Poacher railway line.

7.4.13 Between Kirton End and the River Welland, all Corridors would route near to the proposed G2W Project. However, Corridors 20 and 22 are less preferred than Corridor 21 primarily as they follow a less direct and therefore longer route south towards the River Welland. It is also noted that Corridor 20 may require routeing parallel to an existing gas main which would further increase technical complexity and limit routeing flexibility.

7.4.14 Overall, subject to the selection of the preferred LCS converter station site, and considering the requirement to consider potential Corridors from both the Theddlethorpe and Anderby Creek landfalls, the following Corridors are preferred between the Landfall Study Areas and the River Welland:

- From Theddlethorpe: Corridors 1, 3, 4, 6, 8, 17, and 21.
- From Anderby Creek: Corridors 3, 4, 5, 6, 8, 17, and 21.

8. Options Appraisal – Underground Cables: River Welland to Walpole

8. Options Appraisal – River Welland to Walpole

8.1 Introduction

8.1.1 This Chapter details the outcomes of the Options Appraisal (Step 7 as described in **Chapter 4**) for the Corridors from the River Welland to Walpole. The Corridors have been developed through definition of a study area (Step 1), mapping and weighting of features (Step 2 and Step 3), and an iterative identification, review and refinement process (Steps 4, 5 and 6). The Corridors from the River Welland to Walpole are shown in **Figure 8-1**.

Underground Cable Corridors

8.1.2 The Corridors (shown in **Figure 8-1**) between the River Welland to Walpole are described below:

- Corridor 24: This Corridor initially routes south from the River Welland, before curving round the west edge of the settlement of Weston, crossing the A151 as it does so. The Corridor then proceeds south-east across predominantly fenland and towards Wisbech, before turning south and crossing the A17 south of Wisbech St Mary. The Corridor then routes east before terminating at the border between Cambridgeshire and Norfolk, east of Friday Bridge. Underground cable routes within this Corridor would be approximately 43.7 km in length.
- Corridor 25: This Corridor initially routes south from the River Welland, before curving round the west edge of the settlement of Weston, crossing the A151 as it does so. The Corridor diverges east soon after it crosses the Lincolnshire and Cambridgeshire border, before terminating to the north of West Walton. Underground cable routes within this Corridor would be approximately between 31.8 km and 36.5 km in length, subject to siting decisions for the Walpole converter stations and substation (see **Chapter 9**).
- Corridor 26: This Corridor initially routes south from the River Welland, before curving round the western edge of the settlement of Weston, crossing the A151 as it does so. The Corridor diverges east soon after it crosses the Lincolnshire and Cambridgeshire border and terminates close to the settlement of Tydd St Giles. Underground cable routes within this Corridor would be approximately between 29.8 km and 35.2 km subject to siting decisions for the Walpole converter stations and substation (see **Chapter 9**).

Figure 8-1 - Corridors between River Welland and Walpole

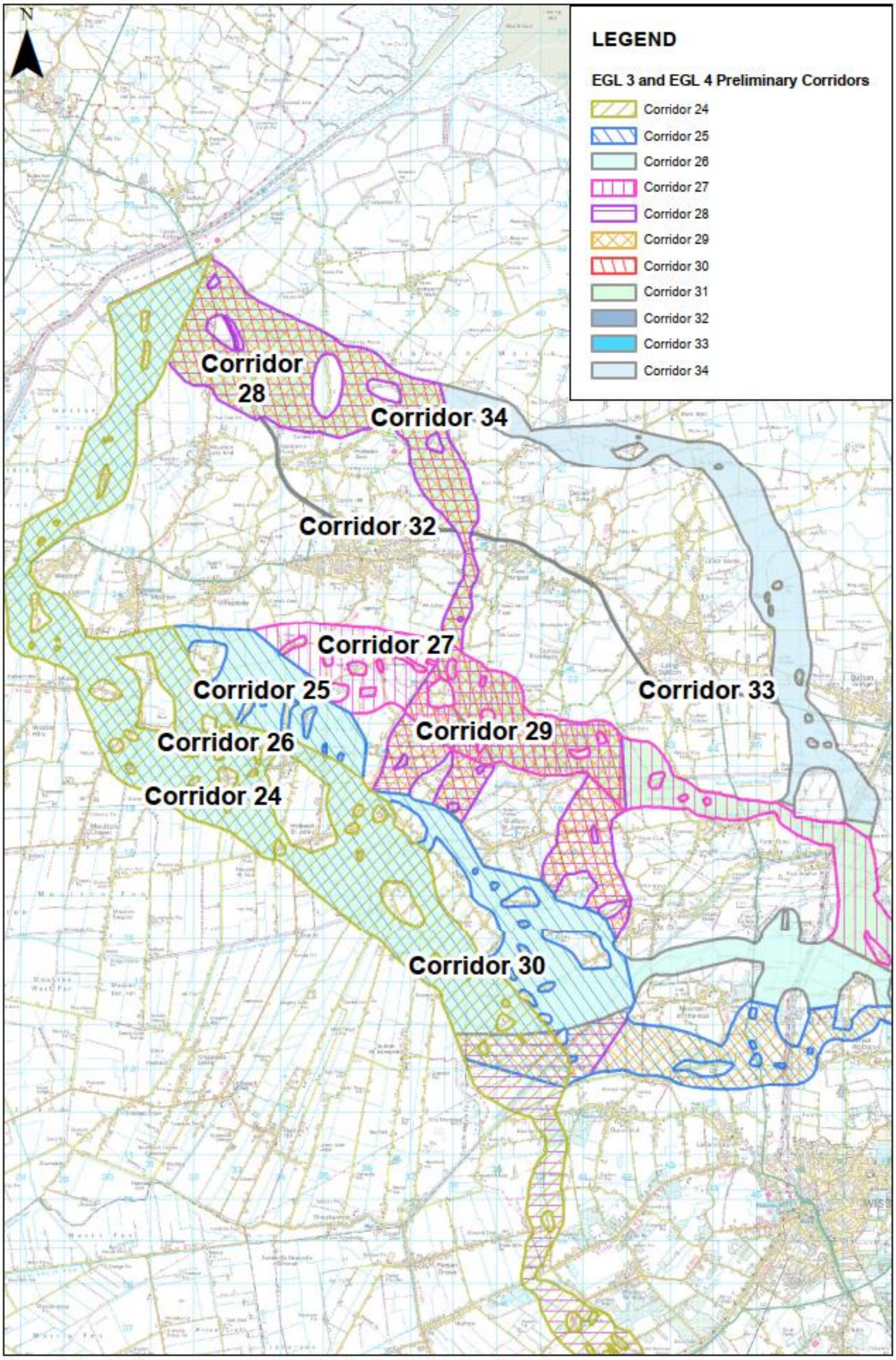


Figure 8-1 – Corridors between the River Welland and Walpole - Page 1

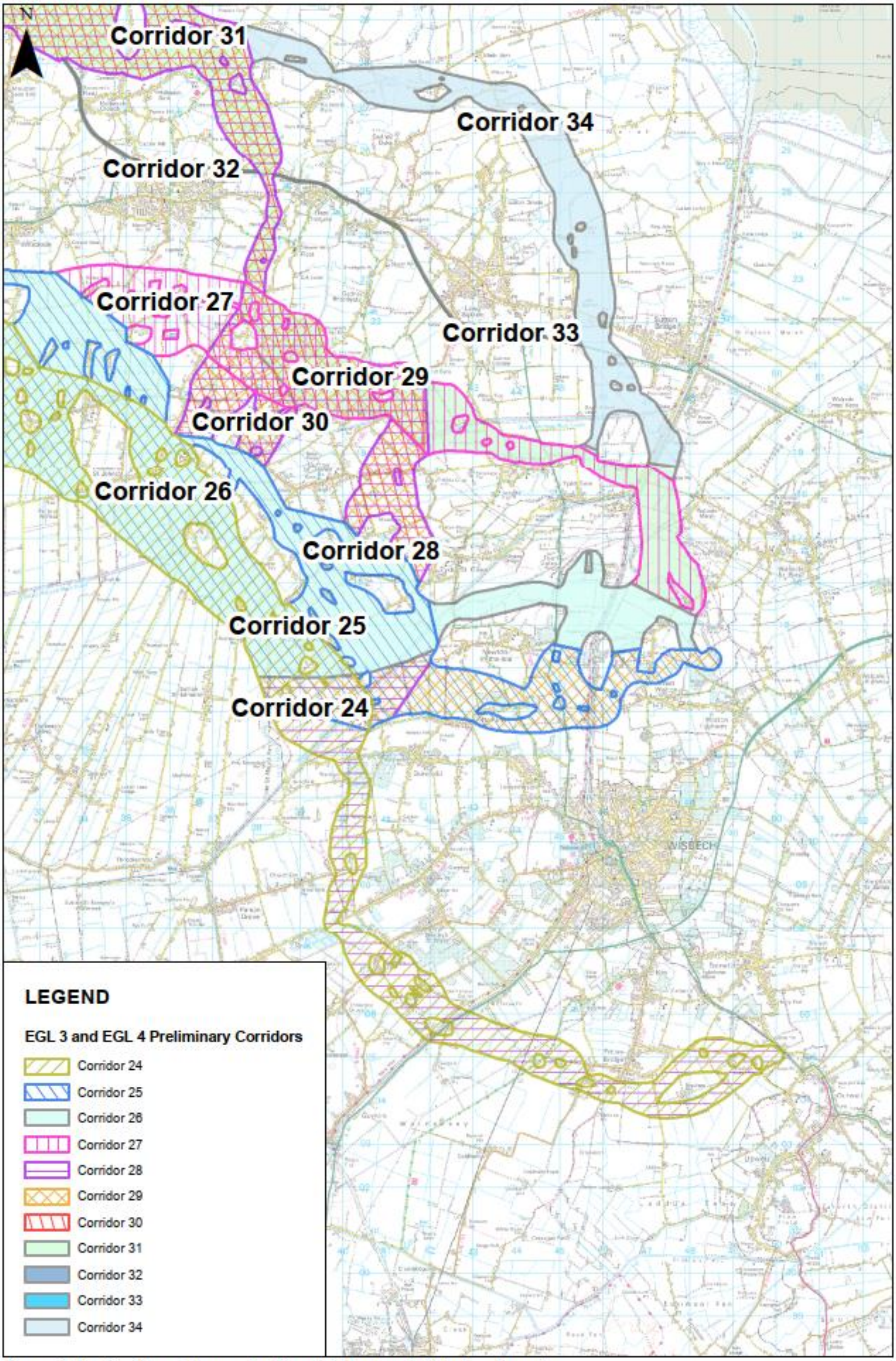


Figure 8-1 – Corridors between the River Welland and Walpole - Page 2

- Corridor 27: This Corridor initially routes south from the River Welland, before curving round the western edge of the settlement of Weston, crossing the A151 as it does so. The Corridor then diverges east to take a northerly route through the fenland; north of Sutton St James and Tydd St Mary. The Corridor crosses into Norfolk, from Lincolnshire, before terminating at the same point as Corridor 26. Underground cable routes within this Corridor would be approximately between 33.7 km and 36.1 km in length, subject to siting decisions for the Walpole converter stations and substation (see **Chapter 9**).
- Corridor 28: This Corridor initially routes south-east from the River Welland, and curving around the east of Holbeach, crossing the A17 as it does so. The Corridor then routes south, widening out as it crosses the fenland, and splitting into two arms to bypass Sutton St James. The Corridor then overlaps with Corridor 25 as it crosses the Lincolnshire and Cambridgeshire border, before following the same route as Corridor 24 to its end point east of Friday Bridge. Underground cable routes within this Corridor would be approximately 42.4 km in length.
- Corridor 29: This Corridor initially routes south-east from the River Welland, and curving around the east of Holbeach, crossing the A17 as it does so. The Corridor then routes south, widening out as it crosses the fenland until south of Sutton St James, where the Corridor diverges east and overlaps with Corridor 25 to its end point north of West Walton. Underground cable routes within this Corridor would be between approximately 29.1 km and 33.6 km in length, subject to siting decisions for the Walpole converter stations and substation (see **Chapter 9**).
- Corridor 30: This Corridor initially routes south-east from the River Welland, and curving around the east of Holbeach, crossing the A17 as it does so. At a point south of Tydd St Giles it diverges east, following Corridor 26 to its end point north of West Walton. Underground cable routes within this Corridor would be approximately between 25.1 km and 30.5 km in length, subject to siting decisions for the Walpole converter stations and substation (see **Chapter 9**).
- Corridor 31: This Corridor initially routes south-east from the River Welland, and curving around the east of Holbeach, crossing the A17 as it does so. The Corridor then routes south, widening out as it crosses the fenland until north of Sutton St James, where the Corridor diverges east, following the same route as Corridor 27 to the north of Tydd St Mary, to its terminus north of West Walton. Underground cable routes within this Corridor would be approximately between 27.4 km and 29.3 km in length, subject to siting decisions for the Walpole converter stations and substation (see **Chapter 9**).
- Corridor 32: This Corridor allows alternative routes to Corridors 28 to 31 (and Corridor 34 if Corridor 33 is also used). It follows the A17 from north of Saracen’s Head to the terminus east of Holbeach. Underground cable routes within this Corridor would be approximately 6.4 km in length.
- Corridor 33: This Corridor begins at the terminus of Corridor 32. It allows alternative routes to Corridors 28 to 31 (to connect to Corridor 34)). The Corridor follows the A17 to its end point to the west of Sutton Bridge (at Corridor 24). Underground cable routes within this Corridor would be approximately 9.3 km in length.
- Corridor 34: This Corridor initially routes east towards The Wash from the River Welland, passing to the north of Lutton, before turning south, passing to the east of Long Sutton, crossing the A17 and adjoining Corridor 31 to the east of Tydd St Mary. Underground cable routes within this Corridor would be approximately between 28.4 km and 29.9 km in length.

8.2 Options Appraisal

8.2.1 The Options Appraisal below has considered environmental, socio-economic and technical topics for each Corridor and was informed by the data gathered as outlined in **Table 5-1** and **Table 5-2**. For the current Project stage, relevant data comprises desk study information, supplemented by a site visit to select locations, on important receptors.

8.2.2 As detailed in **Chapter 5**, for the environmental, socio-economic and technical topics, the appraisal considers the potential impacts because of the Project on relevant receptors, and whether such effects could be avoided or mitigated through careful routeing or siting. Where impacts cannot be avoided or mitigated by careful routeing or siting, other forms of mitigation have been considered. The main cable installation method is assumed to be open-cut as this is the most economic and efficient installation method. Therefore, the application of trenchless cable installation, as a means of crossing main rivers, major roads and railways, and substantive areas of environmental sensitivity is regarded as an additional means of mitigating impacts. The residual impacts considered in this Options Appraisal do not take account of further detailed project-specific environmental, socio-economic or technical mitigations which are likely to be developed later through the EIA process to be undertaken at the project's Defined Proposal and Statutory Consultation Stage (Stage 3).

Environmental Factors

Landscape and Visual

8.2.3 All Corridors lie within the Fens NCA (No 46) and are all over 10 km away from any Nationally Designated Landscape. The closest of which is the North Norfolk NL (formerly known as the North Norfolk AONB) and therefore is not considered further as it is not a differentiating factor. The areas within the Corridors comprise of open arable farmland with networks of drains and rivers as shown in **Figure 8-2.**

8.2.4 Visual receptors in proximity to each of the Corridors comprise residential properties (either within or at the edge of settlements or scattered properties) and recreational receptors (people using PRoW, roads and cycle routes). The main settlement in this area is at Wisbech. The most densely settled areas are those in proximity to Holbeach, Tydd St Giles and Sutton Bridge which has resulted in narrower Corridors and/or Corridors with a greater number of potential residential receptors. In other areas between the River Welland and Walpole, settlements comprise smaller linear settlements or scattered properties. The potential likelihood and severity of effects upon visual amenity is greater for receptors in closer proximity to the Corridors. Identified receptors within 250 m of the Corridor are likely to experience temporary effects upon visual amenity at a greater magnitude, as detailed in **Table 8-1**.

8.2.5 For all Corridors, there is a risk that installation of the underground cables could influence the character of the area where hedgerows, trees and woodland within the Corridors cannot be avoided and therefore would require removal. Careful routeing would help to limit the potential for significant adverse impacts on landscape character by seeking to limit impacts upon woodland, tree planting, hedgerows, and by seeking more direct routes where possible. As the permanent works are underground (excluding marker posts), impacts with the potential to cause significant adverse effects to the landscape character of the area would be limited to the construction and installation phase. Careful siting of temporary construction and installation sites and facilities together with the control of site working measures and practices will further mitigate and help to reduce the severity of any potential adverse effects. Impacts upon visual amenity would be limited to the construction and installation phase. Careful routeing would seek to limit impacts upon woodland, tree planting, hedgerows and would seek to increase distances from residential properties. In addition, careful siting of temporary works and implementation of standard working measures and practices will also help to reduce the severity of impacts.

8.2.6 There is a risk that installation of the underground cables within the Corridors will have an adverse effect upon visual amenity of the identified key receptors. As the permanent works are underground, impacts with the potential to cause significant adverse effects upon visual amenity are temporary and related only to the construction and installation phase. Careful routeing would seek to limit impacts upon woodland, tree planting, hedgerows, and would also seek to increase or maximise distances from residential properties. In addition, careful siting of temporary construction and installation sites and facilities together with the control of site working measures and practices will further mitigate and help to reduce the severity of any potential adverse effects.

Figure 8-2 – Landscape and Visual Features between the River Welland and Walpole

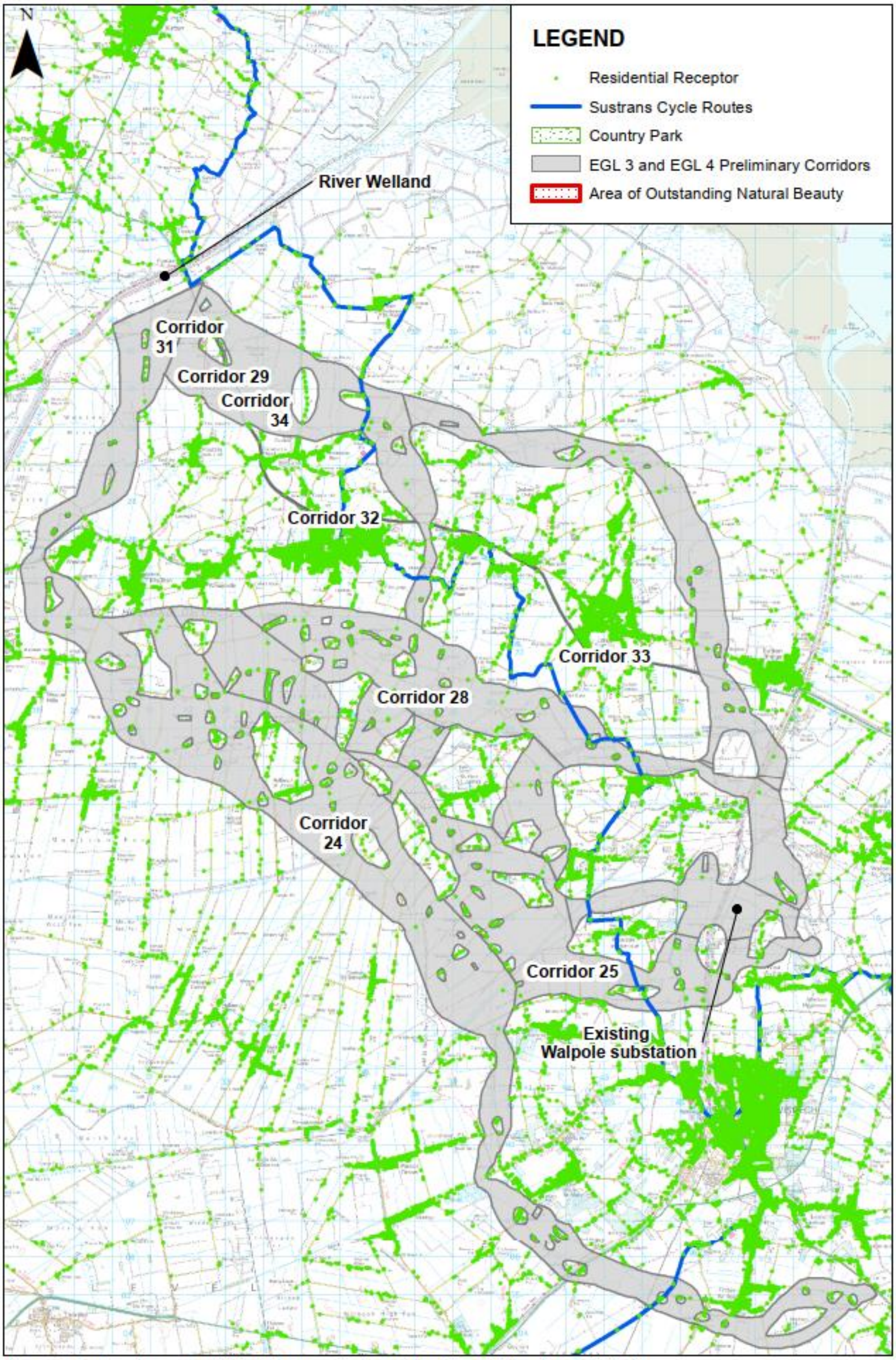


Figure 8-2 – Landscape and Visual features between the River Welland and Walpole

Table 8-1 Landscape character and key visual receptors

Corridor	Landscape Character of the Corridor	Key visual receptors
Corridor 24	Characterised by arable farmland in a rectilinear pattern, comprising open fields bound by a network of drains. There is a distinctive, small-scale field pattern south-west of Sutton St James and orchards west of Gorefield. Horizons are distant and low, featuring occasional small blocks of woodland and distant trees. Multiple existing overhead lines are prominent north of Holbeach St John's and west of Friday Bridge. The voltages of these existing overhead lines are; 33 kV operated by UKPN, 132 kV operated by NGED, and 400 kV operated by NGET. Scattered settlement is present throughout the Corridor.	Within the Corridor there are approximately 33 residential receptors. These are primarily located at Whaplode and Friday Bridge and can be avoided by careful routeing. Outside of the Corridor, but within 250 m of the Corridor there are approximately 1,000 residential receptors. These are primarily located at the settlements of Weston (east), Holbeach St John's (in an area specifically excluded within the Corridor), Wisbech St Mary (east) and Friday Bridge (north). In addition to residential receptors other key visual receptors include recreational receptors (users of identified features). Those identified within 250 m of the Corridor include approximately four PRoW, including the Nene Way Long Distance Footpath (described in this report as the Nene Way). Other recreational receptors in the wider area are those using major and minor roads which cross or route parallel to the Corridor. Narrower areas of the Corridor (where receptors would be closer to construction) are located west of Weston and south of Church End.
Corridor 25	Characterised by arable farmland in a rectilinear pattern, comprising open fields bound by a network of drains. There is a particularly distinctive small-scale field pattern south-west of Sutton St James and orchards south of Newton-in-the-Isle. Horizons are distant and low, featuring occasional small blocks of woodland and distant trees. Multiple existing overhead lines are prominent north of Weston, north of Sutton St James and north of Newton-in-the-Isle, as well as the wind warm at Tydd St Mary. The voltages of these existing overhead lines are; 33 kV operated by UKPN, 132	Within the Corridor there are approximately 42 residential receptors. These are primarily located at Whaplode, Tydd St Giles and Newton-in-the-Isle and can be avoided by careful routeing. Outside of the Corridor, but within 250 m of the Corridor there are approximately 910 residential receptors. These are primarily located at the settlements of Weston (east), Moulton (east), Holbeach (north-east), Holbeach St Johns (in an area specifically excluded within the Corridor), Sutton St James (east), Tydd St Giles (east), Newton-in-the-Isle (north) and West Walton (south). In addition to residential receptors other key visual receptors include recreational receptors (users of identified features). Those identified within

Corridor	Landscape Character of the Corridor	Key visual receptors
	kV operated by NGED, and 400 kV operated by NGET. Scattered settlement is present throughout the Corridor.	250 m of the Corridor include approximately six PRoW, including the Nene Way. Other recreational receptors in the wider area are those using major and minor roads which cross or route parallel to the Corridor. Narrower areas of the Corridor (where receptors would be closer to construction) are located west of Weston and south of Newton-in-the-Isle.
Corridor 26	Characterised by arable farmland in a rectilinear pattern, comprising open fields bound by a network of drains. There is a particularly distinctive small-scale field pattern south-west of Sutton St James. Horizons are distant and low featuring occasional small blocks of woodland and distant trees. Multiple existing overhead lines are prominent north of Weston, north of Sutton St James and north of Newton-in-the-Isle, as well as the wind warm at Tydd St Mary. The voltages of these existing overhead lines are; 132 kV operated by NGED and UKPN and 400 kV operated by NGET. Scattered settlement is present throughout the Corridor.	Within the Corridor there are approximately 37 residential receptors. These are primarily located at Whaplode and Holbeach St Johns and can be avoided by careful routeing. Outside of the Corridor, but within 250 m of the Corridor there are approximately 800 residential receptors. These are primarily located at the settlements of Weston (east), Moulton (east), Holbeach (north-east), Holbeach St Johns (in an area specifically excluded within the Corridor), Sutton St James (east), Tydd St Giles (east), Newton-in-the-Isle (north) and Ingleborough (south). In addition to residential receptors other key visual receptors include recreational receptors (users of identified features). Those identified within 250 m of the Corridor include approximately six PRoW, including the Nene Way. Other recreational receptors in the wider area are those using major and minor roads which cross or route parallel to the Corridor. Narrower areas of the Corridor (where receptors would be closer to construction) are located west of Weston and north of Newton-in-the-Isle.
Corridor 27	Characterised by arable farmland in a rectilinear pattern, comprising open fields bound by a network of drains. Horizons are distant and low, featuring occasional small blocks of woodland and distant trees. Multiple existing overhead lines are prominent north of Weston, north of Sutton St James and south of Tydd St Mary, as well as the wind farm at Tydd St Mary. The voltages of these existing overhead lines are; 132 kV operated by	Within the Corridor there are approximately 24 residential receptors. These are primarily located at Holbeach and Moulton Seas End and can be avoided by careful routeing. Outside of the Corridor, but within 250 m of the Corridor there are approximately 540 residential receptors. These are primarily located at the settlements of Weston (east), Moulton (north), Sutton St James, (south) Tydd St Mary (south), Foul Anchor (west) and Ingleborough (south).

Corridor	Landscape Character of the Corridor	Key visual receptors
	NGED and UKPN and 400 kV operated by NGET. Scattered settlement is present throughout the Corridor.	In addition to residential receptors other key visual receptors include recreational receptors (users of identified features). Those identified within 250 m of the Corridor include approximately six PRoW, including the Nene Way. Other recreational receptors in the wider area are those using major and minor roads which cross or route parallel to the Corridor. Narrower areas of the Corridor (where receptors would be closer to construction) are located west of Weston and north of Tydd St Mary.
Corridor 28	Characterised by arable farmland in a rectilinear pattern, comprising open fields bound by a network of drains. There is a particularly distinctive field pattern surrounding Sutton St James, and orchards west of Gorefield. Horizons are distant and low, featuring occasional small blocks of woodland and distant trees. Multiple existing overhead lines are prominent north of Sutton St James. The voltages of these existing overhead lines are; 33 kV operated by UKPN, 132 kV operated by NGED, and 400 kV operated by NGET. Scattered settlement is present throughout the Corridor.	Within the Corridor there are approximately 54 residential receptors. These are primarily located at Moulton Marsh, Cross Drove and Sutton St James and can be avoided by careful routeing. Outside of the Corridor, but within 250 m of the Corridor there are approximately 1,260 residential receptors. These are primarily located at the settlements of Moulton Common (south), Little Common (south), Cowfield Gould (in an area specifically excluded from the Corridor), Sutton St James (in an area specifically excluded from Corridor), Tydd St Giles (east), Gorefield (east), Bunker’s Hill (in an area specifically excluded from the Corridor), Friday Bridge (north) and Holly End (east). In addition to residential receptors other key visual receptors include recreational receptors (users of identified features). Those identified within 250 m of the Corridor include approximately four PRoW, including the Nene Way. Other recreational receptors in the wider area are those using major and minor roads which cross or route parallel to the Corridor. Narrower areas of the Corridor (where receptors would be closer to construction) are located east of Holbeach and south of Church End.
Corridor 29	Characterised by arable farmland in a rectilinear pattern, comprising open fields bound by a network of drains. There is a particularly distinctive field pattern surrounding Sutton St James, and several orchards south of Newton-in-the-Isle. Horizons are distant and low, featuring occasional small blocks	Within the Corridor there are approximately 53 residential receptors. These are primarily located at Newton-in-the-Isle, Sutton St James and West Walton and can be avoided by careful routeing. Outside of the Corridor, but within 250 m of the Corridor there are approximately 720 residential receptors. These are primarily located at the

Corridor	Landscape Character of the Corridor	Key visual receptors
	of woodland and distant trees. Multiple existing overhead lines are prominent north of Sutton St James. The voltages of these existing overhead lines are; 132 kV operated by NGED and UKPN and 400 kV operated by NGET. Scattered settlement is present throughout the Corridor.	settlements of Moulton Common (south), Little Common (south), Cowfield Gould (in an area specifically excluded from the Corridor), Sutton St James (in an area specifically excluded from Corridor), Tydd St Giles (east), Newton-in-the-Isle (north), Fitton End (south) and West Walton (south). In addition to residential receptors other key visual receptors include recreational receptors (users of identified features). Those identified within 250 m of the Corridor include approximately four PRoW, including the Nene Way. Other recreational receptors in the wider area are those using major and minor roads which cross or route parallel to the Corridor. Narrower areas of the Corridor (where receptors would be closer to construction) are located east of Holbeach and south of Newton-in-the-Isle.
Corridor 30	Characterised by arable farmland in a rectilinear pattern, comprising open fields bound by a network of drains. There is a particularly distinctive field pattern surrounding Sutton St James. Horizons are distant and low, featuring occasional small blocks of woodland and distant trees. Multiple existing overhead lines are both prominent in the south. The voltages of these existing overhead lines are; 132 kV operated by NGED and UKPN and 400 kV operated by NGET. Scattered settlement is present throughout the Corridor.	Within the Corridor there are approximately 48 residential receptors. These are primarily located at Holbeach St Marks, Moulton Seas End and Sutton St James and can be avoided by careful routeing. Outside of the Corridor, but within 250 m of the Corridor there are approximately 820 residential receptors. These are primarily located at the settlements of Moulton Common (south), Little Common (south), Cowfield Gould (in an area specifically excluded from the Corridor), Sutton St James (in an area specifically excluded from Corridor), Tydd St Giles (east), Newton-in-the-Isle (south), Four Gotes (north) and Ingleborough (south). In addition to residential receptors other key visual receptors include recreational receptors (users of identified features). Those identified within 250 m of the Corridor include approximately four PRoW, including the Nene Way. Other recreational receptors in the wider area are those using major and minor roads which cross or route parallel to the Corridor. Narrower areas of the Corridor (where receptors would be closer to construction) are located east of Holbeach and north of Newton-in-the-Isle.

Corridor	Landscape Character of the Corridor	Key visual receptors
Corridor 31	Characterised by arable farmland in a generally irregular pattern, comprising open fields bound by a network of drains. Horizons are distant and low, featuring occasional small blocks of woodland and distant trees. Multiple existing overhead lines, and a wind farm at Tydd St Mary's Marsh, are both particularly prominent in the south. The voltages of these existing overhead lines are; 132 kV operated by NGED and UKPN and 400 kV operated by NGET. Scattered settlement present throughout the Corridor.	Within the Corridor there are approximately 33 residential receptors. These are located at Holbeach Bank, Sutton St James and Moulton Marsh and can be avoided by careful routeing. Outside of the Corridor, but within 250 m of the Corridor there are approximately 570 residential receptors. These are primarily located at the settlements of Moulton Common (south), Little Common (south), Clark's Hill (west), Holland Ho (south), Tydd St Mary (south), and Walpole Marsh (east). In addition to residential receptors other key visual receptors include recreational receptors (users of identified features). Those identified within 250 m of the Corridor include approximately four PRoW, including the Nene Way. Other recreational receptors in the wider area are those using major and minor roads which cross or route parallel to the Corridor. Narrower areas of the Corridor (where receptors would be closer to construction) are east of Holbeach and north of Tydd St Mary.
Corridor 32	Corridor tracks directly along the A17; hence landscape character is dominated by highway features set into a rural fringe setting with open arable fields interspersed with settlements of various sizes including the town of Holbeach. An existing overhead line which runs across the Corridor north of Holbeach is prominent in the landscape. The voltage of this existing overhead line is 33 kV and is operated by NGED. Views are occasionally open, but generally enclosed by roadside vegetation including trees and hedgerows, which are particularly dense north of Holbeach.	There are no residential properties located within the Corridor. Outside of the Corridor, but within 250 m of the Corridor there are approximately 760 residential receptors. These are primarily located at the settlements of Saracen's Head (east), Cackle Hill (north) and Holbeach (south). In addition to residential receptors other key visual receptors include recreational receptors (users of identified features). Those identified within 250 m of the Corridor include approximately two PRoW. Other recreational receptors in the wider area are those using major and minor roads which cross or route parallel to the Corridor.

Corridor	Landscape Character of the Corridor	Key visual receptors
Corridor 33	Corridor tracks directly along the A17; hence landscape character is dominated by highway features set into a rural fringe setting, comprising open arable fields interspersed by settlements of various sizes. Two existing overhead lines which run across the Corridor, south-east of Long Sutton are prominent features in the landscape. The voltages of these two existing overhead lines is 11 kV and 33 kV and both are operated by NGED Views are generally open, but occasionally enclosed by roadside vegetation including trees and a small number of hedgerows.	There are no residential properties located within the Corridor. Outside of the Corridor, but within 250 m of the Corridor there are approximately 560 residential receptors. These are primarily located at the settlements of Fleet Hargate (south) and Long Sutton (east). In addition to residential receptors other key visual receptors include recreational receptors (users of identified features). Those identified within 250 m of the Corridor include approximately three PRoW. Other recreational receptors in the wider area are those using major and minor roads which cross or route parallel to the Corridor.
Corridor 34	Characterised by arable farmland in a rectilinear pattern, comprising open fields bound by a network of drains. Horizons are distant and low, featuring occasional small blocks of woodland and distant trees. An existing overhead line which roughly follows the route of the Corridor and is present in views, the A17 and a wind farm at Tydd St Mary’s Marsh are prominent features in the landscape. The voltage of the existing overhead line is 132 kV and is operated by NGED. Settlement is sparse, occasionally strung out along roads.	Within the Corridor there are approximately 36 residential receptors. These are primarily located at Moulton Seas End and Moulton Marsh and can be avoided by careful routeing. Outside of the Corridor, but within 250 m of the Corridor there are approximately 340 residential receptors. These are primarily located at the settlements of Moulton Common (south), Little Common (south), and Holbeach Hurn (south). In addition to residential receptors other key visual receptors include recreational receptors (users of identified features). Those identified within 250 m of the Corridor include approximately five PRoW, including the Nene Way. Other recreational receptors in the wider area are those using major and minor roads which cross or route parallel to the Corridor. Narrower areas of the Corridor (where receptors would be closer to construction) are north of Holbeach Hurn and south of Sutton Bridge.

Ecology

8.2.7 All Corridors between the River Welland and Walpole lie within 10 km of NSN (comprising SPA and SACs) and Ramsar sites which are located along the Lincolnshire coastline (see **Figure 8-3**). The NSN and Ramsar sites located closest to the Corridors are The Wash and Norfolk Coast SAC and The Wash SPA and Ramsar site ('The Wash Designated sites' as described in Paragraph 7.2.17). Except for Corridors 32 and 33 (which require use of other Corridors to create an end-to-end solution between the River Welland and Walpole), all the Corridors between the River Welland and Walpole are between 2.4 km and 3.0 km from The Wash Designated sites.

8.2.8 Other International and European sites designated for nature conservation identified within 10 km of the Corridors are the Nene Washes SAC, SPA and Ramsar sites and the Ouse Washes SAC, SPA and Ramsar sites. The Ouse Washes SAC, SPA and Ramsar site is located over 9 km from the nearest Corridors (Corridors 24 and 28) and is therefore not considered a differentiating factor between Corridors.

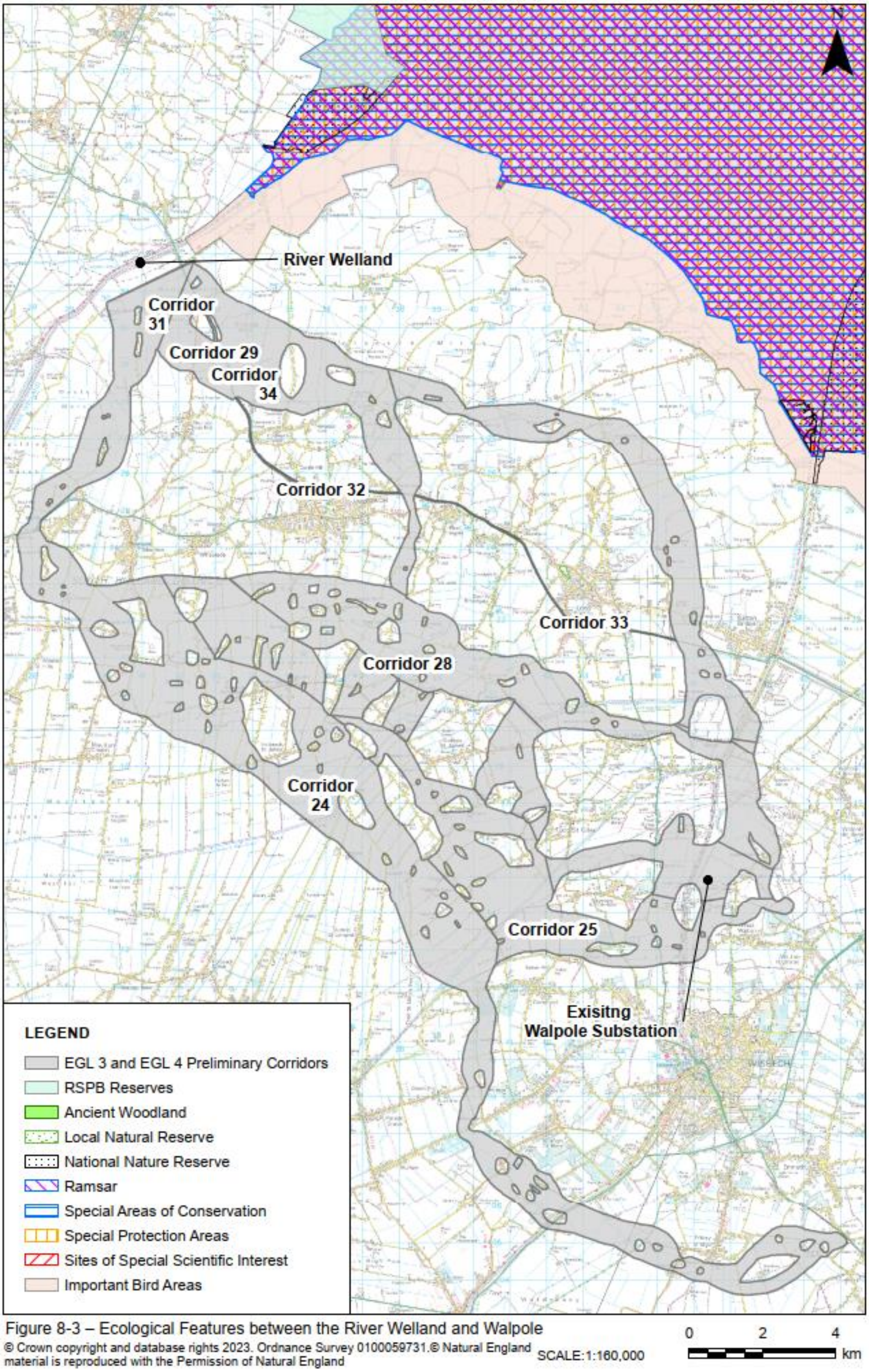
8.2.9 The Nene Washes SAC, SPA and Ramsar sites which also overlap with a SSSI ('The Nene Wash designated sites') is located adjacent to the River Nene between Peterborough and Guyhirn. The Nene Washes designated sites are a Flood Storage Reservoir for the River Nene and include an extensive area of seasonally flooded wet grassland along channelised river reaches. Several nationally scarce plants and vulnerable, rare or relict fenland invertebrates are represented as well as supporting habitat (predominantly along Moreton's Leam) for the spined loach. The Nene Washes designated sites are important for various species of breeding and wintering waterbirds, notably Tundra Swan, Black-tailed godwit and Northern pintail. The Corridors within 10 km of The Nene Wash designated sites are Corridors 24, 25, 28 and 29; Corridors 24 and 28 are approximately 3.4 km north and Corridors 25 and 29 are approximately 9.3 km north.

8.2.10 The River Nene is also hydrologically connected to The Wash and therefore The Wash Designated sites (as described in Paragraph 7.2.17).

8.2.11 Impacts on NSN and Ramsar sites are predominantly limited to potential pollution pathways and disturbance of functionally connected habitats, resulting in the risk of injury and mortality for vulnerable bird species, if present. These impacts are associated with construction as there are no above ground-structures (except for marker posts) or operational activities from the underground HVDC cables. The potential effects upon NSN and Ramsar sites will be considered in detail within a HRA (conducted in the absence of mitigation), as the Project development progresses. However, for the purposes of Options Appraisal, the Corridors located further from the NSN and Ramsar sites are considered to have a lesser likelihood of resulting in adverse environmental effects. With the implementation of careful routeing and standard construction measures, all Corridors are considered capable of being acceptable when considering the potential impacts on identified sites. Should the work done in support of a HRA identify adverse effects on the integrity of the NSN and Ramsar sites, the emerging preferences identified will be revisited.

8.2.12 No other SSSIs or NNRs are identified within 2 km of the Corridors.

Figure 8-3 – Ecological Features between the River Welland and Walpole



8.2.13 **Table 8-2** below details priority habitats within each Corridor. No other designated sites were identified within the Corridors. The construction of the underground cables has the potential to result in habitat loss/degradation and impacts to protected species. The implementation of the following will help to reduce the magnitude of impact on the designated sites, species and priority habitats within the Corridors:

- careful routeing and siting of temporary and permanent infrastructure to avoid designated areas and areas of priority habitat; and
- implementation of a CEMP setting out specific procedures for the protection of habitats and species.

8.2.14 In addition, the provision of compensation and enhancement measures would be made. It is also noted that the consideration of BNG will be included in the later stages of the Project.

Table 8-2 - Priority habitats

Corridor	Priority habitats within the Corridor
Corridor 24	Priority habitats, including deciduous woodland are sporadic throughout the Corridor. Traditional Orchard clusters found within the Corridor, south-west of Wisbech St Mary. Coastal and floodplain grazing marsh located throughout the Corridor, but the main clusters are located west of Wisbech of St Mary. The Corridor crosses an area at South Brink, the River Nene and this cannot be avoided.
Corridor 25	Priority habitats, including deciduous woodland and Coastal and floodplain grazing marsh features throughout the Corridor. A strip of priority habitat cuts through the Corridor to the south (north of Wisbech) which cannot be avoided.
Corridor 26	Priority habitats, including deciduous woodland and Coastal and floodplain grazing marsh features throughout the Corridor. A strip of priority habitat cuts through the Corridor to the south (north of Wisbech) which cannot be avoided.
Corridor 27	Priority habitats, including deciduous woodland and Coastal and floodplain grazing marsh features throughout the Corridor. A strip of priority habitat cuts through the Corridor to the south (north of Wisbech) which cannot be avoided.
Corridor 28	Priority habitats, including deciduous woodland and Coastal and floodplain grazing marsh. Deciduous woodland areas are few and scattered throughout the Corridor. Coastal floodplain and grazing marsh are primarily located in clusters throughout the Corridor most notably north-east of Sutton St Edmund and at North Level Main Drain. Traditional Orchards are in the Corridor, south-west of Wisbech St Mary; however, these can be avoided.
Corridor 29	Priority habitats, including Coastal and floodplain grazing marsh feature in small clusters (most notably at Raven’s Bank and Cross Drove Road) throughout the Corridor. A strip cuts through the Corridor to the south (north of Wisbech and associate with the River Nene) which cannot be avoided.

Corridor	Priority habitats within the Corridor
Corridor 30	Priority habitats, including Coastal and floodplain grazing marsh feature in small clusters (most notably at Raven's Bank and Cross Drove Road) throughout the Corridor. A strip cuts through the Corridor to the south (north of Wisbech and associate with the River Nene) which cannot be avoided.
Corridor 31	Priority habitats, including deciduous woodland and Coastal and floodplain grazing marsh are located sporadically throughout the Corridor. A strip cuts through the Corridor to the south (north of Wisbech and associate with the River Nene) which cannot be avoided.
Corridor 32	Priority habitats deciduous woodland is present within the Corridor. These are two areas of ancient woodland along the A17; one at the roundabout at Welbourne Lane South and the other at Holbeach Primary School.
Corridor 33	Priority habitats, including Coastal and floodplain grazing marsh is located immediately adjacent to the Corridor boundary.
Corridor 34	Priority habitats, including Coastal and floodplain grazing marsh which is associated with the River Nene and crosses through the Corridor and must be crossed.

Historic Environment

8.2.15 Designated heritage assets are present in Corridors 27, 28, 29, 30, 31 and 33 (see **Figure 8-4).** These are Grade II Listed Buildings:

- *Foremans Bridge* is present within Corridors 27, 28, 29, 30 and 31,
- a *footbridge, roadbridge and Sluices* are present at the southern extent of Corridors 27 and 31; and
- a *Milestone* is present at the centre of Corridor 33.

8.2.16 The majority of these designated heritage assets present within these Corridors are located at the edge of the Corridors. There is considered sufficient space within the Corridors to avoid direct impacts to these identified designated heritage assets through careful routeing. Therefore impacts on the designated heritage assets would be limited to effects upon the setting of the asset, which would primarily be during construction.

8.2.17 Between the River Welland and Walpole, there are numerous designated heritage assets within 1 km of the Corridors, the majority of which comprise scattered Grade II listed buildings. The designated heritage assets within 1 km of each Corridor are detailed in **Table 8-3** and illustrated in **Figure 8-4**.

8.2.18 There may be significant adverse effects upon the setting of designated heritage assets from construction activity where routeing is in proximity and has an increased potential to disturb buried archaeology due to an assumed greater presence. However due to the width of the Corridors there is sufficient flexibility to materially reduce impacts through careful routeing and the implementation of standard construction measures.

