VikingLink

nationalgrid

UK Onshore Scheme

Route Corridor Selection Report

VKL-08-06-G500-001

September 2016

Co-financed by the European Union
Connecting Europe Facility

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Contents

1 INTRODUCTION 1
1.1 About Viking Link 1
1.2 National Grid Viking Link Ltd 5
1.3 The UK Onshore Scheme 5
1.4 The Cable Route Corridor Selection Report 10
2 UNDERGROUND CABLES 11
2.1 What are DC Cables? 11
2.2 Installation of DC Cables 12
2.3 Summary 17
3 APPROACH TO ROUTEING 19
3.1 Introduction 19
3.2 Overview of Approach to Routeing 19
3.3 Technical & Engineering Considerations 21
3.4 Environmental & Planning Considerations 21
3.5 Stakeholder Engagement 22
4 ASSESSMENT OF CABLE ROUTE CORRIDORS 23
4.1 Identification of the Cable Route Search Area 23
4.2 Assessment of Route Corridor A 31
4.3 Assessment of Route Corridor B 49
4.4 Assessment of Route Corridor C 67
4.5 Assessment of Route Corridor D 78
4.6 Assessment of Route Corridor E 93
4.7 Route Corridor Options for Phase 2 Consultation 106
5 NEXT STEPS 115
5.1 Approach to Consultation 115
5.2 Next Steps 116
List of Abbreviations 137
Appendix A Sources of Information 141
Appendix B Stakeholder Engagement 143
Appendix C Thematic Constraints Plans 145
Appendix D Geology Description 227
Appendix E Soils 229

List of Tables

Table 2.1 Underground DC Cables – Summary of Key Characteristics 17
Table 3.1 Cable Routeing Summary of Technical & Engineering Considerations 21
Table 3.2 Cable Routeing Summary of Environmental Considerations 21
Table 4.1 Initial Cable Route Corridors 26
Table 4.2 Route Corridor A – Road and Infrastructure Crossings 33
Table 4.3 Route Corridor A – Watercourse Crossings 36
Table 4.4 Route Corridor A – Agricultural Land Classification 36
Table 4.5 Route Corridor A – Soil Associations 37
Table 4.6 Route Corridor A – Key Assessment Findings 44
Table 4.7 Route Corridor B – Infrastructure Crossings 51
Table 4.8 Route Corridor B – Watercourse Crossings 54
Table 4.9 Route Corridor B – Agricultural Land Classification 55
Table 4.10 Route Corridor B – Soil Associations 55
Table 4.11 Route Corridor B – Key Assessment Findings 61
Table 4.12 Route Corridor C – Infrastructure Crossings 68
Table 4.13 Route Corridor C – Watercourse Crossings 71
Table 4.14 Route Corridor C – Key Assessment Findings 75
Table 4.15 Route Corridor D – Infrastructure Crossings 80
Table 4.16 Route Corridor D – Watercourse Crossings 83
Table 4.17 Route Corridor D – Agricultural Land Classification 83
Table 4.18 Route Corridor D – Soil Associations 84
Table 4.19 Route Corridor D – Key Assessment Findings 89
Table 4.20 Route Corridor E – Infrastructure Crossings 94
Table 4.21 Route Corridor E – Watercourse Crossings 97
Table 4.22 Route Corridor E – Agricultural Land Classification 98
Table 4.23 Route Corridor E – Soil Associations 98
Table 4.24 Route Corridor E – Key Assessment Findings 102
Table 4.25 Route Corridor Options – Summary of Assessment 109
Table 5.1 Public Consultation Events 115

List of Figures

Figure 1.1 Overview of Viking Link 1
Figure 1.2 Existing and Planned Interconnectors to Great Britain 4
Figure 1.3 UK Onshore Scheme – Study Area 8
Figure 1.4 Approach to the development of the UK Onshore Scheme 9
Figure 2.1 Example of DC Cable 11