Figure 8-4 – Heritage Features between the River Welland and Walpole

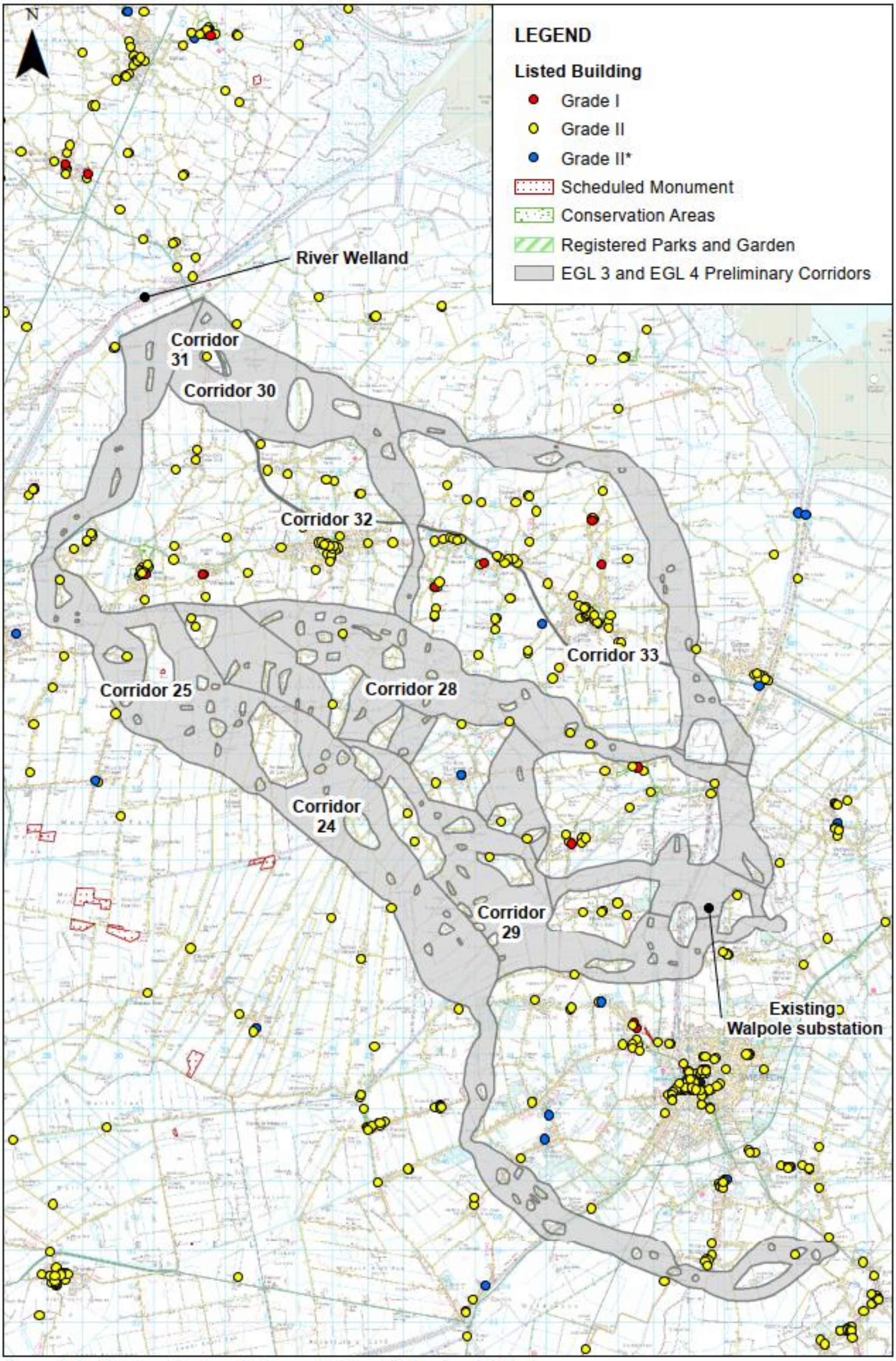


Figure 8-4 – Heritage Features between the River Welland and Walpole

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0 2 4 km

8.2.19 In addition to the identified designated heritage assets, there is a risk of unrecorded archaeology within all Corridors. Careful routeing will also seek to avoid known non-designated heritage assets. Where direct construction impacts on below ground archaeological remains (either known or previously unrecorded) cannot be avoided, these may be managed through standard mitigation measures such as preservation by record.

Table 8-3 - Identified Designated Heritage Assets within 1 km

Corridor	Designated heritage assets within 1 km
Corridor 24	Five Scheduled Monuments, the closest is *King's Hall* moated site, located approximately 270 m from the Corridor within an area specifically excluded from the Corridor at Sparkes Lane. One Conservation Area; *Moulton*, located approximately 870 m north of the Corridor. Four Grade I Listed Buildings the closest is the closest is *Church of St Mary*, which is approximately 350 m south-east of the Corridor in Weston. Two Grade II* Listed Buildings, the closest is *Old Office Block of Land Settlement Association*, located approximately 830 m south-west of the Corridor. 51 Grade II Listed Buildings, the closest is *Guanock House*, approximately 75 m west of the Corridor near Sutton St Edmund.
Corridor 25	Seven Scheduled Monuments, the closest is *Boundary cross, Old Fen Dike,* located approximately 270 m away within an area specifically excluded from the Corridor. One Conservation Area; *Moulton*, which is approximately 870 m north of the Corridor. Seven Grade I Listed Buildings, the closest is *Church of St Mary*, located approximately 290 m south of the Corridor in West Walton. Four Grade II* Listed Buildings, the closest is *Park House*, located approximately 580 m south of the Corridor in Leverington. 58 Grade II Listed Buildings, the closest is *Bloodfold House*, located approximately 40 m east of the Corridor near Whaplode St Catherines.
Corridor 26	Seven Scheduled Monuments, the closest is *Boundary cross*, *Old Fen Dike*, located approximately 270 m away within an area specifically excluded from the Corridor. One Conservation Area; *Moulton,* which is approximately 870 m north of the Corridor. Six Grade I Listed Buildings, the closest is *Church of St Mary*, located approximately 350 m south-east of the Corridor in Weston. Four Grade II* Listed Buildings, the closest is *Church of Giles*, approximately 790 m north of the Corridor. 50 Grade II Listed Buildings, the closest is *Bloodfold House* which is approximately 40 m east of the Corridor, near Whaplode St Catherines.
Corridor 27	Five Scheduled Monuments, the closest is *Churchyard cross*, *St Mary's churchyard*, located approximately 330 m south-east from the Corridor in Weston. Three Conservation Areas, the closest is *Tydd St Mary*, located adjacent to the Corridor in the south.

Corridor	Designated heritage assets within 1 km
	Six Grade I Listed Buildings, the closest is *Church of St Mary's*, located approximately 160 m south in Tydd St Mary. One Grade II* Listed Building; *Old Office Block of Land Settlement Association*, located approximately 830 m south-west of the Corridor, in Low Fulney. 52 Grade II Listed Buildings, scattered around the Corridor. The closest is *Hurdle Tree Bank House*, located approximately 45 m away within an area specifically excluded from the Corridor at Strongs Bank.
Corridor 28	Four Scheduled Monuments, the closest is *Boundary cross*, *Old Fen Dike* which is approximately 270 m away within an area specifically excluded from the Corridor at Old Fen Dike. Two Conservation Areas, the closest of which is *Fleet*, located approximately 270 m east of the Corridor. Three Grade I Listed Buildings, the closest of which is *Bell Tower* located approximately 430 m east in Fleet. Two Grade II* Listed Buildings, the closest of which is *Church of St Giles*, located approximately 680 m east in Tydd St Giles. 64 Grade II Listed Buildings, the closest is *Guanock House* located approximately 72 m west of the Corridor near Sutton St Edmund.
Corridor 29	Four Scheduled Monuments, the closest is *Boundary cross*, *Old Fen Dike* located approximately 270 m away within an area specifically excluded from the Corridor at Old Fen Dike. Two Conservation Areas, the closest is *Fleet*, located approximately 270 m east of the Corridor. Eight Grade I Listed Buildings, the closest is *Church of St Mary*, located approximately 290 m south of the Corridor in West Walton. Four Grade II* Listed Buildings, the closest of which is *Church of St Giles*, located approximately 680 m east in Tydd St Giles. 59 Grade II Listed Buildings, the closest is *Guanock House* located approximately 72 m west of the Corridor near Sutton St Edmund.
Corridor 30	Four Scheduled Monuments, the closest is *Boundary cross*, *Old Fen Dike*, located approximately 270 m away within an area specifically excluded from the Corridor at Old Fen Dike. Two Conservation Areas, the closest is *Fleet*, located approximately 270 m east of the Corridor. Three Grade I Listed Buildings, the closest is *Bell Tower*, located approximately 430 m east in Fleet. Three Grade II* Listed Buildings, the closest is *Church of St James*, located approximately 550 m south in Newton. 48 Grade II Listed Buildings, the closest is *Guanock House* which is approximately 72 m west of the Corridor near Sutton St Edmund.
Corridor 31	One Scheduled Monument; *White Cross, 80 m north of Poultry Farm*, located 390 m to the south of the Corridor. Four Conservation Areas, the closest is *Tydd St Mary*, located adjacent to the Corridor in the south. Three Grade I Listed Buildings, the closest is *Church of St Mary*, located approximately 160 m south in Tydd St Mary.

Corridor	Designated heritage assets within 1 km
	39 Grade II Listed Buildings, the closest is *Strawberry Hall* located approximately 45 m away within an area specifically excluded from the Corridor near Tydd St Mary.
Corridor 32	One Conservation Area; *Holbeach* which is 440 m south. One Grade I Listed Building *Church of All Saints* located approximately 750 m south in Holbeach. 31 Grade II Listed Buildings, the closest is a *Town Farm*, located approximately 28 m north of the Corridor near Holbeach.
Corridor 33	Two Conservation Areas, the closest if *Fleet Hartgate* located approximately 30 m south of the Corridor. Two Grade I Listed Buildings, the closest is *Church of St Mary Magdalene* is 330 m south-west of the Corridor in Gedney. One Grade II* Listed Building; *Garnsgate Hall with Wall and Railings* 190 m south-west near Long Sutton. 47 Grade II Listed Buildings, the closest is *Briar Cottage* 16 m north in Chapelgate.
Corridor 34	One Conservation Area; *Tydd St Mary* 870 m south-west. 13 Grade II Listed Buildings, the closest is a *Milestone*, located approximately 60 m east on Bridge Road.

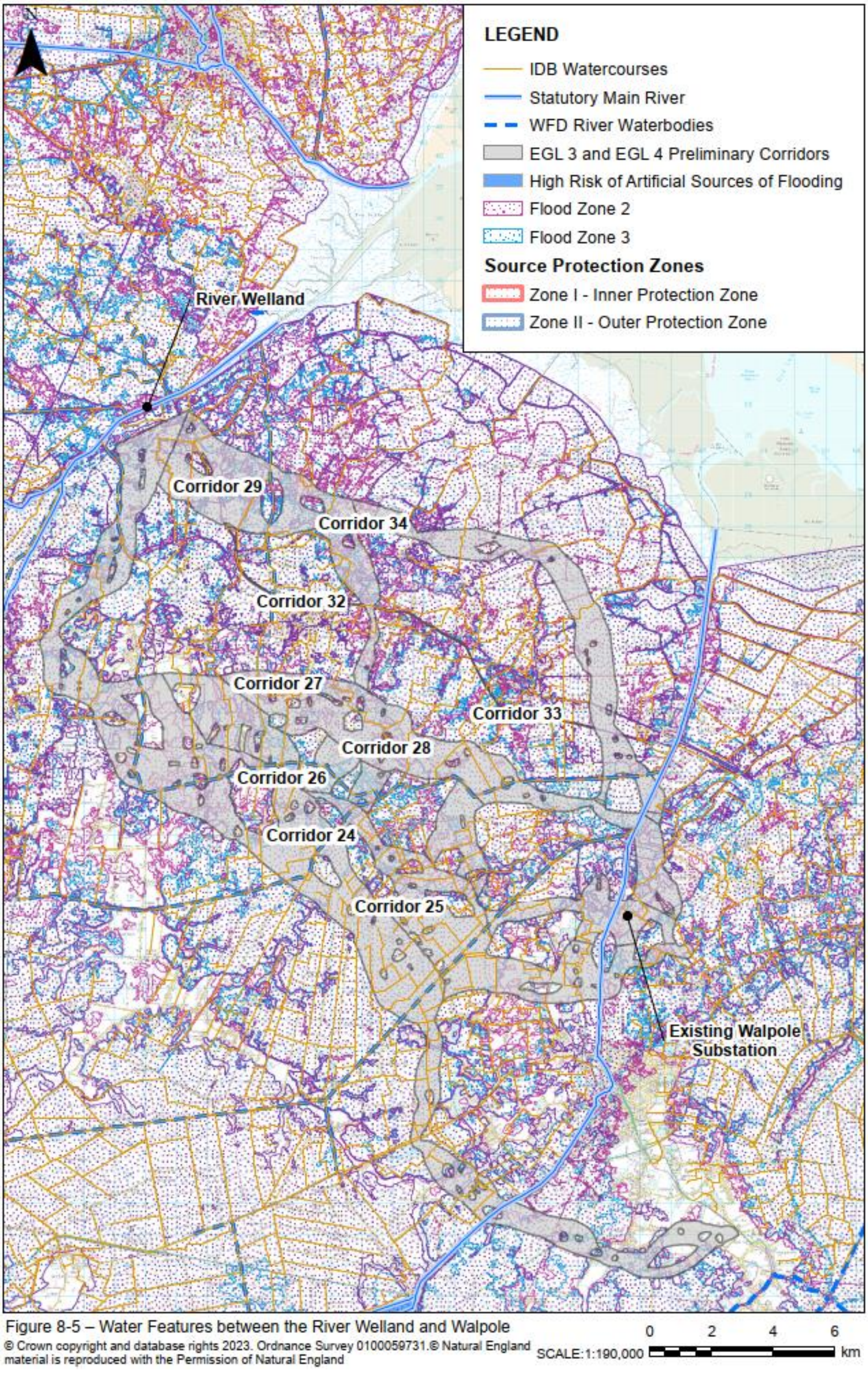
Water Environment

8.2.20 There are several surface water and groundwater features within and adjacent to the Corridors (see **Figure 8-5**). Potential effects on these features include:

- Turbid run-off which could enter the water environment during construction;
- Changes to surface water runoff patterns affecting flood risk during construction;
- Potential damage to flood defences or surface water drainage infrastructure during construction;
- Pollution or flow disruption of groundwater caused through excavation or piling as part of construction work;
- Changes to surface water drainage at identified features during operation;
- Potential risk that infrastructure could result in the release of sediment-laden runoff and pollution to controlled water bodies (surface water and groundwater), changes to hydrological regime and physical disturbance to watercourses; and
- Potential risk of impacts on water resource availability, including impacts to groundwater levels from any dewatering required during construction.

All Corridors lie within Flood Zones 2 and 3; each Corridor contains approximately between 74% and 98% of coverage from these flood zones. Therefore, Flood Zones 2 and 3 are not considered a determining factor between these Corridors. In addition, each Corridor contains ordinary watercourses, including IDB watercourses which are also likely to require crossing in addition to the features detailed within **Table 8-4**. Due to the high number of IDB watercourses within each Corridor, these are not considered a determining factor and therefore are not included within **Table 8-4.**

Figure 8-5 – Water Features between the River Welland and Walpole



8.2.21 Careful routeing will seek to avoid areas sensitive to the water environment (e.g., environmentally designated sites, sources of water use/abstractions), Flood Zones 2 and 3 and minimise watercourse and drain crossings. Appropriate construction methods would be considered at sensitive locations and development and adherence to appropriate management measures would be required. Further detailed assessments of impacts would be undertaken including a FRA and WFD assessment. Water environment features are shown in **Figure 8-5** and detailed in **Table 8-4**.

Table 8-4 Water environment features within and adjacent to Corridor

Corridor	Water Environment Features Within and Adjacent to Corridor
Corridor 24	The River Nene Main River will require crossing in the south-east of the section, south-west of Wisbech. Groundwater vulnerability in the Corridor is unproductive. Flood Zones 2 and 3 (FZ2 and FZ3) are present across the Corridor, primarily attributed to the River Nene, South Holland Drain and North Level Main Drain. FZ2 and FZ3 cover 86% and 74% of the Corridor, respectively. WFD river waterbodies including North Level Drain, South Holland Main Drain, Whaplode River and the Moulton River and will require crossing.
Corridor 25	The River Nene Main River will require crossing in the south-east of the section, located south-west of Wisbech. FZ2 and FZ3 present across the Corridor, primarily attributed to the River Nene, South Holland Drain and North Level Main Drain. FZ2 and FZ3 cover 87% and 75% of the Corridor, respectively. WFD river waterbodies including North Level Drain, South Holland Main Drain, Whaplode River and the Moulton River and will require crossing.
Corridor 26	The River Nene Main River will require crossing in the south-east of the section south-west of Wisbech. FZ2 and FZ3 present across the Corridor, primarily attributed to the River Nene, South Holland Drain and North Level Main Drain. FZ2 and FZ3 cover 87% and 74% of the Corridor, respectively. WFD river waterbodies including North Level Drain, South Holland Main Drain, Whaplode River and the River Moulton and will require crossing.
Corridor 27	Groundwater vulnerability within the Corridor is unproductive. The River Nene Main River will require crossing in the south-east of the section, south-west of Wisbech. FZ2 and FZ3 present across the Corridor, primarily attributed to the River Nene and South Holland Drain. FZ2 and FZ3 cover 91% and 81% of the Corridor, respectively. WFD river waterbodies including South Holland Main Drain, Moulton River and the Whaplode River and will require crossings.
Corridor 28	Groundwater vulnerability within the Corridor is unproductive. The River Nene Main River will require crossing in the south-east of the section, south-west of Wisbech. FZ2 and FZ3 present across the Corridor, primarily attributed to the River Nene, South Holland Drain, North Level Main Drain and the River Welland. FZ2 and FZ3 cover 96% and 93% of the Corridor, respectively. WFD river waterbodies including North Level Main Drain, South Holland Main Drain and the Whaplode River and will require crossing.

Corridor	Water Environment Features Within and Adjacent to Corridor
Corridor 29	Groundwater vulnerability within the Corridor is unproductive. The River Nene Main River will require crossing in the south-east of the section, south-west of Wisbech. FZ2 and FZ3 present across the Corridor, primarily attributed to the River Nene, South Holland Drain and North Level Main Drain. FZ2 and FZ3 cover 96% and 94% of the Corridor, respectively. WFD river waterbodies including North Level Drain, South Holland Main Drain, Whaplode River, River Moulton and the River Holbeach and will require crossing.
Corridor 30	The River Nene Main River will require crossing in the south-east of the section, north of Wisbech. FZ2 and FZ3 present across the Corridor, primarily attributed to the River Nene, South Holland Drain and North Level Main Drain. FZ2 and FZ3 cover 98% and 94% the Corridor, respectively. WFD river waterbodies including North Level Drain, South Holland Main Drain, Whaplode River and the Holbeach River and will require crossing.
Corridor 31	Groundwater vulnerability within the Corridor is unproductive. FZ2 and FZ3 present across the Corridor, primarily attributed to the River Nene, South Holland Drain and North Level Main Drain. FZ2 and FZ3 cover 99% and 94% the Corridor, respectively. The River Nene Main River will require crossing in the south-east of the section, north of Wisbech. WFD river waterbodies including North Level Drain, South Holland Main Drain, Moulton River, Holbeach River and Whaplode River and will require crossing.
Corridor 32	Groundwater vulnerability in the Corridor is unproductive. FZ2 and FZ3 present across the Corridor, primarily attributed to Holbeach River and the River Nene. FZ2 and FZ3 cover 97% and 90% of the Corridor, respectively. WFD river waterbodies Holbeach River and Whaplode River will require crossing.
Corridor 33	Groundwater vulnerability in the Corridor is unproductive. FZ2 and FZ3 present across the Corridor, primarily attributed to Holbeach River and the River Nene. FZ2 and FZ3 cover 96% and 92% of the Corridor, respectively. WFD river waterbodies including the Old River (drain) will require crossing.
Corridor 34	The River Nene Main River will potentially require crossing in the south-east of the section, south of Sutton Bridge. Groundwater vulnerability within the Corridor is unproductive. FZ2 and FZ3 present across the Corridor, primarily attributed to the River Nene, South Holland Drain and North Level Main Drain. FZ2 and FZ3 both cover 99% of the Corridor, respectively. WFD river waterbodies including North Level Drain, South Holland Main Drain, Whaplode River, Moulton River and the Holbeach River and will require crossing.

Socio Economic

8.2.22 Except for recreational paths, including PRoW which can be found within **Table 8-5** (and illustrated in **Figure 8-6**) for each Corridor there are few socio-economic features identified within or immediately adjacent to each of the Corridors. Community features (e.g., golf courses, caravan sites and holiday parks) are located within or adjacent to Corridors. Those identified are a boarding kennels (within Corridors 25, 26, and 27), a hotel/motel (within Corridors 27 to 31) and a caravan site (within Corridors 28 to 31 and Corridor 34). No defence or aviation features have been identified within or adjacent to the Corridors and these are therefore not considered a differentiating factor. Key allocations identified within local plans and major planning applications and proposals are located within or adjacent to Corridors 24, 25, 26, 29, 30, 31, and 32. The socio-economic features identified within the Corridors is detailed in **Table 8-5** (and illustrated in **Figure 8-6**).

8.2.23 There is a potential risk that the Project, could result in temporary effects upon amenity and operations of identified features and temporary closures and disruption to recreational activities, routes and roads. This includes cumulative effects upon common receptors from other proposed large scale developments (such as the Grimsby to Walpole (G2W) Project and Proposed Grantham to Bexwell Pipeline NSIP) within the wider area. Following careful routeing potential permanent effects upon identified features could be limited.

8.2.24 Careful routeing and design of construction access is likely to reduce, and where possible avoid effects on identified receptors. In addition, standard mitigation and management measures would be implemented via a CEMP to reduce the potential risks identified for each Corridor. Further discussion with relevant stakeholders in the area should take place to fully understand the scale of the risks and their potential effects.

Figure 8-6 – Socio-economic Features between the River Welland and Walpole

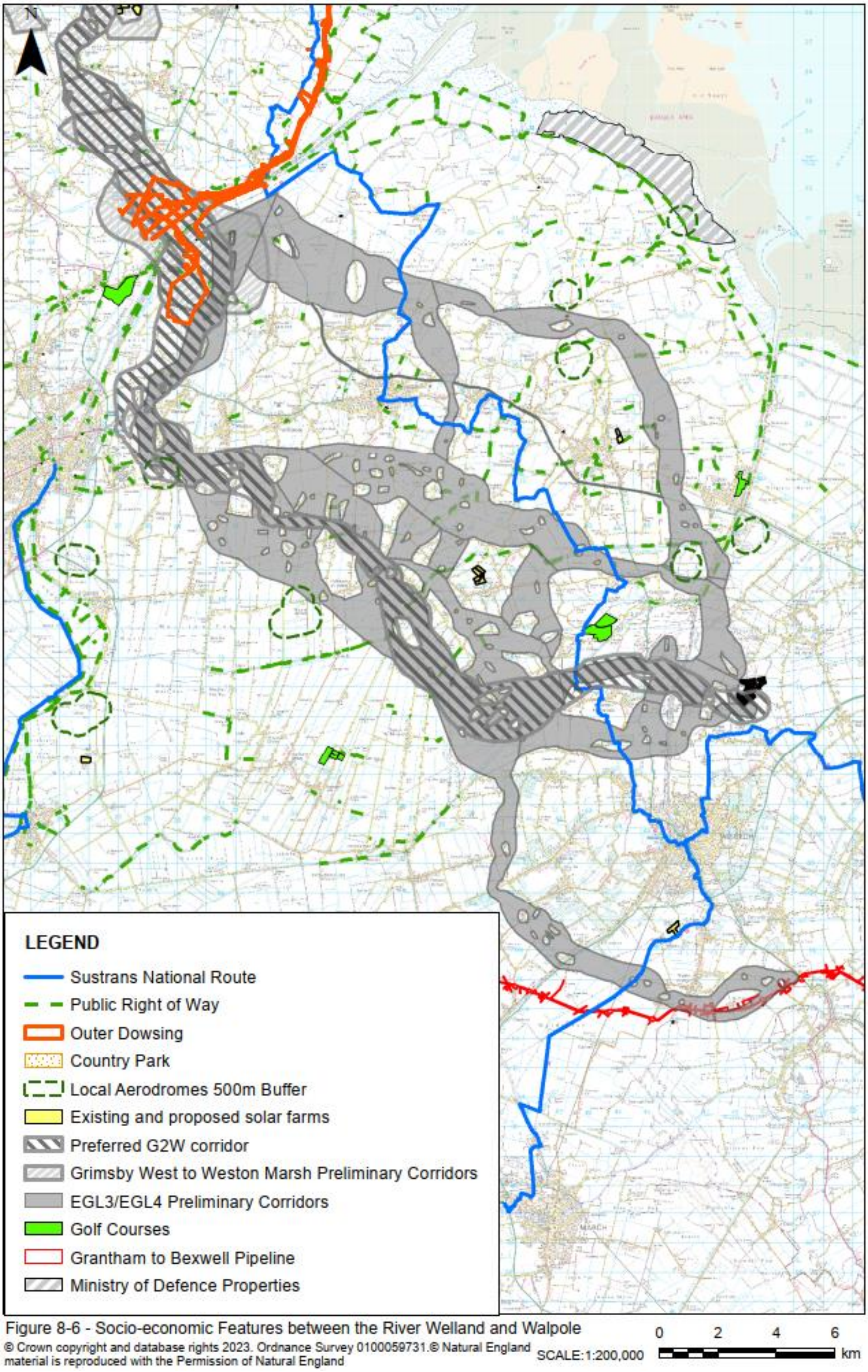


Table 8-5 - Additional Socio-economic receptors and constraints within and adjacent to the Corridors

Corridor	Community receptors and recreational routes	Proposed development (allocations and applications)
Corridor 24	Recreational routes including approximately seven PRoW, located across the Corridor mostly near northwest of Moulton Seas End, Sutton St James and Sutton St Edmond. In addition, the Sustrans National Route 63 is situated west of Friday Bridge and cannot be avoided.	Proposed Grantham to Bexwell Pipeline NSIP routes through the south of the Corridor between Friday Bridge and the A1101. Two solar farm applications which intersect the Corridor north of Sutton St Edmund. This Corridor overlaps with the G2W Project preferred corridor from the start to Sutton St Edmund.
Corridor 25	Community receptors are a boarding kennels near Spalding. Recreational routes including approximately seven PRoW, located across the Corridor mostly near northwest of Moulton Seas End, west of Sutton St James and northeast of Sutton St Edmund. In addition, the Sustrans National Route 1 is situated north of Leverington and cannot be avoided.	Two solar farm applications which intersect the Corridor north of Sutton St Edmund. This Corridor overlaps with the G2W Project preferred corridor for the entirety of the route and cannot be avoided.
Corridor 26	Community receptors are a boarding kennels near Spalding. Recreational routes including approximately seven PRoW, located across the Corridor mostly northwest of Moulton Seas End, west of Sutton St James and northeast of Sutton St Edmund. In addition, the Sustrans National Route 1 is situated northwest of Tydd St Mary.	Two solar farm applications which intersect the Corridor north of Sutton St Edmund. This Corridor overlaps with the G2W Project preferred corridor for the entirety of the route and cannot be avoided.
Corridor 27	Community receptors are a boarding kennels and hotel/motel near Spalding. Recreational routes including approximately seven PRoW, located across the Corridor mostly northwest of Moulton Seas End, north of Sutton St James and Foul Anchor. In addition, the Sustrans National Route 1 is situated northwest of Tydd St Mary.	The Gunthorpe Road Solar Farm. This Corridor overlaps with the G2W Project preferred corridor for the northern section of the route and cannot be avoided in this area.

Corridor	Community receptors and recreational routes	Proposed development (allocations and applications)
Corridor 28	Community receptors are a hotel/motel and a caravan site near Spalding. Recreational routes including approximately six PRoW, located across the Corridor mostly near Sutton St James. In addition, the Sustrans National Route 1 and 63 is situated/routes at north and east of Holbeach and west of Friday Bridge.	Proposed Grantham to Bexwell Pipeline NSIP routes through the south of the Corridor between Friday Bridge and the A1101. The Holbeach Marsh Energy Park which intersects with the Corridor north-east of Sutton St Edmund. This Corridor overlaps with the G2W Project preferred corridor in the middle section, north and north-east of Sutton St Edmund. This cannot be avoided.
Corridor 29	Community receptors are a hotel/motel and a caravan site near Spalding. Recreational routes including approximately six PRoW, located across the Corridor mostly near north and south of Sutton St James. In addition, the Sustrans National Route 1 is situated/routes north and east of Holbeach and north of Leverington.	Two solar farm applications (one of which being Holbeach Energy Park) which intersect the Corridor north of Sutton St Edmund. This Corridor overlaps with the G2W Project preferred corridor in the middle section, north and north-east of Sutton St Edmund as well as the south of the Corridor, north of West Walton. This cannot be avoided.
Corridor 30	Community receptors are a hotel/motel and a caravan site near Spalding. Recreational routes including approximately six PRoW, located across the Corridor mostly north and south of Sutton St James. In addition, the Sustrans National Route 1 is situated/routes north and east of Holbeach and south of Tydd St Giles.	Two solar farm applications (one of which being Holbeach Energy Park) which intersect the Corridor north of Sutton St Edmund. This Corridor overlaps with the G2W Project preferred corridor in the middle section, north and north-east of Sutton St Edmund as well as the south of the Corridor, north of West Walton. This cannot be avoided.
Corridor 31	Community receptors are a hotel/motel and a caravan site near Spalding. Recreational routes including approximately six PRoW, located across the Corridor mostly near Sutton St James. In addition, the Sustrans National Route 1 is situated/routes north and east of Holbeach and north-west of Tydd St Mary.	A proposed Solar Farm at Sutton Bridge. This Corridor overlaps with the G2W Project preferred corridor in the north-west corner and can be avoided.

Corridor	Community receptors and recreational routes	Proposed development (allocations and applications)
Corridor 32	Recreational routes are in proximity, but no overlap. In addition, the Sustrans National Route 1 is routes across the A17 at Holbeach.	Two housing allocations and a prestige employment site located immediately south of Corridor as it passes Holbeach.
Corridor 33	Recreational routes including approximately four PRoW, located across the Corridor mostly near Long Sutton, all crossing the A17.	An employment site located immediately north of Corridor as it passes Fleet Hargate.
Corridor 34	Community receptors are a caravan site near Spalding. Recreational routes including approximately eight PRoW, located across the Corridor mostly near Lutton, Long Sutton and Sutton Bridge. In addition, the Sustrans National Route 1 routes north of Holbeach.	A proposed Solar Farm at Sutton Bridge. This Corridor overlaps with the G2W Project preferred corridor in the north-west corner and can be avoided.

Other Considerations

8.2.25 Other environmental topics were also considered as part of the options appraisal and include air quality, noise and geology.

8.2.26 There are several geological features within the Corridors. The only relevant geology (including potential sources of contamination) features identified which may be impacted by the Corridors are:

- A sewage treatment works east of Sutton St James in Corridors 28, 29 and 30.
- A historic landfill site overlaps with Corridors 24, 25, 26, 27, 28, 29, 30, and 31, to the north and west of Sutton St James.
- A historic landfill site overlaps with Corridor 32, adjacent to the centre of the Corridor north of Holbeach.
- A historic landfill site also overlaps with Corridor 33 and 34, adjacent to the centre of the Corridor, north of Fleet Hargate.

8.2.27 Potential impacts because of the construction include: mobilisation of, and spills of, contaminants during construction (including those that may be associated with petroleum exploration activities); sterilisation of mineral deposits by construction; and disturbance of peat leading to loss of peaty soils. However, for all Corridors, further investigation into soil type and ground conditions would be investigated as part of future design stages and standard mitigation measures regarding pollution prevention and contaminated materials would be implemented. Careful routeing reflecting the outcomes of these investigations will reduce the potential for adverse effects.

8.2.28 Overall, there are residential properties and other sensitive receptors to air quality and noise and vibration impacts within and/or adjacent to the Corridors. There are residential properties associated with numerous settlements and villages, including Holbeach, Fleet Hargate, Long Sutton, Sutton St James, Tydd St Giles, Newton, and West Walton scattered throughout the Corridors. There are also numerous individual dwellings scattered throughout the Corridors. There is a potential risk of temporary effects upon receptors within and adjacent to the Corridors, limited to localised changes in air quality and noise and vibration during construction. However, all Corridors are considered sufficient in size to allow for careful siting and routeing and to reduce the likelihood and magnitude of these effects. These construction effects could then be further reduced through implementation of a CEMP. No potential adverse air quality, noise or vibration impacts are anticipated during operation.

8.3 Engineering Factors

8.3.1 All Corridors have engineering and system factors to consider when routeing underground cables between the River Welland and Walpole. Features relevant to engineering are shown in **Figure 8-7**.

Figure 8-7 –Features relevant to Engineering between the River Welland and Walpole

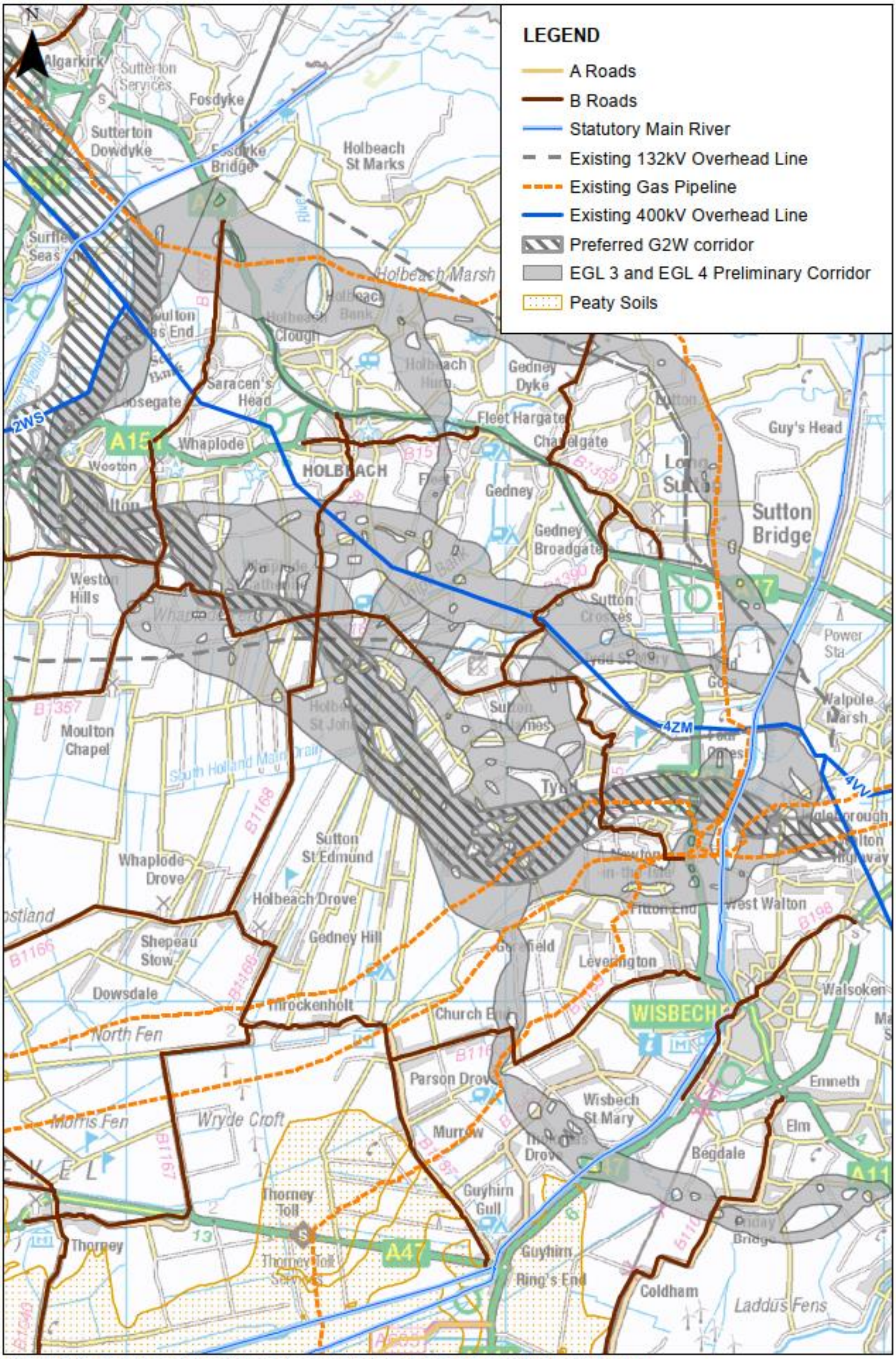


Figure 8-7 - Features relevant to Engineering between the River Welland and Walpole

Routeing Flexibility

8.3.2 Overall, routeing flexibility is generally good along the Corridors due to their width, the lack of major engineering constraints for large sections and alternative crossing locations available throughout the Corridors. However, at certain locations within the Corridors there are narrower areas (caused by features such as settlement and woodland) where flexibility of routeing the DC cables is decreased. At these areas, there is a potential for increased technical complexity which may result in additional costs and construction durations. The routeing flexibility identified for the Corridors are:

- Corridor 24: Generally wide Corridor with good flexibility within the northern extent of the Corridor, routeing south of the River Welland and continuing to the A151, which will require a crossing and where the Corridor narrows. South of the A151 the Corridor widens with good flexibility for various routeing options which continues up to Honeyhill Road which will require crossing, east of Gorefield. However within this section between the A151 and Honeyhill Road, there are some narrower areas present where crossings are required at Hog’s Gate Road, Hurldetree Bank and just south of the Jekils Bank, though alternative routeing options are available. South of the crossing with Honeyhill Road, the Corridor narrows up to Seadyke Road with no alternative routeing options. An existing high-pressure gas main next to Seadyke Road limits flexibility at this crossing further. The Corridor widens past this point with several narrower areas which includes the areas adjacent to Galls Drove and Willock Lane, in the vicinity of Broad Drain, west of the River Nene. Although there are alternative routeing options available, these are constrained by other roads, ditches and utilities. At the crossing with the B1101 March Road, south-west of Friday Bridge, there are additional narrower areas where there no alternative routeing options available.
- Corridor 25: Generally wide corridor with good flexibility within the northern extent of the Corridor, routeing south of the River Welland and continuing to the A151, which will require a crossing and where the corridor narrows. South of the A151, the corridor widens with good flexibility for various routeing options which continues up to the crossing with North Level Main Drain, east of Gorefield. There are some narrow areas within this section of the Corridor between the A151 and North Level Main Drain, most notably where crossings would be required at Hog’s Gate Road, Hurldetree Bank and just south of the Jekils Bank. However, alternative routeing options are available. South-east of the North Level Main Drain, the corridor continues easterly towards the River Nene. In this area the corridor is generally wide providing good flexibility however narrow areas are present where crossings are required at Fitton End Road and Sutton Road and adjacent to Bledwick Drove. At all of these narrow areas alternative routeing options are available. East of the crossing with the River Nene, the corridor heads north-east towards the Walpole siting zones, however, the Corridor has limited flexibility due to congestion of high-pressure gas mains, in addition to large water courses that require crossing. Just east of the crossing with the River Nene, before the Corridor diverges into two separate legs (in the direction of WLP 4 and 5, and WLP 1, 2 and 3, respectively), a narrow area is present at the crossing with River Road, where alternative routeing options are available.
- Corridor 26: Generally wide corridor with good flexibility within the northern extent of the Corridor, routeing south of the River Welland and continuing to the A151, which will require a crossing and where the corridor narrows. South of the A151, the corridor widens with good flexibility for various routeing options which continues up

to the crossing with the B1165 High Road, south of Tydd St Giles. There are some narrow areas within the section between the A151 and the B1165, most notably where crossing are required of Hog’s Gate Road, Hurldetree Bank and just south of Jekils Bank. However, alternative routeing options are available. Poor flexibility within the corridor at the crossing of the North Level Main Drain where the corridor is narrow and restricted by an existing high-pressure gas main. No alternative routeing options are available. East of the North Level Main Drain, the corridor wides providing some flexibility, however the presence of G2W running parallel with the high-pressure gas main may further limit routeing options.

- Corridor 27: Generally wide corridor with good flexibility within the northern extent of the Corridor, routeing south of the River Welland and continuing to the A151, which will require a crossing and where the corridor narrows. South of the A151 and continuing easternly towards the crossing with South Holland Main Drain, the Corridor widens with generally good flexibility for various routeing options. There are some narrow areas within this area where crossings would be required at Hog’s Gate road, the B1168 Fen Road and the B1390 St James Road. However, alternative routeing options are available. South-east of the crossing with South Holland Main Drain and continuing towards the River Nene, the corridor narrows with no alternative routeing options available. Despite being narrow, sufficient space for routeing is available. Good flexibility is present south of the crossing with the River Nene where the corridor widens up to the Walpole siting zones.
- Corridor 28: Generally wide corridor with good flexibility within the northern extent of the Corridor, south of the River Welland and continuing south-east to the A17, west of Fleet Hargate, where a crossing is required, before the Corridor then narrows. There are some narrow areas within this area, most notably where crossings of Common Road and Middle Marsh Road are required. However, alternative routeing options are available. South of the crossing with the A17 and continuing towards Ben’s Gate Road, the corridor continues to be generally narrow with no alternative routeing options. Despite being narrow, sufficient space is available for routeing. There is one narrow area near Ball’s Lane, however alternative routeing options are available. South of Ben’s Gate Road and continuing south to the crossing of Honeyhill Road, east of Gorefield, the Corridor widens with good flexibility and multiple route options. South of the crossing with Honeyhill Road, the Corridor narrows up to Seadyke Bank with no alternative routeing options. An existing high-pressure gas main next to Seadyke Bank limits flexibility at this crossing further. The Corridor widens slightly past this point; however several narrow areas are present, most notably at the crossings of Gall’s Drove and Willock Lane, west of the River Nene. Although there are alternative routeing options available, these are constrained by other roads, ditches and utilities. At the crossing with the B1101, south of Friday Bridge, there are additional narrow areas where there no alternative routeing options available.
- Corridor 29: Generally wide corridor with good flexibility within the northern extent of the Corridor, south of the River Welland and continuing south-east to the A17, west of Fleet Hargate, where a crossing is required, before the Corridor then narrows. There are some narrow areas within this area, most notably where crossings are required at Common Road and Middle Marsh Road. However, alternative routeing options are available. South of the crossing with the A17 and continuing towards Ben’s Gate Road, the corridor continues to be generally narrow with no alternative routeing options. Despite being narrow, sufficient space is available for routeing. There is one narrow area near Ball’s Lane, however alternative routeing options are available. South of the Ben’s Gate Road and continuing south towards the North

Level Main Drain, north of Gorefield, the corridor widens with good flexibility and multiple route options. South of the crossing with the North Level Main Drain and continuing east towards the River Nene, the corridor continues to be wide providing good flexibility with narrow areas present where crossings are required at Fitton End Road and Sutton Road, and adjacent to Bledwick Drove. At all these narrow areas alternative routeing options are available. East of the crossing with the River Nene, the corridor heads north-east towards the Walpole siting zones, however, the Corridor has limited flexibility due to congestion of high-pressure gas mains, in addition to large watercourses that require crossing. Just east of the crossing with the River Nene, before the Corridor diverges into two separate legs (in the direction of WLP 4 and 5, and WLP 1, 2 and 3, respectively), a narrow area is present at the crossing with River Road, where alternative routeing options are available.

- Corridor 30: Generally wide corridor with good flexibility within the northern extent of the Corridor, south of the River Welland and continuing south-east to the A17, west of Fleet Hargate, where a crossing is required, before the Corridor then narrows. There are some narrow areas within this area, most notably where crossings are required at Common Road and Middle Marsh Road. However, alternative routeing options are available. South of the crossing with the A17 and continuing towards Ben’s Gate Road, the corridor continues to be generally narrow with no alternative routeing options. Despite being narrow, sufficient space is available for routeing. There is one narrow area near Ball’s Lane, however alternative routeing options are available. South of the Ben’s Gate Road and continuing south towards North Level Main Drain, north of Gorefield, the corridor widens with good flexibility and multiple route options. Poor flexibility within the corridor at the crossing with North Level Main Drain where the corridor is narrow and restricted by an existing high-pressure gas main. No alternative routeing option is available. East of the crossing with North Level Main Drain, the corridor widens providing some flexibility, however the presence of G2W running parallel with the high-pressure gas main may further limit routeing options.
- Corridor 31: Generally wide corridor with good flexibility within the northern extent of the Corridor, south of the River Welland and continuing south-east to the A17, west of Fleet Hargate, where a crossing is required, before the Corridor then narrows. There are some narrow areas within this area, most notably where crossings are required at Common Road and Middle Marsh Road. However, alternative routeing options are available. South of the crossing with the A17 and continuing towards Ben’s Gate Road, the corridor continues to be generally narrow with no alternative routeing options. Despite being narrow, sufficient space is available for routeing. There is one narrow area near Ball’s Lane, however alternative routeing options are available. South of Ben’s Gate Road, and continuing south-east towards the crossing with the South Holland Main Drain, the Corridor widens with generally good flexibility for various routeing options. There are some narrow areas within this area which include the crossing required at the B1390 St James Road. However, alternative routeing options are available. Past the South Holland Main Drain and continuing east towards the River Nene the corridor narrows with no alternative routeing options available. Despite being narrow, sufficient space for routeing is available. Good flexibility past the River Nene crossing where the corridor widens up to the Walpole siting zones.
- Corridor 32: The corridor follows the A17 with limited flexibility, having to cross multiple roundabouts which include the Welbourne Lane South roundabout and the B1168 roundabout. There are no alternative options available.

- Corridor 33: The corridor follows the A17 with limited flexibility, having to cross multiple roundabouts which include the B1359 roundabout, the B1390 roundabout and the Wisbech Road roundabout with no alternative options available.
- Corridor 34: Generally wide corridor with good flexibility within the north-western extent of the Corridor, routeing south-east from the south of the River Nene, towards Holbeach Hurn where the corridor narrows. There are some narrow areas within this area, most notably at the crossings of Common Road and Middle Marsh Road. However, alternative routeing options are available. East of Holbeach Hurn, the corridor narrows where a crossing is required at the B1359 Marsh Road, however the remainder of the corridor continuing south-west to the A17 has alternative routeing options. Between Lutton Leam Drain and the A17 there is a high pressure gas main which runs parallel to the corridor restricting flexibility, however there are alternative routeing options. South of the A17, narrow areas are present along Peters Point Road and a crossing of the South Holland Main Drain, and the River Nene is required before the Corridor widens towards the Walpole siting zones.

Access

8.3.3 Accessibility for construction of the HVDC underground cables varies between Corridors, and across each of the Corridors. Most Corridors have available accesses from A-roads, B-road and various minor connecting roads. However, many of the Corridors contain constraints or limited access points from major roads and therefore may require longer haul roads. These are detailed below.

- Corridor 24 – access is available from the A151 and A17 in the northern sections. The A47 intersects with Corridor 24 in the south as well as the B1165, B1357, B1168, B1166, B1101 and various minor connecting roads along its length. Despite this, long haul roads would be required to access segments of the Corridor, including an 8 km section in the north and 23 km section in the centre of the Corridor which are over 2 km from the nearest A-road.
- Corridor 25, 26 and 28 – access available from the A151, A17, A1101 and the A47, as well as the B1161, B1165, B1168, B1390, B1357, B1101, B1166 and various minor connecting roads. Despite this, long haul roads would be required to access sections of the Corridors which are over 2 km from the nearest A-road. For Corridors 25 and 26, long haul roads are likely to be required for the region between Moulton Marsh and Weston. For Corridor 28, long haul roads are likely to be required for the region around Holbeach Bank, and between Honeyhill Road and the River Nene. South Holland Main Drain and North Level Main Drain are notable constraints to access due to encirclement by large watercourses in the centre of the Corridors.
- Corridor 27 – access is generally good, with the Corridor intersecting with the A17 and A151 at the northern end and the A1101 in the south. The B1357, B1168, B1390 as well as various minor connecting roads intersect the Corridor along its length. Despite this, long haul roads are required to access sections of the Corridor which are over 2 km from the nearest A-road, most notably for the regions between Moulton Marsh and Weston, and between Jekyll's Gate and just east of Bullock's Short Gate.
- Corridor 29 and 31 – access across the Corridors is generally good, both intersecting the A17 at multiple points and the A1101. Corridor 31 is also accessible via the A47. The B1357, B151, B1390, B1165 and various minor connecting roads

intersect the Corridor along its length. Long haul roads would be required to access sections of the Corridors, including areas at Holbeach Bank, to the east of North Level Main Drain and at Bullocks Short Gate, which are over 2 km from the nearest A -road.

- Corridor 32 and 33 – access is considered excellent given that both Corridors follow the A17, which would be the primary access route.
- Corridor 30 and 34 – access is generally good across the Corridors, with both accessible via the A17 at multiple points. Corridor 30 is also accessible from the A1101 at its southern end. The B1357, B1515, B1359, B1390, B1165 and various minor connecting roads intersect the Corridors along their length. Long haul roads would be required to access sections of the Corridors, including areas at Holbeach Bank and Raven’s Drove, which are over 2 km from the nearest A-road.

8.3.4 The long haul roads within the Corridors specified above would increase the construction programme and impact vehicle movement. As the haul road is limited by 1 or 2 access points, the length will dictate how quickly the road can be built. Only once the road in installed will the cable installation be able to commence. Therefore, a longer haul road will impact the construction programme. Furthermore, long haul roads also prevents quick access to certain areas along the construction route, this means that construction vehicles may have to travel long distances along the haul road before reaching their destination. Long haul roads will also increase construction vehicle movements at the access points.

Existing and Proposed Infrastructure

8.3.5 All the Corridors would interact with existing infrastructure and proposed infrastructure which hold the potential to constrain cable routeing. Those identified (major roads, major gas pipelines, and those for energy transmission) are detailed below.

8.3.6 Proximity to major roads and access points would be beneficial as this can allow for ease of access to site, routeing within proximity of major roads increases the likelihood of road crossings. However, limiting the amount of crossings would also be beneficial as crossings increase the complexity of construction as alternate construction methods, such as trenchless solutions and traffic management and diversions, may need to be used increasing the cost and duration of construction. The number of major roads and rail crossings which have been identified are shown in **Table 8-6**.

Table 8-6 – Major Road and Rail Crossings between River Welland and Walpole

Corridor	Number road crossings	Number of Rail crossings
Corridor 24	8	1 (dismantled)
Corridor 25	6	0
Corridor 26	6	0
Corridor 27	5	0
Corridor 28	9	1 (dismantled)
Corridor 29	8	0
Corridor 30	8	0
Corridor 31	6	0

Corridor 32	2 (roundabouts)	0
Corridor 33	3 (roundabouts)	0
Corridor 34	3	0

8.3.7 All Corridors, except for Corridor 32, interact with existing high pressure gas pipelines, which would require crossing within these Corridors. Crossings of these existing and proposed pipelines would need to be sufficiently deep to avoid impacts to the HVDC underground cables and upon the gas pipelines, this may impact upon the cable system design. Careful routeing and additional technical solutions and investigation including cathodic protection studies would be required to avoid impacts on these assets and to avoid potential safety risks to site staff from accidentally striking these assets.

8.3.8 All Corridors would interact with at least one existing low voltage (220 kV or lower) overhead line. Additionally, all Corridors, except for Corridors 32 and 33, interact with the existing 4ZM 400 kV overhead line. Where these existing assets would require crossing, modification (such as undergrounding or diversions of the existing assets) would likely be required to facilitate routeing. This would increase the cost and technical complexity of construction and the duration of the construction programme.

8.3.9 All Corridors, except for Corridors 32 and 33, interact with the proposed NGET G2W Project preferred corridor as it routes south from Weston Marsh to Walpole. Given the proposed route of the G2W Project, close interaction and/or crossing of the overhead line route may be required which may pose a technical constraint to routeing within these Corridors. Close co-ordination with the G2W Project is ongoing and will be required as the Project continues. As part of this ongoing engagement with the G2W Project, discussions include the identification of shared opportunities (such as shared construction accesses or construction compounds) to limit the potential for impacts upon wider communities through coordination of construction programmes and infrastructure.

Watercourse Crossings and Flooding

8.3.10 As detailed in **Table 8-4,** areas of FZ2 and FZ3 are present within all Corridors. Where they are present within Corridors, they are unavoidable. As such, there is no end-to-end solution (routeing from the River Welland to Walpole) that provides an opportunity to entirely avoid FZ2 and FZ3. These areas of FZ2 and FZ3 are attributed to flooding from the sea and from various watercourses including the River Welland, South Holland Main Drain and North Level Main Drain. Any infrastructure required to be located within FZ2 and FZ3 will be designed accordingly, and the mitigation and flood zone compensation required will be determined as the Project progresses.

8.3.11 All Corridors contain both watercourses that will require crossing. The construction methods for crossing identified watercourses will be subject to further reviews as the Project progresses and in consultation with the relevant stakeholders. However, there are larger watercourses which would increase the technical complexity of a crossing and therefore may require the use of construction methods such as trenchless cable installation methods. These crossings, most notably where trenchless cable installation methods are required would increase the complexity, cost, land requirements and duration of construction. Larger watercourse (identified, using aerial imagery, with a width over 10 m from the top of opposite banks) are most likely to increase technical complexity of construction. Watercourses of a moderate width (identified, using aerial imagery, with a width of between 5 m and 10 m from the top of opposite banks) are also likely to increase the technical complexity of construction. Smaller watercourses (identified, using aerial imagery, with a width of less than 5 m in width from the top of opposite banks) are unlikely to increase the complexity of construction. A Ground investigation will be carried out at each of these water crossings to determine crossing method including depth, monitoring requirements and bank stability. The number of the large and moderate watercourse crossings for each Corridor is detailed in **Table 8-7** below.

Table 8-7 – Number of Large & Moderate Watercourse Crossings within each Corridor

Corridor	Number of large watercourses likely to require crossing	Number of moderate watercourses likely to require crossing
Corridor 24	5	17
Corridor 25	3	9
Corridor 26	3	7
Corridor 27	2	6
Corridor 28	6	12
Corridor 29	3	4
Corridor 30	3	4
Corridor 31	2	4
Corridor 32	5	2
Corridor 33	8	1
Corridor 34	3	4

Ground Conditions

8.3.12 Geotechnical constraints were considered for all Corridors. For all Corridors, further investigation into soil type and ground conditions would be investigated as part of future design stages and standard mitigation measures regarding pollution and contaminated materials would be implemented. All Corridors contain varying material types including, but not limited to, peat deposits, glacial till and tidal flats deposits which would necessitate further geotechnical investigation, increasing overall cost and programme duration of the Project. Geotechnical risks are present throughout all the Corridors, however those identified are not considered to present differentiating factors between Corridors.

8.4 Comparative Appraisal and Summary

8.4.1 The findings detailed above and the relative merits of the different options for the HVDC underground cables between the River Welland and Walpole were considered. Each Corridor on its own (except for Corridors 32 and 33 which provide alternative routes to connect to Corridor 34) does not provide an end-to-end solution for this area, and a combination of Corridors will be required. In addition, each Corridor has localised constraints which could be avoided through alternative routeing and therefore, it is likely that a combination of Corridors will be used. The defined components of the route between the River Welland and Walpole were considered in isolation. The emerging preferences for the Corridors from the Landfalls to the River Welland and the Walpole station siting zones are considered within **Chapter 7** and **Chapter 9**, respectively.

8.4.2 This section sets out the factors that influence the decision-making process for determining the emerging preferred Corridor between the River Welland and Walpole. As the design progresses, regular reviews will be undertaken to ensure the emerging preferred Corridor taken forward at this stage remains the optimum Corridor when all environmental, socio-economic and technical aspects are considered. The steps are graphically shown in **Appendix A.**

8.4.3 Routeing options within this area comprised the use of a combination of Corridors 24 to 34 to connect directly from a point south of the River Welland to the Walpole siting areas located north-east of Wisbech. Corridors 32 and 33 are the only Corridors not to provide an end-to-end solution for underground cables between the River Welland and Walpole. Corridor 32 would require use of Corridors 28, 29, 30, 31 and 34 to provide a solution between the River Welland and Walpole. Corridor 33 would require use of Corridors 28, 29, 30, 31 and 34 to provide a solution between the River Welland and Walpole. Corridor 24 is the only Corridor which was developed that can connect to the Walpole siting area south of Wisbech outside of both Flood Zones 2 and 3.

Comparative Appraisal

8.4.4 Following comparative review of the Corridors, use of Corridors 24 and 28 are less preferred. This is primarily due to the extended length of Corridors 24 and 28 (approximately 10 km longer than the next longest Corridor) which would increase the potential environmental impacts, especially those on the landscape and heritage receptors south-west of Wisbech. Furthermore, this increased length would further increase the amount of permanent and temporary infrastructure required for construction, alongside increasing the number of watercourses which would require crossing. This would increase the complexity, cost and duration of construction. Despite these Corridors being the only options available to route to a Walpole siting area outside of Flood Zone 3 (and partially outside Flood Zone 2), it is considered that the environmental benefits of routeing in these areas do not outweigh the potential adverse environmental impacts and technical complexities associated with the extended lengths of the Corridors, and as such use of the Corridors is not preferred.

8.4.5 Corridors 25, 26 and 27 are also considered less preferred. Crossing the A151 west of Weston as part of these Corridors would increase the length of the Corridor and necessitate additional crossings of both the existing 2WS and 4ZM 400 kV overhead lines. Furthermore, in crossing the A151 west of Weston, these Corridors would also introduce temporary visual impacts on denser settlement areas at both Weston and Spalding which can be avoided by routeing within the other Corridors.

8.4.6 Corridors 29 and 30 are likely to have marginally longer routes compared to the remaining Corridors (31, 32, 33, 34) due to the divergence of the Corridors to the south of Sutton St James and Tydd St Giles, before entering the Walpole siting area. Both Corridors are likely to require multiple crossings of the South Level Main Drain and North Level Main Drain, as well as a greater number of road crossings when compared to the remaining Corridors. Moreover, both Corridors have considerable overlap with the G2W Project preferred corridor which cannot be avoided. The presence of the G2W Project at the most southernly/easternly extent of the Corridors significantly constrains routeing flexibility and poses technical complexities for both Corridors, but most notably Corridor 30 at the entrance to the Walpole siting area. Corridors 29 and 30 are therefore not considered preferred.

8.4.7 Overall, there is little to differentiate between Corridors 31, 32, 33 and 34. As such, it was considered that, subject to the selection of the preferred Walpole siting area that a combination of Corridor 31, 32, 33 and 34 would be preferred as they offer the shortest and most direct route to the Walpole siting areas whilst also offering the opportunity to utilise routeing along the A17 to reduce the potential environmental impacts and technical constraints during construction. Despite this, it is noted that there is no connection between Corridor 33 and Corridor 31 between Sutton Bridge and Tydd St Mary to allow for Corridor 33 to be utilised as part of an end-to-end route. However, it is considered that the section of Corridor 34 between Sutton Bridge and Tydd St Mary could be utilised as part of this route to allow for both Corridors 31 and 33 to be used simultaneously as part of an end-to-end solution. Corridors 32 and 33 would route along the A17 for approximately 5.95 km and 8.7 km respectively which would likely introduce significant traffic and transport effects to users of this primary road in the area. Corridors 32 and 33 may have traffic and transport disruptions, however they both potentially bring comparative benefits to ecology, heritage and water (due to low disruption on habitats, heritage assets and the water environment), subject to engineering studies. Moreover, from an accessibility perspective, Corridors 32 and 33 are in favourable locations, allowing for direct access from the A17 along the entirety of their route. These Corridors will also be routed in an urban environment, and therefore previously developed land. This will result in fewer impacts on landscape setting compared to other Corridors. Corridors 31, 32, 33 and 34 are therefore the emerging preferences for the underground cable routes between the River Welland and Walpole.

9. Options Appraisal – Walpole

9. Options Appraisal – Walpole Converter Stations and Substation

9.1 Introduction

9.1.1 This Chapter details the outcomes of the Options Appraisal (Step 7 as described in **Chapter 4**) for the preliminary siting zones for the new Walpole converter stations and substation. The Walpole siting zones have been developed through definition of a study area (Step 1), mapping and weighting of features (Step 2 and Step 3), and an iterative identification, review and refinement process (Steps 4, 5 and 6). They have been developed to accommodate two converter stations (one for each of the EGL 3 and EGL 4 projects) each of which could require areas in order of 350 m by 300 m (approximately 11 ha) and a 400 kV AIS substation (to be consented as part of the Project or the Grimsby to Walpole (G2W) Project as described in **Chapter 2**), which could extend approximately 800 m by 200 m (approximately 16 ha), The siting zone options progressed for appraisal (shown on **Figure 9-1** to **Figure 9-3**) comprise:

- Siting zone WLP1 – an area, approximately 1.8 km by 1.4 km (approximately 252 ha), located west of the A1101, south-east of the North Level Main Drain and north of Newton – in – the- Isle.
- Siting zone WLP2 - an area, approximately 1.3 km by 1.1 km (approximately 143 ha), located west of the River Nene, east of the A1101, north-west of the Wisbech Compressor Gas (Wisbech Compressor) Station and south-west of Foul Anchor.
- Siting zone WLP3 - an area, approximately 1.7 km by 0.9 km (approximately 153 ha), located west of the River Nene, east of the A1101 and Newton, north-west of the Wisbech Compressor Station and south-west of Foul Anchor.
- Siting zone WLP4 – an area, approximately 2.5 km by 0.9 km (approximately 225 ha), located east of the River Nene, south-east of the existing Walpole substation and north-west of West Walton.
- Siting zone WLP5 - an area, approximately 2.7 km by 1.5 km (approximately 405 ha), located directly south of the Rose and Crown Farm solar farm, north of Walton Highway and West Walton.
- Siting zone WLP6 - an area, approximately 2.5 km by 1.6 km (approximately 400 ha), located south-west of Emneth, north-east of Outwell and east of Friday Bridge.

9.1.2 The appraisal of the Walpole siting zones has considered the infrastructure required for the Walpole converter stations and potential effects of the overhead line diversion required for the 400 kV 4ZM overhead line (which routes between Burwell and Walpole) to connect to the new Walpole substation, in and out of each siting zone. Ultimately the Walpole siting zone emerging as preferred should balance the following to provide the best overall location:

- the ability for the Project, to connect to the new Walpole substation via underground cables;

- suitable locations for the two converter stations required for the Project near the new Walpole 400 kV substation;
- suitable locations for the new Walpole substation; and
- the requirements of the overhead line corridor developed for the G2W Project to connect to the new Walpole substation (discussed in **Chapter 5**).

9.1.3 The appraisal of environmental, socio-economic and technical factors for the Walpole siting zones, has considered, as detailed in **Chapter 5**, the potential impacts on relevant features, and whether such effects could be avoided or mitigated through careful siting. Where effects cannot be avoided or mitigated by careful routeing and siting (and routeing of overhead line and underground cable entries), other forms of mitigation have been considered in accordance with NGET's mitigation hierarchy.

9.1.4 For the current Project stage, the relevant data to inform the appraisal comprises desk study information, supplemented by site visits.

Figure 9-1– Walpole Siting Zone Locations, Existing Infrastructure and Environmental Constraints

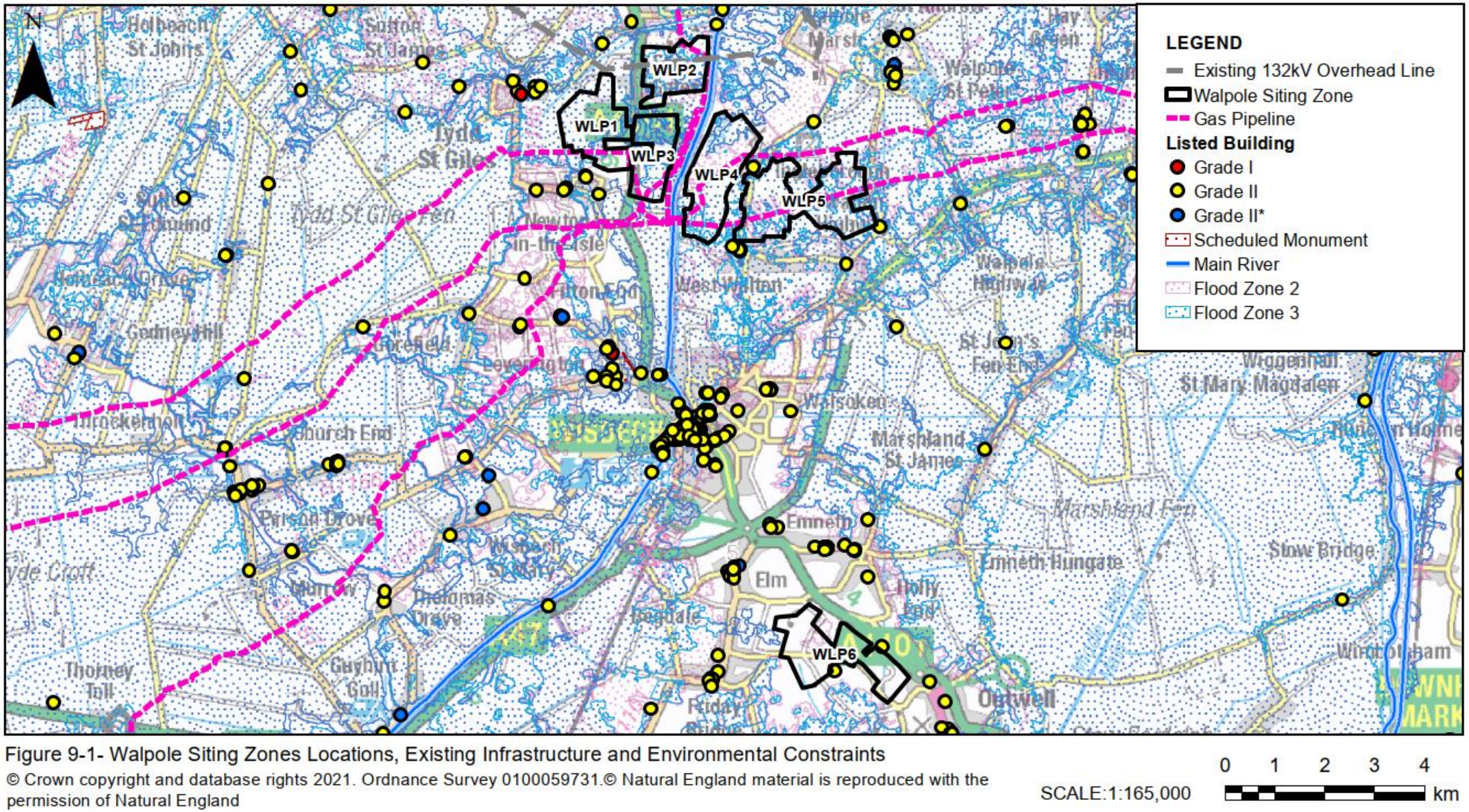


Figure 9-1- Walpole Siting Zones Locations, Existing Infrastructure and Environmental Constraints

Figure 9-2 – Siting Zone WLP1-WLP5 Location, Existing Infrastructure and Environmental Constraints

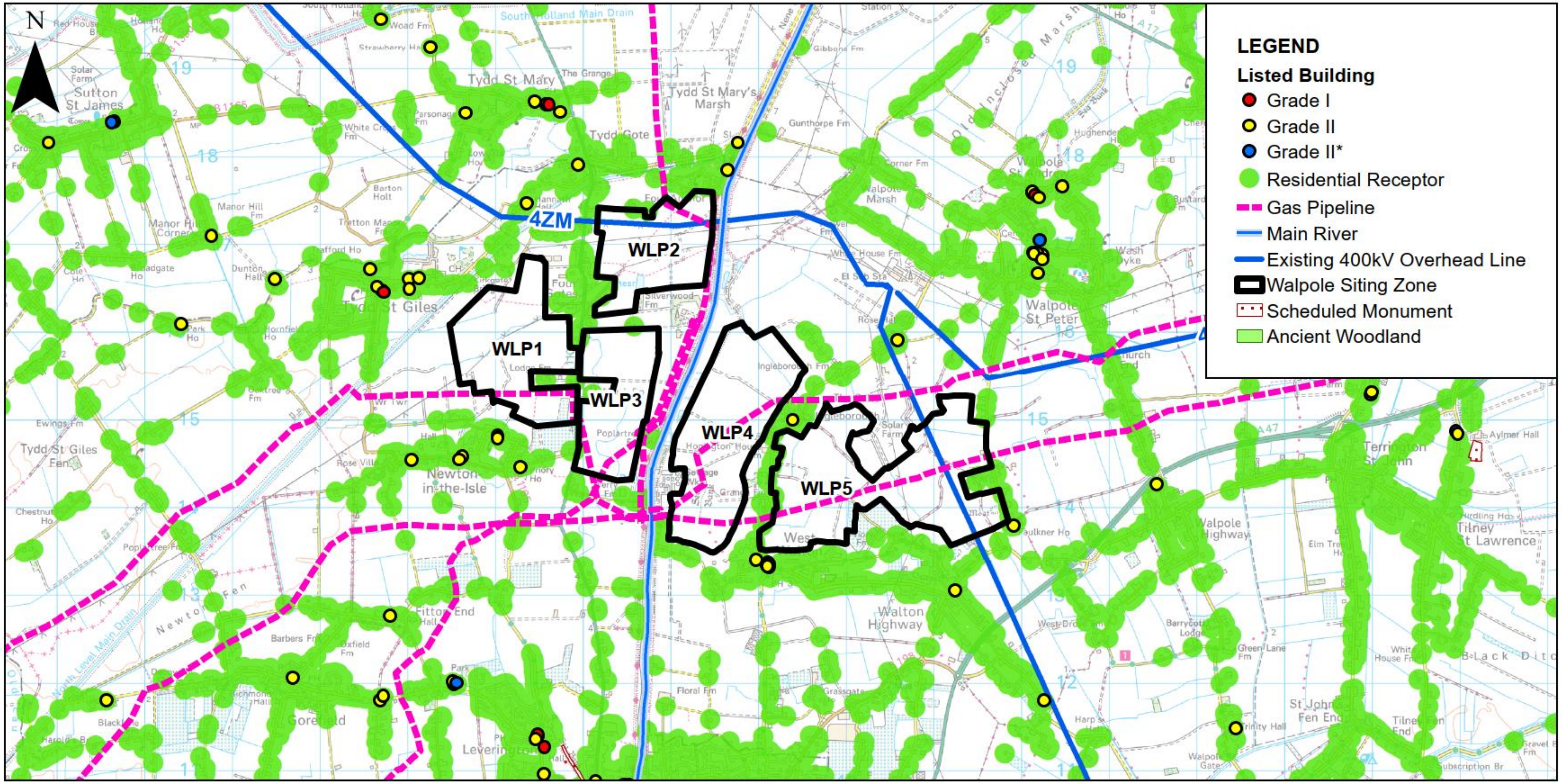


Figure 9-2-Siting Zone WLP1-WLP5 Location, Existing Infrastructure and Environmental Constraints

Figure 9-3– Siting Zone WLP6 Location, Existing Infrastructure and Environmental Constraints

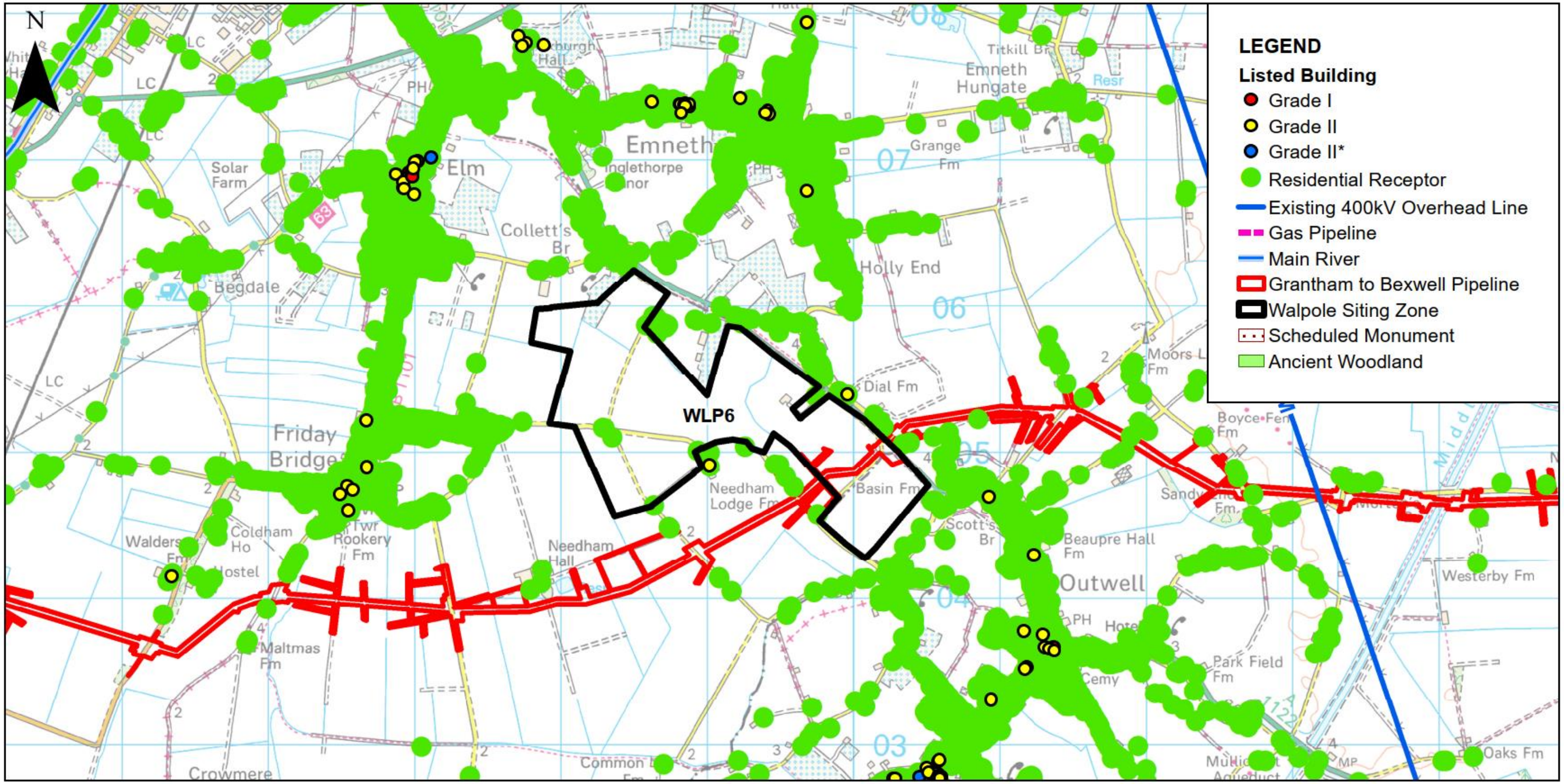


Figure 9-3-Siting Zone WLP6 Location, Existing Infrastructure and Environmental Constraints

0 1 2 km
SCALE:1:60,000

9.2 Environmental Factors

Landscape and Visual

9.2.1 Siting zones WLP1 to WLP5 are located within approximately 7 km of each other. Siting zone WLP6 is approximately a further 7 km to the south from the other siting zones. However, all siting zones are located:

- within the Fens NCA (No. 46), characterised by a distinctive, historic and human-influenced wetland landscape lying to the west of The Wash estuary. The NCA is notable for its large-scale, flat, open landscape with extensive vistas to level horizons;
- over 13 km from the North Norfolk NL (formerly known as the North Norfolk AONB, and the closest nationally designated landscape). Siting zone WLP6 is located furthest away at approximately 23 km) and siting zones are therefore unlikely to affect this nationally designated landscape; and
- in an open and flat arable landscape with a mix of regular and irregular field patterns often bounded by drainage ditches, a strong rural character, scattered urban areas, existing transmission infrastructure and level topography offering flexibility for siting.

9.2.2 Given the desire to co-locate the new Walpole converter stations with the new Walpole substation, each siting zone will also require overhead line connections to the siting zones (diversions of the existing 4ZM 400 kV overhead line and the proposed overhead line for the G2W Project). The locations of the siting zones will influence the lengths of these connections and therefore the potential scale of landscape and visual impacts of siting within each siting zone. For example, those located further west will require longer connections of the 400 kV 4ZM overhead line (between Burwell and Walpole) but shorter connections of the proposed overhead line for the G2W Project (from the new Weston Marsh substation).

9.2.3 Siting zone WLP1 (shown on **Figure 9-1** and **Figure 9-2**) is characterised by open fields of varied size and smaller field pattern in places, enclosed by drainage ditches. Urban elements in the landscape comprise scattered settlement around the edges of the siting zone along the A1101, North Level Main Drain and at Newton-in-the-Isle, and prominent existing 132 kV overhead line pylons through the siting zone and within distant views to the north. Views within the siting zone and in the surrounding area, are generally wide and expansive due to sparse vegetation cover, however an orchard in the south (part of which outside WLP1 is identified as traditional orchard) is enclosed by dense field edge trees which contrasts with the openness elsewhere. In the areas surrounding WLP1 the main visual receptors include residents living in properties at the northern edge of the village of Newton-in-the-Isle to the south, residents living in properties along the A1101 (Sutton Road) to the east, Swallow Lane and Sandy Lane (along the banks of the North Level Main Drain) to the north.

9.2.4 Siting zone WLP2 (shown on **Figure 9-1** and **Figure 9-2**) is characterised by moderate to large, irregular sized open arable fields. Vegetation is generally sparse, comprising occasional hedgerows. Views within the siting zone and in the surrounding area, are generally open, with layered distant vegetation associated with surrounding settlement, and the Wisbech Compressor to the south. As with siting zone WLP1, the urban elements in the landscape comprise scattered settlements around the edges of the siting zone and pylons associated with existing overhead lines (the 400 kV 4ZM overhead line and two 132 kV overhead lines) but also includes the Wisbech Gas Compressor (referred to hereafter as the Wisbech Compressor). The raised banks of the River Nene to the east and North Level Main Drain to the north also provide some enclosure of the siting zone (however it is noted that the heights of the stations are likely to exceed these). Settlement is scattered around the edges of the WLP2, largely concentrated to the north at Foul Anchor and Tydd Gote, and west along the A1101 Sutton Road. In addition to residential receptors within these settlements, visual receptors in the surrounding area also include people using the Nene Way Long Distance Footpath (the 'Nene Way'), located to the east along the banks of the River Nene.

9.2.5 Siting zone WLP3 (shown on **Figure 9-1** and **Figure 9-2**) is characterised by large, open, broadly rectilinear flat arable fields bisected by a raised winding drain. Like WLP1 and WLP2, vegetation is sparse and comprises of occasional hedgerows as well as dense planting around the Wisbech Compressor to the north-east. Views are wide and expansive, punctuated by occasional surrounding tree belts, including that around the Wisbech Compressor, and shortened to the east by the raised banks of the River Nene. The landscape is characterised by scattered settlements, the Wisbech Compressor and distant pylons associated with existing overhead lines to the north and north-west. The pylons of the existing overhead lines on the horizon are a prominent feature in views, providing comparatively more visual clutter in an otherwise simple landscape. Settlement form comprises several farms scattered around the edges of the siting zone, largely concentrated along the A1101 Sutton Road. Like siting zone WLP2, visual receptors in the surrounding area also include users of the Nene Way to the east.

9.2.6 Siting zone WLP4 (shown on **Figure 9-1** and **Figure 9-2**) is characterised by flat, open arable farmland. Views are generally open and punctuated with layers of vegetation. These include occasional small blocks of woodland, screening associated with the sewage works to the west, trees and hedges associated with scattered settlement around the edges (along Mill Road and the outskirts of West Walton to the east and south-east), and vegetation associated with the River Nene to the west, which combines with elevated banks to screen views to the east. The landscape is characterised by linear settlement, the sewage works (Anglian Water Pump Station) to the west and pylons associated with existing overhead lines (routeing into the existing Walpole substation) to the north. Settlement pattern comprises those along Mill Road to the east and the outskirts of West Walton to the south-east. To the west, the Nene Way is located along the western banks of the River Nene, however views are partially screened by the banks of the River Nene and vegetation.

9.2.7 Siting zone WLP5 (shown on **Figure 9-1** and **Figure 9-2**) is characterised by large, irregular sized open arable fields, contrasting with orchards (part of which outside the siting zone is identified as traditional orchard) set in small, enclosed paddocks in the south. WLP5 is surrounded by solar development to the north, scattered farms and residential properties to the east and west, and the villages of West Walton and Walton Highway to the south. Field boundaries are largely open in the east and north, however there is some enclosure in the west by dense hedgerows, particularly located around orchards, as well as vegetation associated with settlement. This creates localised visual enclosure, contrasting with open views experienced elsewhere in the Walpole Substation Study Area. Pylons associated with existing 132 kV and 400 kV overhead lines are prominent on the horizon in open views to the north, as is the tower of *St Mary's Parish Church* (Grade I listed building) visible above the trees in West Walton. Residential receptors include residents along Mill Road, on the outskirts of West Walton and Walton Highway, and along West Drove North to the east.

9.2.8 Siting zone WLP6 (shown on **Figure 9-1** and **Figure 9-2**) is characterised by moderate to large arable fields bound by a network of drainage ditches. Field boundaries are largely unmarked, although rows of poplars, and orchards enclosed by dense hedgerows to the north combine to create treed skylines. Views are generally open, featuring scattered farm buildings and the occasional large barn. The landscape is characterised by settlements and distant pylons associated with existing overhead transmission lines to the east (4ZM 400 kV overhead line) and west (UKPN 132 kV overhead line). Residential receptors include those living in properties along the Outwell Road to the north-east, Needham Bank to the south-west, and on the western edge of Outwell to the south-east and more distantly scattered residences to the west.

9.2.9 The scale of development is such that there will be adverse landscape and visual effects from siting the new Walpole converter stations and new Walpole substation in any of the siting zones. Careful siting would seek to avoid key landscape features, such as the orchards to the south of WLP1, the distinctive drainage pattern in WLP3, the small field pattern where orchards are present in WLP5, as well as vegetation within and surrounding the siting zones. Careful siting would also seek to retain offsets from visual receptors (where practicable) to limit the risk of effects upon visual amenity and disrupting the strong sense of openness and expansive views associated with all siting zones. However, careful siting of the new Walpole converter stations alongside the new Walpole substation within the siting zone is unlikely to fully mitigate the increased likelihood of wirescape effects experienced from within and outside the siting zones.

9.2.10 When considering the potential overhead lines (the existing 4ZM 400 kV overhead line diversions and those for the G2W Project), crossing of the River Nene will require taller towers (like those for the 4ZM 400 kV overhead line currently located adjacent to its banks) to achieve required clearances and these will have a significant impact on the surrounding area. For those siting zones located to the west of the River Nene (WLP1, WLP2, WLP3) the diversion of the 400 kV 4ZM overhead line (Burwell to Walpole) will be required to cross the river twice (going into, then back out of the siting zone) which will further increase the potential for adverse landscape and visual impacts and the likelihood of a wirescape. In comparison, siting zones located to the east of the River Nene (WLP4, WLP5 and WLP6) will only require a single crossing of the River Nene to accommodate the proposed G2W Project’s 400 kV overhead line from Weston Marsh. The influence of multiple crossings at the River Nene by overhead line is considerable when determining a preferred siting zone and therefore those siting zones to the west of the River Nene are less preferred. When comparing the other siting zones (WLP4, WLP5 and WLP6) situated to the east of the River Nene, there is less to differentiate between them when considering landscape impacts. However, WLP5 provides the best opportunity to limit the diversions of the 400 kV 4ZM overhead line as it is located within WLP5, and because WLP5 would, limit visual intrusion into the surrounding areas.

9.2.11 When considering the siting of the new Walpole substation alongside the siting of the new Walpole converter stations, sufficient space is available within the siting zones. However, given the open landscape characteristics associated with each of the siting zones adverse landscape and visual effects will likely be exacerbated by this additional infrastructure (and its overhead line connections; the diversion of the 4ZM 400 kV overhead line and the proposed overhead line for the G2W Project) despite the implementation of mitigation (such as landscape planting). The cumulative effect of siting the new Walpole converter stations and new Walpole substation is particularly acute for siting zones WLP1, WLP2, and WLP3 where the infrastructure would be seen in the context of the taller pylons associated the River Nene crossings. Therefore, siting zones WLP1, WLP2 and WLP3 are less preferred.

Ecology

9.2.12 All the Walpole siting zones are located over 9 km from NSN or Ramsar sites (see **Figure 9-1**). The nearest designated sites to siting zones WLP1 to WLP5 are The Wash and North Norfolk Coast SAC, the Greater Wash SPA and The Wash Ramsar and SPA sites which also overlap with SSSIs and a NNR ('The Wash designated sites', as described in Paragraph 7.2.17) located at the mouth of the River Nene. The Wash designated sites are hydrologically connected to the River Nene and its tributaries. Siting zones WLP5 and WLP6 are located furthest from the Nene and its tributaries. The nearest designated sites to WLP6 are the Nene Washes SPA, SAC, Ramsar sites which also overlap with a SSSI ('The Nene Wash designated sites', as described in Paragraph 8.2.9) located adjacent to the River Nene between Peterborough and Guyhirn but are over 8.5 km from WLP6.

9.2.13 Due to the distance of the siting zones from The Wash designated sites and The Nene Washes designated sites, potential effects of substation infrastructure are limited to pollution during construction and effects upon functionally connected habitats. However, for overhead line connections to each siting zone, potential effects also include the risk of bird strike, flight path disruption, injury and mortality for protected bird species, if present. The potential impact on NSN and Ramsar sites will be considered in detail within an HRA, as the Project development progresses.

9.2.14 Priority habitat datasets identified priority habitat, in the form of coastal flood plain grazing marsh as present only within WLP1 (at its north-east corner). This was confirmed as present from site walkovers. However, this is located at the very edge of the siting zone and therefore could be avoided. As such, this was not considered a differentiating factor. There are also other important habitats, again in the form of coastal floodplain and grazing marsh priority habitat, deciduous woodland and traditional orchards located adjacent to the borders of all the siting zones.

9.2.15 There is little to differentiate from an ecological perspective between each of the Walpole siting zones. However, given their distance from designated sites and potential sources of hydrological connectivity to these sites, siting zones WLP5 and WLP6 are preferred. When considering the siting of the new Walpole converter stations, the new Walpole 400 kV substation and its required connections, the potential cumulative effects upon adjacent priority habitats and designated sites is increased. This further increases the preference for siting zones in WLP5 and WLP6 from an ecological perspective.

Historic Environment

9.2.16 There are no designated assets located within any of the Walpole siting zones, however designated heritage assets are present within 1 km. Therefore, each siting zone has the potential to affect the setting of identified designated heritage assets. The magnitude of the potential effects upon the setting of these assets would be limited due to the presence of either intervening blocks of woodland, other development, and/or the distance from the siting zones. Identified designated heritage assets within 1 km of each siting zone comprise:

- Siting zone WLP1 (see **Figure 9-2**): one Grade I listed building; two Grade II* listed buildings; and eight Grade II listed buildings. The Grade II* *Church Of St James* and Grade II *War Memorial In Churchyard South Of Church Of St James* are those located closest (approximately 300 m south) with the remaining assets located over 500 m from the siting zone. The identified assets within 1 km are predominantly located within Tydd St Giles (north-west) and Newton-in-the-Isles (south) where existing development and/or vegetation screening would (following careful siting) partially or fully limit impacts to the settings of assets.

- Siting zone WLP2 (see **Figure 9-2**): four Grade II listed buildings. one of the Grade II listed buildings; and one Conservation Area. The Grade II *County Boundary Post* is located closest (approximately 300 m north-east) with the remaining assets located over 500 m from the siting zone. The identified assets within 1 km are predominantly located within Tydd Gote (north-west) and Foul Anchor (north) where existing development and/or vegetation screening would (following careful siting) partially or fully limit impacts to the settings of assets.
- Siting zone WLP3 (see **Figure 9-2**): one Grade II* listed building; and two Grade II listed buildings. The Grade II *Priory House* is located closest (approximately 550 m west) with the remaining assets located over 900 m from the siting zone. The identified assets within 1 km are predominantly located within Newton-in-the-Isles (west) where existing development and/or vegetation screening would (following careful siting) partially or fully limit impacts to the settings of assets.
- Siting zone WLP4 (see **Figure 9-2**): two Grade I listed buildings; and eight Grade II listed buildings. The Grade II *Ingleborough Mill* is located closest (approximately 330 m east) with the remaining assets located over 400 m from the siting zone. The identified assets within 1 km are predominantly located within West Walton (west) where existing development and/or vegetation screening (following careful siting) would partially or fully limit impacts to the settings of assets. Siting to the north of the siting zone would adversely impact the setting of *Ingleborough Mill*, however as it is set in the context of large agricultural sheds, careful siting and use of mitigation planting would limit potential adverse impacts to its setting.
- Siting zone WLP5 (see **Figure 9-2**): two Grade I listed buildings; and 11 Grade II listed buildings. Two of the Grade II listed buildings (*Ingleborough Mill* and *Faulkner House*) are located closest (approximately 110 m north-west and south-east); there is a further cluster of five listed buildings at West Walton located within 300 m, the remaining assets are located over 500 m from the siting zone. The identified assets within 1 km are predominantly located within West Walton (south-west) where existing development and/or vegetation screening would (following careful siting) partially or fully limit impacts to the setting of assets. Siting to the north-west and south-east of the siting zone would adversely impact the setting of *Ingleborough Mill* and *Faulkner House*, respectively, however as these listed buildings are set in the context of large agricultural sheds, careful siting and use of mitigation planting would limit potential adverse impacts to their settings.
- Siting zone WLP6 (see **Figure 9-3**): four Grade II listed buildings scattered around the siting zone, the closest are *Dial Farmhouse* and *Needham Lodge* (both located within 100 m) with the remaining located over 500 m from the siting zone. Most of the identified assets within 1 km are screened (either partially or fully) by existing development and/or vegetation screening which would partially or fully limit impacts to the setting of assets. For *Dial Farmhouse* and *Needham Lodge,* siting to the west and south-east would adversely impact their settings, however as these listed buildings are set in the context of large agricultural sheds, careful siting and use of mitigation planting would limit potential adverse impacts.

9.2.17 Overall, all siting zones have designated heritage assets in proximity which are set in the context of existing development (including overhead lines, solar farms and largescale agricultural operations) and therefore do not present a significant constraint to siting. As WLP3 is the most distant zone from heritage receptors (which are partially or fully screened from the siting zone) it is preferred. WLP6 and WLP5 are least preferred as they are closest to heritage receptors.

9.2.18 When considering the siting of the new Walpole converter stations, no direct effects upon designated assets are likely (as no assets are present within the siting zones). However, the cumulative effects of the new Walpole converter substations and new Walpole substation (and the associated overhead line connections) will exacerbate the effects upon the setting of identified designated heritage assets, especially those closest with lack of identified screening. This therefore supports a preference for WLP3 as it is the most distant zone from heritage receptors. WLP6 and WLP5 remain the least preferential due to their proximity to heritage receptors.

Water Environment

9.2.19 Flood Zone 3 is present across all siting zones except for siting zone WLP6. Flood Zone 2 is present across all siting zones, with WLP6 having the least coverage (see **Figure 9-1**). The areas of Flood Zones 2 and 3 are attributed to coastal flooding, the River Nene, North Level Main Drain and their tributaries. Flood defences are present along the banks of the River Nene; however, the floodplain is not identified to be defended up to the usual ‘design event’ for fluvial or tidal flooding. Given that WLP1 to WLP5 are relatively flat, it is considered that a potential 1 in 1000 year flood event is unlikely to be to a substantial depth (subject to further investigation). Further work and stakeholder engagement will be undertaken to identify the scale of potential effects and any mitigation and compensation required. Although siting zone WLP6 (on an area approximately 1 m higher than sites WLP1 to WLP5) is located within Flood Zone 1 (except for a small area of Flood Zone 2 to the north-west), Flood Zones 2 or 3 surround the entire siting zone. For siting zones WLP1 to WLP5 flood compensation for the proposed new infrastructure would be required as Flood Zones 2 and 3 are unavoidable.

9.2.20 Minor watercourses are located within WLP1, WLP3, WLP4, WLP5, and WLP6. These are primarily tributaries associated within the River Nene and/or field drainage ditches. Interactions between proposed infrastructure and these watercourses would be unavoidable within the siting zones. Other watercourses including IDB watercourses may also influence siting within all siting zones.

9.2.21 When considering the potential impacts upon water features, siting zone WLP6 is preferred (although it contains a denser draining network) as it is located outside of areas designated as Flood Zone 3.