Figure 2.2 Indicative cross section of working width..... 12
Figure 2.3 Typical cable delivery vehicle 13
Figure 2.4 Cable installation..... 15
Figure 2.5 Cable jointing operation..... 16
Figure 3.1 Approach to Cable Routeing..... 20
Figure 4.1 Development of Cable Route Search Area..... 28
Figure 4.2 Cable Route Search Area..... 29
Figure 4.3 Initial Route Corridors..... 30
Figure 4.4 Route Corridor A 47
Figure 4.5 Refined Route Corridor A 48
Figure 4.6 Route Corridor B 65
Figure 4.7 Refined Route Corridor B 66
Figure 4.8 Route Corridor C 77
Figure 4.9 Route Corridor D 91
Figure 4.10 Refined Route Corridor D 92
Figure 4.11 Route Corridor E 104
Figure 4.12 Refined Route Corridor E 105
Figure 4.13 Purple Route Corridor..... 112
Figure 4.14 Orange Route Corridor 113
Figure 5.1 Phase 2 Consultation – Purple Route Corridor..... 117
Figure 5.2 Phase 2 Consultation – Orange Route Corridor 127

1 Introduction

1.1 About Viking Link

Background

1.1.1 Viking Link is a proposed 1400 megawatt (MW) high voltage Direct Current (DC) electricity link between the British and Danish electricity transmission networks connecting at the Bicker Fen 400 kilovolt (kV) substation in Lincolnshire and at the Revsing 400kV substation in south Jutland, Denmark. Viking Link will be approximately 760 km long and will allow electricity to be exchanged between Great Britain and Denmark equivalent to round 1.3% of Great Britain's current usage. It is being jointly developed by National Grid Viking Link Ltd (NGVL) and Energinet.dk (ENDK).

1.1.2 The project will involve installing high voltage DC onshore and offshore electricity transmission cables, a new converter station at each end of the link, and connections to the high voltage electricity transmission networks at existing substations in Bicker Fen, Great Britain and at Revsing in Denmark.

1.1.3 The existing electricity networks in Great Britain and Denmark both operate predominantly High Voltage Alternating Current (AC) electricity transmission systems. In order to transmit electricity between the two countries it must first be converted to high voltage DC. Interconnectors such as Viking Link use DC technology because it is more effective at transmitting large volumes of electricity over longer distances with lower energy losses than an equivalent AC system and also because a DC technology system provides a greater degree of control over the magnitude and direction of power flow. This flexibility brings operational benefits, however, in order to transmit electricity in DC form, specialist electrical equipment contained within a converter station is required to convert from AC to DC (or vice versa).

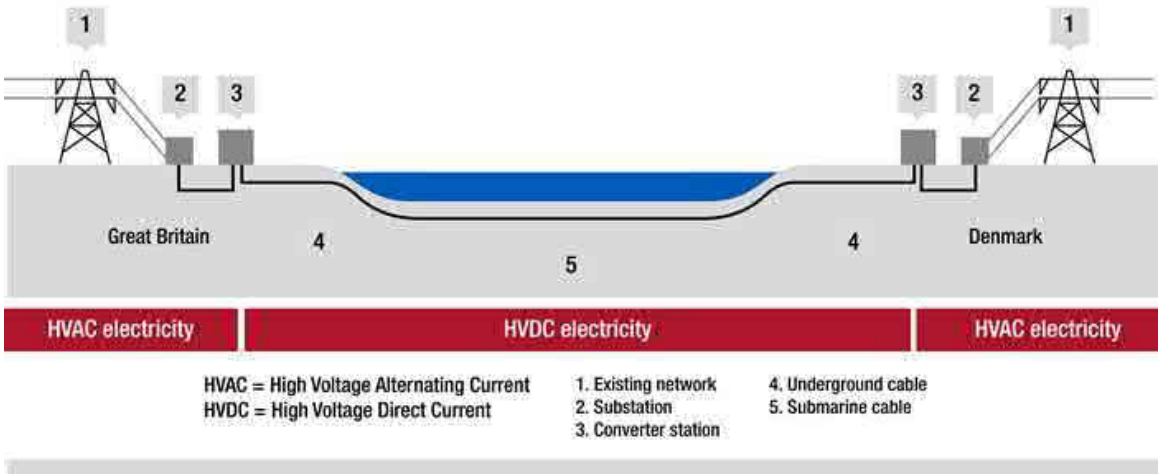

Figure 1.1 Overview of Viking Link

1.1.4 An overview of Viking Link (hereafter also referred to as 'the Project') is illustrated in Figure 1.1. It comprises converter stations in Great Britain and Denmark connected by approximately 760km of onshore and offshore DC electricity cables. More specifically the project comprises the following:

- In Denmark, referred to as the 'DK Onshore Scheme'.
  - New equipment within the existing Revsing 400 kV substation and connection to a new converter station;
  - New converter station to change electricity between AC and DC or vice versa depending on direction of operation;
  - Onshore underground high voltage DC cables from a converter station to the coast in western Denmark;
- In the North Sea (Danish, German, Dutch and English Exclusive Economic Zones (EEZ), referred to as respective country's 'Offshore Scheme'
  - Approximately 650 km of submarine high voltage DC cables buried in the seabed for as much of their length as practicable.
- In Great Britain, referred to as the 'UK Onshore Scheme' (hereafter also referred to as 'the Scheme'):
  - Onshore underground high voltage DC cables from the Lincolnshire coast to a new converter station;
  - New converter station to change electricity between DC and AC or vice versa depending on direction of operation;
  - AC cables from the converter station to new equipment within the existing Bicker Fen 400kV substation which connects to the electricity transmission system.

Why an Interconnector?

1.1.5 Electricity generation in Great Britain is undergoing fundamental change and modernisation as existing fossil fuel power stations are approaching the end of their operational lives and new sources of generation are coming on stream. Interconnectors can play a key role in supporting this transition by providing additional generation capacity and allowing electricity to be imported when it is needed but when generation isn't needed, allowing electricity to be exported and sold overseas.

1.1.6 Linking with other countries' electricity transmission networks provides the opportunity to increase the diversity and security of the country's energy supplies, increase competition and allow lower prices to be passed on to consumers as well as help the transition to a low carbon energy sector by integrating renewable energy sources. By connecting to Denmark, which is aiming for half of the electricity it uses to come from renewable sources by 2020, Viking Link will provide access to a well-developed and low cost renewable energy market helping Great Britain to meet carbon reduction commitments as well as diversifying and securing its energy supplies.

1.1.7 Great Britain currently has four interconnectors (see Figure 1.2) which provide around 5% of the country's total generation capacity (based on 2014). This includes a 2000 MW link to France (IFA) and a 1000 MW link to the Netherlands (BritNed); 500 MW link to Northern Ireland (Moyle) and 500 MW link to the Republic of Ireland (East-West). In order to reach a European Union (EU) benchmark for member states to have electricity interconnection equivalent to at least 10% of production capacity by 2020, Great Britain needs to double its interconnector capacity. In addition to Viking Link, proposals are being developed by National Grid for a number of other interconnectors with European neighbours (see Figure 1.2) including Belgium (Nemo Link), Norway (North Sea Link), Iceland (IceLink) and France (IFA2). In combination these interconnectors could unlock up to £1bn of benefits for energy consumers. Failure to double existing interconnector capacity could be equivalent to foregoing a wholesale electricity price reduction of nearly £3 million every day.

1.1.8 Further information on interconnectors can be found in Getting More Connected[1], a paper prepared by National Grid setting out the opportunities presented by interconnector development as well as in Smart Power[2], a report prepared by the National Infrastructure Commission (NIC) to help ensure that the country's electricity system is fit for the future.

Project of Common Interest

1.1.9 The European Commission has developed guidelines to assist in the development of energy networks within Europe. These networks will play an important role in ensuring an efficient energy market within Europe and the security and diversification of energy supply. These guidelines are known as the TEN-E Regulation[3]. They set out guidance for streamlining the permitting process for major energy infrastructure projects that contribute to European energy networks. These projects are referred to as Projects of Common Interest (PCI).

1.1.10 Viking Link has been confirmed as a PCI under the TEN-E Regulation. This means it should deliver benefits for at least two European Member States, further support market integration and competition, enhance security of energy supply, and contribute to reducing CO_2 emissions.

[1] Getting More Connected available from http://www2.nationalgrid.com/About-us/European-business-development/Interconnectors/

[2] Smart Power available from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/505218/IC_Energy_Report_web.pdf

[3] EU Regulation 347/2013 on guidelines for trans-European energy infrastructure (TEN-E Regulation) came into force on 17 April 2013. The TEN-E Regulation helps build and finance the EU's priority energy infrastructure projects in order to connect EU countries currently isolated from European energy markets, strengthen existing cross border interconnections, and help integrate renewable energy supply.