Socio Economics

9.2.22 The key socio-economic constraints associated with the Walpole siting zones are the Rose and Crown Solar Farm, located adjacent to WLP5, and the Grantham to Bexwell NSIP (an application for a new 90 km water pipeline), that intersects the south of WLP6 (restricting siting in approximately 15% of the siting zone to the south-east) (see **Figure 9-3**). The proximity of the Rose and Crown Solar Farm will increase technical complexity of siting infrastructure at the north of WLP5 (see **Figure 9-2**), however sufficient space is considered to be available within the remainder of the siting zone to accommodate the Walpole converter stations and Walpole 400 kV substation without permanently impacting the solar farm. The presence of the Grantham to Bexwell NSIP within WLP6 may cause conflict with the use of this siting zone. Avoiding interactions with the NSIP would limit siting opportunities and may require complex engineering solutions or complex land negotiations to agree settlement for removing portions of the proposed infrastructure. As only WLP5 and WLP6 contain or are adjacent to relevant socio-economic features, they are less preferred, with WLP6 the least preferred.

Other considerations

9.2.23 Other environmental topics were also considered as part of the options appraisal and include air quality, noise and geology.

9.2.24 No geology and soil receptors have been identified within the siting areas.

9.2.25 There are scattered properties (residential, commercial and agricultural) surrounding the siting zones; most notably at Fore Gotes, Newton-in-the-Isles, Tydd St Giles, Kirkgate, West Walton, Walton Highway and Walpole Highway for siting zones WLP1 to WLP5. For WLP6, of similar nature receptors are located at Elm, Emneth and Friday Bridge.

9.2.26 For each of the siting zones, there is a potential risk of temporary impacts limited to localised changes in air quality and noise and vibration during construction. No potential adverse air quality impacts are anticipated during operation, although there is the potential for localised changes in noise and vibration on settlements adjacent to the siting zones. However, each siting zone is considered sufficient in size to allow for careful siting of the required infrastructure (at a later stage) to therefore reduce the likelihood and magnitude of these effects.

9.2.27 Scattered properties are in the vicinity of all siting zones such that they do not constitute a differentiating factor in terms of potential air quality and noise effects. However, WLP3 has the fewest properties in its immediate vicinity and is therefore preferred with regards to air quality, noise and vibration. WLP6 has three residential dwellings located immediately adjacent to the siting zone itself whereas no residential dwellings are within siting zones WLP1 to WLP5 and therefore siting zone WLP6 is least preferred with regards to air quality, noise and vibration.

9.3 Engineering and System Factors

9.3.1 The key factors when considering a best performing Walpole siting zone include:

- the overall length of new underground HVDC cable connections from the new landfalls and the Grimsby to Walpole (G2W) Project’s proposed overhead line (from a new Weston Marsh substation);
- feasibility of collocation of required NGET infrastructure;
- proximity to the 4ZM (Burwell to Walpole) 400 kV overhead line;
- minimisation of system outages required to facilitate construction; and
- reducing the amount of road infrastructure required.

Access

9.3.2 Due to their comparatively greater distance from major roads, siting zones WLP4 and WLP5 (the closest major road is the A47 which is located approximately 850 m from WLP5 and 2.6 km from WLP4) would require an increased level of road infrastructure (see **Figure 9-2**). The additional infrastructure would be required for construction of a new permanent access road for operational purposes and/or upgrades to existing roads to make them suitable to support abnormal indivisible loads (AILs). Siting zones WLP1, WLP2, WLP3, and WLP6 (see **Figure 9-2** and **Figure 9-3**) are adjacent to A-roads and therefore minimal infrastructure would be required for new permanent access or upgrades to existing roads.

Outages and diversion of the 4ZM 400 kV overhead line

9.3.3 For all siting zones, construction sequencing will be rationalised to reduce the potential for system outages. The new Walpole converter stations, new Walpole substation, and additional connection infrastructure will be built offline as far as practicable. The required connections to each Walpole siting zone are show in **Figure 2-5**.

9.3.4 Within WLP2 an outage may be required on the 400 kV 4ZM (Bicker Fenn to Walpole) overhead line which crosses the north of the siting zone. This is due to the significant works expected to reroute this overhead line during construction which would be unavoidable given the scale of the new Walpole converter stations and new Walpole substation infrastructure. Minimal outages are envisioned during construction for the other siting zones.

9.3.5 The new Walpole substation will be required to connect into the existing 4ZM (Burwell to Walpole) 400 kV overhead line. The diversion of this overhead line into the substation will require two overhead line double circuits from the existing overhead line to connect to the preferred siting zone from the east.

9.3.6 Siting zones WLP1, WLP2 and WLP3 are all located west of the River Nene (see **Figure 9-2**) and the overhead line diversions would be required to cross this watercourse. WLP4 and WLP5 are located east of the River Nene (see **Figure 9-2**) and therefore do not require the incoming and outgoing circuits of the 4ZM overhead line diversion to cross the River Nene. As the 4ZM routes through WLP5 significantly less connection infrastructure would be required. WLP6 is located approximately 2.6 km west of the 4ZM overhead line (see **Figure 9-3**) and would require the second longest diversions (WLP1 has the longest diversions), increasing the amount of infrastructure required. Diversions of the 4ZM overhead line connecting to WLP6 would require routeing through narrow areas along the A1101 (associated with residential properties and designated heritage assets) south of Friday Bridge and may require oversailing curtilages of residential properties. In contrast, connections from the other Walpole siting zones to the 4ZM 400 kV overhead line are comparatively less constrained.

Existing and Proposed Infrastructure

9.3.7 The Rose and Crown Solar Farm borders siting zone WLP5 to the north, creating a narrow area between western and eastern areas of the zone where it is also bounded to the south by traditional orchards. Whilst the solar farm does not overlap WLP5, its presence would increase the technical complexity of the design at the siting zone.

9.3.8 The proposed Grantham to Bexwell water pipeline NSIP overlaps with WLP6. Given the location where the pipeline would cross the zone, siting would be restricted in approximately 15% of the siting zone to the south-east. This pipeline may cause conflict with the use of this siting zone, limiting the flexibility and increasing the complexity of design for siting infrastructure.

9.3.9 132 kV and 400 kV overhead lines are also present within WLP1, WLP2 and WLP5 (see **Figure 9-2**):

- WLP 1 contains a singular UKPN 132 kV overhead line.

- WLP2 contains the 4ZM (Bicker Fenn to Walpole) 400 kV overhead line, a NGED 132 kV overhead line and a UKPN 132 kV overhead line.
- WLP5 contains a UKPN 132 kV overhead line and the 4ZM (Burwell to Walpole) 400 kV overhead line.

9.3.10 There are high pressure gas mains within WLP1, WLP2, WLP3, WLP4 and WLP5 (see **Figure 9-2**), the locations of which are outlined below. Given the potential safety risk of construction within proximity to these assets, these gas mains represent a constraint to siting:

- WLP1 – one gas main routes west to east at the south of the siting zone parallel to Church Lane.
- WLP2 – one gas main crosses the north-eastern corner of the siting zone, south of Foul Anchor, before routeing parallel to the eastern border of the siting zone.
- WLP3 – two gas mains intersect the south of the siting zone east of Chapel Lane.
- WLP4 – one gas main runs parallel to the southern border of the siting zone whilst another crosses the siting zone from south-west to the north-east.
- WLP5 – one gas main crosses from the south-west to the east of the siting zone, passing south of the narrow area present within the siting zone (underneath orchard habitat).

9.3.11 Due to the combined density and locations of existing and proposed infrastructure identified within the siting zones, WLP1 and WLP2 are least preferred and WLP3 is most preferred.

Flooding

9.3.12 Flood Zone 3 is present across all siting zones except for siting zone WLP6. Flood Zone 2 is present within all siting zones with WLP6 having the least coverage. The siting of infrastructure within these areas of flood risk is unavoidable within siting zones WLP1 to WLP5 due to the amount of infrastructure required. Infrastructure required within Flood Zones 2 and 3 will be designed accordingly and the mitigation and compensation required will be determined as the Project progresses. The King’s Lynn and West Norfolk Strategic Flood Risk Assessment (SFRA) and South Holland SFRA mapping identifies the areas around WLP1 to WLP5 as having a most likely flood risk source from surface water and the highest flood risk source from tidal. It is noted that flood defences are present along the River Nene and the River Great Ouse, with the area also identified (in part) as an area benefiting from flood defences which should help mitigate the risk of this essential infrastructure becoming flooded during a flood event. In addition, high risk watercourses associated with the River Nene are located adjacent to siting zones WLP3 and WLP4, further increasing the complexity of construction, design and operational requirements of infrastructure in these siting zones. Further assessment of flood risk (such as an FRA) for a preferred substation site will be undertaken in more detail at a later stage of Project development and will identify appropriate mitigation.

Siting converter station and 400 kV substation infrastructure

9.3.13 All the identified siting zones hold enough space to site the new Walpole converter station infrastructure alongside the new Walpole kV substation infrastructure. Siting all this infrastructure within one siting zone would help to reduce the spread of infrastructure and limit the lengths of new roads and/or upgrades to existing roads. However, siting all this infrastructure within a single siting zone may increase the technical complexity of infrastructure designs (for example by potentially limiting orientations) subject to the outcomes of further detailed siting work following non-statutory consultation.

9.4 Holford and Horlock Rules

9.4.1 The following paragraphs provide commentary on the extent to which the appraised options for siting the Walpole converter stations accord with the Horlock Rules (relating to substation siting, as described in **Chapter 3**). As there is a desire to co-locate the new Walpole 400 kV substation within the same siting zone, the Holford Rules (relating to overhead line routeing, as described in **Chapter 3**) regarding line entries have been taken into consideration. These two sets of rules represent NGET's guiding principles for the routeing/siting new energy transmission infrastructure and a primary mechanism by which compliance with national policy is assured.

9.4.2 At this early stage of development Horlock Rules 7, 9, 10 and 11 are not considered applicable as they are primarily concerned with detailed design of converter stations following site selection. In relation to the siting of the new Walpole substation within the same siting zone, Holford Rules 1, 2, 3 and 6 are considered applicable.

9.4.3 When reviewed against the applicable Horlock and Holford Rules:

- Definition of the siting zones has taken into consideration environmental features and potential impacts upon identified features (Horlock Rule 1).
- All siting zones 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).
- Siting zones WLP1 to WLP5 are best located to connect to the new underground HVDC cables from landfalls and the proposed G2W Project's 400 kV overhead line (from a new Weston Marsh substation). WLP1 to WLP5 allow using the most direct route to allow for collocation of infrastructure, whereas the connection to WLP6 results in significantly longer routes making it less compliant than alternative corridors when considering Holford Rule 3.
- All siting zones could keep the proposed high voltage overhead lines (4ZM 400 kV diversion and G2W Project's overhead line) away from existing overhead lines to avoid a convergence of assets and development of a wirescape (Holford Rule 6).
- Sufficient space is available within the siting zones to enable micro-siting to avoid identified socio-economic constraints within WLP5 and WLP6, and further reduce effects upon environmental receptors, even when considering the requirements of the new Walpole converter stations and new Walpole substation. (Horlock Rules 4 and 5). Given its proximity to the existing Burwell to Walpole 4ZM overhead line, WLP5 offers the greatest opportunity to limit the intrusion of infrastructure (converter stations, substation and connection infrastructure) into surrounding areas.
- All siting zones offer the opportunity to utilise screening provided by existing features (such as raised banks of the River Nene, hedgerows and treelines) where possible to reduce intrusion of the associated connection infrastructure into surrounding areas (Horlock Rule 4); with the greatest opportunity offered by WLP5 should nearby orchards be retained. Given of the predominately open landscape with sparse vegetation, there is a requirement to achieve greater distances from receptors and use of screening (most likely by planting) will be necessary.

- All siting zones are predominantly located on agricultural land (Horlock Rule 6- reducing effect on agricultural land and drainage), although this is unavoidable. All siting zones contain drains, however given the distribution of drains within siting zones WLP3 and WLP6, it will be more difficult to avoid drains, which makes these siting zones less preferred when considering such features.
- No vacant or available brownfield land for siting of the required infrastructure has been identified within the Walpole Stations Study Area. However, when considering proximity to existing 400 kV infrastructure (in line with Horlock Rule 8 – space to be used effectively to limit the area required for development) the proximity of WLP2 and WLP5 will help to limit the area required for development.

9.5 Comparative Appraisal and Conclusion

9.5.1 Environmentally there were few factors to differentiate between each of the siting zones when considering the siting of the converter stations in isolation. However, when considering the collocation of the new Walpole substation infrastructure and required diversions of the 4ZM (Burwell to Walpole) 400 kV overhead line to the siting zones, there is a strong preference for siting zones that avoid multiple overhead line crossings of the River Nene. Therefore, WLP4, WLP5 and WLP6 are more preferred. Each of these siting zones present different opportunities for siting; WLP5 and WLP4 will reduce the length of diversions of the 4ZM overhead line and limit the spread of impacts into the surrounding areas, whereas WLP6 is likely to result in a spread of effects (most notably landscape and visual) into the surrounding areas but is wholly located outside of Flood Zone 3 areas (albeit upon a denser drainage network).

9.5.2 From a technical perspective, there are notable factors to differentiate the siting zones. Most notably, the closer proximity of WLP4 and WLP5 to the 4ZM (Burwell to Walpole) overhead line would necessitate significantly less connection infrastructure to enable collocation between the converter stations and new Walpole substation compared with the other siting zones. Though it is noted that more infrastructure would be required to develop permanent accesses (or upgrade existing roads) to these siting zones compared to others given their distance from nearby A-roads.

9.5.3 The concentration of existing infrastructure within WLP1, WLP2, and WLP3 would limit the flexibility for siting (such as orientations), increase the complexity of construction and, in the case of WLP2, would likely result in outages being required during construction. As noted in Paragraph 8.3.2, use of siting zones WLP1, WLP2 and WLP3 would also require use of a narrower area of Corridor from the west (south of Tydd St Giles. Within this area the DC cables would require crossing the North Level Main Drain, a gas main and would be near the G2W Project's overhead line, significantly increasing the technical complexities of entries to siting zones WLP1, WLP2 and WLP3. The Rose and Crown Solar Farm may pose a slight technical challenge for siting within WLP5 and the proposed Grantham to Bexwell pipeline NSIP may conflict with siting in WLP6.

9.5.4 On balance, when considering engineering and system factors altogether, siting zones WLP4 and WLP5 would be preferred as they offer flexible siting which would not necessitate a complex infrastructure design to allow for collocation of infrastructure between the Walpole converter stations and new Walpole substation compared with the other siting zones and would limit the diversions of the 4ZM (Burwell to Walpole) 400 kV overhead line. Overall, taking into account all identified features and constraints, siting zones WLP4, WLP5 and WLP6 offer the best opportunity for flexible siting. WLP4 and WLP5 reduce the amount of connection infrastructure required and intrusion into the surrounding environment (in line with the Horlock Rules). WLP6 is located outside areas of Flood Zone 3 (and partially outside areas of Flood Zone 2). WLP4 and WLP5 perform slightly better than WLP6 given their potential to limit the length of the underground cable connections from the LCS and the overhead line connection for the G2W overhead line. Therefore, when considered in isolation, siting zones WLP4, WLP5 and WLP6 are the emerging preferences for the new Walpole stations. The emerging preferences will be reviewed as part of the end-to-end solution within **Chapter 11.**

10. Options Appraisal – LCS Converter Station

10. Options Appraisal – Lincolnshire Converter Station (LCS) Converter Station

10.1 Introduction

10.1.1 This Chapter details the outcomes of the Options Appraisal (Step 7 as described in **Chapter 4**) for the LCS converter station (including a DCSS, as shown in **Figure 1-4**). This would be required should a decision be taken to proceed with a three-ended connection as detailed in **Chapter 5**. The siting zones have been developed through the definition of a study area (Step 1), mapping and weighting of features (Step 2 and Step 3), and an iterative identification, review and refinement process (Steps 4, 5 and 6). As detailed in Paragraph 2.5.12, engineering solutions are available to locate the new LCS converter station and the DCSS in the same or connected structures. However for the purposes of the current stage of the Project it has been assumed that the new LCS converter station and DCSS would not be within the same or connected structures but would be in proximity to each other. The LCS converter station siting zones, which will contain the new LCS converter station and the DCSS, have been developed to accommodate a converter station approximately 350 m by 300 m (approximately 11 ha) and a DCSS 190 m by 100 m (approximately 2 ha). The siting zones progressed for options appraisal, see **Figure 10-1,** comprise:

- Siting zone DC1: an area which is approximately 550 m by 250 m (approximately 14 ha) and is located immediately east of Woodthorpe. The siting zone is approximately 850 m west of the A1104 and 950 m east of the B1373.
- Siting zone DC2: an area approximately 890 m by 380 m (approximately 34 ha) and is located adjacent to Beesby to the north-east. The A1104 is approximately 550 m to the east.
- Siting zone DC3: an area which is approximately 1.95 km by 580 m (approximately 113 ha), and it is located approximately 220 m north of Saleby. The A1104 overlaps with the north-western boundary of the siting zone.
- Siting zone DC4: an area approximately 1.13 km by 360 m (approximately 41 ha) and is located approximately 650 m west of Saleby. This siting zone overlaps Greenfield Lane, and the Wold Grift Drain is approximately 150 m to the west.
- Siting zone DC5: an area which is approximately 2.95 km by 1.36 km (approximately 401 ha) and is located approximately 300 m north of Bilsby and approximately 190 m east of Thoresthorpe. The siting zone overlaps with the Wold Grift Drain and the A1111.
- Siting zone DC6: an area which is approximately 1.8 km by 600 m (approximately 108 ha) and located west (approximately 100 m) of Huttoft. The siting zone is approximately 240 m west of the A52.

- Siting zone DC7: an area which is approximately 640 m by 560 m (approximately 36 ha) and is located approximately 550 m north-east of Huttoft. It is approximately 260 m east of the A52.
- Siting zone DC8: an area which is approximately 460 m by 300 m (approximately 14 ha) and is located between Alford (1.45 km east of Alford) and Thurlby (approximately 1.42 km west of Thurlby) and approximately 280 m south-east of Bilsby. The B1449 is immediately north of the siting zone.
- Siting zone DC9: an area east of siting zone DC8 which is approximately 700 m by 320 m (approximately 22 ha) and is located between Alford (approximately 2.2 km west) and Thurlby (approximately 600 m east) and approximately 1 km south-east of Bilsby. The B1449 is immediately north of the siting zone.
- Siting zone DC11: an area which is approximately 390 m by 480 m (approximately 19 ha) and is adjacent to Woodthorpe (to the south). The siting zone is adjacent to the B1373.
- Siting Zone DC12: an area approximately 2.5 km by 1.45 km (approximately 363 ha) and is located between Claythorpe (approximately 1.1 km south-west) and Woodthorpe (approximately 470 m east). Wold Grift Drain routes 80 m to the south of the siting zone.
- Siting Zone DC13: an area which is approximately 830 m by 530 m (approximately 44 ha). This is located approximately 1 km north of Alby and is adjacent to Greenfield Lane which routes to the south. Wold Grift Drain routes adjacent to the siting zone to the north-east.

10.1.2 As part of the refinement of siting zone options, siting zone DC10 was also developed at Theddlethorpe Gas Terminal with the aim of taking advantage of this previously disturbed site to minimise potential adverse effects in the area. However, upon further review it was found that the site was not commercially available for development and as such would not be considered further within the Options Appraisal.

Figure 10-1– LCS Converter Station Siting Zone locations

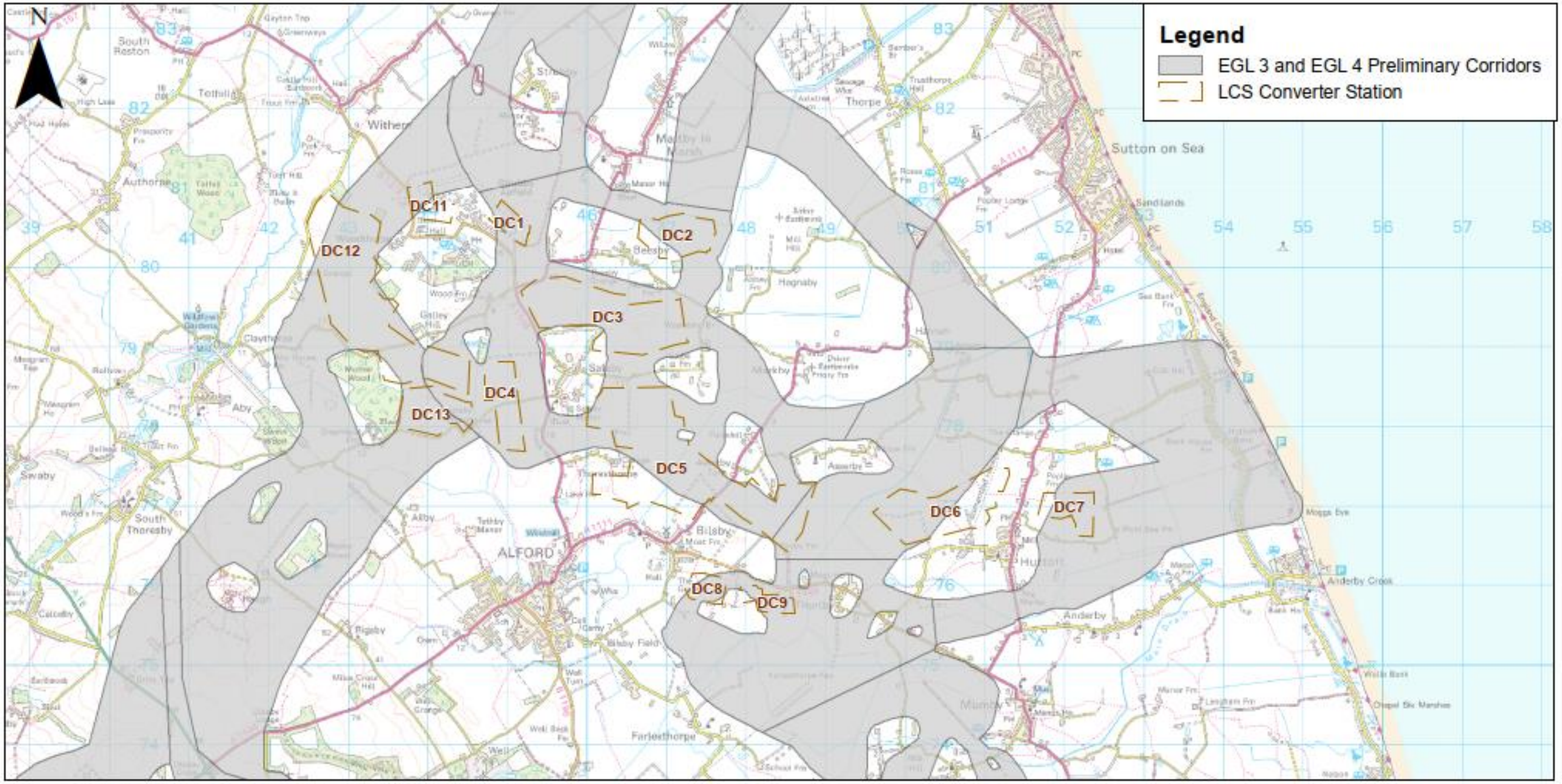


Figure 10-1-LCS Converter Station Siting Zone locations

10.2 Options Appraisal

10.2.1 The appraisal of the siting zones has considered the potential effects of connections (new HVDC and HVAC underground cables, as detailed in **Chapter 5**) of the Project into and out of each siting zone.

10.2.2 The appraisal of environmental, socio-economic and technical issues for the new LCS converter substation has considered, as detailed in **Chapter 5**, the potential effects on relevant receptors, and whether such effects could be avoided or mitigated through careful siting. Where impacts cannot be avoided or mitigated by careful siting, other forms of mitigation have been considered in accordance with the mitigation hierarchy.

10.2.3 For the current Project stage, the relevant data to inform the appraisal comprises desk study information, supplemented by site visits to select locations, on important receptors.

10.3 Environmental Factors

Landscape and Visual

10.3.1 The siting zones DC1 to DC9 and DC11 to DC13 are all located within a radius of approximately 10 km. However, all the siting zones (**Figure 10-2**) are located:

- within the Lincolnshire Coast and Marshes NCA (NCA 42), which is characterised by wide coastal plains. This extends from Barton-upon-Humber in the north, to Grimsby at the mouth of the Humber and south to Skegness;
- over 2 km away from Lincolnshire Wolds NL (the closest nationally designated landscape). Although all are within 12.5 km of the Lincolnshire Wolds NL, the scale of potential impacts on the Lincolnshire Wolds NL and its setting are specific to each siting zone.

10.3.2 The Lincolnshire Wolds NL is comprised of several Local Character Areas (LCA) which are defined by key characteristics. The closest LCA to the siting zones is the South-Eastern Claylands LCA, the key characteristics of which are:

- *"Views across the Middle Marsh to the coast"* – Corridors will be visible within views of the wider of area.
- *"Extensive oak-ash woodland"* – provides an opportunity to improve the connectivity of green infrastructure assets as part the mitigation.
- *"Ridge top roads and their associated archaeology"* – enables views of the wider landscape.

10.3.3 The landscape and visual amenity characteristics of each of the LCS converter station siting zones is described below in **Table 10-1**. No residential properties are identified within the siting zones.

10.3.4 Ongoing design refinement and micrositing will help reduce impacts to landscape and visual receptors. Siting should seek to avoid mature woodland, hedgerows and tree planting, where practicable, and be set back from settlements and residential properties as far as possible. Implementation of standard working measures and practices during construction will reduce the severity of impacts.

Figure 10-2– Key landscape and visual features adjacent to LCS Converter Stations

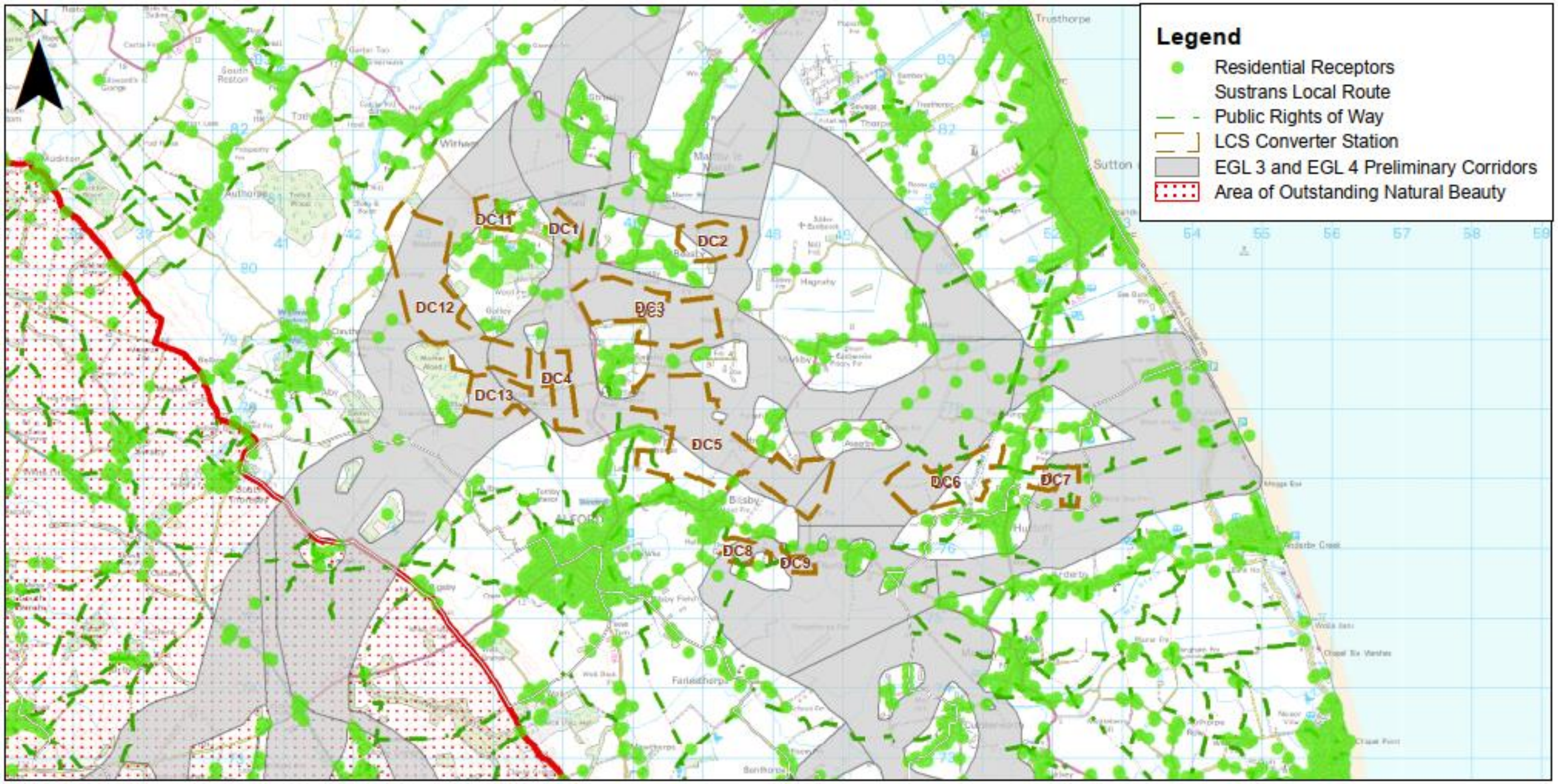


Figure 10-2 – LCS Converter Station Siting Zones - Landscape Features

Table 10-1 - Landscape characteristics of the LCS Converter Siting Zones

Siting zone	Landscape Character of the siting zone	Proximity to the Lincolnshire Wolds NL	Key visual receptors
DC1	The siting zone is surrounded by open arable fields and is characterised by the historic south-eastern part of the Strubby Airfield runway. Large scale commercial buildings are located to the south-west, which combined with a mature roadside hedge and trees and woodland south of Woodthorpe provides visual enclosure to the south. Views to the north are more open, with low horizons featuring distant layered trees and hedgerows associated with settlement and roads.	Approximately 5.2 km from the Lincolnshire Wolds NL.	Surrounding DC1, the key visual receptors are residential properties. Those identified are individual properties and those located at Woodthorpe Camping and Leisure Park, approximately 400 m south-west of the siting zone. Other key sensitive receptors include recreational receptors. Those identified are users of PRoW Stru/526/1 which intersects the south of the siting zone.
DC2	Characterised by open, irregular arable fields of medium size bound by drainage ditches. Vegetation is limited, but small blocks of woodland and hedgerows in the wider landscape provide some visual enclosure, as do trees and mature hedgerows on the northern edge of Beesby.	Approximately 6.2 km from the Lincolnshire Wolds NL.	Surrounding DC2, the key visual receptors are residential properties. Those identified are residential properties located at Beesby to the south-west of the siting zone.
DC3	Characterised by large scale irregular arable fields south of the village of Beesby. The gently undulating topography in a largely flat landscape means that localised high points in the west and east feel relatively prominent. Fields are largely bound by drainage ditches, with occasional boundary trees or hedgerows. There are also scattered tree belts and woodlands in the wider landscape which provide treed horizons in an otherwise open landscape, and contribute towards filtering views towards the Lincolnshire Wolds NL to the west. Detractors include the A1104 to the north and west.	Approximately 4.6 km from the Lincolnshire Wolds NL.	Surrounding DC3, the key visual receptors are residential properties. Those identified are residential properties located at the south of Beesby, at Manor Farm, Glebe Farm and the north of Saleby. Other sensitive visual receptors include users of nearby roads.

Siting zone	Landscape Character of the siting zone	Proximity to the Lincolnshire Wolds NL	Key visual receptors
DC4	Characterised by large open arable fields, rising to a localised high point around the eastern boundary, screening views to the east. Fields are generally bound by drainage ditches, although there are occasional boundary trees in places. Views are open, including towards the Lincolnshire Wolds NL in the west, and punctuated by blocks of woodland and trees in the wider landscape. There is a strong rural character with limited built form.	Approximately 3.1 km from the Lincolnshire Wolds NL.	Surrounding DC4, the key visual receptors are residential properties. Those identified are those at Galley Hill, Saleby and those along the A1111. Other key sensitive receptors include recreational receptors. Those identified are users of the A1104, approximately 350 m east, and users of Greenfield Lane, which routes through the centre of the siting zone.
DC5	Characterised by large scale arable fields bound by drainage ditches. There are some hedgerows and boundary trees along roads but limited internal structure. The topography is gently undulating, rising either side of a watercourse through the centre of the site to localised high points in the east and west. Scattered surrounding settlement includes the village of Bilsby to the south, Thoresthorpe to the west and Saleby to the north-west. Views are open, towards horizons with layered trees associated with settlement, and including filtered views towards the Lincolnshire Wolds NL to the west.	Approximately 3.5 km from the Lincolnshire Wolds NL.	Surrounding DC5, the key visual receptors are residential properties. Those identified are located at Saleby (to the north), Thoresthorpe (to the west), Bilsby (to the south) and in scattered properties at Asserby Turn and around Glebe Farm (east of Saleby). Other key sensitive receptors include recreational receptors. Those identified are users of PRoW Sale/284/3 which crosses through the west of the siting zone.
DC6	Characterised by arable fields of varying size and shape, with a smaller scale pattern and more intact field boundaries of trees/hedgerows in the east, north-west of the village of Huttoft. A linear, tree-lined dismantled railway is a distinctive feature in the landscape, screening views to the west including from the village to the east. A gentle undulation in topography means that the western part of the site is relatively elevated and is very open with glimpsed views to the Lincolnshire Wolds NL in the west.	Approximately 6.2 km from the Lincolnshire Wolds NL.	Surrounding DC6, the key visual receptors are residential properties. Those identified are located at Huttoft (to the south-east), and in isolated properties on Mill Lane (to the north), and Alford Road (to the south). Other key sensitive receptors include recreational receptors. Those identified are users of PRoW routes Hutt/12/1, Hutt/14/1 and Hutt/14/2 which cross through the centre of the siting zone, as well as the

Siting zone	Landscape Character of the siting zone	Proximity to the Lincolnshire Wolds NL	Key visual receptors
			South Wolds Cycle Route, which passes immediately to the south of the siting zone.
DC7	Characterised by small scale open arable fields bound by drainage ditches east of Huttoft. Boundary vegetation within the site is limited, and views are open however trees and occasional hedgerows on the edge of Huttoft and in the wider landscape mean views are less expansive than elsewhere.	Approximately 7.7 km from the Lincolnshire Wolds NL.	Surrounding DC7, the key visual receptors are residential properties. Those identified are located at Huttoft (to the south-west), Poplar Farm (to the north) and isolated properties on Jolly Common Lane (to the south and east respectively). Other key sensitive receptors include recreational receptors. Those identified are users of PRoW Hutt/2/2 (which crosses the east of the siting zone) and Hutt/4/1 (which crosses the north of the siting zone), as well as South Wolds Cycle Route (situated immediately to the south of the siting zone).
DC8	Characterised by a large arable field south-east of the village of Bilsby. It is surrounded by much smaller pastoral fields with mature hedgerows and boundary trees. The topography is gently undulating with a localised high point on the northern boundary, which results in a very open character and long views across the countryside, including towards the Lincolnshire Wolds NL.	Approximately 3.7 km from the Lincolnshire Wolds NL.	Surrounding DC8, the key visual receptors are residential properties. Those identified are located at the east Bilsby, and on several isolated farms/cottages accessed from Thurlby Road (to the north) and Ancroft Fen Lane (to the south). Other key sensitive receptors include recreational receptors. Those identified are users of PRoW Bils/74/3, which crosses the centre of the siting zone.
DC9	Characterised by parts of three large, arable fields surrounded by scattered settlement. Field boundary vegetation includes occasional trees and fragmented hedgerows, although two of the fields are separated by drainage ditches. Views are open to the east, and	Approximately 4.3 km from the Lincolnshire Wolds NL.	Surrounding DC9, the key visual receptors are residential properties. Those identified are located in properties on Thurlby Road (to the north).

Siting zone	Landscape Character of the siting zone	Proximity to the Lincolnshire Wolds NL	Key visual receptors
	boundary trees filter long views towards the Lincolnshire Wolds NL to the west.		Other key sensitive receptors include recreational receptors. Those identified are users of PRoW Bils/75/1, which crosses the centre of the siting zone.
DC11	The siting zone comprises the westernmost part of the runway and taxiway at Strubby Airfield in the north-eastern corner, with small sized, irregular arable fields with some ditches to the west and south. It is broadly flat, however a slight rise in the otherwise flat surrounding landscape is notable. Vegetation is sparse, however there are hedgerows with occasional hedgerow trees adjacent to the B1373 which routes along the western boundary. There are also several scattered woodlands in the wider landscape, including a large area to the south which combine with sparse vegetation on site to give generally open views with distant, treed horizons. Large hangars associated with the airfield are located to the east of the site, and to the south are Woodthorpe Hall, Woodthorpe Camping and Leisure Park, and Woodthorpe Hall Golf Course.	Approximately 4.5 km from the Lincolnshire Wolds NL.	Surrounding DC11, the key visual receptors are residential properties. Those identified are located at Woodthorpe (including Woodthorpe Hall) situated to the south/south-west, as well as those who have properties at and use Woodthorpe Hall Golf Course and Woodthorpe Camping and Leisure Park for recreational purposes. Other sensitive visual receptors include users of nearby roads.
DC12	The siting zone comprises gently undulating arable fields, set in a wider landscape with woodland blocks of varying size. A minor lane, Rye Lane, routes through the southern part of the site. Field boundaries are generally open, with ditches. Occasional hedgerows combine with the surrounding woodland to create pockets where there is a strong sense of visual enclosure. This is further strengthened south of Rye Lane, where there is rising topography to the east.	Approximately 2.8 km from the Lincolnshire Wolds NL	Surrounding DC12, the key visual receptors are residential properties. Those identified are located in individual properties at Galley Hill Farm (to the east) and at Aby Grange (to the west) and Woodthorpe (to the east). Other key sensitive receptors include recreational receptors. Those identified are users of Woodthorpe Hall Golf Course and Woodthorpe Camping and Leisure Park (to the east), and along nearby roads.

Siting zone	Landscape Character of the siting zone	Proximity to the Lincolnshire Wolds NL	Key visual receptors
DC13	The siting zone is slightly undulating arable farmland, largely bound by hedgerows and ditches with hedgerow trees. There is a localised high point in the west of the site, and another to the east which limits intervisibility with Saleby. The site is contained by woodland blocks to the west and a minor road to the south. Occasionally, where hedgerows have been removed, there are open views to the south, however views are generally contained by vegetation and topography.	Approximately 3.0 km from the Lincolnshire Wolds NL	Surrounding DC13, the key visual receptors are residential properties. Those identified are located in individual properties including Greenfield Farm, to the west; and along minor roads. Other key sensitive receptors include recreational receptors. Those identified area users of PRoW Sale/290/1, which passes immediately south-east of the siting zone.

10.3.5 Landscape and visual impacts will be both temporary, relating to the construction works, and permanent, due to the introduction of new infrastructure (LCS converter station and DCSS) into the landscape. Siting zones located furthest from the Lincolnshire Wolds NL, most separated from settlement and/or those located on previously disturbed land are preferred to reduce the magnitude of landscape and visual impacts. In addition, siting zones adjacent to (where practicable) one of the proposed LCS 400 kV substations (proposed as part of the NGET Grimsby to Walpole (G2W) Project) would also be preferrable to limit the spread of landscape and visual impacts to a wider area.

10.3.6 Siting zones DC3 and DC4 would be less preferred from a landscape and visual perspective. Siting zone DC3 is less preferred due to the potential impacts upon the residential receptors at Beesby. Siting zone DC4 is less preferred due to potential impacts on the distinctive field pattern within the siting zone and its potential visibility in views from the Lincolnshire Wolds NL.

10.3.7 DC1 is preferrable as it is partially located upon existing hardstanding (used for Strubby Airfield and agricultural storage, based on available aerial information), is set in the context of large commercial buildings and woodland and due to limited visual receptors within the immediate vicinity. Siting Zones DC5 and DC12 are also preferred from a landscape and visual perspective as both Siting Zones contain features which offer screening and provide a sense of visual enclosure, and offer the opportunity to co-locate infrastructure with one of the proposed LCS 400 kV substations. Siting within zones DC5 and DC12 would therefore help to limit the potential spread of effects in the surrounding area.

Ecology

10.3.8 All the LCS converter station siting zones are located between 2.3 km (siting zone DC7) and 8.7 km (siting zone DC13) from NSN and Ramsar sites (see **Figure 10-3**). The Humber Estuary SPA and Ramsar site, Saltfleetby-Theddlethorpe Dunes SAC and Inner Dowsing, Race Bank and North Ridge SAC are all situated over approximately 6.5 km from the siting zones (at their closest points) and are therefore not considered further. The nearest NSN to the siting zones is the Greater Wash SPA (as described in Paragraph 6.2.4) which is located approximately 2.3 km to the east of DC7. No national statutory ecological designations are identified within 2 km of the siting zones (see **Figure 10-3**) and are therefore not considered further. Priority habitats have been identified within, or immediately adjacent to the LCS converter station siting zones (see **Figure 10-3**) and are detailed in **Table 10-2**.

Figure 10-3– Key ecological features adjacent to LCS Converter Station Siting Zones

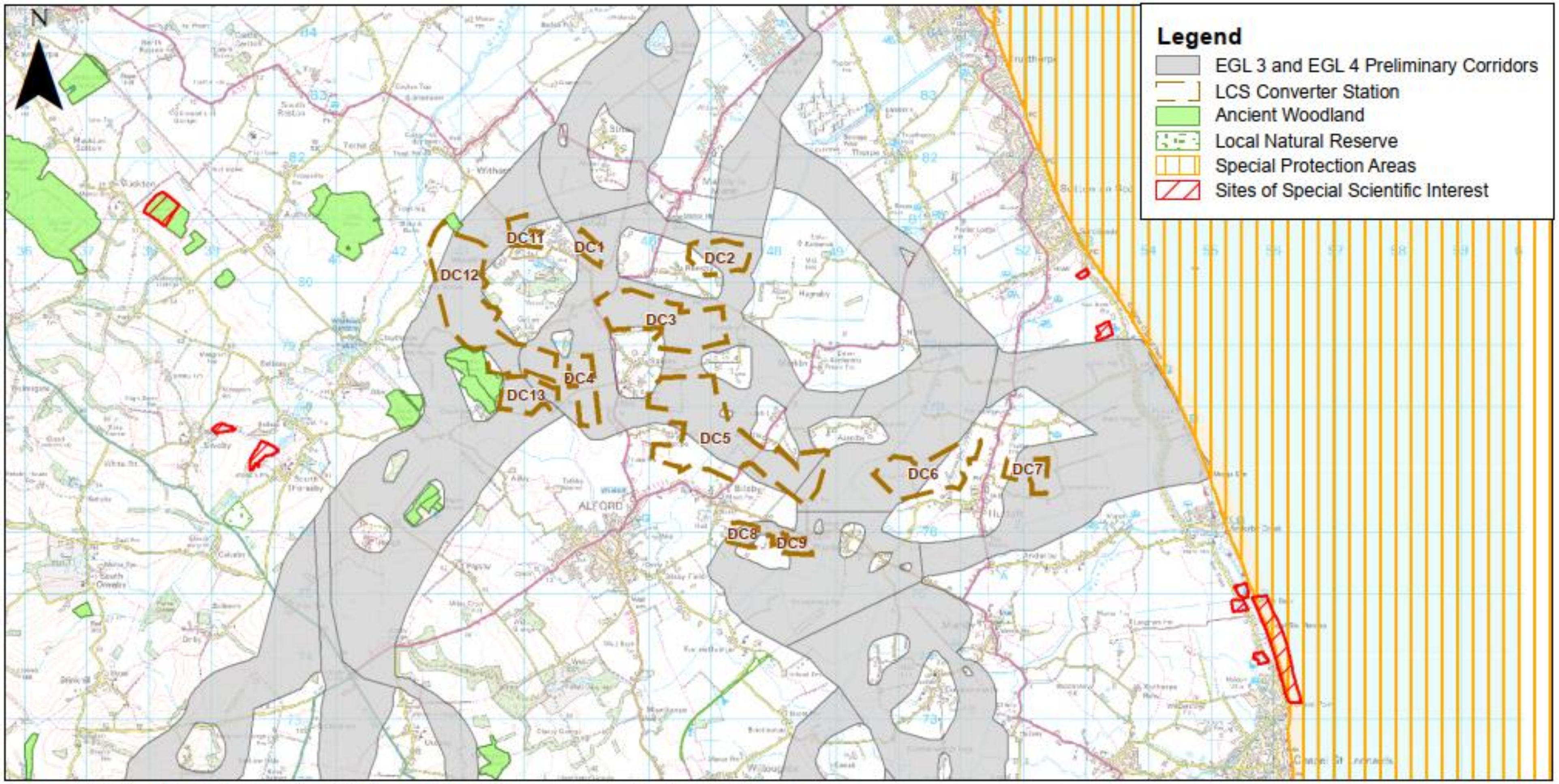


Figure 10-3 – LCS Converter Station Siting Zones – Key Ecological Features

SCALE: 1:140,000 0 1 2 3 4 km

10.3.9 Several measures could be implemented to reduce the magnitude of impact on the above designated sites, species and priority habitats, these include:

- careful siting of converter station and DCSS infrastructure, and routeing of underground cable connections to avoid areas of priority habitat; and
- implementation of a CEMP, or similar, setting out specific procedures for the protection of habitats and species.

10.3.10 In addition, the provision of compensation and enhancement measures would be made. It is also noted that the consideration of BNG will be included in the later stages of the Project.

10.3.11 Due to the distance of the siting zones from the Greater Wash SPA potential impacts of the proposed infrastructure are limited to pollution during construction and effects upon functionally connected habitats. Siting zones DC7 and DC6 are located the closest at approximately 2.3 km and 3.1 km away respectively, with siting zones DC12 and DC13 located the furthest away, at approximately 8.4 km and 8.7 km, respectively. The potential effects upon NSN and Ramsar sites will be considered in detail within a HRA (conducted in the absence of mitigation), as the Project development progresses. However, for the purposes of Options Appraisal, the Siting Zones located further from the NSN and Ramsar sites are considered to have a lesser likelihood of resulting in adverse environmental effects. With the implementation of careful siting (and routeing for connections) and standard construction measures, all Siting Zones are considered capable of being acceptable when considering the potential impacts on identified sites.

10.3.12 Outside of the statutory ecological designations, the construction of the LCS converter stations has potential to result in habitat loss/degradation and impacts to protected species. Further impacts to habitats may arise because of pollution of soils and watercourses during construction.

Table 10-2 - Relevant Sites Designated for Nature Conservation and Priority Habitat

Siting zone	Priority habitats within and adjacent to the siting zone
DC1	None
DC2	Woodland and Wet ditch located immediately south of the Siting Zone, which can be avoided.
DC3	None
DC4	Wet ditch located immediately west of the Siting Zone, which can be avoided.
DC5	Woodland located within the centre of the Siting Zone which can be avoided.
DC6	Woodland located within the centre of the Siting Zone which can be avoided.
DC7	Woodland located within the south of the Siting Zone which can be avoided.
DC8	None
DC9	None
DC11	None
DC12	Withern Wood and Hornby/Mother Woods Ancient Woodland (also priority habitat deciduous woodland) are located immediately east and west and can be avoided.

Siting zone	Priority habitats within and adjacent to the siting zone
DC13	Hornby/Mother Woods Ancient Woodland (also priority habitat deciduous woodland) is located immediately west and can be avoided.

10.3.13 From an ecological perspective there is a need to balance the requirement for greater distances from the Lincolnshire coastline (where the NSN and Ramsar sites are located) and a greater length of underground cables (resulting in the increased risk of disturbance on ecological receptors) by routeing further inland. Therefore, it is considered that siting zones that are both closest to and furthest from the coastline would both be less preferable overall. Additionally, siting zones on (wholly or fully) previously disturbed land would also be preferred as this would limit the risk of new impacts on undisturbed land. Furthermore, siting zones adjacent to (where practicable) one of the proposed LCS 400 kV substations would be preferrable to help limit the spread of impacts upon potentially functionally linked land and upon habitat connectivity to a wider area.

10.3.14 When considering the above criteria, siting zones DC2, DC3, DC5, DC6, DC7 and DC11 are preferred from an ecological perspective. These siting zones are all located approximately between 2 km and 6 km west of the coastline, and although contain priority habitat, this is considered avoidable through careful siting. Siting Zone DC1 is also a preferred siting zone as despite being located over 6 km from the Lincolnshire coast, the siting zone offers the opportunity to partially site on previously disturbed land. Overall siting zone DC5 is most preferred as it would also offer the opportunity for collocation with one of the proposed LCS 400 kV substations, limiting the potential spread of impacts on functionally linked habitats.

Historic Environment

10.3.15 No designated heritage assets are located within the LCS converter station siting zones. However designated heritage assets are located within 1 km of all siting zones and therefore may be subject to adverse effects during construction and operation. Those identified are listed in **Table 10-3** and shown on **Figure 10-4**. Potential risks to these designated assets include:

- physical impacts to designated heritage assets (from underground cabling into and out of the siting zones);
- ground disturbance causing the removal/truncation of buried archaeological remains; and
- change in the character and setting of designated heritage assets during construction and operation.

10.3.16 There are also numerous non-designated assets in addition to the risk for unrecorded archaeology within all siting zones.

Figure 10-4- Key heritage features within proximity to LCS Converter Siting Zones

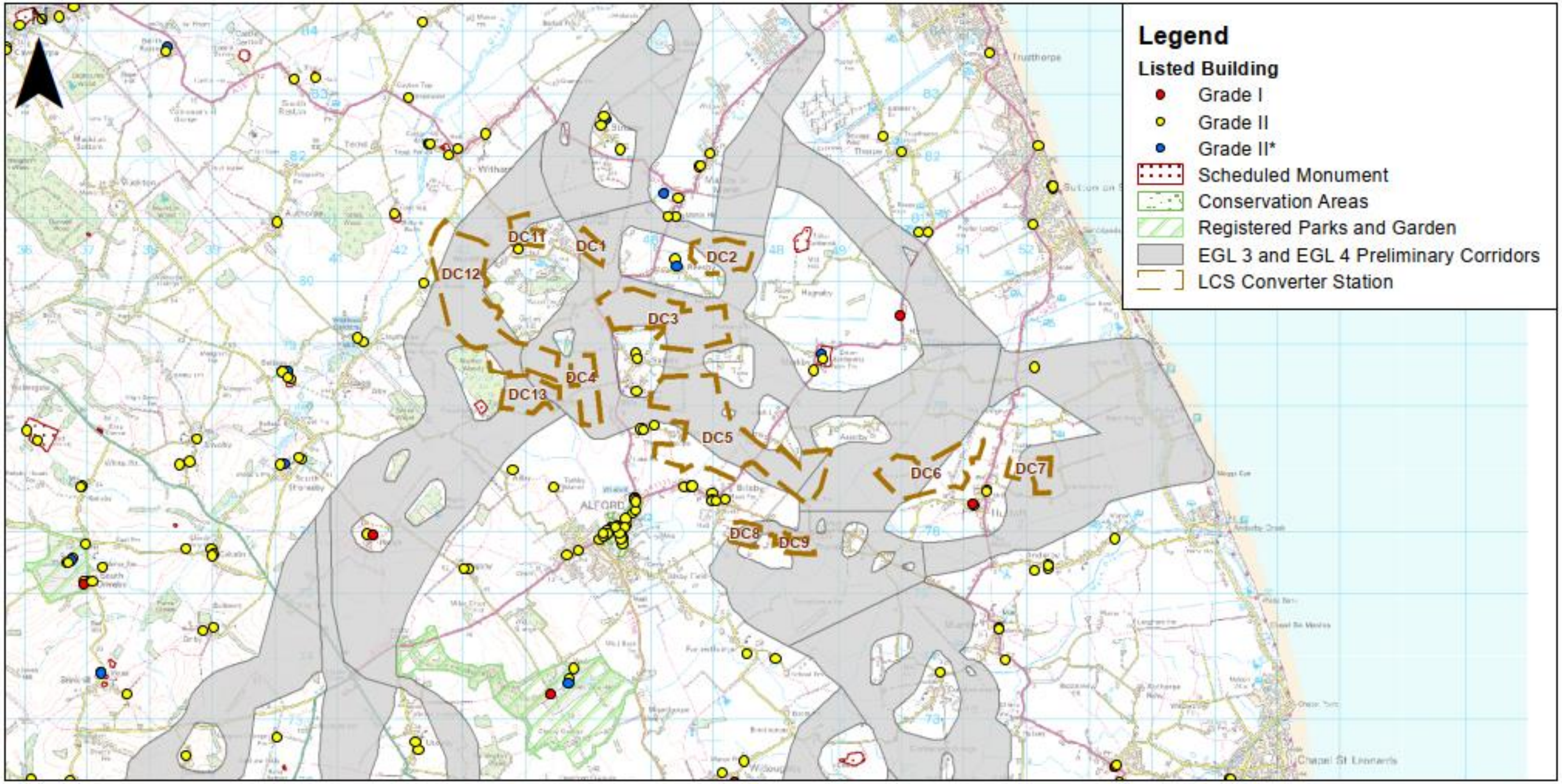


Figure 10-4 – LCS Converter Station Siting Zones – Key Heritage Features

10.3.17 Wherever possible, the LCS converter station (and DCSS) and HVDC/HVAC underground cables to and from the siting zones would avoid designated heritage assets and known non-designated heritage assets. However, in addition to the identified designated heritage assets, there is a risk of unrecorded archaeology within all siting zones. The presence and extent of unrecorded archaeology would be determined through surveys at a later stage of the Project following consultation with relevant stakeholders. Where direct construction impacts on below ground archaeological remains (either known or previously unrecorded) cannot be avoided, these may be managed through standard mitigation measures such as preservation by record.

Table 10-3 - Identified Designated Heritage Assets within 1 km

Siting Zone	Designated heritage assets within 1 km
DC1	One Grade II Listed Building (*Woodthorpe Hall*) located 0.8 km west of the Siting Zone. This asset is partially screened by vegetation to the east, which would limit potential impacts to its setting.
DC2	One Scheduled Monument (*Hagnaby Abbey*) located 600 m east of the siting zone. Screening between the Siting Zone and this asset is limited, therefore careful siting and use of mitigation planting would be required to limit potential adverse impacts. Two Grade II* and Four Grade II Listed Buildings, the closest of which being the Grade II* Listed Building (*Church of St Andrew*) and the Grade II Listed Building (*The Cottage*) located 250 m west of the Siting Zone. These assets are partially screened by vegetation to the east, which would limit potential impacts to its setting.
DC3	One Scheduled Monument (*Churchyard cross, St Margarets churchyard Saleby*) located 350 m south-west of the Siting Zone. One Grade II* Listed Building (*Church of St Andrew*) located 580 m north of the Siting Zone. Five Grade II Listed Buildings mainly located south of the Siting Zone at Saleby. All the identified assets within 1 km are screened by existing development at Saleby and woodland screening to the asset’s north which would partially or fully limit impacts to setting.
DC4	One Scheduled Monument (*Churchyard cross, St Margarets churchyard Saleby)* located 700 m east of the Siting Zone. Eight Grade II Listed Buildings mainly located east of the Siting Zone. The closest of which is *Manor Farmhouse* located approximately 630 m east of the Siting Zone. All the identified assets within 1 km are screened by existing development and/or woodland screening at Saleby to the east of the Siting Zone which would partially or fully limit impacts to the setting of assets.
DC5	Two Scheduled Monuments, *Churchyard cross, St Margaret's churchyard, Saleby* and *Churchyard cross, Holy Trinity churchyard* located less than 500 m south and north-west of the Siting Zone, respectively. One Grade I Listed Building (*Windmill*), located 800 m south-west of the Siting Zone.

Siting Zone	Designated heritage assets within 1 km
	One Grade II* Listed Building (*Church of the Holy Trinity*) located 300 m south of the Siting Zone. 21 Grade II Listed Buildings, mainly located to the south and west of the Siting Zone. The closest of which is *Bilsby House* located approximately 300 m south of the Siting Zone. All the identified assets within 1 km are screened by existing development at Thoresthorpe and Bilsby and/or woodland screening to the west and south which would partially or fully limit impacts to the setting of assets.
DC6	One Grade I Listed Building, *Church of St Margaret*, located 400 m south-east of the Siting Zone. Three Grade II Listed Buildings, the closest of which is Huttoft Mill located less than 300 m south-east of the Siting Zone. All of the identified assets within 1 km are screened by existing development and woodland screening at Huttoft to the east which would partially or fully limit impacts to the setting of assets.
DC7	One Grade I Listed Building, *Church of St Margaret*, located 700 m south-west of the siting zone. Three Grade II Listed Buildings, the closest of which is *Huttoft Mill* located less than 300 m south-west of the Siting Zone. All of the identified assets within 1 km are screened by existing development and woodland screening at Huttoft to the west which would partially or fully limit impacts to the setting of assets.
DC8	One Scheduled Monument, *Churchyard Cross Holy Trinity Churchyard*, located 800 m north-west of the Siting Zone. One Grade II* Listed Building, *Church of the Holy Trinity*, located 800 m north-west of the Siting Zone. Eight Grade II Listed Buildings, the closest of which is *Moat Farm* located 370 m north-west of the Siting Zone. All the identified assets within 1 km are screened by existing development and vegetation screening at Bilsby to the north-west which would partially or fully limit impacts to the setting of assets.
DC9	One Grade II Listed Building, *Moat Farm*, located under 1 km north-west of the Siting Zone. This asset is fully screened by vegetation which would limit impacts to its setting.
DC11	One Grade II Listed Building, *Woodthorpe Hall*, located approximately 150 m south of the Siting Zone. This asset is partially screened by vegetation which would limit impacts to its setting.
DC12	Two Scheduled Monuments (*site of St Mary's Priory, Greenfield and Toot Hill Motte and Bailey Castle)*. The closest of which is located 500 m south-west of the Siting Zone. Three Grade II Listed buildings, the closest of which is *Aby Grange Cottage* located immediately north-west of the Siting Zone. Most of the identified assets within 1 km are screened by existing development at Woodthorpe and/or vegetation screening at Mother Wood which would partially or fully limit impacts to the setting of assets. For *Aby Grange Cottage* siting to the north of the zone would adversely impact its setting therefore

Siting Zone	Designated heritage assets within 1 km
	careful siting and use of mitigation planting would be required to limit potential adverse impacts.
DC13	One Scheduled Monument, *site of St Mary's Priory, Greenfield*, located approximately 250 m west of the Siting Zone One Grade II Listed Building, *Ailby House Farmhouse*, located approximately 950 m south of the Siting Zone. All the identified assets within 1 km are screened by vegetation screening at Mother Wood which would partially or fully limit impacts to the setting of assets.

10.3.18 Overall, from a heritage perspective the Siting Zone with the fewest heritage assets identified within 1 km is the most preferred. As such, siting zones DC9 and DC11 are preferred as these Siting Zones only contain one asset within 1 km and those assets identified are partially screened by vegetation and/or existing development.

10.3.19 Siting zones DC5 and DC12 have the most heritage assets identified within 1 km. However, it is noted that these Siting Zones are the largest and therefore potentially presents the greatest opportunity in reducing adverse effects through targeted mitigation planting and careful siting of infrastructure. In addition, Siting Zone DC5 and DC12 would offer the opportunity to co-locate infrastructure with either of the two LCS which would limit the potential spread of impacts.

Water

10.3.20 Water environment features within proximity of the Siting Zones are shown in **Figure 10-5**. Careful siting will seek to avoid, where possible, areas sensitive to the water environment (e.g., environmentally designated sites, sources of water use/abstractions), Flood Zones 2 (FZ2) and 3 (FZ3) and minimise watercourse and drain crossings.

10.3.21 All siting zones overlie a principal bedrock aquifer and groundwater vulnerability is also medium across all siting zones and therefore not considered differentiating factors.

10.3.22 Siting zones DC5, DC6, DC8 and DC9 are partially within a groundwater source protection zone (SPZ) identified as Zone II (SPZ2). Siting zone DC5 is also adjacent to an area of SPZ identified as Zone I (SPZ1) to the south. A drinking water safeguard zone lies partially within siting zone DC11. Except for siting zone DC8 (where the extent of the SPZ2 is such that it cannot be avoided) the SPZ2 and drinking water safeguard zones could be avoided within these siting zones.

Figure 10-5- Key water environment features adjacent to LCS Converter Siting Zones

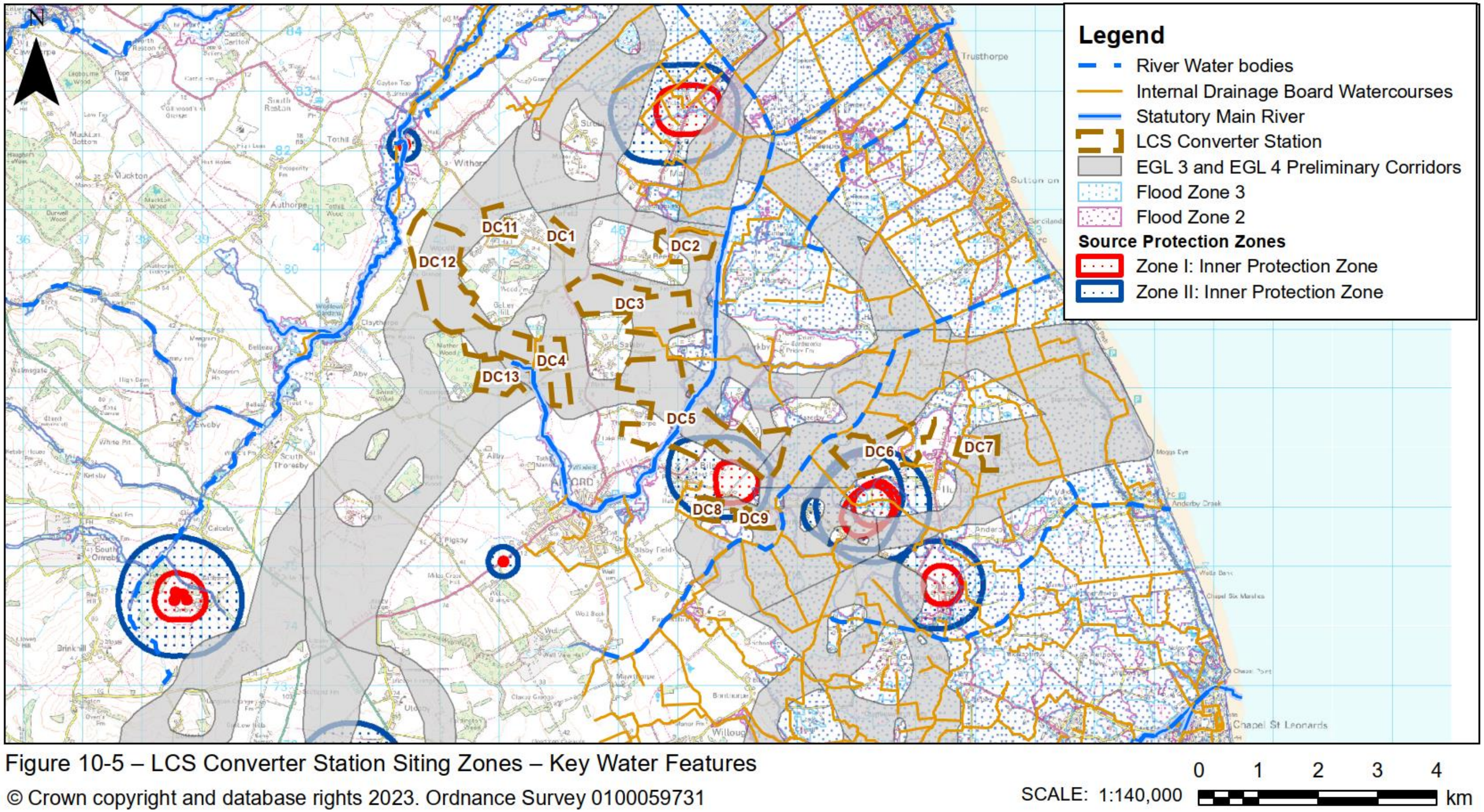


Figure 10-5 – LCS Converter Station Siting Zones – Key Water Features

10.3.23 FZ2 and FZ3 are present within siting zones DC2, DC5, DC6, DC7 and DC9 however the coverage of FZ2 and FZ3 within these siting zones is limited and these could be avoided with careful siting.

10.3.24 Watercourses (either statutory main rivers, WFD river waterbodies, Internal Drainage Board (IDB) watercourses, and/or drains) are present within Siting Zones DC2, DC3, DC5, DC6, DC7, DC12 and DC13. When considering statutory main rivers and WFD waterbodies, the Wold Grift Drain (both a statutory main river and WFD river waterbody) crosses Siting Zone DC5 from south-west to north-east across the centre of the Siting Zone. Wold Grift Drain is also situated parallel to the south-east borders of Siting Zones DC12 and DC13. With careful siting it should be possible to avoid siting upon Wold Grift Drain, especially within DC5 due to the size of, and therefore potential flexibility for siting within, the siting zone.

10.3.25 IDB watercourses are located within siting zones DC2, DC3, DC6 and DC7. Other drains are also located within Siting Zones DC2, DC3, DC5, and DC13. However, due to the distribution of these IDB and drains it is considered that direct impacts could be avoided through careful siting of infrastructure.

10.3.26 Development of, and adherence to, a Construction Environmental Management Plan (CEMP) or Code of Construction Practice (CoCP) which would set out principals for storage and handling of oils, fuel or any other potentially polluting substance, management of surface water and soil management. Appropriate construction methods would be considered at sensitive locations and development and adherence to appropriate management measures would be required. Further detailed assessments of impacts would be undertaken including a Flood Risk Assessment (FRA) and Water Framework Directive (WFD) assessment.

10.3.27 Siting Zones DC1, DC9, DC11 are preferred from a water environment perspective as these siting zones all contain few water related receptors. As DC1 also offers the opportunity to utilise previously disturbed land it is most preferred.

10.3.28 Siting zones DC5, DC6 and DC7 are less preferred due to the presence of major and minor watercourses, SPZ2 and areas of Flood Zones 2 and 3 which whilst identified as avoidable may constrain the siting of infrastructure within the zone. However it is noted that siting zone DC5 offers the opportunity to co-locate infrastructure with one of the proposed LCS 400 kV substations, which would potentially limit the spread of impacts on water features in the area.

Socio Economics

10.3.29 There are few relevant socio-economic receptors in proximity to the LCS converter station siting zones (see **Table 10-4**). Those identified are the Strubby Airfield, users of PRoW in the vicinity of the siting zones, and the NGET G2W project. Strubby Airfield is in proximity to siting zones DC1 and DC11, both of which are located partially on the disused runways for the airfield (current use identified as agricultural storage from aerial imagery). The existing Strubby Airfield runway routes east to west and siting in Siting Zone DC1 or to the centre or south of Siting Zone DC11 is unlikely to adversely impact upon operations of the airfield. However due to the proximity of the airfield, discussion with the operator, further assessments or stakeholder agreements would be required if siting within these zones.

10.3.30 Siting Zones DC1, DC5, DC6, DC7, DC8 and DC9 all contain PRoW. Whilst it is considered that permanent impacts on these routes can be avoided through careful siting, there may be a requirement for temporary closure and diversion of affected routes during construction.

10.3.31 Due to the presence of the G2W Project’s proposed 400 kV overhead line, LCS 400 kV substations and associated connection infrastructure, there is a potential for cumulative impacts on the receptors previously identified. As such, co-location of infrastructure is considered preferable to reduce the spread of potential impacts across the wider region.

10.3.32 It is considered that ongoing careful design and micrositing of infrastructure is likely to reduce, and where possible avoid, impacts upon identified receptors. Construction phase impacts may occur; however these can be mitigated using standard best practice measures or through a Construction Environmental Management Plan (CEMP) (or equivalent). Changes in air quality and dust will be monitored in line with guidance set out by the Institute of Air Quality Management (IAQM). Avoidance of important agricultural activities and seasons (e.g. harvesting) may need to be considered during construction. Impacts may arise because of construction traffic and would be addressed through a Traffic Management Plan.

Table 10-4 - Identified socio-economic features within or immediately adjacent to siting zones

Siting zone	Community receptors and recreational routes	Proposals (allocations & applications)
DC1	Community receptors located at Woodthorpe House Farm including Woodthorpe Garden Centre and Woodthorpe Karting Club. Both located to the west of the siting zone. Users of the PRoW Stru/526/1 which intersects the southern edge of the siting zone.	None
DC2	None	None
DC3	The Stables at Beesby (north of the siting zone).	Overlap with the G2W Project.
DC4	None	Overlap with the G2W Project
DC5	High Ash Boarding Kennels located adjacent to the A1111 and The Paddock adjacent to the B14449. Adjacent to the south of the siting zone. Users of the PRoW Sale/284/3 which crosses through the west of the siting zone.	Overlap with the G2W Project
DC6	Stables and paddocks adjacent to the north-east of the siting zone. Users of the PRoW Hutt/12/1, Hutt/14/1 and Hutt/14/2 which cross through the centre of the siting zone, as well as the South Wolds Cycle Route, which passes immediately to the south of the siting zone.	Overlap with the G2W Project
DC7	Lyndale Caravan and Camping adjacent to the west of the siting zone.	None

Siting zone	Community receptors and recreational routes	Proposals (allocations & applications)
	Users of the PRoW Hutt/2/2 which passes through the east of the siting zone and Hutt/4/1 which crosses through the north of the siting zone, as well as the South Wolds Cycle Route, which passes immediately to the south of the siting zone.	
DC8	Users of the PRoW route Bils/74/3, which crosses through the centre of the siting zone.	Overlap with the G2W Project
DC9	Users of the PRoW route Bils/75/1, which crosses through the centre of the siting zone.	Overlap with the G2W Project
DC11	Woodthorpe Garden Centre, Lincs Aquatics and Woodthorpe Hall. Located adjacent to the east, north and south of the siting zone, respectively. Users of golf courses located in Woodthorpe approximately 200 m south.	None
DC12	Community receptors located at Woodthorpe Hall Golf Course and Galley Hill campsite located to the east of the siting zone.	Overlap with the G2W Project
DC13	Users of the PRoW Sale/290/1, which passes approximately 20 m to the south-east of the siting zone.	Overlap with the G2W Project

10.3.33 Except for recreational routes, there are no socio-economic receptors within the siting zones and few socio-economic receptors adjacent to the siting zones. Therefore no one siting zone is considered substantially preferred. However there is the potential to limit the spread of impacts into the surrounding area by seeking to locate near to the proposed G2W Project’s infrastructure. As siting zones DC1, DC2, DC7 and DC11 do not offer this opportunity they are less preferred.

Other Considerations

10.3.34 Other environmental topics that were also considered as part of the options appraisal include air quality, noise, vibration and geology.

10.3.35 Except for agricultural land, no relevant geology receptors are identified within or immediately adjacent to the siting zone. Best and most versatile (BMV) agricultural land was scoped out of the options appraisal (see **Chapter 5**) as the entire Study Area for the Project contains BMV agricultural land. It is however noted that siting zone DC1 partially contains an area of previously disturbed land which is currently used for agricultural storage (as identified from aerial imagery). As such, siting zone DC1 is preferred from a geology perspective.

10.3.36 There are scattered properties (residential, commercial and agricultural) surrounding the Siting Zones. For each of the siting zones, there is a potential risk of temporary impacts limited to localised changes in air quality and noise and vibration during construction. No potential adverse air quality impacts are anticipated during operation, although there is the potential for localised changes in noise and vibration on settlements adjacent to the siting zones. However, each siting zone is considered sufficient in size to allow for careful siting of the required infrastructure (at a later stage) to therefore reduce the likelihood and magnitude of these effects. Scattered properties are in the vicinity of each siting zone such that they do not constitute a differentiating factor in terms of potential air quality and noise impacts.

10.3.37 It is noted that the desire to co-locate the LCS converter station and DCSS with one of the proposed LCS 400 kV substations may have adverse effects the local area by increasing the concentration of construction traffic, and therefore potential impacts upon noise, air quality and amenity, in the surrounding area. However, these adverse effects would be managed through measures included within the CEMP or CoCP for each project.

10.4 Engineering Factors

Construction Area and Access

10.4.1 All siting zones are within 1 km from local A-roads and B-roads (see **Figure 10-6**) and therefore road infrastructure required for new permanent access or upgrades to existing roads is unlikely to be substantial. However roads in the siting zones may need to be temporarily modified or upgraded to accommodate for deliveries of abnormal indivisible loads (AIL) for construction.

10.4.2 Construction of the infrastructure required within each of the siting zones may lead to the use of minor roads through settlements. However, it is considered that secondary access points would be constructed for smaller vehicles to avoid construction traffic routeing through settlements.

Siting Flexibility

10.4.3 All siting zones are large enough to accommodate the infrastructure required for the LCS converter station and the DCSS (see **Figure 10-6**). However due to the size and shape of siting zones DC1, DC7, DC8, DC9, DC11, these siting zones have less flexibility for micrositing of both permanent and temporary (such as construction compounds), LCS converter station and DCSS infrastructure and for routeing connecting underground HVDC cables. Should these siting zones be identified as preferred, additional land outside of the siting zones may be required for temporary infrastructure subject to further design studies.

Figure 10-6- Key engineering features for LCS Converter Siting Zones

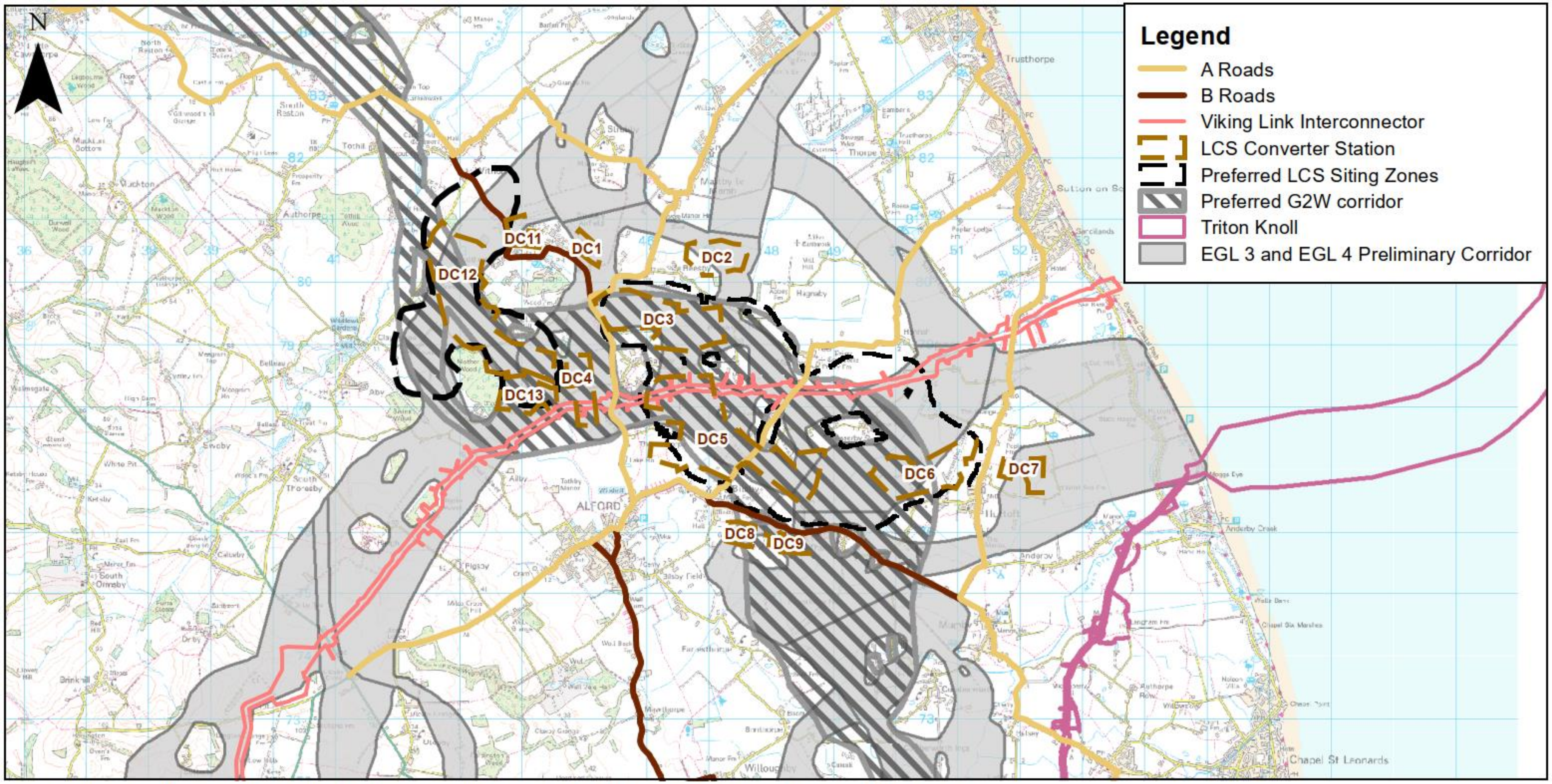


Figure 10-6 – Key engineering features adjacent to the LCS Converter Station Siting Zones

10.4.4 Each siting zone will require a connection to the HVDC underground cables from either the Theddlethorpe landfall or Anderby Creek landfall. It will also require an onward connection via underground HVDC cables to Walpole and via underground HVAC cables to one of the proposed LCS 400 kV substations. All siting zones are free from significant constraints to routeing into siting zones. However the locations of siting zones DC1 to DC5 allow for the shortest deviations of underground HVDC cables between the new landfall at Theddlethorpe or Anderby Creek and onward routeing towards Walpole.

Existing and Proposed Infrastructure

10.4.5 The existing Viking Link Interconnector (HVAC underground cables) routes through the north of siting zone DC5, therefore increasing technical complexity and limiting siting flexibility at the north of the siting zone. Due to the size of the siting zone there is sufficient space to accommodate the required LCS converter station and DCSS infrastructure. However, a crossing of this existing infrastructure would be required if routeing from the Theddlethorpe landfall and may be required from the Anderby Creek landfall (subject to detailed siting and routeing at a later stage of the Project).

10.4.6 Other existing infrastructure present within the siting zones are those of distribution network operators (DNO). Those identified are two NGED 11 kV overhead lines that intersect siting zone DC9. Modification (such as undergrounding or diversions of the existing assets) of these existing assets may be required to facilitate construction of the required infrastructure within the siting zone (and underground cable connections to the siting zone), increasing technical complexity.

10.4.7 Connection, and therefore proximity, to either of the proposed 400 kV LCS substations is a key driver for the three-ended connection (if identified as a future requirement), as described in **Chapter 2**. Except for siting zones DC1, DC2, DC7 and DC11, the siting zones overlap with the G2W Project. This overlap is either with the G2W Project's proposed 400 kV overhead line corridor and/or either of the proposed 400 kV LCS substation siting zones. Siting and routeing near the infrastructure proposed by the G2W Project may increase the technical complexity of construction. However siting and routeing near the G2W Project would offer opportunities in terms of shared infrastructure (such as haul roads). Close co-ordination with the G2W Project is ongoing and will be required as the Project continues. As part of this ongoing engagement with the G2W Project, discussions include the identification of shared opportunities to limit potential for impacts upon communities through coordination of construction programmes and infrastructure.

Ground Conditions

10.4.8 Geotechnical constraints have been considered for each of the siting zones. For all siting zones, further investigation into soil type and ground conditions would be carried out as part of future design stages and standard mitigation measures regarding pollution and contaminated materials would be implemented.

10.4.9 No relevant geotechnical constraints have been identified for siting zones DC1, DC8 and DC11. For the other siting zones (DC2 to DC7, DC9, DC12 and DC13) the main risk identified is the variation in material type within each siting zone. The mixture of geology, which includes glacial till, glaciofluvial, alluvium and tidal flat deposits, has the potential to increase technical complexity of construction as these materials may result in areas of reduced bearing capacity and variable permeability. In addition, the presence of these materials may necessitate further geotechnical investigation, increasing overall cost and programme duration of the Project.

Flooding

10.4.10 As described in Paragraph 10.3.23**,** FZ2 and FZ3 are present within siting zones DC2, DC5, DC6, DC7 and DC9, attributable to nearby watercourses. Coverage of FZ2 and FZ3 within these siting zones is limited and could be avoided through careful siting of infrastructure. Infrastructure required within FZ2 and FZ3 will be designed accordingly, and the mitigation and compensation required will be determined as the Project progresses.

10.4.11 Wold Grift Drain intersects siting zones DC5, and siting on or adjacent to this watercourse would increase the technical complexity of construction, design and operational requirements of infrastructure. However, there is likely to be sufficient space within the siting zone to avoid siting infrastructure on or immediately adjacent.

10.4.12 Further assessment of flood risk (such as a FRA) for a preferred LCS converter station (including DCSS) site will be undertaken in more detail at a later stage of Project development and will identify appropriate mitigation.

Conclusion

10.4.13 Overall from a technical perspective siting zone DC5 is preferred. This siting zone contains sufficient space (even when noting potential constraints of Wold Grift Drain, Viking Link Interconnector and potential proximity of a LCS 400 kV substation) to site the required infrastructure. Siting within this zone would also limit the deviation of the underground HVDC cables routeing from a new landfall at either Theddlethorpe or Anderby Creek and on to the new Walpole converter stations. This siting zone also offers the opportunity to be located near to one of the proposed LCS 400 kV substations, allowing the opportunity for efficient design and construction of both projects such as use of shared permanent and construction access roads. However it is noted that siting near to one of the proposed LCS 400 kV substations is likely to increase the complexity of construction management.

10.5 Horlock Rules

10.5.1 The following paragraphs provide commentary to the extent to which the appraised options for siting the new LCS converter station (including a DCSS) accord with the Horlock Rules (relating to substation siting, as described in **Chapter 3**). These rules represent NGET’s guiding principles for the siting new energy transmission infrastructure and a primary mechanism by which compliance with national policy is assured.

10.5.2 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 converter stations and substations following site selection.

10.5.3 When reviewed against the applicable Horlock Rules:

- Defining siting zones has taken into consideration environmental features and potential impacts upon identified features (Horlock Rule 1).
- All siting zones have been defined to exclude areas of highest amenity value and interest in the area (Horlock Rules 2 and 3). However, all siting zones are within 10 km to areas of high amenity value (as all are within 8.5 km of the Lincolnshire Wolds NL).
- Sufficient space is available within the siting zones to enable micro-siting to avoid identified socio-economic constraints and further reduce effects upon environmental features present (Horlock Rules 4 and 5).
- All siting zones offer the opportunity to utilise screening provided by existing features (such as hedgerows, treelines and where possible blocks of woodland) to reduce intrusion into surrounding areas (Horlock Rule 4). This is varied for the siting zones as some are screened by hedgerows and treelines, with some screened by woodland blocks. Given the predominately open landscape, there is a requirement to achieve greater distances from receptors and use of screening (most likely by planting) will be necessary.
- All siting zones are predominantly located on agricultural land and therefore do not wholly align with Horlock Rule 6 (reducing effect on agricultural land and drainage), although this is unavoidable. It is noted that Siting Zone DC1 is partially located on previously disturbed land which is now associated with agricultural activities. Not all siting zones contain drainage features such as drains or ditches, however due to the size of siting zones DC3, DC6, and DC7, and the distribution of drainage features within their boundaries it will be more difficult to avoid drainage features within these siting zones.
- No vacant or available brownfield land for siting of the required infrastructure has been identified within the LCS Converter Station Study Area, although it is noted that Siting Zone DC1 is partially located on previously disturbed land which is now associated with agricultural activities. However, when considering proximity to the proposed LCS 400 kV substation infrastructure (in line with Horlock Rule 8 – space to be used effectively to limit the area required for development) the proximity of siting zones DC12 and DC5 may help to limit the area required for development.

10.6 Comparative Appraisal and Conclusion

10.6.1 Following comparative appraisal of the LCS converter station siting zones, siting zones DC1, DC7, DC8, DC9, DC11 are least preferred due to the limited flexibility for siting, and therefore potential increased technical complexity for siting within these zones. The limited flexibility for siting within these zones may mean that potential environmental and socio-economic impacts cannot be avoided or adequately mitigated.

10.6.2 Siting zones DC4, DC12, and DC13 are less preferred as these siting zones would increase the deviation, and therefore increase the length of, HVDC underground cable connections from the new landfalls and on to the new Walpole converter stations. This additional length of underground cabling would increase the risk of encountering technical constraints and increase the likelihood of potential adverse environmental and socio-economic impacts.

10.6.3 On balance, DC5 is considered the optimal and most preferred siting zone. Locating the proposed LCS converter station (and DCSS) within DC5 offers the opportunity to be located near to one of the proposed LCS 400 kV substations. From an environmental perspective, the co-location of infrastructure is considered preferable to reduce the spread of potential impacts across the wider region. From an engineering perspective, this would offer opportunities in terms of shared infrastructure (such as haul roads). DC5 also allows for the shortest deviations of underground HVDC cables between the new landfall at Theddlethorpe or Anderby Creek and onward routeing towards Walpole.

10.6.4 While DC5 does have constraints i.e. from a hydrological (presence of Wold Grift Drain), and existing/proposed infrastructure (Viking Link Interconnector) perspective, it is considered that the size of the siting zone is such that these constraints could be avoided and/or adequate mitigation could be implemented to reduce the magnitude of potential impact.

11. Option Selection

11. Option Selection

11.1 Introduction

11.1.1 The Options Appraisal and a comparative appraisal for each component of the Project (listed below from north to south) is presented in **Chapter 6 to Chapter 9**:

- two new landfalls;
- new HVDC underground cables for EGL 3 and EGL 4 between the landfall and Walpole;
- two new Walpole converter stations; and
- a new 400 kV Walpole substation.

11.1.2 In addition, the Options Appraisal and comparative appraisal has considered the components of the Project required should there be a future requirement for a three-ended connection, presented in **Chapter 7** and **Chapter 10**. These include a new HVDC underground cable (for either EGL 3 or EGL 4) between the landfall and a new LCS converter station (comprising converter station and DCSS) and a new HVAC underground cable between the new LCS converter station and the proposed LCS.

11.1.3 Each of the comparative appraisals identified a single or set of emerging preferences for each component of the Project in isolation whilst considering the various constraints and opportunities alongside the cost performance, relevant National Planning Policy and NGET's statutory duties.

11.1.4 This Chapter summarises the outcomes of the comparative appraisals in **Chapter 6 to Chapter 10** and considers all components as an end-to-end solution to ensure that there were no circumstances where an accumulation of smaller constraints in a 'discarded' option might justify reconsidering decisions in identification of the components.

11.1.5 As the design progresses, regular reviews will be undertaken to ensure the emerging preferences taken forward at this stage remains the optimum solution when all environmental, socio-economic and technical aspects are considered.

11.2 Stage 1 – Landfalls and LCS Converter Station

11.2.1 Stage 1 considered the emerging preferences for the new landfalls (as identified in **Chapter 6**), the new HVDC underground cables between the landfalls and the River Welland (as identified in **Chapter 7**) and the new LCS converter station (as identified in **Chapter 10**). These were considered together should there be a future requirement for a three-ended connection by either EGL 3 or EGL 4 to the proposed LCS 400 kV substation.

11.2.2 The emerging preference for the new landfalls is to use either Theddlethorpe or Anderby Creek. The emerging preference for the HVDC underground cable routes from either of these landfalls (Corridor 1 from Theddlethorpe and Corridor 5 from Anderby Creek) towards Walpole via the LCS converter station where it joins the preferred landfalls. These emerging preferences overlap (shown on **Figure 11-1**) and therefore form part of the end-to-end solution should this become a future requirement for the Project.

11.2.3 The emerging preference for the new LCS converter station (and DCSS), which will form a three-ended-solution for either EGL 3 or EGL 4 (should this become a future requirement for the Project), is to use LCS converter station Siting Zone DC5. The emerging preferences of Corridors in this area are Corridors 1 and 3 from the Theddlethorpe landfall and Corridors 4 and 5 from the Anderby Creek landfall both of which overlap with the preferred siting zone for the LCS converter station. These emerging preferences overlap (shown on **Figure 11-1**) and therefore form part of the end-to-end solution.

11.2.4 As detailed in **Chapter 7**, the Corridors 6, 7, 8, 16, 17 and 21 were the emerging preferences for the HVDC underground cables to the River Welland. This combination of Corridors was appraised to provide a comparatively direct connection between the new landfall (from Theddlethorpe or Anderby Creek), where required via a new LCS converter station, and to the River Welland whilst avoiding the environmental constraints associated with routeing closer to The Wash designated sites and the technical constraints associated with routeing in proximity with the Outer Dowsing OWF and other existing and proposed linear infrastructure assets between Burgh Le Marsh and Skegness (at the south of Corridor 7). Whilst a route following Corridor 8 would cross the Lincolnshire Wolds NL it is considered that landscape and visual impacts on the designation could be suitably mitigated by providing a feasible design and construction methodology to accommodate the environment in liaison with the relevant stakeholders. When considering the Corridors connecting from Corridor 8 towards the River Welland, those which connected to routes south-east of the A52 (i.e. Corridors 9, 10 and 11) were also not preferred due to their proximity to The Wash designated sites and the significant technical complexity posed by a narrow Corridor in close proximity to the Outer Dowsing OWF (including crossings of this proposed infrastructure) and crossings of Hobhole Drain and The Haven to the south-east of Boston.

Figure 11-1 – Emerging Preferred Landfall and LCS Converter Station Siting Areas

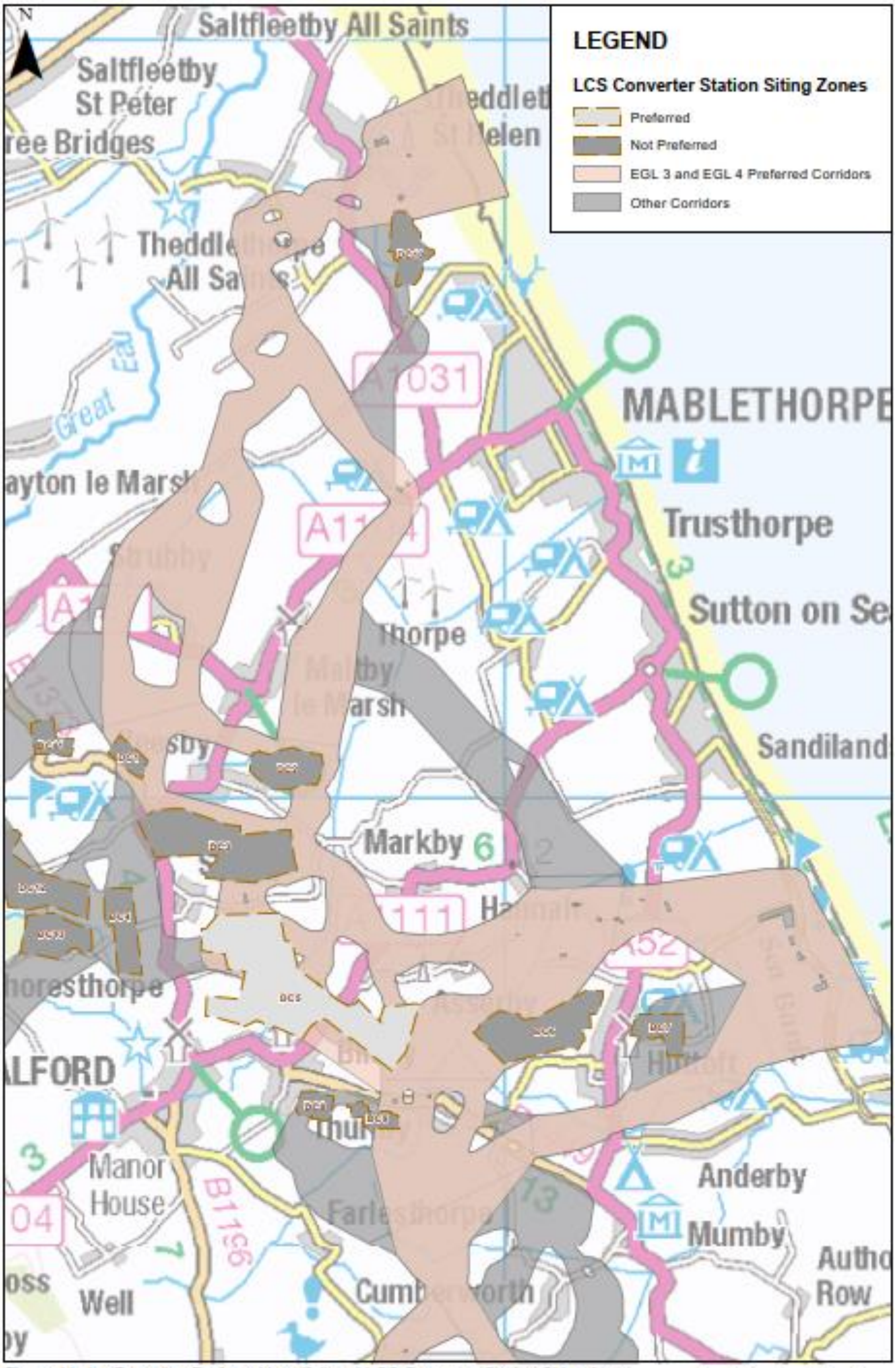


Figure 11–1 – Emerging Preferred Landfall and LCS Converter Station Siting Areas

11.3 Stage 2 – Walpole

11.3.1 Stage 2 considered the emerging preferences for the new HVDC underground cables from the River Welland to Walpole (as identified in **Chapter 8** and for the Walpole siting zones (as identified in **Chapter 9**).