Figure 1.2 Existing and Planned Interconnectors to Great Britain

EU Referendum Result

1.1.11 The outcome of the EU referendum in June 2016 does not influence the plans to build and operate Viking Link. NGVL and ENDK believe that there is a strong business case for the development of the interconnector. NGVL remains fully committed to the project as it serves to deliver significant benefits by ensuring a more secure, sustainable and affordable source of electricity to consumers in Great Britain.

1.2 National Grid Viking Link Ltd

1.2.1 NGVL is a wholly owned subsidiary of National Grid Interconnector Holdings Limited (NGIHL). NGVL is part of the National Grid group of companies but is separate from National Grid Electricity Transmission (NGET) which operates the high voltage transmission network in Great Britain and owns the high voltage transmission network in England and Wales. NGET operates under an electricity transmission licence granted under the Electricity Act 1989.

1.2.2 As a separate company, NGVL operates under a separate electricity interconnector licence which was granted by Ofgem in 2014. As separate companies, interactions between NGVL and NGET are undertaken on an 'arm's length' basis and are bound by business separation obligations enforced by Ofgem.

1.3 The UK Onshore Scheme

Identification of the Connection Point

1.3.1 Viking Link is required to follow the same process that any other developer seeking to connect to the National Electricity Transmission System (NETS) would. To secure a connection, Viking Link applied to NGET for a connection offer. Viking Link in conjunction with NGET explored possible connection points. As part of this NGET had to consider what system reinforcement would need to be built to support the connection of Viking Link, such as new overhead lines and substation developments, and identify the most efficient solution in order to manage costs to consumers.

1.3.2 Bicker Fen 400 kV substation was identified as the Connection Point to the NETS which would best achieve an appropriate balance between the technical, economic and environmental obligations applicable to both NGET and the Viking Link project.

1.3.3 For more information on the selection of the Bicker Fen 400 kV substation as the Connection Point to the NETS refer to 'National Grid Viking Link Limited GB-Denmark Interconnector Project (Viking Link) Strategic Options Report'[4].

Description of the UK Onshore Scheme

1.3.4 As noted above the UK Onshore Scheme will comprise the following components:

[4] NGVL Strategic Options Report available from http://viking-link.com/

- Subject to survey a landfall located at Sandilands in East Lindsey, Lincolnshire (known as LF1A[5]). This is where the two offshore (submarine) high voltage DC cables transition to onshore high voltage DC cables at an underground Transition Joint Pit (TJP);
- An underground high voltage DC cable route (comprising two DC cables and an optional fibre optic cable) from the landfall to a converter station located within the cable routeing search area;
- Subject to survey a converter station located on North Ing Drove in South Holland, Lincolnshire (known as CS1[5]) connecting to the existing Bicker Fen 400 kV substation;
- An underground AC cable route from the converter station to Bicker Fen 400 kV substation; and
- Specialist equipment facilitating the connection within the existing Bicker Fen 400 kV substation.

1.3.5 All of the components of the UK Onshore Scheme will require planning permission under the Town and Country Planning Act 1990. The specifics of the planning application including the Local Planning Authorities (LPAs) who shall be responsible for its determination will depend on final design of the UK Onshore Scheme. The study area, including the locations of the preferred landfall and converter station sites, is illustrated in Figure 1.3. Due to the linear nature and scale of the project it is acknowledged that multiple LPAs will be involved in determining any planning application(s). Submission of planning application(s) to the relevant LPAs is anticipated in summer 2017.

1.3.6 As noted above Viking Link has also been accepted as a PCI in accordance with the European Union's Trans-European Energy Regulation (the TEN-E Regulation). Under the TEN-E Regulation, Member States are required to designate a National Competent Authority (NCA), who is responsible for coordinating the permitting process for PCIs. In the case of Viking Link, the UK NCA role has been delegated by the Secretary of State for Energy to the Marine Management Organisation (MMO). It is important to note that their role does not replace that of the relevant LPAs in the decision making process, their role as NCA is to coordinate the decision making process with the relevant LPA's in the UK and other jurisdictions affected by Viking Link.

The Development of the UK Onshore Scheme

1.3.7 The overall approach to the development of the UK Onshore Scheme including some of the specialist studies and consultation activities which will inform its design from initial site identification and assessment of alternatives through cable routeing to Environmental Impact Assessment (EIA) and design are illustrated in Figure 1.4.