11.3.2 As detailed in **Chapter 9,** when considering all features and constraints within the Walpole Converter Station Study Area, siting zones WLP4, WLP5 and WLP6 offer the best opportunity for flexible siting. Siting zones WLP4 and WLP5 reduce the amount of connection infrastructure required for new HVDC underground cables from the landfalls (as well as new overhead line for the new transmission connection of the Grimsby to Walpole (G2W) Project) and the diversion of the existing 4ZM (Burwell to Walpole) 400 kV overhead line. Siting zone WLP6 is located outside of Flood Zones 2 and 3 albeit within an area of extensive field drainage. Siting zones WLP4 and WLP5 perform slightly better than siting zone WLP6 on technical perspective given their closer proximity to the 400 kV 4ZM overhead line and the existing Walpole substation, and better entries for the HVDC underground cables, despite more road infrastructure being required.

11.3.3 As detailed in **Chapter 8**, the Corridors 31, 32, 33 and 34 were the emerging preferences for the HVDC underground cables from the River Welland to Walpole when considered in isolation. These Corridors were identified as preferred as they offer a direct connection to Siting Zones WLP1 through 5 (with the potential to route along the A17), thereby minimising the potential for adverse impacts whilst avoiding an additional crossing of North Level Main Drain and avoiding potential technical complexities associated with routeing in near to the proposed 400 kV overhead line corridor for the G2W Project. Corridor 24 was identified as least preferred as using this Corridor reach Siting Zone WLP6 would require between approximately 6 km and 12 km (subject to detailed alignments) of additional underground cable infrastructure to reach it. In addition, this would also result in two additional crossings of main rivers (South Holland Main Drain and the River Nene) and an additional crossing of the A47 main road.

11.3.4 When considering the emerging preferences above, Corridor 31 overlaps with WLP4 and WLP5 and connects to Corridors 32 and 33 (which route along the A17) and onto Corridor 34. Should either of siting zones WLP4 and WLP5 be used then these Corridors emerging as preferred would remain. Corridor 24 overlaps with siting zone WLP6. When the Corridors and Walpole siting zones emerging as preferred were reviewed alongside each other, using Corridor 24 to reach a siting zone at WLP6 is less preferred due to the additional underground cables (for the Project) and overhead line (for the G2W Project) infrastructure to reach it. The requirement for this additional infrastructure, which routes primarily through areas of Flood Zones 2 and 3 and through areas at risk from reservoir flooding, in combination with the constraints, listed below, which are faced by routeing via the Corridor 24 to WLP6 are considered to overall outweigh the benefits of siting within WLP6.

11.3.5 In addition to the constraints listed above for the EGL 3 and EGL 4 underground cables routeing through Corridor 24 to WLP6 the G2W Project's overhead line would also encounter the constraints listed below when routeing via its Southern Corridor to WLP6:

- proximity to the Fenland Airfield;

- comparatively more crossings of linear features (watercourse, drains, roads and the Grantham to Bexwell water pipeline NSIP);
- routeing through narrower areas which may require oversailing residential properties or the use of multiple angle pylons in proximity to residences;
- closer proximity to the Nene Washes designated sites; and
- potential impacts to numerous areas of traditional orchard priority habitat.

11.3.6 Both siting zones WLP4 and WLP5 overlap with the emerging preferred Corridors (Corridors 31, 32, 33 and 34) between the River Welland and Walpole, and there is considered little to differentiate between the two (both having adjacent boundaries). WLP5 provides the opportunity to limit the length of diversion to the 4ZM 400 kV overhead line, whilst WLP4 is more remote from visual receptors at West Walton and Walton Highway. Therefore, it is considered that both are taken forward as a hybrid zone (described in this report as siting zone ‘WLP4/5’) for non-statutory consultation and subject to more detailed studies and design work following consultation.

11.3.7 Having identified a preference for siting zones WLP4 and WLP5 (compared to WLP6), the Corridors and Walpole siting zones emerging as preferred were again reviewed alongside each other. Following this, Corridor 33 was widened at the intersection with Corridor 34, to the west of Sutton Bridge, thereby offering a shorter, more direct route from the A17 and towards Walpole via Corridor 34.

11.4 Conclusion

11.4.1 After considering the emerging preferences of the Corridor and Walpole siting zones in combination, a combination of siting zones WLP4 and WLP5 (resulting in WLP4/5) is the emerging preference for the Walpole siting zone. This siting zones overlap with the emerging preferred Corridors (Corridors 31, 32, 33 and 34) which routes from River Welland to Walpole.

11.5 Stage 3 - End-to-End Solution

11.5.1 The emerging preference for the landfalls was both Theddlethorpe and Anderby Creek. The emerging preferred siting zones for the LCS converter station was DC5, should a future requirement of a three-ended connection be required. The emerging preference for Walpole siting zones was the hybrid siting zone WLP4/5.

11.5.2 The Corridor emerging as preferred includes Corridors 1 and 3 from a new landfall at Theddlethorpe and Corridors 4 and 5 from a new landfall at Anderby Creek. The Corridors emerging as preferred from either of the new landfalls, via a new LCS converter station if required, would also include a combination of Corridors 6, 7, 8, 16, 17, 21, 31, 32, 33 and 34 to reach the preferred siting zones at Walpole (WLP4 and WLP5).

11.5.3 When considering all components as an end-to-end solution, there were considered no circumstances where an accumulation of smaller constraints in a ‘discarded’ option might justify reconsidering decisions in identification of the components. The emerging preferences, shown on **Figure 11-1** through **Figure 11-6**, were then taken through to Step 8 (development of graduated swathe) as detailed in **Chapter 13**.

Figure 11-2 – Emerging Preferred Corridor between the LCS Converter Station and Little Steeping

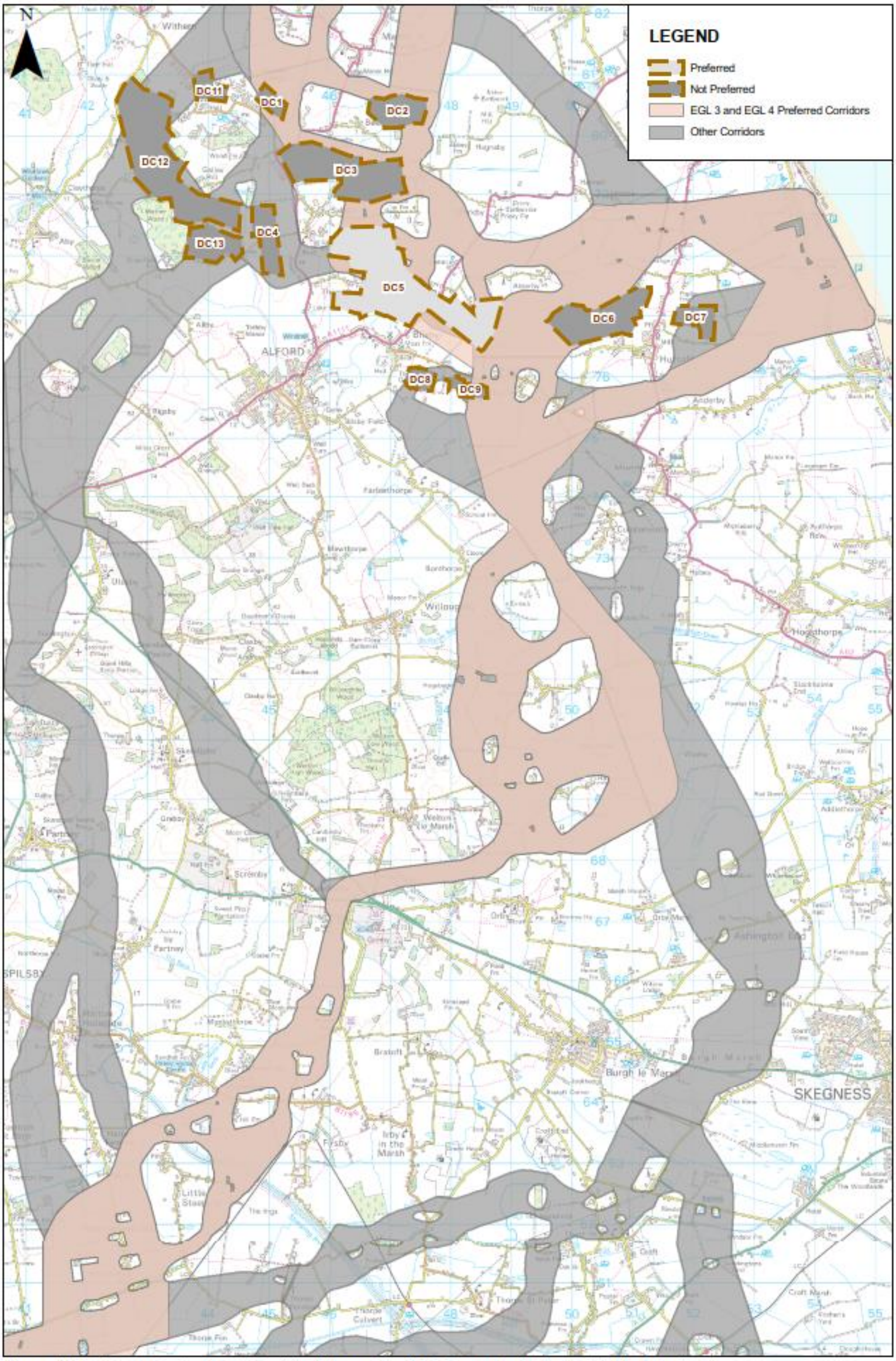


Figure 11–2 – Emerging Preferred Corridor between the LCS Converter Station and Little Steeping

Figure 11-3 - Emerging Preferred Corridor between Little Steeping and Brothertoft

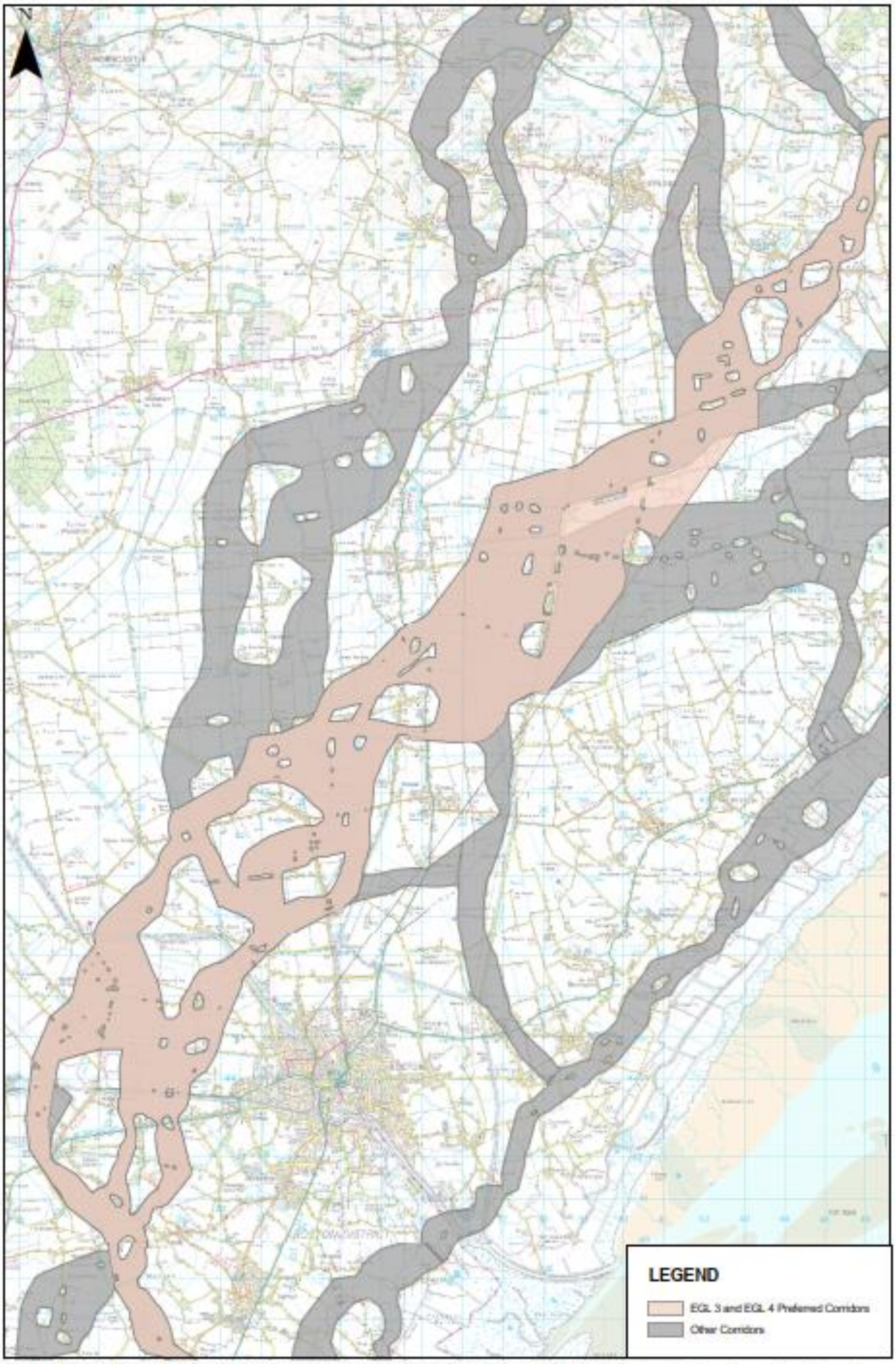


Figure 11–3 – Emerging Preferred Corridor between Little Steeping and Brothertoft

SCALE: 1:150,000 0 1 2 3 4 km

Figure 11-4 – Emerging Preferred Corridor between Brothertoft and the River Welland

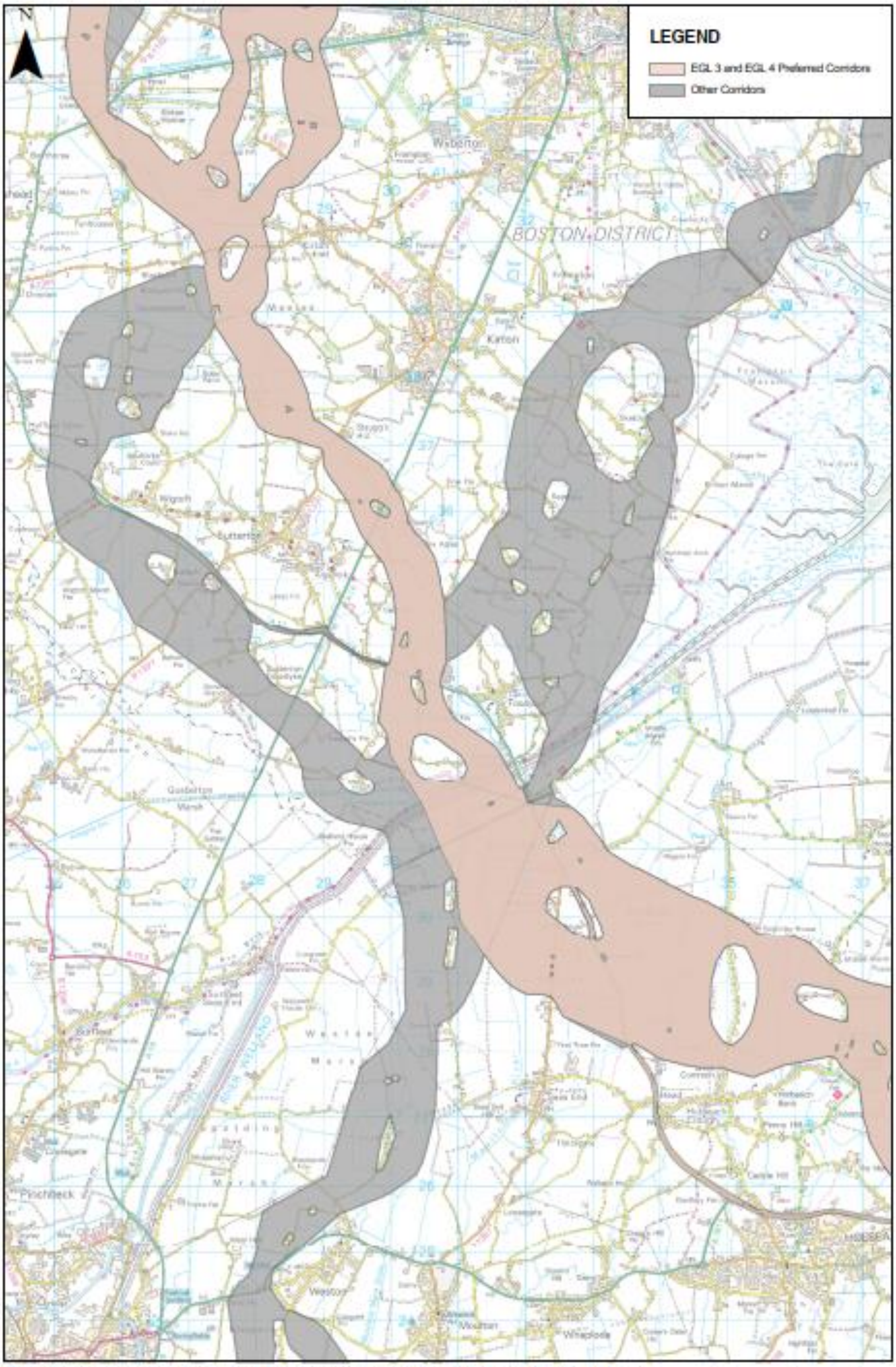


Figure 11 - 4 – Emerging Preferred Corridor between Brothertoft and the River Welland

Figure 11-5 - Emerging Preferred Corridor between the River Welland and Walpole

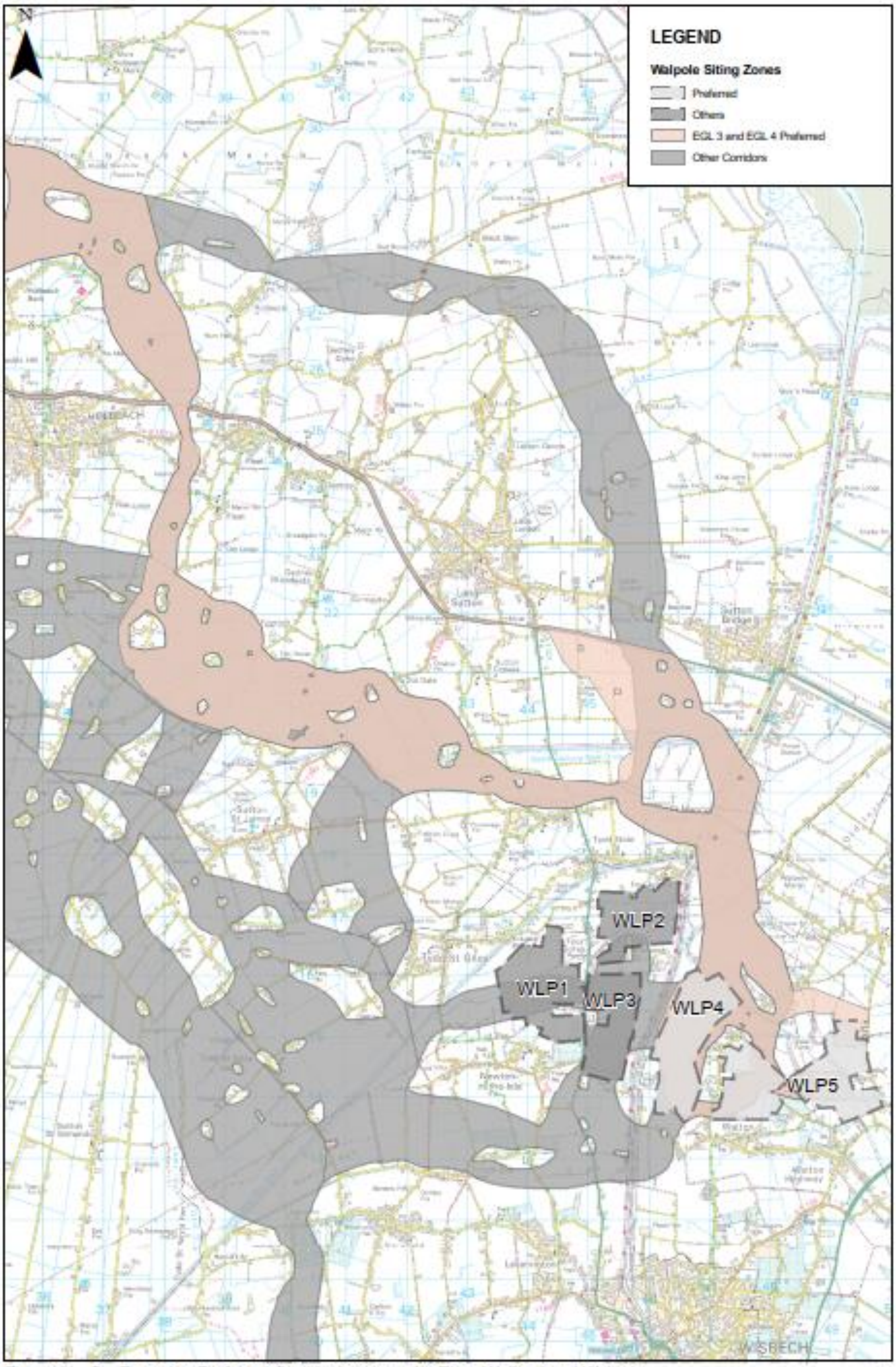


Figure 11 - 5 – Emerging Preferred Corridor between the River Welland and Walpole

Figure 11-6 – Emerging Preferred Siting Zone at Walpole

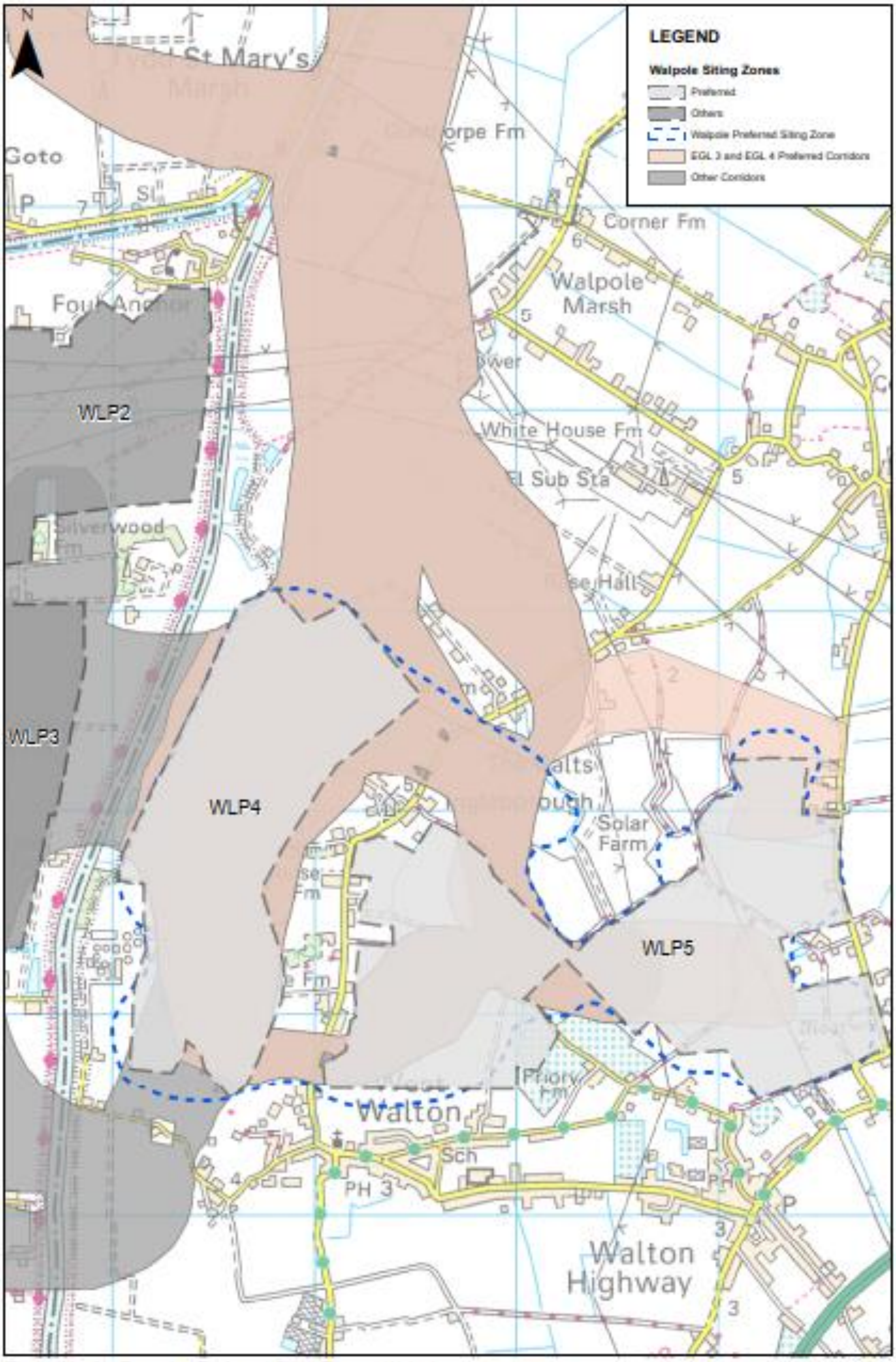


Figure 11 - 6 – Emerging Preferred Siting Zone at Walpole

SCALE 1:30,000 0 0.25 0.5 Km

12. Cost and Programme Performance

12. Cost and Programme Performance

12.1 Introduction

12.1.1 As detailed in **Chapter 3**, Section 9 of the Electricity Act requires National Grid to develop and maintain an *'efficient, co-ordinated and economical'* transmission network, amongst other things. Therefore, due regard must be given to the potential cost associated with different options for each Project component.

12.1.2 In line with the methodology identified within **Chapter 5**, following the corridor appraisal process, the Corridors were costed and an outline, activity-based schedule was produced for each one to provide an estimate of the likely earliest operational date (in-service date). This Chapter describes the analysis undertaken to determine the difference in cost and programme estimates of different options for the underground cable components. The potential carbon implications of the Corridors emerging as preferred are also considered.

12.1.3 Cost and programme estimates in relation to the proposed converter stations and substations (for the LCS converter station, the DCSS, and the Walpole converter stations and substation), are not considered materially different when the HVDC underground cables are excluded, between each siting zone or siting area. Costs of converter stations and substations are primarily driven by the number of circuits and the level of generation they must connect into the wider transmission system. These drivers are not affected by the choice of siting zones and siting areas, and as such are common across all options for each of the new converter stations and substations considered. Converter station and substation costs and the duration of their construction are therefore not a differentiating factor. Costs of the landfalls are likely to be similar. As a result, the landfalls, siting zones or siting areas are not considered further in this Chapter.

12.1.4 Cost and programme estimates are high level at this stage as they are based on simple indicative underground cable distances which will ultimately change as the detailed design is developed during further stages of the Project. The cost and programme estimates are subject to further design, survey work and are also highly subject to market forces such as resource availability and external market rates.

12.2 The Cost and Programme Estimate Options

12.2.1 A model has been built to determine the cost and programme estimates associated with the potential transmission connections between the proposed landfalls, converter stations and substations. The model consists of connection points (at landfalls, the LCS converter station (where applicable) and the Walpole converter stations and substation, as shown in **Figure 12-1** and connection lines (between these connection points). The resulting route lengths are costed using the National Grid cost tool as based on historic project outturn data.

12.2.2 For each corridor it was assumed that the connection line would follow the most direct path possible within the corridor, whilst considering key routeing constraints and professional underground cable design judgement (as shown in **Figure 12-2**).

12.2.3 For costing Corridors 4 and 5 have been used from a new landfall at Theddlethorpe, and Corridors 1, 2 and 3 have been used from a new landfall at Anderby Creek. Other Corridors from either a new Theddlethorpe or Anderby Creek landfall would not represent a reasonable direct approach to the emerging preferred siting zone at DC5 (should there be a future requirement for a three-ended connection). In addition, as the Walpole siting zones are up to 6 km, each of the Corridors to the Walpole siting zones has been costed to each of the Walpole siting zones it connects to. The Corridors and paths used are shown in **Figure 12-3.**

Figure 12-1 – Cost Option Connection Points

Figure 12-1 – Cost Option Connection Points
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Figure 12-2 – Example Indicative Straight Line Route

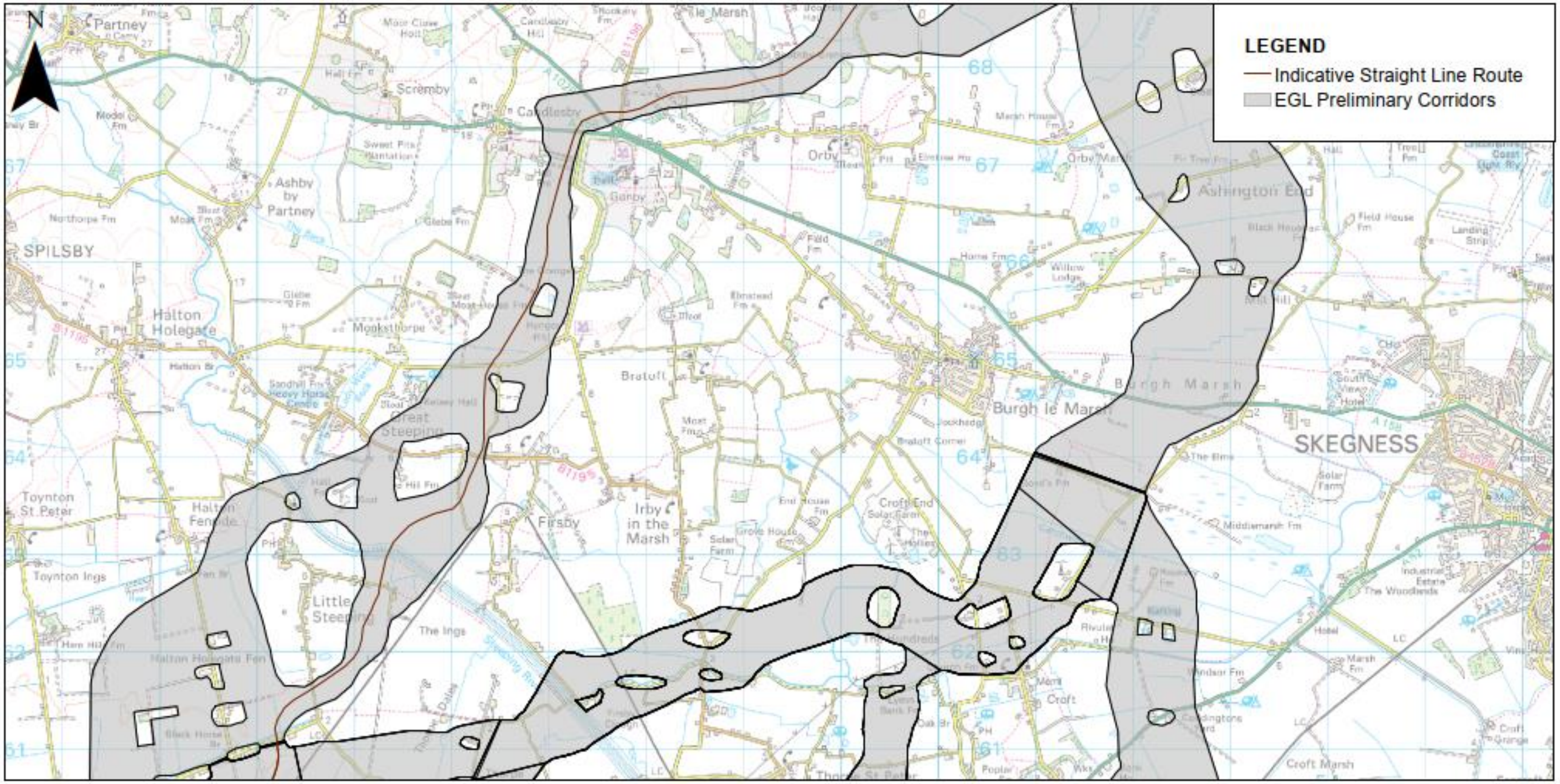


Figure 12-2 - Example of Indicative Straight Line Route

Figure 12-3 –Options used within the cost and programme estimate model

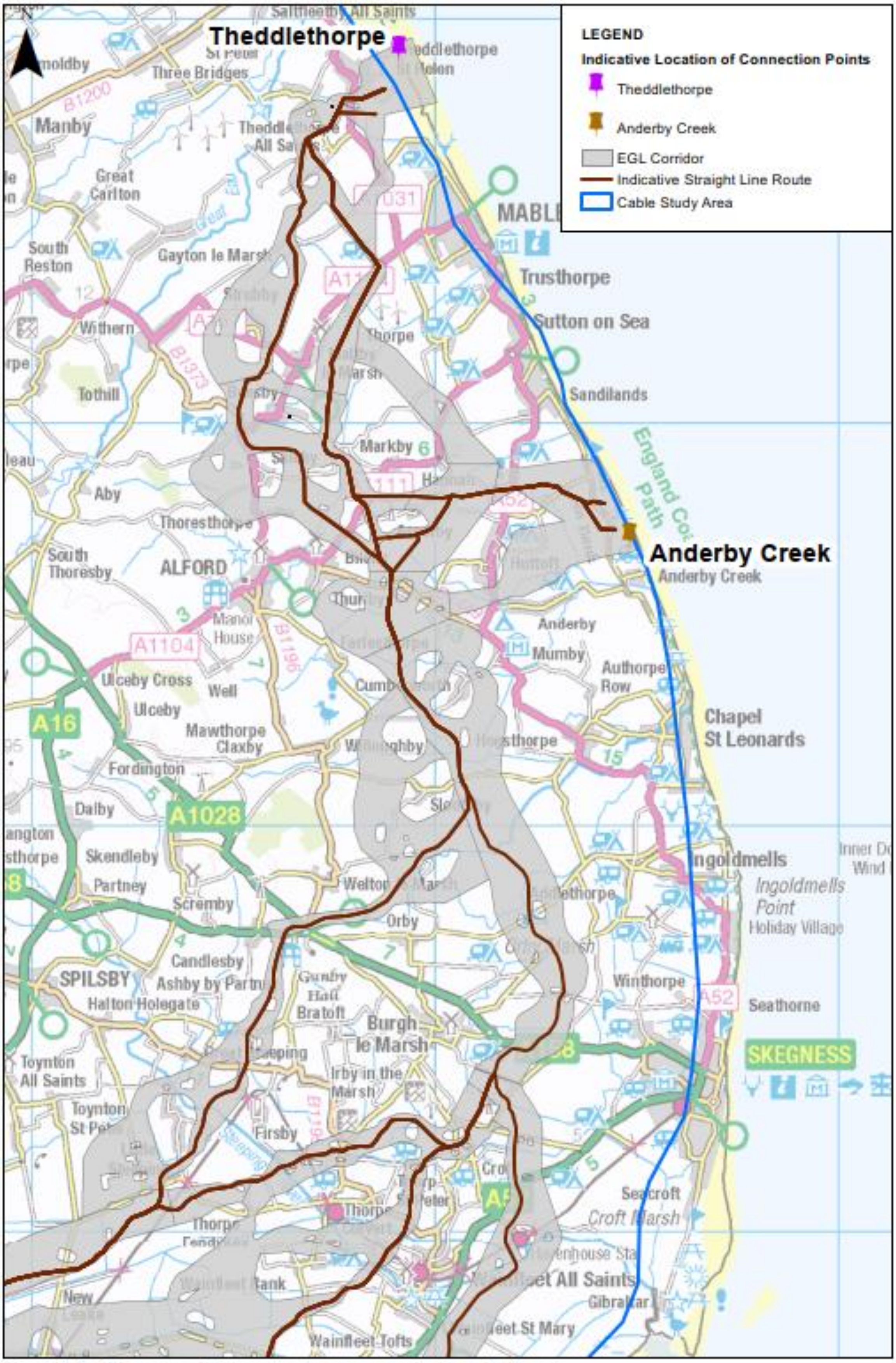


Figure 12-3 – Options used within the cost and programme estimate model - Page 1

SCALE:1:150,000

0 2.5 km

Figure 12-3 – Options used within the cost and programme estimate model - Page 2

SCALE:1:200,000

0 2.5 km

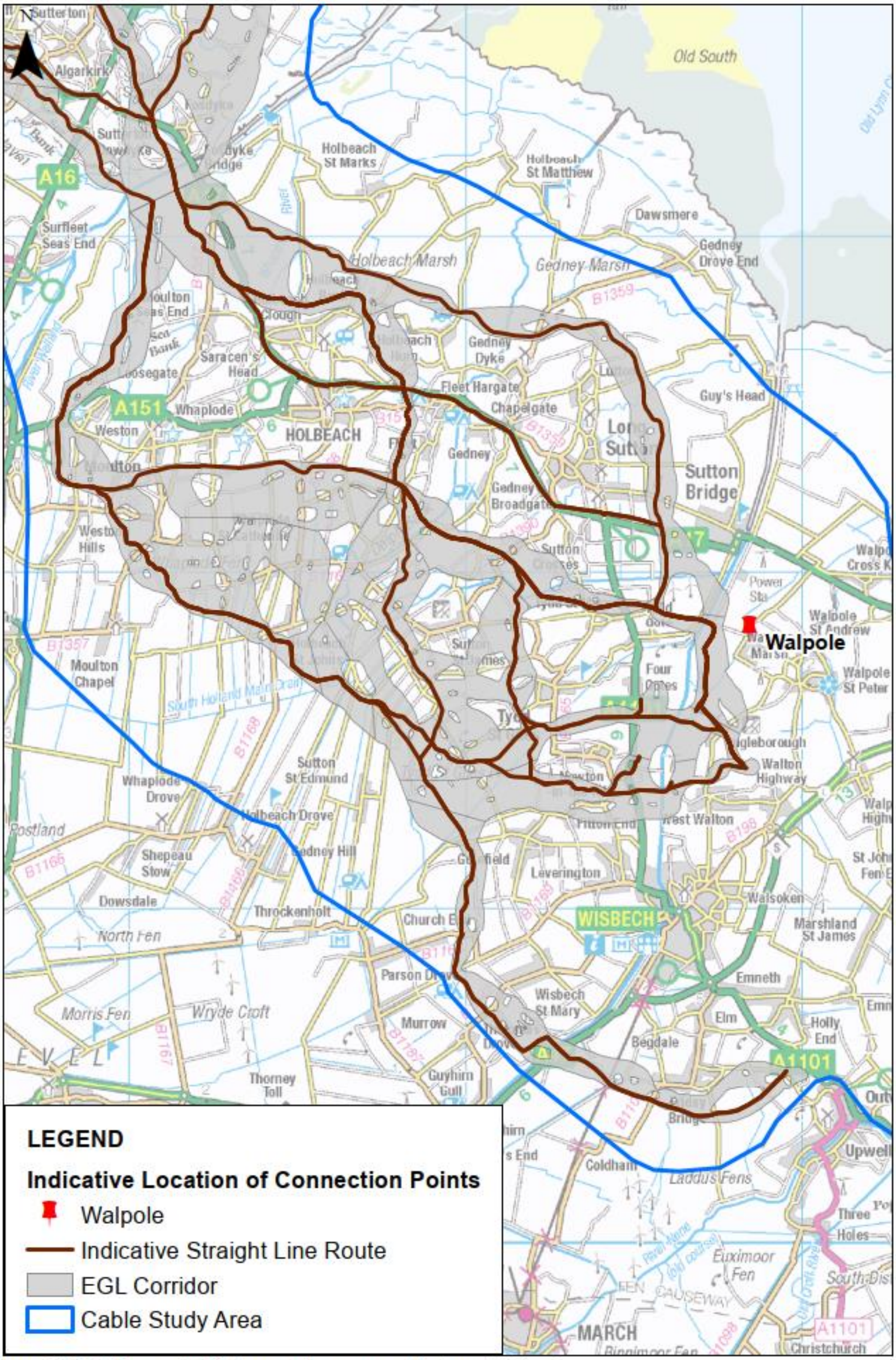


Figure 12-3 – Options used within the cost and programme estimate model - Page 3

SCALE:1:180,000

0 2.5 km

12.3 National Grid's Cost and Programme Estimates

Cost Estimates

12.3.1 Cost estimates have been developed by NGET's cost estimating team using the following assumptions:

- route lengths are based on an indicative route through Corridors. They have been determined from a preliminary desktop exercise that is informed by the likely constraints to routeing and professional judgement to seek the most direct route possible; and
- the costs of applying industry 'best practice' mitigation measures during construction and operation are included within the cost base used.

12.3.2 This means that cost estimates of different options can be compared on a consistent basis, such that there is no systematic bias in the costing. While there is potential for costs to end up higher or lower from those which have been estimated, this will be the case across all options considered. Therefore, the relative preference for corridor options on the basis of cost should be unchanged by any future fluctuations despite estimates having the potential to shift in absolute terms. This method is adopted at the early stages of a project. It also allows cost estimates to be generated for the different options considered prior to selecting an emerging preference and the later development of a detailed alignment.

12.3.3 The cost estimates developed include estimates of the indicative 'capital cost' for the different options. The capital cost estimates consist of the sum of the estimates for the initial capital cost of developing, consenting, installing and commissioning the new transmission assets and the associated procurement of equipment and land.

12.3.4 Cost estimates for the different options were estimated based on costs from the financial year 2022/23. It is considered that the cost estimates provide a consistent cost point for comparison of different options at this stage.

12.3.5 Underground cable specifications which satisfied the design requirements were assumed based on previous projects, allowing for a unit cost per kilometre of underground cable to be defined. This cost was applied to the estimated route lengths of Corridor to obtain a baseline estimate for the capital cost.

12.3.6 Secondary costs were added to this baseline estimate where significant engineering constraints (which would require a major localised adjustment to the transmission technology selected) were identified. Significant engineering constraints comprised areas which would present likely requirements for trenchless cable installation crossing methods.

12.3.7 Underground cabling can take the form of open cut direct buried cable or trenchless cable installation methods (described in more detail in **Chapter 2**). For cost estimates an open cut direct buried cable method has been used. Trenchless cable installation methods may be required where an underground cable route must cross linear constraints (such as major roads, rivers, railways and gas pipelines). Where use of a trenchless cable installation methods are required, this will result in additional cost to underground cabling and an allowance has been included within the secondary costs.

Programme Estimates

12.3.8 To determine programme estimates for the identified options, a logic linked activity schedule was built for each construction discipline e.g. civils engineering based on a generic build process for underground cables using assumptions such as cable length, open cut direct buried cable method and joint type to standardise any unknown parameters and offer consistency for programme estimates across the identified options. Variables determined by the identified options, such as construction discipline and route length were inputted to the schedule, producing estimates of construction duration and the provision of an earliest operational date for each of the identified options.

12.3.9 The schedule was defined at activity level based on how long it takes to construct one kilometre of underground cable before the differentiating variables for each option were inputted to calculate a duration of construction and testing. The critical path construction activities were used to define the earliest in-service date (EISD). Programme estimates assume that construction of the underground cable will form the critical path. It is assumed that the construction of the landfalls, converter stations and substations will be within the EISDs for each costed option.

Results

12.3.10 The results are detailed below within **Table 12-1** and **Table 12-2**. Cost estimates are calculated for each individual corridor option (with connection point specified where applicable) and combinations of corridor options for different permutations of end-to-end connections, across the two landfall areas.

Table 12-1 – Individual corridor option costs

Landfall	Corridor	Cable Length (km)	Total Cost (£m)
Theddlethorpe (T)	Corridor 1	9.6	50.40
T	Corridor 2	4.44	23.31
T	Corridor 3	4.1	21.53
Anderby Creek (AC)	Corridor 4	3.5	18.38
AC	Corridor 5	2.9	15.23
T/AC	Corridor 35	13.58	71.30
T/AC	Corridor 36	17.62	92.51
T/AC	Corridor 37	34.84	182.88
T/AC	Corridor 6	1.81	9.50
T/AC	Corridor 7	13.2	69.30
T/AC	Corridor 8	18	94.50
T/AC	Corridor 9	32.5	170.63
T/AC	Corridor 10	32.15	168.79

Landfall	Corridor	Cable Length (km)	Total Cost (£m)
T/AC	Corridor 11	36.5	191.63
T/AC	Corridor 12	40.306	211.61
T/AC	Corridor 13	40.95	214.99
T/AC	Corridor 14	38.01	199.55
T/AC	Corridor 15	38.85	203.96
T/AC	Corridor 16	30.3	159.08
T/AC	Corridor 17	40	210.00
T/AC	Corridor 18	28.05	147.26
T/AC	Corridor 19	39.4	206.85
T/AC	Corridor 20	12.9	67.73
T/AC	Corridor 21	9.7	50.93
T/AC	Corridor 22	13.4	70.35
T/AC	Corridor 23	10.84	56.91
T/AC	Corridor 24 to WLP6	43.7	229.43
T/AC	Corridor 25		
	to WLP3	31.8	166.95
	to WLP4	33.2	174.30
	to WLP5	36.3	190.58
T/AC	Corridor 26		
	to WLP1	29.8	156.45
	to WLP2	31.86	167.27
	to WLP3	31.2	163.80
	to WLP4	32.67	171.52
	to WLP5	34.67	182.02
T/AC	Corridor 27		
	to WLP4	33.7	176.93
	to WLP5	35.57	186.74
T/AC	Corridor 28 to WLP6	42.4	222.60
T/AC	Corridor 29		
	to WLP3	29.1	152.78
	to WLP4	31.2	163.80
	to WLP5	32.22	169.16
T/AC	Corridor 30		

Landfall	Corridor	Cable Length (km)	Total Cost (£m)
	to WLP1	25.1	131.78
	to WLP2	27.16	142.59
	to WLP3	26.5	139.13
	to WLP4	27.97	146.84
	to WLP5	29.97	157.34
T/AC	Corridor 31		
	to WLP4	27.4	143.85
	to WLP5	29.25	153.56
T/AC	Corridor 32	6.4	33.60
T/AC	Corridor 33	9.3	48.83
T/AC	Corridor 34		
	to WLP4	28.39	149.05
	to WLP5	29.86	156.77

Table 12-2 – EGL 3 or EGL 4 Emerging Preferred End-to-End Solutions

End-to-End Scenario	Cable Length (km)	Total Cost (£m) (Including Lifetime)	EISD
T -> DCSS 5 -> Walpole	105.39	553.30	Q4 2033
T -> DCSS 5 -> A17 -> Walpole	103.31	542.38	Q4 2033
T -> DCSS 5 -> A17 Section 1 -> Walpole	104.53	548.78	Q4 2033
T -> DCSS 5 -> A17 Section 2 -> Walpole	104.19	547.00	Q4 2033
AC -> DCSS 5 -> Walpole	97.73	513.08	Q4 2033
AC -> DCSS 5 -> A17 -> Walpole	95.65	502.16	Q4 2033
AC -> DCSS 5 -> A17 Section 1 -> Walpole	96.87	508.57	Q4 2033
AC -> DCSS 5 -> A17 Section 2 -> Walpole	96.53	506.78	Q4 2033

12.3.11 Differences from the cost model were largely dictated by:

- route length (with longer routes naturally resulting in a higher cost and longer programme estimates); and
- the number of trenchless crossings that would likely be required for utilities (overhead lines, underground cables and gas pipelines), watercourses and railways crossed.

12.3.12 As shown in **Table 12-1**, the cost of Corridor options from the Theddlethorpe landfall to the DCSS siting zone DC5 range between £73.71 m and £71.93 m. From the Anderby Creek landfall to the DCSS siting zone DC5 the costs are approximately £33.61 m. Therefore, routes from the Anderby Creek landfall to the DC5 siting zone would result in a route approximately half the cost of one from the Theddlethorpe landfall. However, it is noted that the marine cable routes to the Anderby Creek landfall are longer, and therefore would result in greater costs, than to the Theddlethorpe landfall.

12.3.13 When considering routes from landfalls to converter stations at Walpole (**Table 12-1**) the route length is the primary factor for cost differences. The longest Corridor, Corridor 24, was appraised as the most expensive at £229.43 m whereas the shortest, Corridor 6, was appraised as the least expensive at £9.50 m. Each option also involves multiple crossings of 132 kV overhead lines, other underground cables, gas pipelines, watercourses and railway lines which will add to the cost of routeing through options. Further details on these crossings can be found within the engineering appraisals within **Chapter 6**, **Chapter 7** and **Chapter 8**. The shortest route from the Theddlethorpe landfall to the Walpole siting zones (WLP1) would use Corridors 1, 3, 6, 7, 10, 23, and 30 and result in a cost of £508.21 m. The shortest route from the Anderby Creek landfall to the Walpole siting zones (WLP1) would use Corridors 4, 5, 6, 7, 10, 23, and 30 and result in a cost of £469.89 m. The longest routes from both landfalls the Walpole siting zones (WLP4) would be Corridors 1, 3, 6, 7, 13, 22 and 27 from the Theddlethorpe landfall and Corridors 4, 5, 6, 7, 13, 22 and 27 from the Anderby Creek landfall. The cost of these routes would be £613 m and £574.69 m, respectively.

12.3.14 The costs for routes within the corridors emerging as preferred (**Table 12-2**) ranges from £502.16 m to £553.30 m. The lowest cost route within the corridors emerging as preferred follows Corridors 4 and 5 from Anderby Creek before taking a direct route south through to Walpole and routeing underneath the A17 and the highest cost route within the corridors emerging as preferred follows Corridors 1 and 3 before routeing along the emerging preferred Corridor for the greatest extent of all the Options identified and avoiding routeing underneath the A17.

12.3.15 The selection of an emerging preference for a transmission connection considers other factors alongside costs and programme including environmental, socio-economic and technical. The analysis shows that the emerging preference for the Project (as detailed in **Chapter 11**) allows for a lower cost option to be pursued from both the Theddlethorpe and Anderby Creek landfalls. Additionally, the difference between the lowest cost and highest cost scenarios for both Theddlethorpe and Anderby Creek landfalls are not considered large enough to affect the outcome of the previous appraisals. There are strong environmental, socio-economic and technical drivers for the selection of the emerging preference which are not outweighed by the outcome of the cost and programme analysis.

12.4 Conclusion

12.4.1 End-to-end connection options were analysed on cost and programme following, and to be considered alongside, the technical and environmental appraisals as part of the decision-making process.

12.4.2 From end-to-end the cost variance across all options was between approximately £450 m and £670 m for EGL 3 and for EGL 4 (i.e. between approximately £900 m and £1,340 m for both EGL 3 and EGL 4 combined). The cost variance was primarily driven by the overall route length of each end-to-end connection. The variance in EISD was also primarily driven by the route length of each end-to-end connection.

12.4.3 The emerging preference for the Project (as described in **Chapter 11**) allows for a lower cost end-to-end connection option whilst still following a largely direct route avoiding many engineering and environmental constraints. Additionally, the cost difference appraised between the end-to-end options is not sufficient to overturn the environmental, socio-economic and technical factors which have also been appraised. Therefore, the emerging preferred option for the Project detailed in **Chapter 11** remains and both landfall options have been taken forward to non-statutory consultation.

12.4.4 The emerging preference also offers a largely direct route which would help to limit the carbon impact during the construction phase, although the size of carbon reduction is likely to be insignificant when compared to the carbon impacts caused by constraining renewable generation (i.e. later in-service dates).

13. Development of the Graduated Swathe

13. Development of the Graduated Swathe

13.1 Introduction

13.1.1 Following the selection of the emerging preferred corridor, preferred siting zones and siting areas, a preliminary routeing exercise was undertaken to identify where it might be more appropriate to locate the required permanent infrastructure within the corridor, siting zone and siting areas. This exercise considered the Holford Rules and the Horlock Rules, having regard to local sites and features. These include features such as known residential properties, larger areas of woodland and existing infrastructure. The outcome of the preliminary routeing exercise is 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. Detailed plans showing the location of the proposed graduated swathe are included in **Appendix B**.

13.1.2 A graduated swathe 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 development of the Project. However, it should be noted that feedback will be sought for the emerging preferred corridor, emerging preferred siting zones and emerging preferred siting areas and that the graduated swathe indicates where infrastructure is more or less likely to be located.

13.1.3 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 (less flexibility).

13.1.4 The outcomes of the analysis, as depicted in the graduated swathe (an example graduated swathe is depicted in **Figure 1-11**), may be subject to change as the design and consenting process continues, more information becomes available, and the views of stakeholders and communities are considered. It does not rule out development within other parts of the emerging preferred corridor, siting zone or siting areas, or indeed outside of these emerging preferences, based on consultation feedback received, the findings of detailed surveys and subsequent design development.

13.1.5 As discussed in **Chapter 3**, future detailed localised routeing of the new underground cables will have due regard to principles of good design. To limit the number of direction changes 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 and socio-economic considerations.

13.1.6 Additionally, as discussed in **Chapter 4** the siting of converter stations, substation and DCSS has taken into consideration the sequential and exception tests regarding siting infrastructure within flood zones at high and medium risk of flooding (including rivers or the sea, surface water and reservoirs). This has been done through use of the Environment Agency datasets for flood risk from rivers, the sea, surface water and reservoirs. As the proposed design of the Project progresses, the sequential approach will also be applied, as part of the design process and as part of a FRA, to steer the development of infrastructure within areas of lowest flood risk (where possible) whilst also taking into consideration other factors.

13.2 Developing the Graduated Swathe

13.2.1 The development of the graduated swathe was informed by the location of sensitive sites and features within and beyond the corridor, siting zones and siting areas, which were identified from online mapping and site visits to the emerging preferred corridor, siting zones and siting areas, like those that informed the earlier options appraisal work, as described in **Chapter 5**. The emerging preferred corridor, siting zones and siting areas were appraised to identify areas that may be more, or less, sensitive to the introduction of the Project infrastructure. Outline engineering preliminary designs were then developed to identify where new infrastructure might most appropriately be routed or sited, designing in accordance with the Horlock Rules (and where applicable Holford Rules), whilst considering environmental features and technical requirements.

13.2.2 To effectively portray the graduated swathe between the new landfalls, the LCS converter station and new Walpole stations, avoidance of properties has been included in the analysis.

13.2.3 Known (primarily residential) properties and their curtilages, and larger settlements have been excluded from the graduated swathe wherever possible. However, there are locations where there are several grouped exclusions which limit routeing flexibility and as a result, darker shading is presented adjacent to properties within these areas.

13.3 Description of Graduated Swathe

13.3.1 For the purposes of consultation, the graduated swathe has been split into its different infrastructure components (converter stations and underground cables). The graduated swathes for the stations and the underground cables need to overlap to provide an end-to-end solution for the Project. The graduated swathe for the underground cable has also been split into eight separate sections. These have been largely defined by geographical features and are intended to provide clarity during reporting and to aid public consultation feedback. A summary of the graduated swathe for each infrastructure component of the Project is provided below and more detailed plans are included in **Appendix B**.

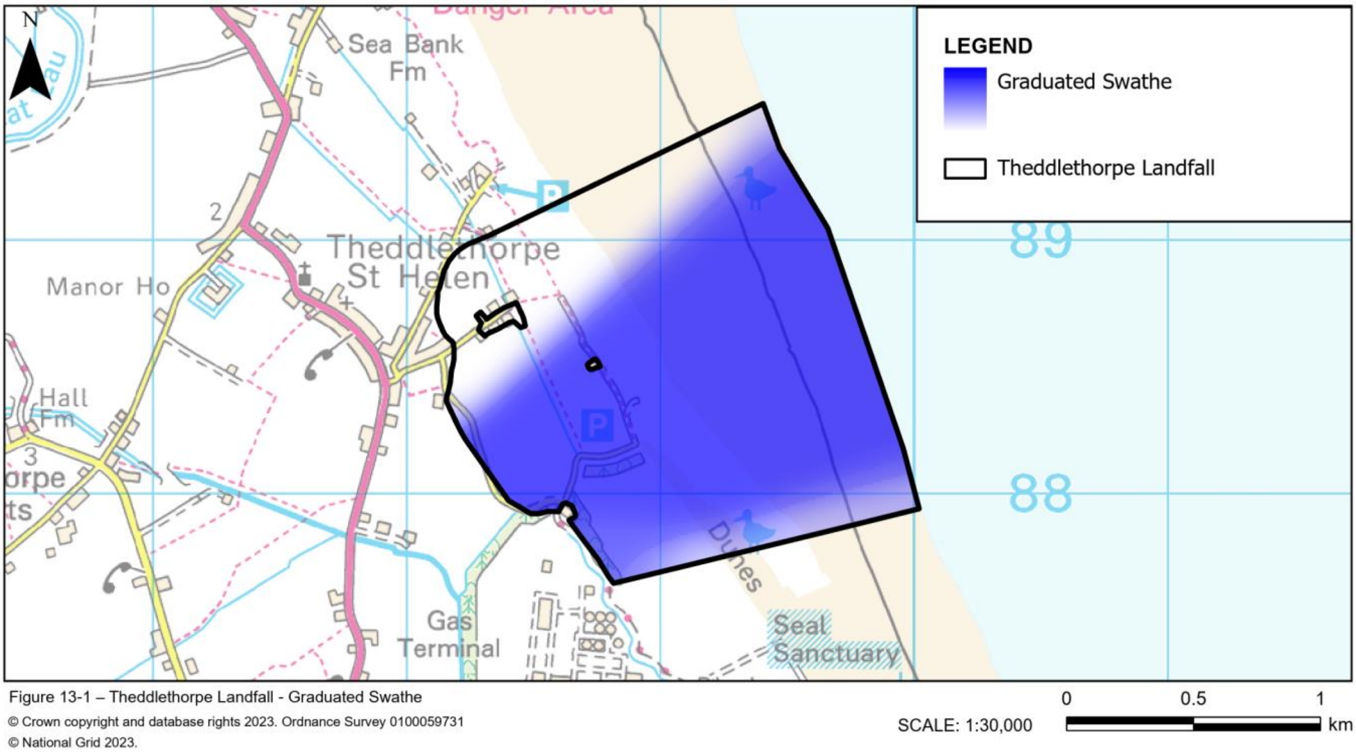
Landfalls

13.3.2 The Landfall Study Areas which emerge as preferred (Theddlethorpe and Anderby Creek) were subject to further environmental and engineering review. The review sought to identify the areas within the Theddlethorpe and Anderby Creek Landfall Study Areas most suitable for accommodating the incoming offshore DC cables, the TJB, the outgoing DC onshore cables and the associated construction compound.

Theddlethorpe

13.3.3 Within the Theddlethorpe Landfall Study Area the area identified as most suitable for the landfall infrastructure is between the area immediately north-east of the former Theddlethorpe Gas Terminal and south-east of Theddlethorpe St Helen. This area contains agricultural land to the west and extends east into the marine environment, beyond the Saltfleetby-Theddlethorpe Dunes/tidal flood defence dunes, as shown on **Figure 13-1**. This area emerges as most suitable as it is located at the narrowest part of the dunes (reducing the complexity of longer trenchless installation methods) and is within an area already influenced by existing development i.e., the former Theddlethorpe Gas Terminal.

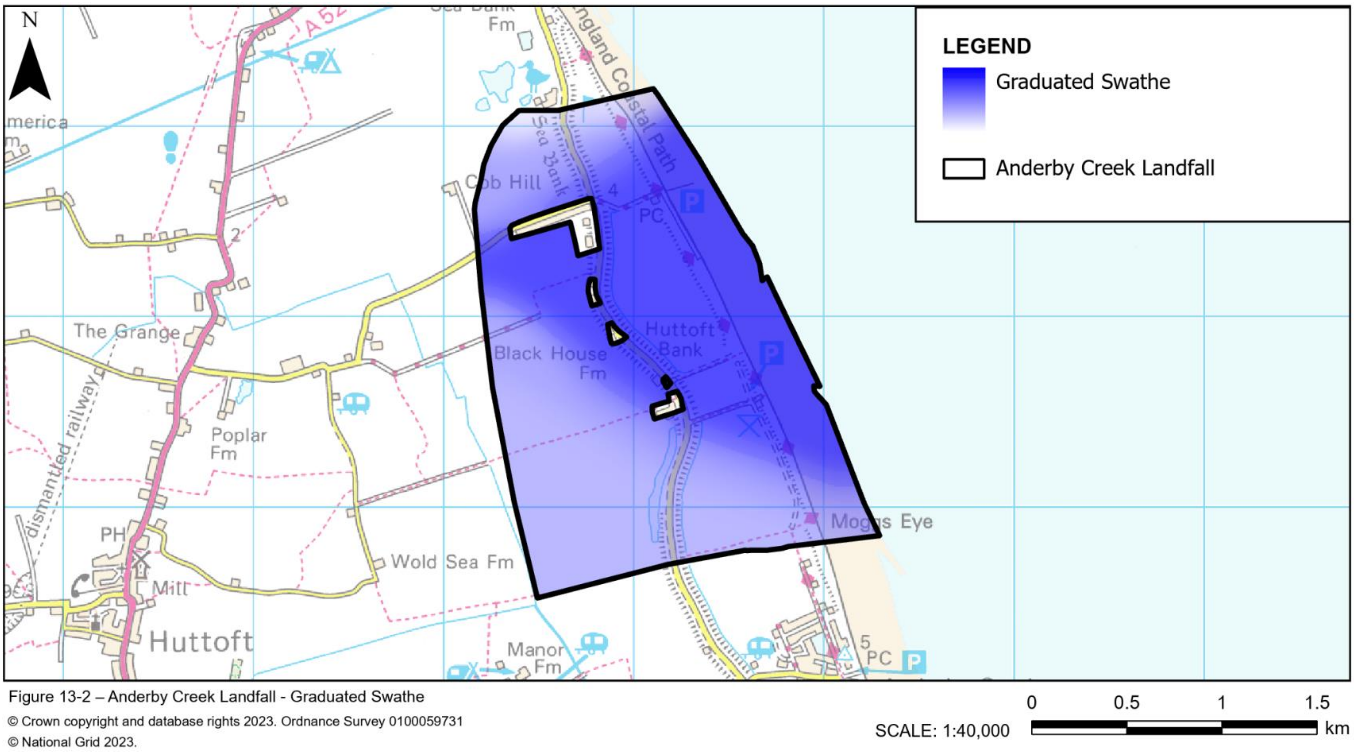
Figure 13-1 – Theddlethorpe Landfall - Graduated Swathe



Anderby Creek

13.3.4 Within the Anderby Creek Landfall Study Area the area identified as most suitable for the landfall infrastructure is situated north of Anderby Creek and south, and partially overlapping the south, of the former Sandilands Golf Course, as shown in **Figure 13-2**. These areas of the Anderby Creek Landfall Study Area are considered most suitable due to its mainly rural setting, few statutory designated sites and narrower beach and dunes. The areas further north and south of the area identified are comparatively more constrained by the former Sandilands Golf Course, residential properties and the Outer Dowsing OWF.

Figure 13-2– Anderby Creek Landfall - Graduated Swathe



Stations

LCS Converter Station

13.3.5 Within the LCS converter station siting area emerging as preferred, outline potential layouts were developed by engineering specialists and reviewed by environment specialists and the Project team. The appraisal identified that the area most suitable for infrastructure to be located was adjacent (where practicable) to the area that has been proposed for one of the new LCS 400 kV substation (proposed by the Grimsby to Walpole (G2W) Project, see **Figure 13-3**) to reduce cumulative impacts upon the surrounding environment, particularly cumulative visual impacts upon nearby sensitive visual receptors. The emerging preferred siting zone for the LCS converter station, DC5, was selected as it was located wholly within the area most likely to contain infrastructure for one of the new LCS 400 kV substation, which in turn was identified as it allows for substation siting outside of Flood Zones 2 and 3 and in an undulating landscape with existing visual screening features. As such, the graduated swathe identified within siting zone DC5 is entirely the darkest shade to retain siting flexibility until design details for the new LCS 400 kV substations are further developed following non-statutory consultation. The graduated swathe for the LCS converter station is shown in **Figure 13-4.**

Figure 13-3– Grimsby to Walpole LCS Zone near Alford - Graduated Swathe

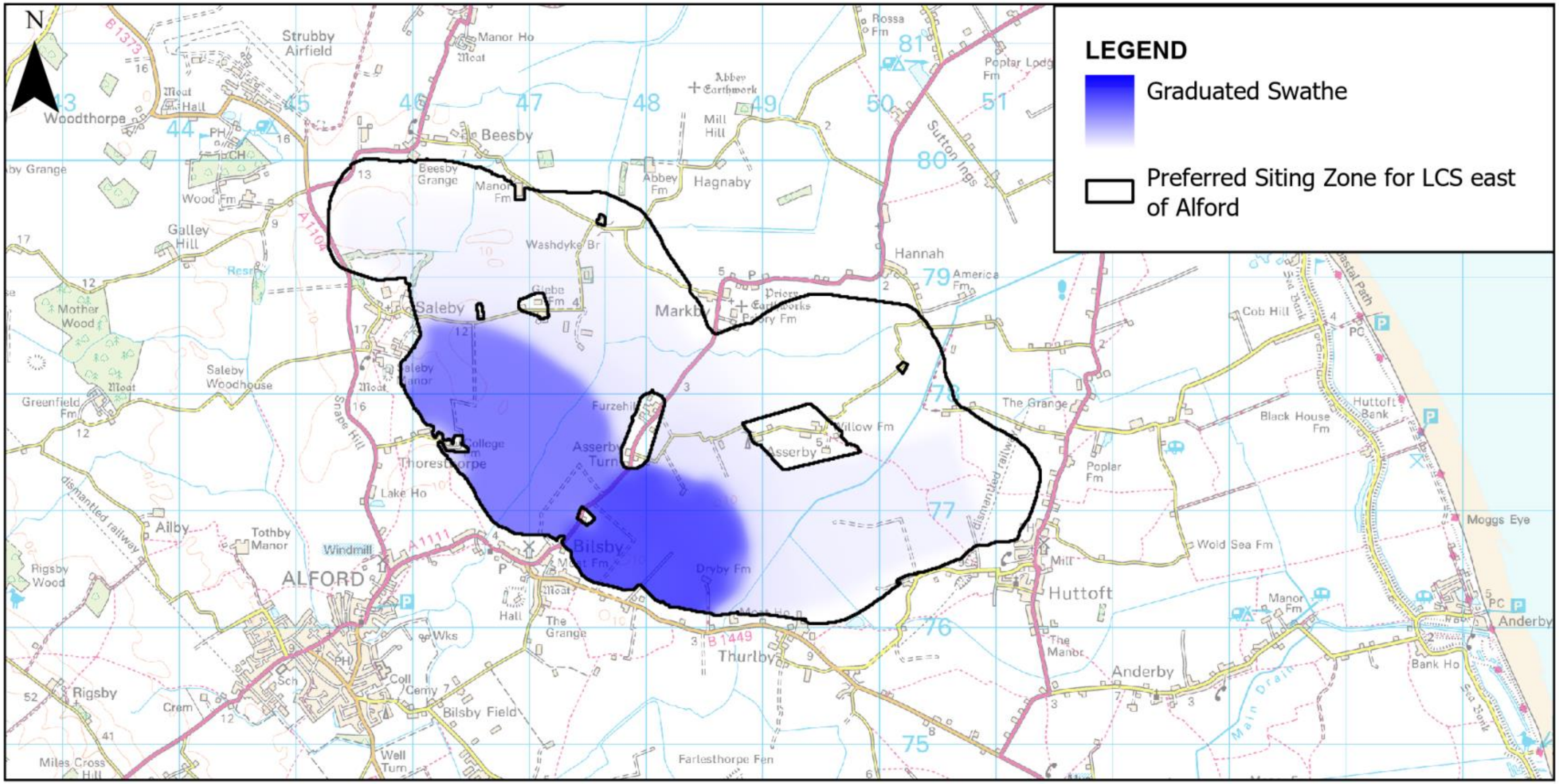


Figure 13-3 – LCS East of Alford Graduated Swathe

Figure 13-4 – LCS Converter Station Graduated Swathe

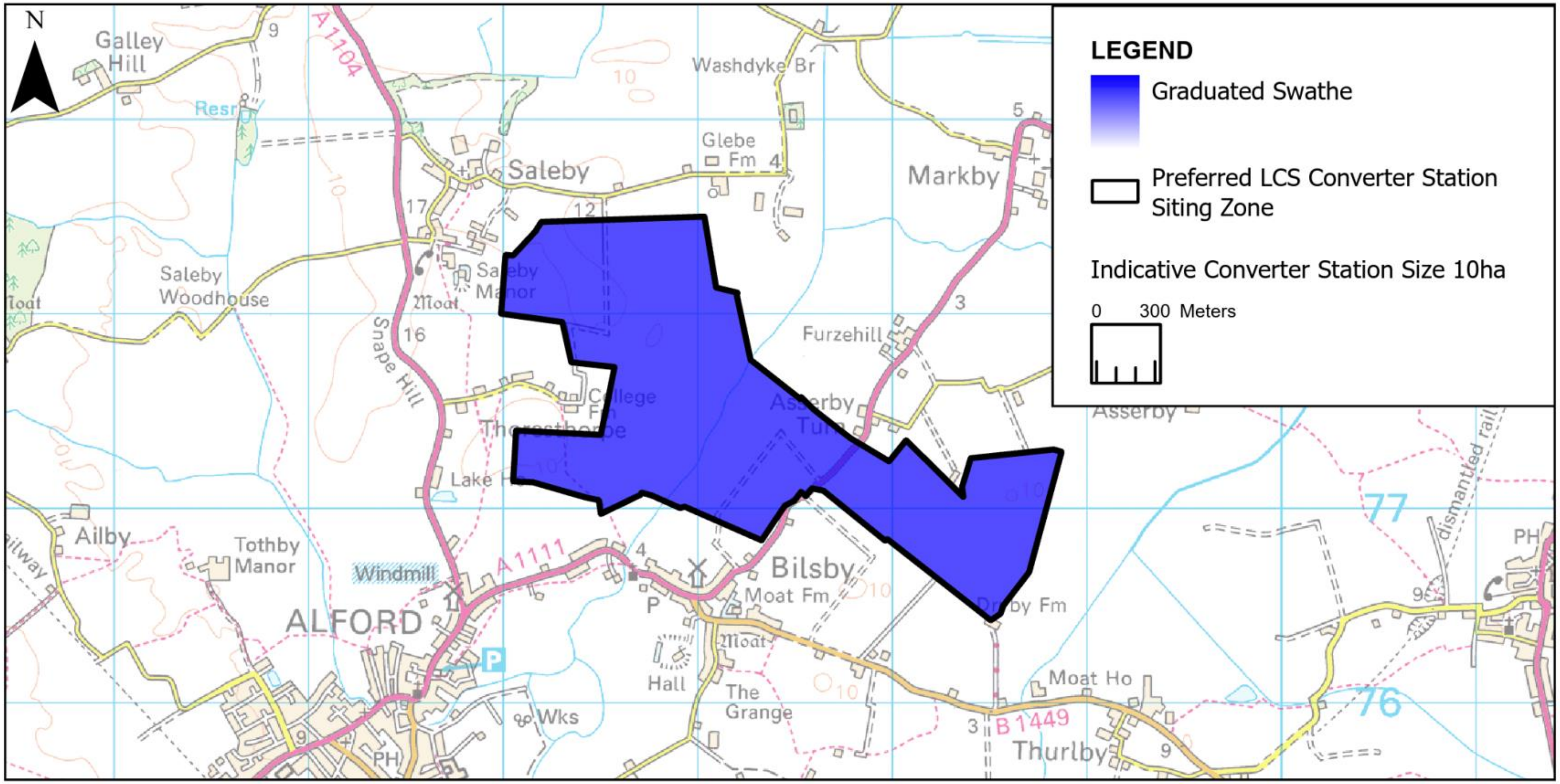


Figure 13-4 – LCS converter station Graduated Swathe

SCALE: 1:45,000

0 0.5 1 1.5 2 km

Walpole

13.3.6 Within the preferred combined Walpole siting zone of WLP4 and WLP5 five siting areas were identified (WLPS1, WLPS2, WLPS3, WLPS4 and WLPS5 shown in **Figure 13-5**), all of which were in a similar area north of West Walton and Walton Highway. The area is characterised by irregular arable fields bound by scattered properties and woodland. The topics of ecology, water, socio-economics, air quality and noise are not considered to be differentiating factors between siting areas WLPS1, WLPS2, WLPS3, WLPS4 and WLPS5. As all siting areas are free from designated ecological features and are located at least 11.6 km from The Wash designated sites at the coastline (the nearest NSN and Ramsar sites) and all are within areas of Flood Zone 2 and 3 (although it is noted that those nearer the River Nene may have comparably greater potential for flooding impacts and require comparatively more complex design solutions) these were not considered a determining factor. There are socio-economic features identified within 1 km of the siting areas except for the Rose and Crown Solar Farm (which is avoided but may be temporarily affected by all siting areas) that would be material to decision making. There are few residential properties within or adjacent to the siting areas and sufficient space is available to allow noise-generating equipment to be located at a reasonable distance from sensitive receptors.

13.3.7 For landscape, visual, heritage and technical aspects, a comparative appraisal was undertaken. The analysis identified a landscape and visual preference for the WLPS5 because of an assessed strong sense of enclosure across the siting area, specifically from the west where views are well screened by vegetation. From a heritage perspective WLPS4 was preferred as only one heritage asset was identified within 1 km with a view to the siting area which could be mitigated through measures such as screen planting during construction. From a technical perspective, the appraisal identified that the area most likely for infrastructure to be located was adjacent (where practicable) to areas where the new Walpole 400 kV substation (within siting area WLPS1 as detailed in the G2W Project CPRSS) would be most likely to be located. The current emerging preferred location of the new Walpole 400 kV substation is within the south-east corner of the siting zone shown on **Figure 13-5**, overlapping with WLPS5, and the graduated swathe for the new Walpole 400 kV substation is shown on **Figure 13-6**. This would limit the spread of effects across a wider area and allow the opportunity for efficiencies during construction, although it may result in a concentration of certain effects (such as those on road users) and a slight increase technical complexity.

13.3.8 Taking this into consideration an area primarily encompassing WLPS2, WLPS3 and WLPS4 has been selected as the emerging preference and most likely location for the new Walpole converter stations. This is due to their position near the new Walpole 400 kV substation siting area (limiting the length of HVAC underground cables and spread of effects into the surrounding environment), near to the emerging preferred corridor from the north (limiting the length of HVDC underground cables), whilst also retaining siting flexibility within the emerging preferred siting zone until further details on the design of the new Walpole 400 kV substation are available. The graduated swathe for the Walpole converter stations are shown in **Figure 13-7**.

Figure 13-5 – Walpole Converter Station Siting Ares

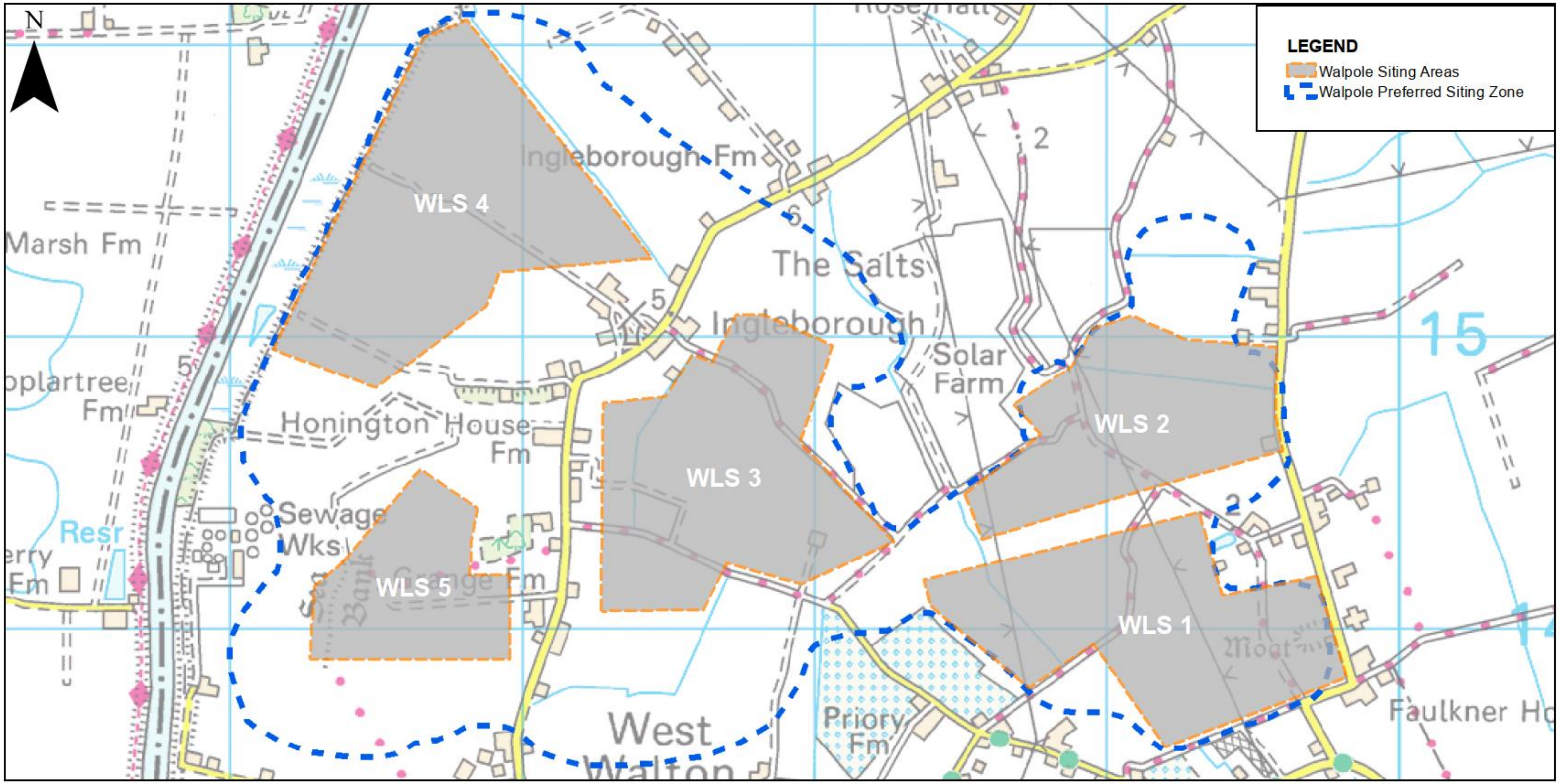


Figure 13-5 – Walpole Station Siting Areas

SCALE: 1:30,000

Figure 13-6 – Walpole Substation Graduated Swathe

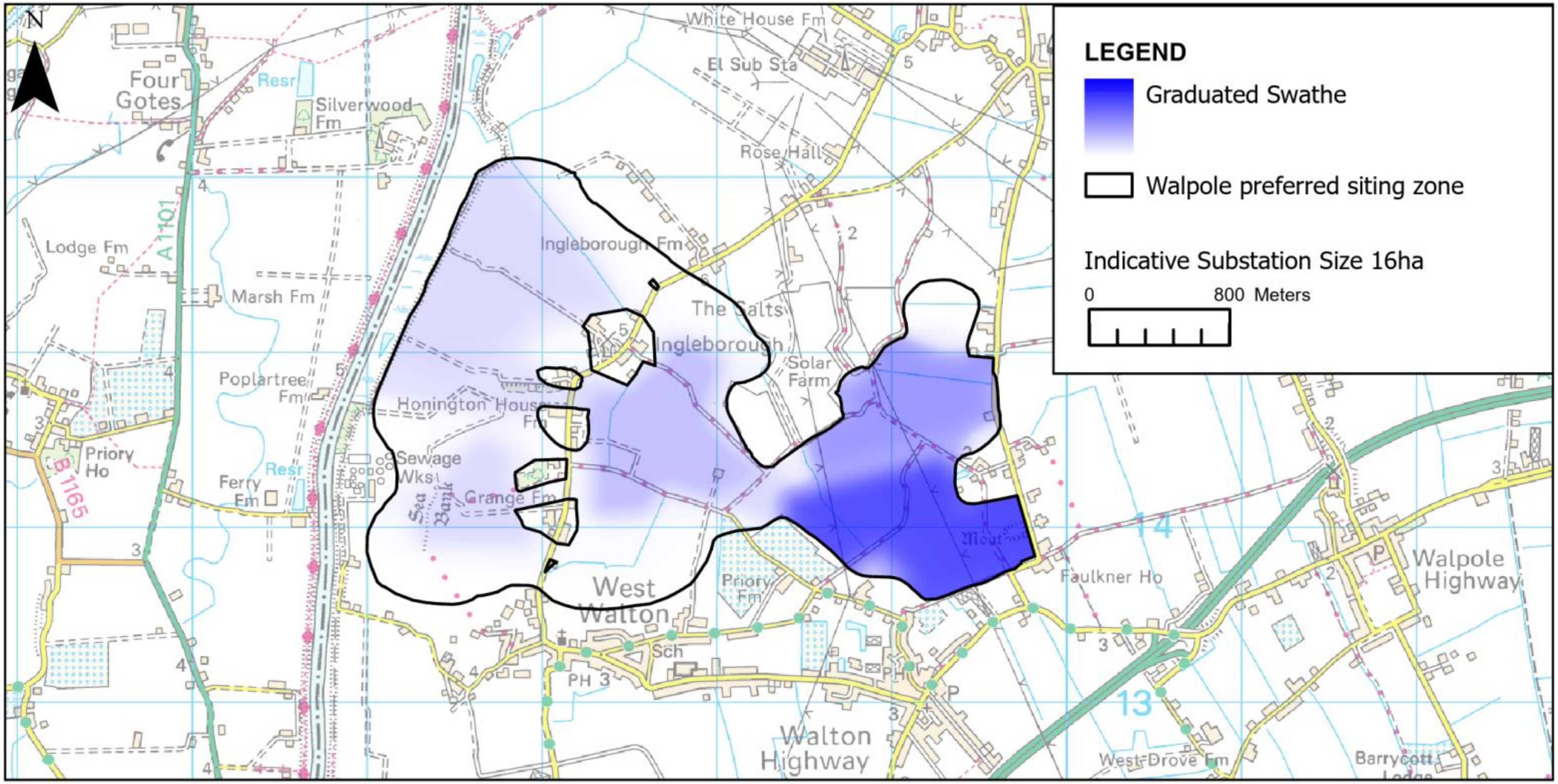


Figure 13-6 – Walpole substation siting zone graduated swathe

SCALE: 1:50,000 0 0.5 1 1.5 2 km

Figure 13-7 – Walpole Converter Station Graduated Swathe

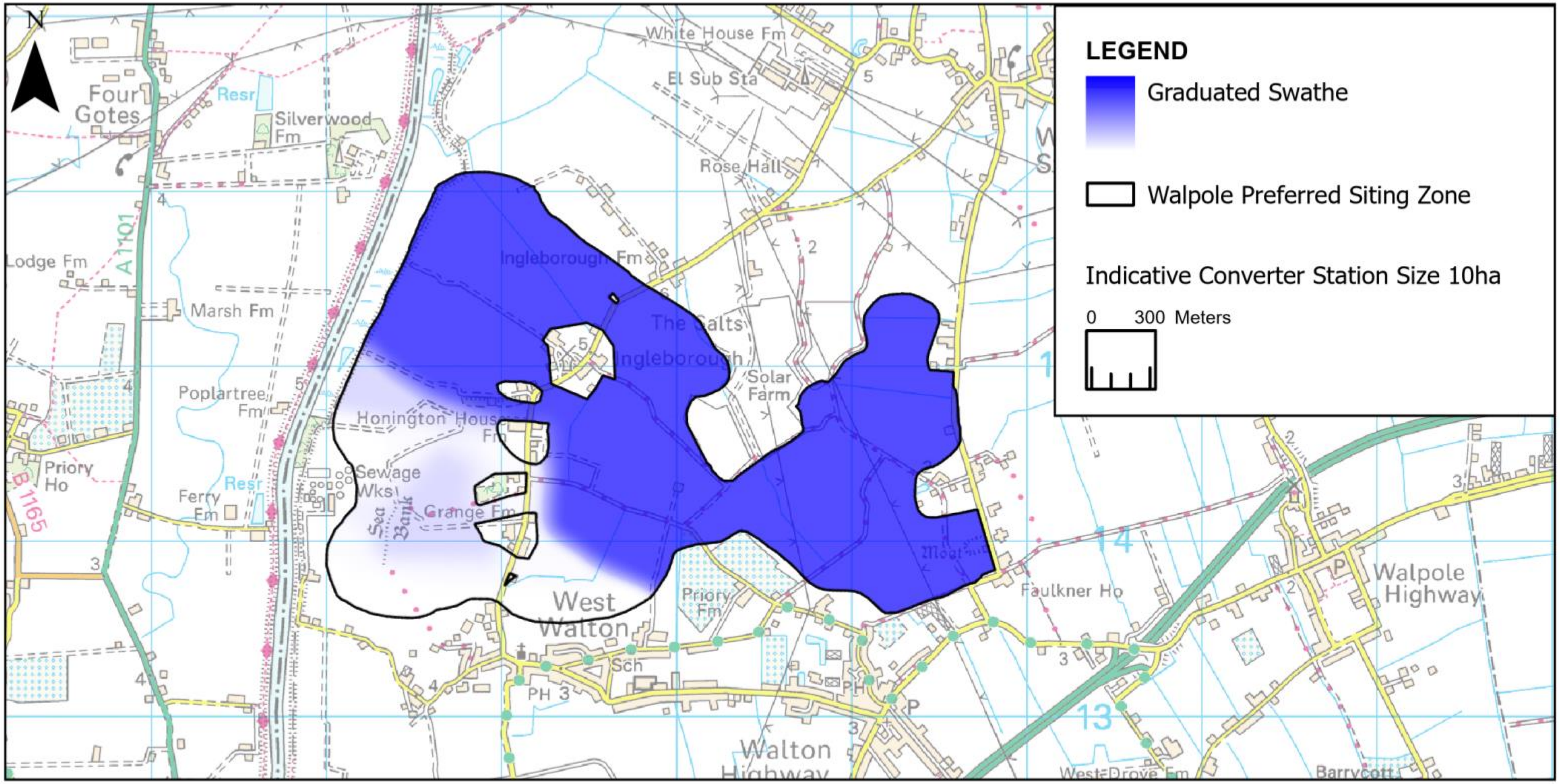


Figure 13-7 – Walpole Converter Stations Graduated Swathe

SCALE: 1:50,000

0 0.5 1 1.5 2 km

HVDC Underground Cables

13.3.9 The eight sections of HVDC underground cable, routeing between the landfalls and Walpole, are listed below and shown on Figure 13-8 to Figure 13-15.

- Section 1: Landfalls – LCS converter station;
- Section 2: LCS converter station – Welton le Marsh;
- Section 3: Welton le Marsh – Little Steeping;
- Section 4: Little Steeping – Sibsey Northlands;
- Section 5: Sibsey Northlands – Hubbert's Bridge;
- Section 6: Hubbert's Bridge – Moulton Seas Ends;
- Section 7: Moulton Seas Ends – Foul Anchor; and
- Section 8: Foul Anchor – Walpole.

13.3.10 A summary of the graduated swathe by sections is provided below and more detailed plans are included in **Appendix B**.

Section 1: Landfalls to Bilsby

13.3.11 This section of the emerging preferred corridor runs from the Landfalls at Theddlethorpe and Anderby Creek to Bilsby. As detailed in **Chapter 2**, should there be a future requirement for a three-ended connection then the underground cables would connect from the landfalls to the emerging preferred DC5 Siting Zone north of Bilsby before routeing south to the B1449. This is shown in **Figure 13-8** below and on Sheet 1 of **Appendix B**.

13.3.12 From the Theddlethorpe Landfall, the underground cable would route westward, crossing the A1031 south of Theddlethorpe St Helen before turning south seeking to take a direct route to the emerging preferred LCS converter station siting zone (DC5) whilst avoiding scattered residential properties. From there, the swathe splits into two options circumventing the settlements of Maltby le Marsh, Beesby and properties east of Saleby. Of these options the eastern leg would be more preferred as it offers a more direct route and minimises crossings of major roads. The route would then cross the A1111 before connecting into the emerging preferred LCS converter station siting zone (DC5) from the north.

13.3.13 From the Anderby Creek Landfall, the underground cable would route west and south-west toward Bilsby. Before reaching Bilsby the route would then begin to route south towards Welton le Marsh and crossing the B1449. Should there be a future requirement for a three-ended connection, as the underground cable route nears Bilsby it would continue into the emerging preferred LCS converter station siting zone (DC5) crossing the A52 Huttoft Road south of Hannah. Optionality is then introduced to avoid the cluster of properties at Asserby and interaction with Viking Link Interconnector, with a preference for the southern option as it allows for a more direct connection into the emerging preferred LCS converter station siting zone (DC5) and would avoid additional crossings of minor watercourses.

Figure 13-8 - Graduated Swathe: Landfalls to Bilsby

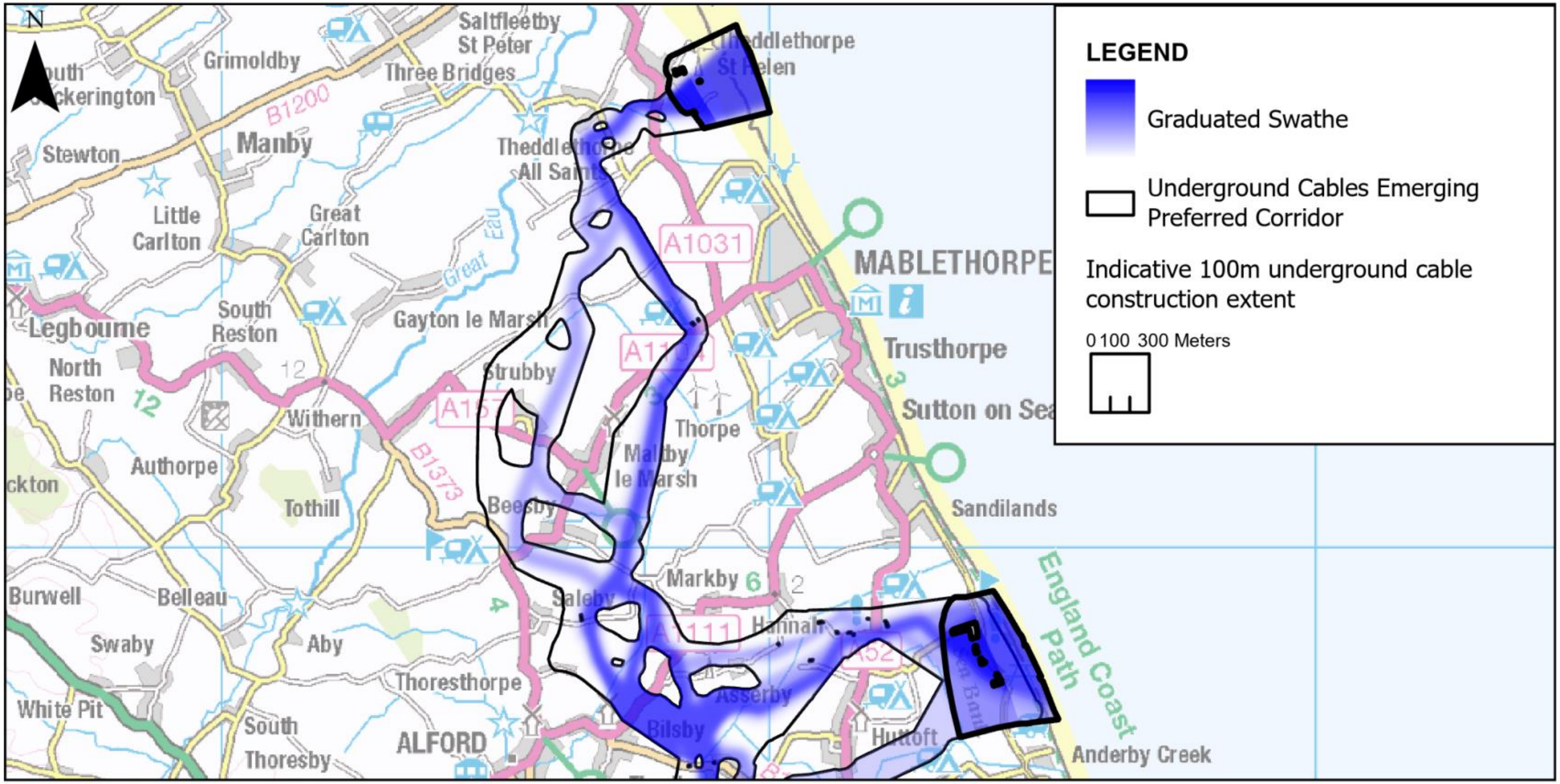


Figure 13-8 - Graduated Swathe: Landfalls to Bilsby

SCALE: 1:160,000

0 0.5 1 1.5 2 km

Section 2: Bilsby – Welton le Marsh

13.3.14 This section of the emerging preferred corridor runs from Bilsby (and should a future requirement for a three-ended connection emerge, the connection point at the new LCS converter station (DC5)) to a point east of the village of Welton le Marsh. This is shown in **Figure 13-9** below and on Sheet 2 of **Appendix B**.