1.3.8 The development of the UK Onshore Scheme comprises two steps; firstly, the identification and assessment of alternative landfall and converter station sites (Siting) and secondly the identification and assessment of alternative cable routes (Routeing). The approach to identifying

[5] UK Onshore Scheme Site Selection Report available from http://viking-link.com/documents

and assessing alternative sites and routes promotes the integrated and iterative consideration of potential impacts on the environment and local communities alongside technical and engineering feasibility and aims to identify sites or routes which best balance these factors.

1.3.9 The first step, identification of the landfall and converter station sites has been completed. The identification and detailed assessment of alternative landfall and converter station sites is described in the Site Selection Report[6]. This was published in April 2016 after which there was a period of consultation (referred to as the UK Onshore Scheme Phase 1 Consultation) with local communities and stakeholders. Feedback received was considered alongside the results of environmental and technical assessments and informed the selection of the preferred landfall site at Sandilands in East Lindsey (known as LF1A) and the preferred converter station site at North Ing Drove in South Holland (known as CS1). The results of the UK Onshore Scheme Phase 1 Consultation are set out in the UK Onshore Scheme Phase 1 Consultation Feedback Report[7] and selection of the preferred sites described in the Preferred Sites Report[8], both of which were published in August 2016.

1.3.10 This Report describes the results of the second step in the development of the UK Onshore Scheme, the identification and assessment of alternative cable route corridors (Routeing).

[6] Site Selection Report available from http://www.viking-link.com/documents/

[7] Phase 1 Consultation Feedback Report available from http://www.viking-link.com/documents/

[8] Preferred Site Report available from http://www.viking-link.com/documents/

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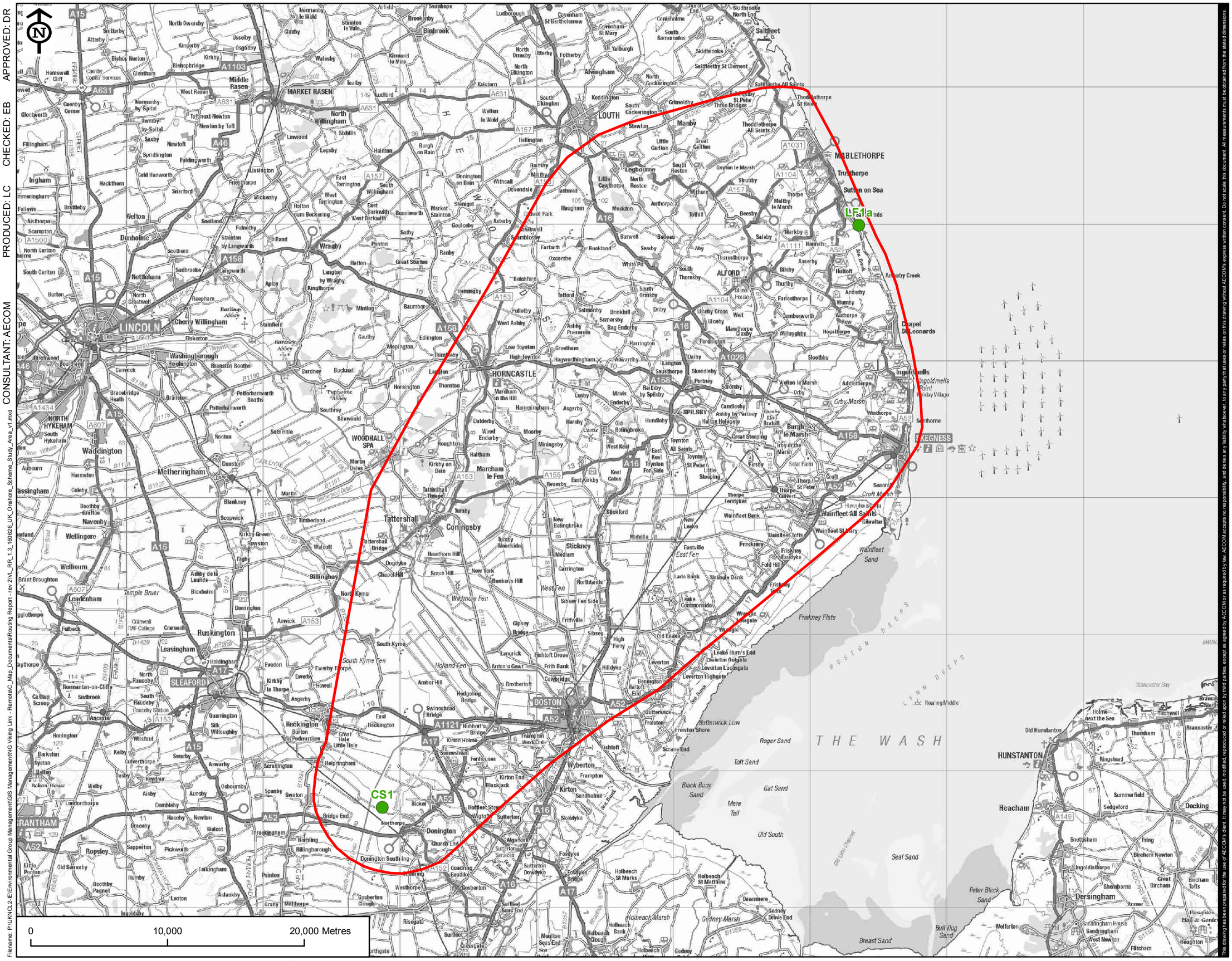

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LEGEND

- UK Onshore Scheme Study Area
- Preferred Landfall and Converter Station Site

REVISION:

REV.	DATE	DESCRIPTION
1	26/08/16	ORIGINAL ISSUE

FIGURE NO.

VL_160826_RR1.3

FIGURE TITLE

FIGURE 1.3
UK ONSURE SCHEME
STUDY AREA

SHEET NUMBER

1 of 1

NOTES

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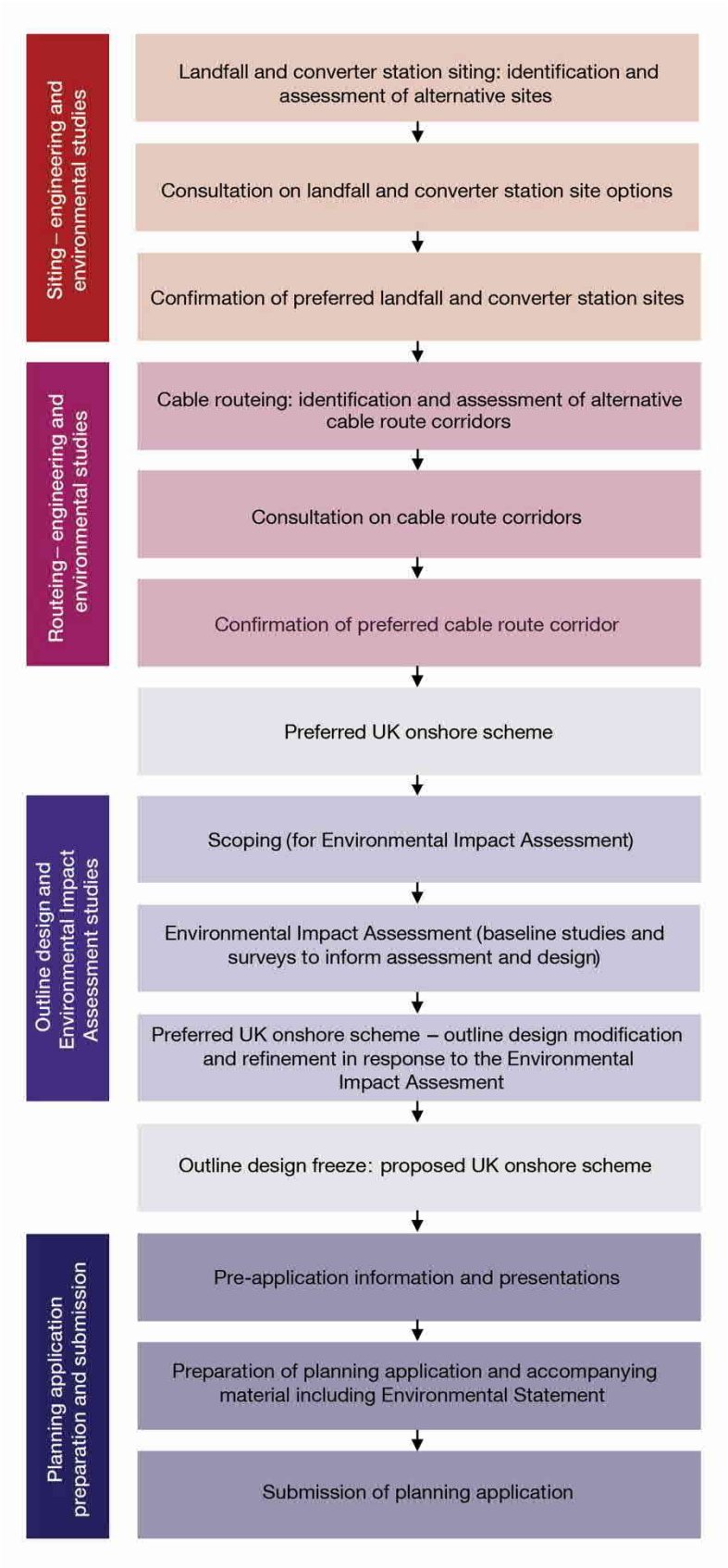