13.3.15 From Bilsby, the underground cable route would continue south, crossing the B1449 either east of, or west of, Thurlby where optionality has been introduced into the graduated swathe to seek to avoid impacts on Thurlby itself and associated non-designated heritage assets. This would also avoid numerous interactions with the G2W Project’s proposed 400 kV overhead line. There is a preference to cross the B1149 west of Thurlby as this option offers marginally greater flexibility for cable routeing.

13.3.16 From Thurlby, the underground cable would continue to route south, avoiding scattered agricultural constraints in proximity to Farlesthorpe and Cumberworth. North of Bonthorpe, western and eastern optionality has been introduced to avoid the Scheduled Monument *Butterbump round barrow cemetery* which was specifically excluded from the swathe. Of these options, there is a preference to route west of the scheduled monument to take advantage of more dense screening vegetation and to seek a more direct route south.

13.3.17 From Sloothby, the underground cables route would continue south avoiding specifically excluded constraints at Hasthorpe and Boothby whilst also maintaining distance from the Scheduled Monument *Castle Hill: a motte castle 250 m east of Hanby Hall Farm* located approximately 320 m west of the swathe at Hanby.

Figure 13-9 - Graduated Swathe: Bilsby to Welton le Marsh

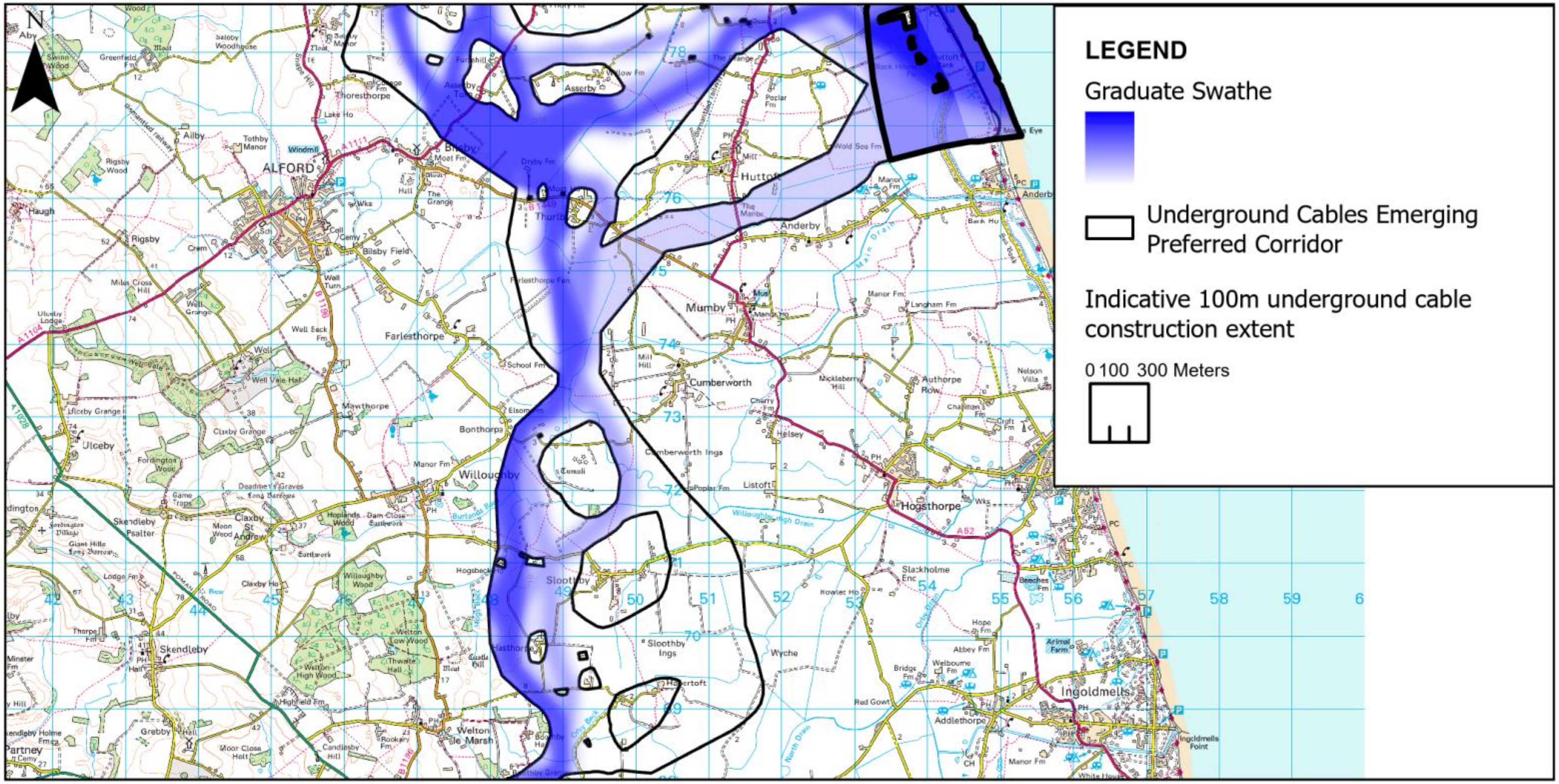


Figure 13-9 - Graduated Swathe: Bilsby to Welton le Marsh

0 0.5 1 1.5 2

SCALE: 1:120,000 km

Section 3: Welton le Marsh to Little Steeping

13.3.18 This section of the emerging preferred corridor runs from Welton le Marsh to a point immediately south of the village of Little Steeping. This is shown in **Figure 13-10** below and on Sheet 3 of **Appendix B**.

13.3.19 From Welton le Marsh, the underground cable route would continue west, seeking to avoid the village of Orby and associated Scheduled Monument *Manor Farm moated site*. The route would continue west before turning south at Gunby Hall. The Project would utilise construction methods that would reduce potential impacts on woodland, treelines, the Lincolnshire Wolds NL and its setting, and Gunby Hall Estate and Gardens.

13.3.20 From Gunby, the underground cable route would continue south, avoiding areas of ancient woodland and properties in the vicinity of Monksthorpe and Hunger Hill before crossing the B1195 east of Great Steeping.

13.3.21 From the B1195, optionality is introduced to cross the Steeping River and to avoid the village of Little Steeping. There is a strong preference to cross the River Steeping and route east of Little Steeping to avoid potential impacts on the Scheduled Monument *Churchyard cross, St Andrew's churchyard* which would be within 100 m of any crossing of the River Steeping north of Little Steeping.

Section 4: Little Steeping to Sibsey Northlands

13.3.22 This section of the emerging preferred corridor runs from a point at Little Steeping to a point immediately south of the village of Sibsey Northlands (south of Waltham Road). This is shown in **Figure 13-11** below and on Sheet 4 of **Appendix B**.

13.3.23 From the south of Little Steeping, the emerging preferred corridor continues routeing south-west, turning south at Scarborough Bank whilst avoiding scattered residential properties connecting back to the main route west of Leake Commonside. However, following further review of the emerging preferred corridor, an alternative route was developed to the east of the specifically excluded areas associated with properties at Midville, Hobhole Drain and Bell Water Drain. The eastern route was developed to introduce more optionality and offer more direct solution to Sibsey Northlands.

13.3.24 The eastern option would continue routeing south, then south-west in parallel with the heritage railway line, crossing Bell Water Drain north of Eastville and routeing adjacent to the west of New Leake. The option would then continue routeing south-west before turning west to connect back into the main route, crossing Hobhole Drain north-west of Leake Commonside.

13.3.25 From Leake Commonside, the route would turn to route west seeking a perpendicular crossing the A16 and East Fen Catchwater Drain south of Sibsey Northlands.

Figure 13-10 - Graduated Swathe: Welton le Marsh to Little Steeping

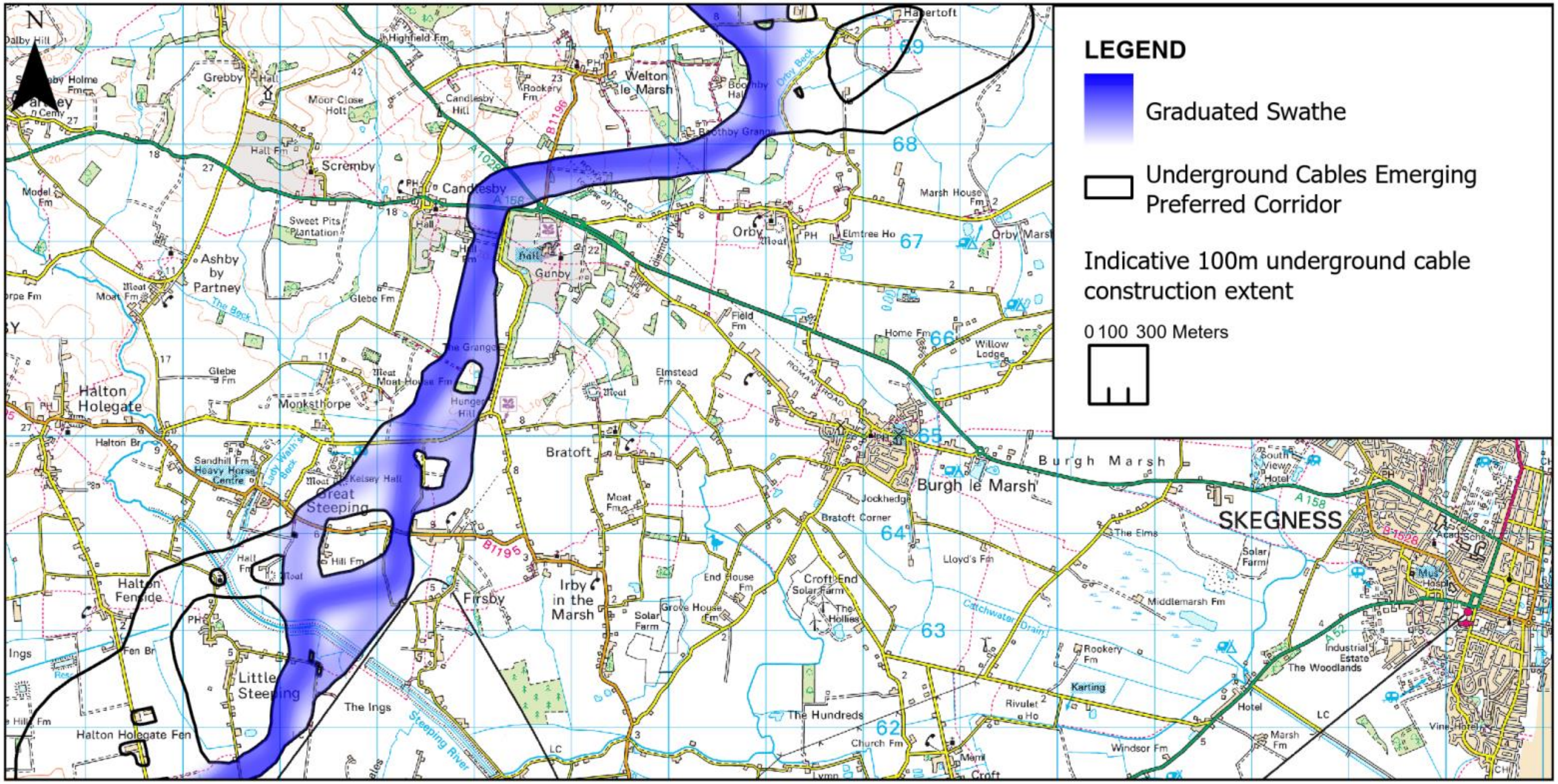


Figure 13-10 - Graduated Swathe: Welton le Marsh to Little Steeping

SCALE: 1:90,000

0 0.5 1 1.5 2 km

Figure 13-11 - Graduated Swathe: Little Steeping to Sibsey Northlands

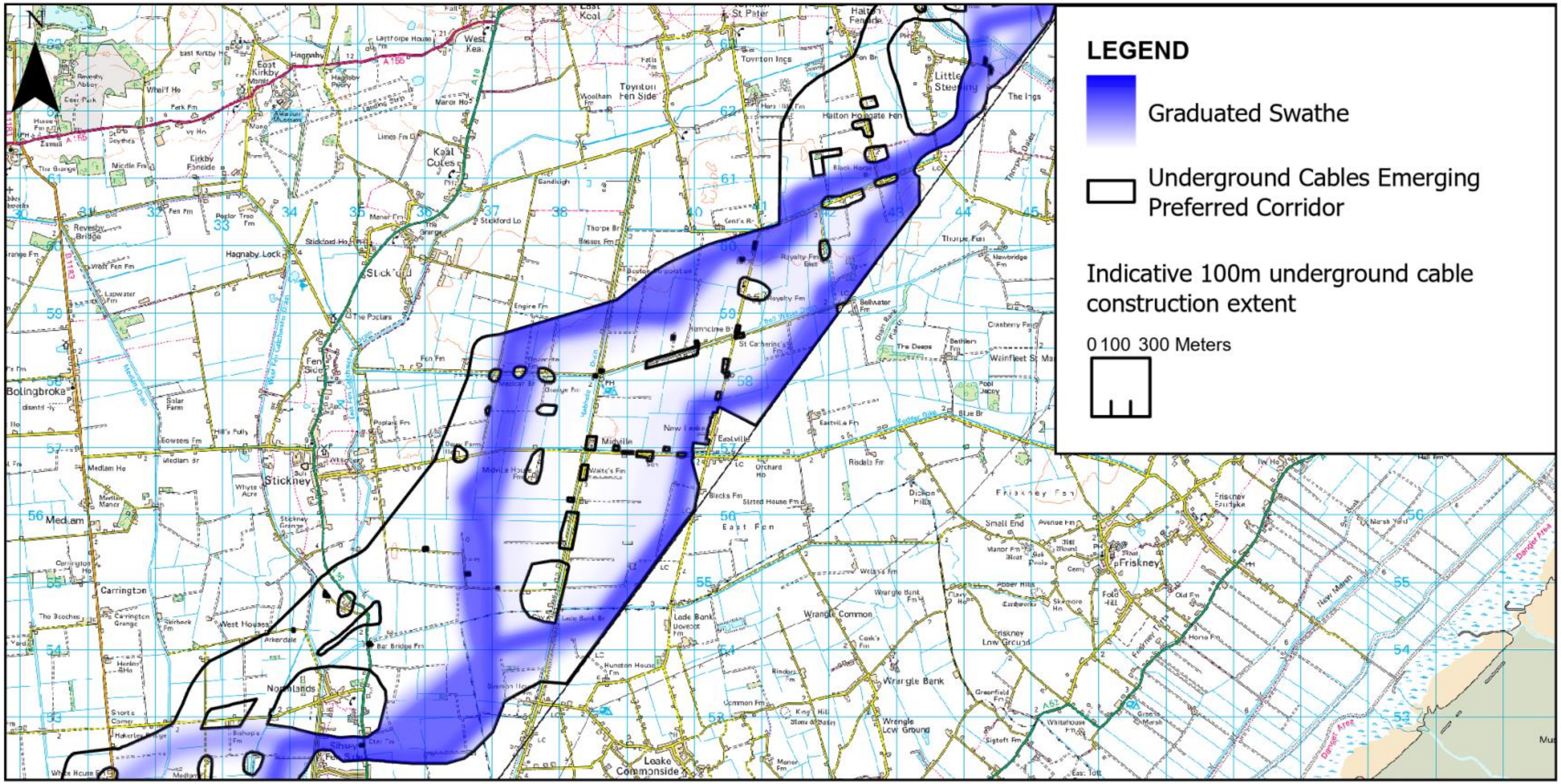


Figure 13-11 - Graduated Swathe: Little Steeping to Sibsey Northlands

SCALE: 1:130,000
0 0.5 1 1.5 2 km

Section 5: Sibsey Northlands to Hubbert's Bridge

13.3.26 This section of the emerging preferred corridor runs from the point at Sibsey Northlands to a point immediately east of Hubbert's Bridge (west of Boston). This is shown in **Figure 13-12** below and on Sheet 5 of **Appendix B**.

13.3.27 From Sibsey Northlands, optionality is introduced to present options to allow for the avoidance of multiple clusters of residential properties and multiple crossings of major and minor watercourses, which include the River Witham, West Fen Drain, Frith Bank Drain and Newham Drain.

13.3.28 After the crossing of the A16, one option would continue routeing west, before turning south-west crossing the B1183, West Fen Drain, B1184 and Newham Drain east of Gipsey Bridge, this route would then continue south seeking a perpendicular crossing of the River Witham before crossing the A1121, North Forty Food Drain, South Forty Foot Drain and Poacher Railway Line east of Hubbert's Bridge.

13.3.29 Another option would turn south after crossing the A16, seeking to cross the B1184 between Frithville and Sibsey whilst avoiding scattered residential properties. From Sibsey, further optionality is introduced to avoid a large cluster of properties at Fishtoft. Of these, the northern option would seek to cross West Fen Drain immediately south of Frithville before turning south-west of Fishtoft, whilst the southern option would seek to cross West Fen Drain south of Fishtoft at a narrow area north of Richardson's Bridge. At Fishtoft, these sub-options converge and route south-west avoiding scattered residential and agricultural properties, crossing both Frith Bank Drain and the River Witham south-east of Anton's Gowt. The route would then turn directly south seeking to cross South Forty Foot Drain and the A1121 west of the Boston Aeroclub.

13.3.30 Following further review of emerging preferred corridor, a section of the emerging preferred corridor, spanning approximately 6 km in length, to the east of Sibsey was removed. Utilisation of this section would require two crossings of the Poacher railway line and an additional road crossing (one of the B1184). Sufficient routeing flexibility is still retained within the emerging preferred corridor without inclusion of this section and as such this section is removed.

Section 6: Hubbert's Bridge to River Welland

13.3.31 This section of the emerging preferred corridor runs from a point east of Hubbert's Bridge to a point north of the Moulton Seas End (west of the B1357). This is shown in **Figure 13-13** below and on Sheet 6 of **Appendix B**.

13.3.32 From the east of Hubbert's Bridge, optionality is introduced to retain options of a perpendicular crossing of New Hammond Beck and the A52 whilst seeking to avoid the areas of woodland and a cluster of residential and agricultural properties along the B1192 Holmes Lane. One option would cross to the west of the B1192 and the other would cross east of B1192. Both underground cable routes would require crossing of the Old Hammond Beck watercourse. The route options would then converge west of Kirton End, requiring crossing an existing 132 kV overhead line and the B1391 before continuing to route directly south.

13.3.33 The underground cable route would then turn south-east seeking a perpendicular crossing of the B1397 and A16 north-east of the villages of Sutterton and Algarkirk whilst also avoiding the Scheduled Monument *Shrunken medieval village* located within Algarkirk.

13.3.34 After crossing the A16, the underground cable route would then continue south, crossing the A17 and Three Towns Drain west of Fosdyke. Optionality is then introduced to avoid the areas of woodland and a cluster of agricultural properties south-west of Fosdyke before the options converge seeking a perpendicular crossing of Outer Dowsing OWF and the River Welland west of Fosdyke Bridge to avoid direct impacts on The Wash designated sites located east of Fosdyke Bridge.

Figure 13-12 - Graduated Swathe: Sibsey Northlands to Hubbert's Bridge

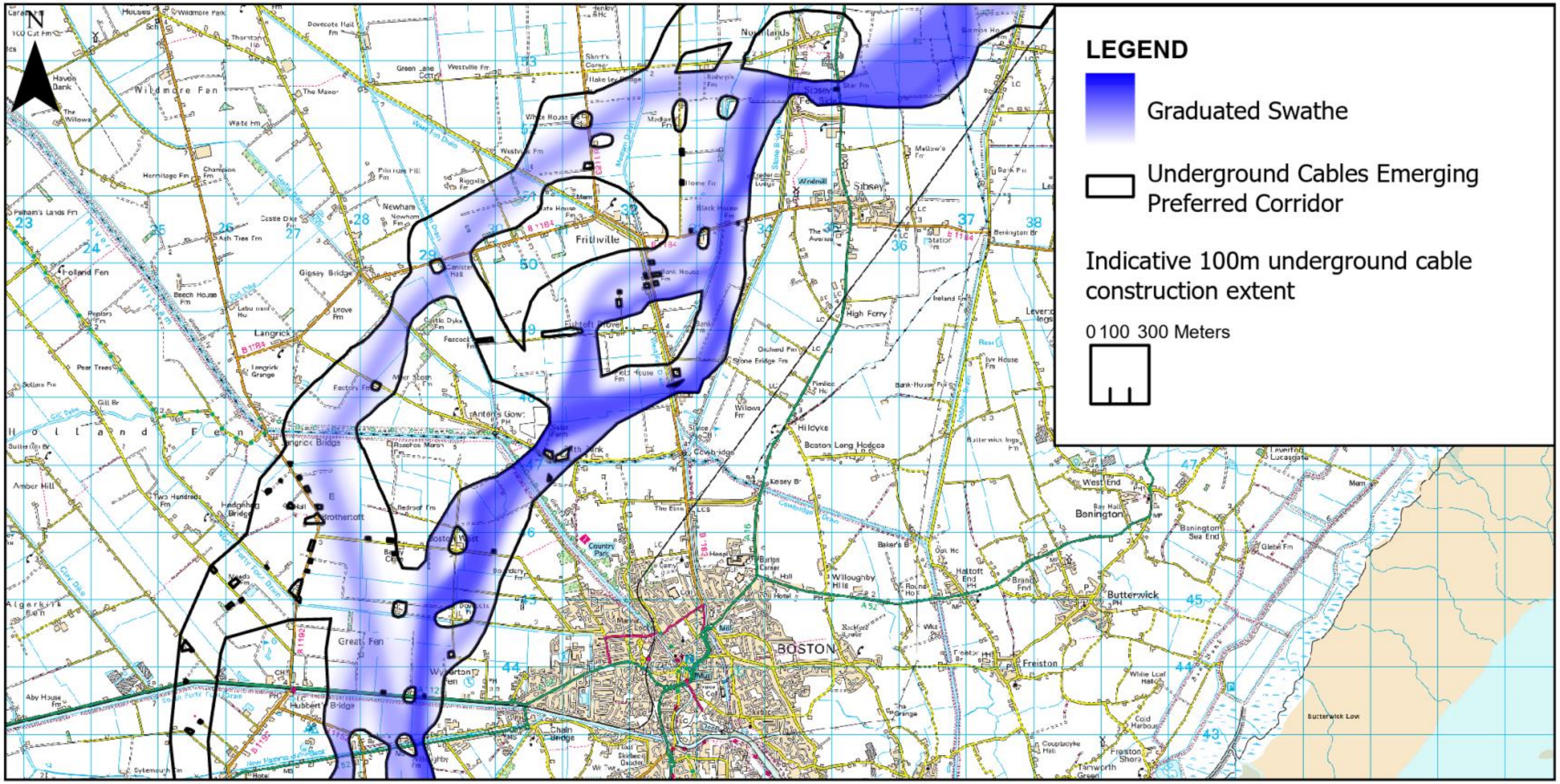


Figure 13-12 - Sibsey Northlands to Hubbert's Bridge

SCALE: 1:130,000 0 0.5 1 1.5 2 km

Figure 13-13 - Graduated Swathe: Hubbert's Bridge to River Welland

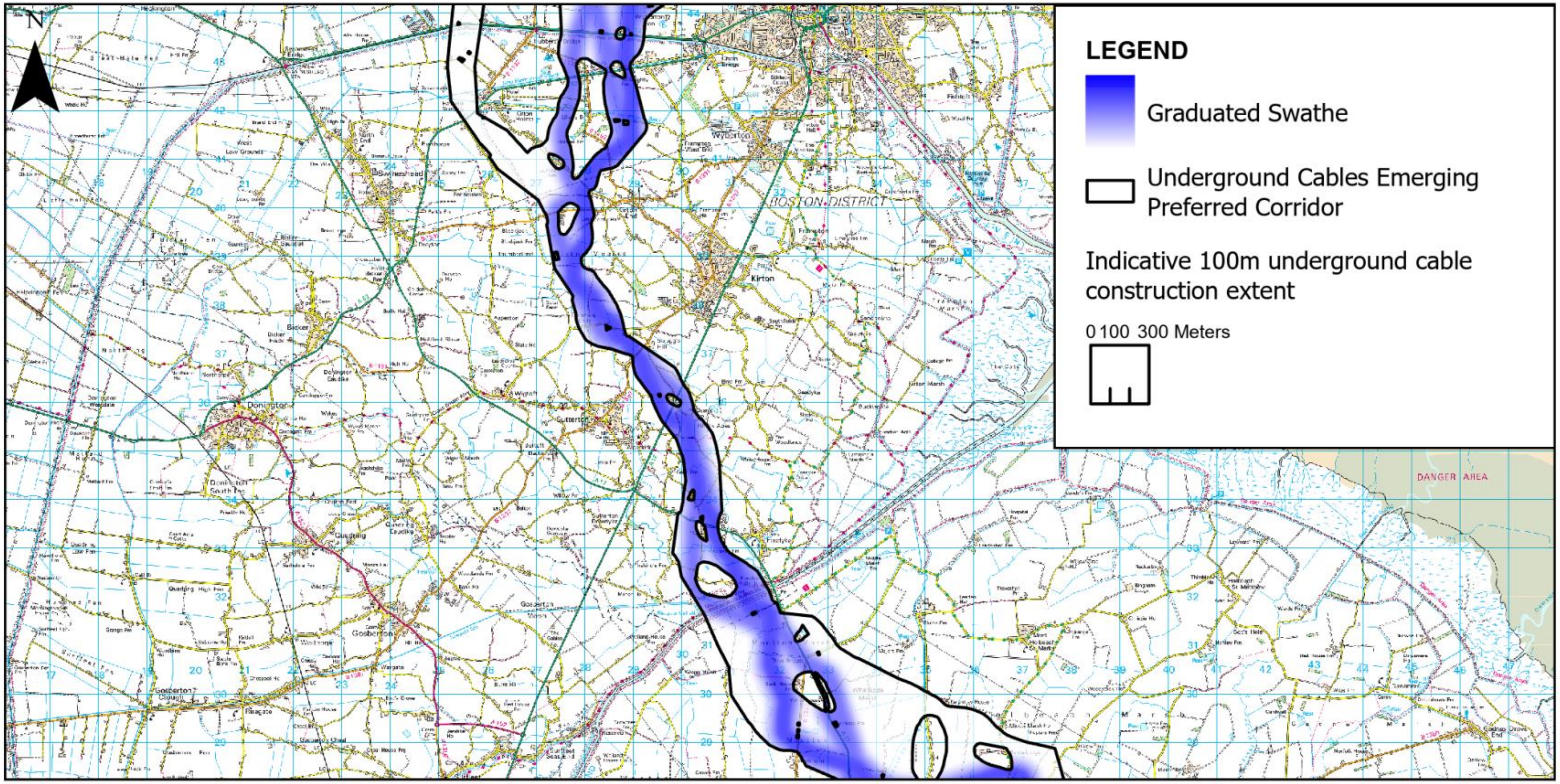


Figure 13-13 - Graduated Swathe: Hubbert's Bridge to Moulton Seas Ends

SCALE: 1:180,000 0 0.5 1 1.5 2 km

13.3.35 From Fosdyke Bridge, the underground cable route would continue south before turning east to cross the B1357 north of Moulton Seas End. Crossings of a gas main would be required. Optionality is also introduced here to either cross the A17 north of Bank House Farm and turning east north of Saracen's Head or to potentially route along approximately 0.8 km of the A17 between Clayton's Cottage and Crown Farm before rejoining the main route north of Saracen's Head.

Section 7: River Welland to Foul Anchor

13.3.36 This section of the emerging preferred corridor runs from a point north of Moulton Seas End to a point immediately east Foul Anchor (east of the A1101). This is shown in **Figure 13-14** below and on Sheet 7 of **Appendix B**.

13.3.37 From Moulton Seas End, the underground cable route would continue routeing eastward to avoid the village of Saracen's Head before turning to route south at Clays Garth (west of Holbeach Hurn) to seek a perpendicular crossing of the A17 and B1515 between Holbeach and Fleet Hargate. However, optionality is also introduced to route along approximately 6 km of the A17 between a point north of Saracen's Head to a point between Holbeach and Fleet Hargate seeking to utilise a more direct route south-east towards the connection point at Walpole.

13.3.38 From the east of Holbeach, the route option which does not follow the A17 would route directly south avoiding scattered residential and agricultural properties before turning to route south-east to the north of the B1165 Raven's Gate seeking to avoid interactions with the existing 4ZM 400 kV overhead line south of Gedney Broadgate. The underground cables route would then cross the B1390 and South Holland Main Drain north-east of Sutton St James before continuing to route directly east, avoiding the villages of Tydd St Mary and Tydd Gote before crossing the River Nene north of Foul Anchor. Crossing of a gas main would be required from either option north of Foul Anchor and at, or south of, the A17

13.3.39 Additionally, optionality is also included to route along approximately 9.3 km of the A17 between Holbeach and a point between Long Sutton and Sutton Bridge. From Sutton Bridge, the route would turn directly south, with further optionality introduced to avoid interactions with a cluster of wind turbines north of Foul Anchor. Both route options in this location would require crossing South Holland Main Drain, the River Nene and at least one crossing of an existing 132 kV overhead line.

Section 8: Foul Anchor to Walpole

13.3.40 This section of the emerging preferred corridor runs from a point east of Foul Anchor to the emerging preferred Walpole converter station siting zone. This is shown in **Figure 13-15** below and on Sheet 8 of **Appendix B**.

13.3.41 From the east of Foul Anchor, the route would then turn south seeking a perpendicular crossing of the existing 4ZM 400 kV overhead lines and two 132 kV overhead lines which connect to the existing Walpole 400 kV substation. Following this crossing optionality is introduced to allow for multiple entry points into the emerging preferred Walpole converter station siting zone whilst avoiding the areas specifically excluded from the swathe, associated West Walton Fire Station and the Rose and Crown solar farm.

Figure 13-14 - Graduated Swathe: River Welland to Foul Anchor

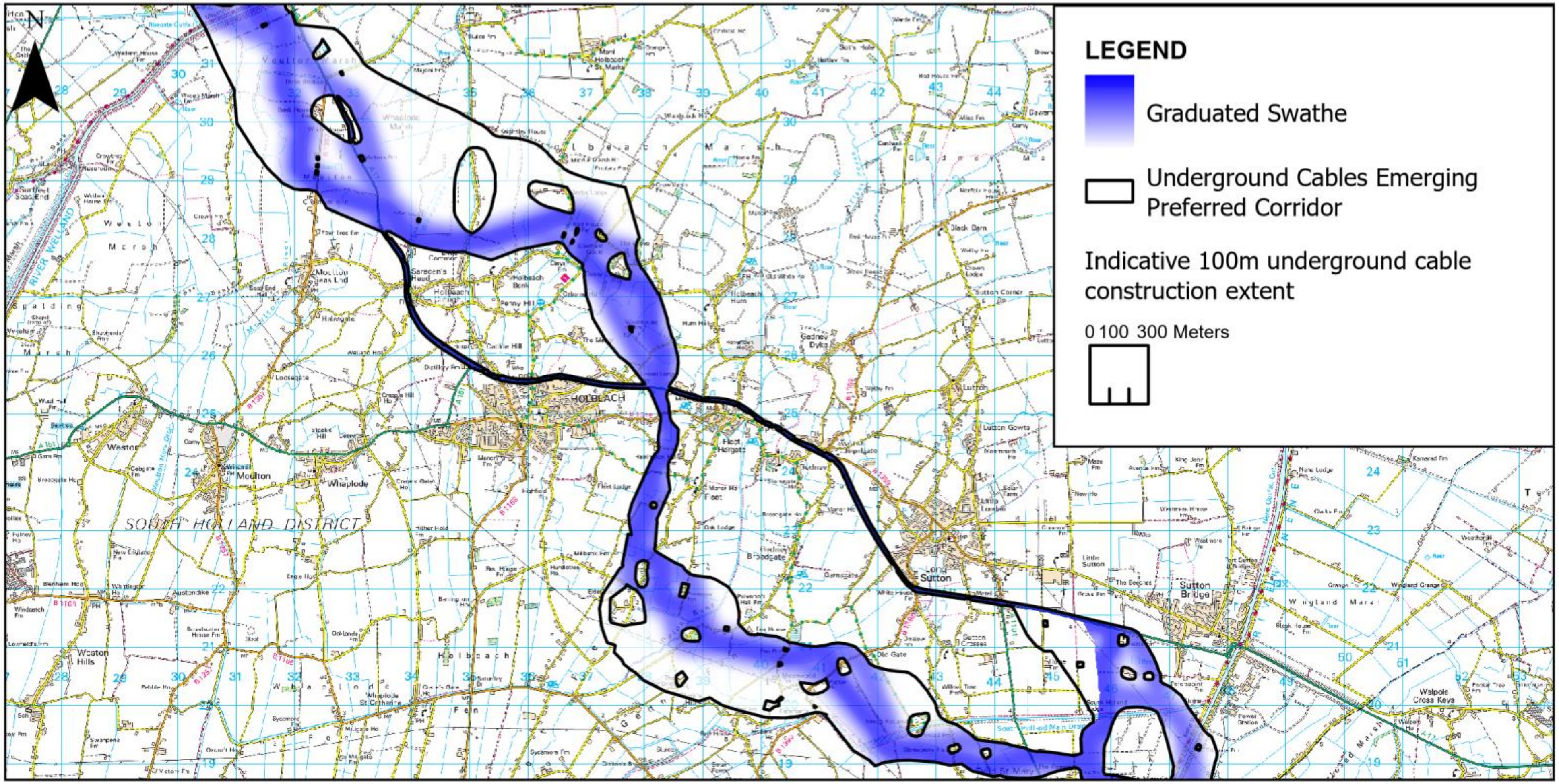


Figure 13-14 - Graduated Swathe: Moulton Seas Ends to Foul Anchor

SCALE: 1:150,000

0 0.5 1 1.5 2 km

Figure 13-15 - Graduated Swathe: Foul Anchor to Walpole

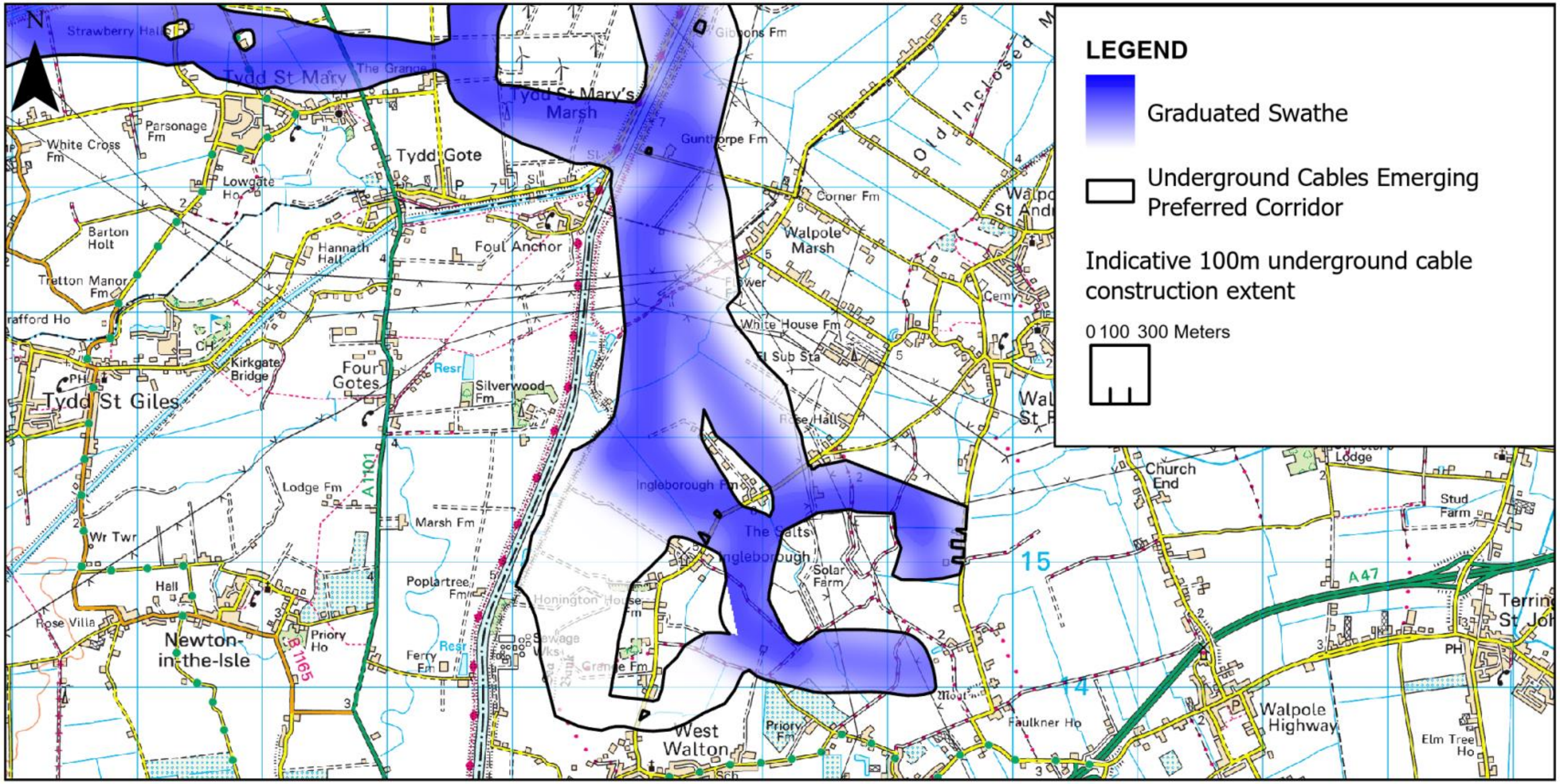


Figure 13-15 - Foul Anchor to Walpole

SCALE: 1:70,000
0 0.5 1 1.5 2 km

13.3.42 The first option would continue south before turning east to follow the boundary of the converter station siting zone, before turning south again, seeking a perpendicular crossing of the Bacton to Wisbech Nene East high pressure gas pipeline immediately west of the Rose and Crown solar farm.

13.3.43 The underground cable route could also continue further east through a narrow area immediately south of the Rose and Crown solar farm associated with the Bacton to Wisbech West high pressure gas pipeline and an area of traditional orchard priority habitat. This route would allow for connection into a siting area south-east of the Rose and Crown Solar Farm. Optionality is also retained to route further east in parallel to the high pressure gas main, crossing the existing 4ZM 400 kV overhead line allowing for a potential connection to a converter station siting area north-east of the Rose and Crown solar farm.

13.4 Summary of the Graduated Swathe

13.4.1 The graduated swathe, for non-statutory consultation, as shown in the figures presented in this chapter and in **Appendix B** depicts the graduated swathe itself, existing overhead lines, underground cables and key environmental, socio-economic and technical features that directly inform the overall graduated swathe.

13.5 Conclusion

13.5.1 The graduated swathe represents the current thinking on where the Project infrastructure is more likely to be located based on the current appraisals of constraints that have been identified. This will be further informed by feedback received during consultation and therefore there is the potential for the current indicated preference to move within the corridor. In some instances, feedback may indicate that the preference should be to route through areas currently being shown as less preferable. This will be addressed at the next stage of the Project. We shall also summarise the feedback within a consultation report during the next stage of the Project when feedback has been fully reviewed. This will be fully considered through the development of the Project, whilst maintaining the principles used to develop the current graduated swathe such as, for instance, the avoidance where practicable of areas of highest constraint such as settlements.

14. Summary and Next Steps

14. Summary and Next Steps

14.1 Summary of Options Identification and Selection Process (Stage 2)

14.1.1 A detailed Options Identification and Selection Process (Stage 2) (see **Chapter 4**) has been undertaken to identify:

- the proposed landfall locations for a new DC cable landfall on the Lincolnshire coastline;
- the proposed underground cable corridors from the proposed landfall locations on the Lincolnshire coastline to Walpole, and where required via a LCS converter station;
- the proposed siting zones and siting areas for new substation at Walpole and converter stations at the Walpole; and
- the proposed siting zones and siting areas for a new converter station and DCSS near the LCS (proposed by the Grimsby to Walpole (G2W) Project), should there be a future requirement for a three-ended connection.

14.1.2 The process sought to connect the proposed landfalls and stations by a proposed corridor. The connection is expected to wholly comprise underground cables. NGET will also need to replace short sections of existing 400 kV overhead line and commission local changes to the lower voltage distribution networks and other utilities to facilitate the construction of the new substations, converter stations, DCSS and underground cables.

14.1.3 For the Project, three preliminary landfall study areas, 37 preliminary corridors, and five siting zones at Walpole were identified and appraised (in **Chapter 6** to **Chapter 9**). In addition, should there be a future requirement for a three-ended connection, thirteen Siting Zones at the LCS were identified and appraised (in **Chapter 10**).

14.1.4 Following appraisal of the landfalls, corridors, siting zones and siting areas, an end-to-end review was then undertaken between the landfalls and Walpole (and via the LCS should a three-ended connection be required). This review considered each preferred corridor, siting zones or siting area in the context of the wider end-to-end solution. The reasoning and justification for progressing each individual element was tested to ensure that it remained robust when considered in the context of the whole route. The wider end-to-end solution review also incorporated cost and programme performance, reported in **Chapter 12**. The review did not result in any amendments to the emerging preferred corridor, siting zones or siting areas.

14.1.5 In summary, the emerging preferred siting areas, siting zones and corridor for new underground cables are as follows:

- **Landfall** – Anderby Creek was identified as the preferred landfall location over Theddlethorpe and Horseshoe Point. Anderby Creek offers the best opportunity for landfall installation particularly from an ecological perspective and it poses fewer terrestrial engineering constraints. However, when considering the potential additional ecological and socio-economic effects from multiple landfalls at Anderby

Creek alongside the complexities associated with marine routeing (as detailed in the Marine Routeing Appraisals undertaken for EGL 3 and EGL 4), the preference over a landfall at Theddlethorpe is reduced. The option of making landfall at Theddlethorpe has therefore been retained to be progressed at non-statutory consultation, and subject to further studies, as an alternative.

- **Connection between the Landfalls and Walpole** – the connection routes between either Theddlethorpe or Anderby Creek and Walpole, and where a three-ended connection is a requirement via the LCS Converter Station.
    - As described in **Chapter 7**, 26 underground cable corridors (1-23 and 35-37) were defined and reviewed between the Landfall Study Areas (at Theddlethorpe and Anderby Creek) and the River Welland. The emerging preferred corridor (see **Chapter 11**) comprises the following corridors from each landfall:
        - Theddlethorpe landfall via Corridors 1, 3, 6, 8, 16, 17, and 21 to the River Welland; and
        - Anderby Creek landfall via Corridors 3, 4, 5, 6, 8, 16, 17, and 21 to the River Welland.
    - A route following these Corridors represents the best opportunity to limit environmental and socio-economic impacts and technical complexity, whilst also representing the most direct, and more economic and efficient route. It is noted that Corridor 8 routes through a small section of the Lincolnshire Wolds NL, north of Gunby, which was selected to avoid an exceptionally constrained area (due to the density of the population and presence of the existing Triton Knoll underground cables, the proposed G2W 400 kV overhead line and the proposed Outer Dowsing OWF HVAC underground cables) between Skegness and Burgh le Marsh.
    - As described in **Chapter 8**, between the River Welland and Walpole the corridor emerging as preferred (see **Chapter 9**) comprises Corridors 31, 32 and 33. A route following these Corridors represents the best opportunity to limit environmental and socio-economic impacts (in part by limiting the length and therefore amount of infrastructure required by taking advantage of a potential route along the A17) and technical complexity, whilst also representing one of the most direct, and therefore more economic and efficient routes
- **New Walpole Substation** - Siting zones WLP4 and WLP5 have been identified as the emerging preferences (see **Chapter 9**). This was because the siting zones offer the greatest opportunity to limit the extent of environmental effects by co-location of the new Walpole converter stations with the new Walpole 400 kV substation. Co-location would also reduce the technical complexity during construction and operation and limit the length of connections for the Project and the proposed G2W Project. The siting zones also best align with the Horlock Rules and Holford Rules.
- **New LCS Converter Station** – of the 13 siting zones considered (DC1-DC13, as set out in **Chapter 10**) the zone identified as most suitable for the LCS converter station and DCSS was siting zone DC5. This siting zone offers the best opportunity to limit potential landscape and visual effects in-combination by aiming to co-locate infrastructure near the preferred LCS 400 kV substation (proposed as part of the G2W Project). Siting at DC5 would also help to reduce the potential for other environmental and socio-economic effects whilst minimising the length of underground cable required (from identified landfalls) as well as technical complexity

during construction and operation. The siting zones also best align with the Horlock Rules.

14.1.6 Following the identification of the preferred route corridor and preferred siting areas, a graduated swathe has been identified within these. The graduated swathe is a way of showing the areas within the emerging preferences 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.

14.1.7 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, siting zones and siting areas. The graduated swathe represents the current thinking on where the Project infrastructure may be located. 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.

14.2 Non-statutory Consultation

14.2.1 This report will be used as part of the non-statutory consultation and to facilitate engagement with key stakeholders, including landowners and the public. The non-statutory consultation will take place in Spring 2024.

14.2.2 The landfall, siting zone, siting area and corridor preferences 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.

14.3 Analysing Non-statutory Consultation Feedback

14.3.1 The feedback from non-statutory consultation will inform the further development of the Project. During the non-statutory consultation, feedback on the preferences identified in this report and on the graduated swathe will be gathered from consultation events and written feedback.

14.3.2 Information from surveys undertaken to obtain baseline data and ongoing design studies will also inform the development of the Project.

14.4 Defined Proposal and Statutory Consultation (Stage 3)

14.4.1 Following the completion of non-statutory consultation, including the analysis of the feedback, NGET will commence the Defined Proposal and Statutory Consultation Stage (Stage 3). As part of this, the design will be subject to an Environmental Impact Assessment (EIA), further statutory consultation, and iterative design development prior to submission of the application to the Planning Inspectorate for a Development Consent Order (DCO).

Appendix A

Option Selection

Appendix A Option Selection

Appendix B

Graduated
Swathe Plans

Appendix B Graduated Swathe Plans

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