Figure 1.4 Approach to the development of the UK Onshore Scheme

1.4 The Cable Route Corridor Selection Report

Purpose of the Report

1.4.1 This Route Corridor Selection Report describes the work undertaken to identify and assess suitable route corridors within which the onshore cables could be developed. It is intended to provide information on the approach to and findings of the routeing assessment and support consultation (referred to as UK Onshore Scheme Phase 2 Consultation) with local communities and stakeholders.

Overview of the Approach to Cable Route Corridor Selection

1.4.2 A staged approach has been taken to cable route corridor selection, taking into account consideration of potential impacts on the environment and the local community, extant and emerging planning policy, other existing and proposed developments as well as technical and engineering design information. The aim of the approach is to balance consideration of these factors and identify potential route corridors within which the detailed alignment of the onshore cables could be finalised.

1.4.3 The iterative nature of the assessment process means that a slightly different approach has been applied for the underground cable route corridors, which will accommodate a linear development where no permanent above ground structures are proposed, than for the approaches taken to landfall and converter station site selection. Details of the approach taken are set out in the latter sections of this report.

1.4.4 The outcome of the RCSR is a shortlist of potential underground cable route corridors which are technically feasible (i.e. within which the DC cables can be installed) and on which NGVL wish to seek feedback from local communities and stakeholder organisations as part of UK Onshore Scheme Phase 2 Consultation.

Report Structure

1.4.5 The exact structure of the report is as follows:

- Chapter 1. Introduction – provides an introduction to Viking Link including its purpose and components as well as providing general background information about interconnectors and the development of the UK Onshore Scheme.
- Chapter 2. Underground Cables – sets out the key details about underground cables including physical characteristics and potential installation methods.
- Chapter 3. Approach to Routeing – provides a description of the approach to the iterative development and assessment of potential route corridors.
- Chapter 4. Assessment of Cable Route Corridors – identifies and assesses potential cable route corridors taking account of technical and environmental factors.
- Chapter 5. Next Steps – sets out the approach to consultation and how the results will be taken into account in developing the design of the UK Onshore Scheme.

2 Underground Cables

2.1 What are DC Cables?

2.1.1 Viking Link will comprise what is termed a "bipole converter station configuration", with two DC cables installed alongside each other. Bipole systems transmit power through two high voltage conductors of opposite polarity, in this instance +500 kilovolts (kV) and - 500 kV. The UK Onshore Scheme comprises two DC cables and an optional fibre optic cable all laid within a single trench (or where constraints dictate pulled through ducts). The term underground cable route is used throughout this report and refers to both DC cables and the optional fibre optic cable.

Figure 2.1 Example of DC Cable

(DC cables can be provided in XLPE (Cross-linked Polyethylene Extruded) and MI (Mass Impregnated) technologies. The image above is of a section of XLPE DC cable.

2.2 Installation of DC Cables

Working Width

2.2.1 Cable installation requires a typical working width up to 30m wide to be established along the length of the cable route to facilitate construction activities, however, land take would be increased at certain locations where temporary facilities are required for example for trenchless crossings and compounds or laydown areas.

2.2.2 Figure 2.2 illustrates an indicative cross section of the working width. The exact arrangement will depend on site specific constraints and engineering requirements but will typically comprise:

- Storage areas for topsoil stripped from the working width.
- Drainage measures
- Temporary haul road for the movement of installation traffic.
- Cable installation trench approximately 1.5m deep and 1.5m wide (subject to design).
- Storage areas for excavated material.
- Other mitigation measures as necessary.

2.2.3 The working width will be fenced to demarcate the working area and secure it from livestock where required.

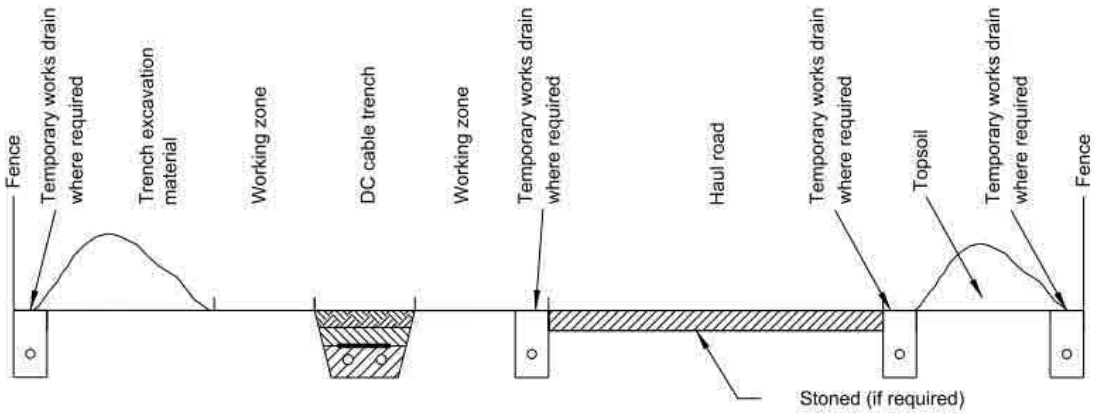

Figure 2.2 Indicative cross section of working width

(Location and number of temporary works drains will vary depending on ground conditions)

Cable Delivery and Access Requirements

2.2.4 Access will be required for cable delivery vehicles (see example in Figure 2.3) at regular intervals along the underground cable route. The number of vehicle movements and specific access routes will depend on the cable route. Estimates of vehicle movements and details of access routes will be developed in parallel with the design of the UK Onshore Scheme.

2.2.5 The length of cable carried and therefore the weight of the vehicles will vary but assuming a maximum cable length of 1 km, vehicles could carry cable drums weighing up to 48 tonnes. Due

to their weight the cable delivery vehicles would be restricted to suitable public highways. An area of hardstanding (approximately 20m by 20m) would be required at selected cable pulling positions which are likely to be located close to where the route crosses roads. The hardstandings will allow the cable delivery vehicles to pull off the road for cable drum delivery and for a crane to enable offloading of cable sections from trailers.

2.2.6 Access will be required to the cable working areas for construction plant and equipment including mechanical excavators, bulldozers, dumpers, aggregate lorries (for Cement Bound Sand, haul road materials and other materials if required). Access will be required to the cable joint bays for concrete lorries and cabins for the jointing works.

2.2.7 Where trenchless methods such as Horizontal Directional Drilling (HDD) are required access will be required for the specialist equipment. For HDD this includes a drilling rig, drill pipe, HDD control cabinet, power packs, mud pump, diesel tank and generators, drill mud mixing tank, and management system, storage containers and workshop; and cabins for staff office and welfare facilities.

Figure 2.3 Typical cable delivery vehicle

(Image reproduced with permission of Allelys Group - photo taken from Western Link Project)

Installation Methods

2.2.8 Cable installation will typically involve the following activities:

- Open cut/direct lay: this is where a trench is excavated by a mechanical excavator and the underground cables laid directly into the trench. Both DC cables and the optional fibre optic cable would be installed in one trench. The trench would then be backfilled using a combination of cement bound sand (CBS), polymeric protection tiles and excavated soils and land reinstated.
- Trenchless methods such as HDD or pipe jacking (auger bore or micro bore): these are used where obstacles are encountered for example watercourses, railways or roads. HDD involves the use of a drill to bore a route below the ground through which ducts will be pulled and cables installed.

2.2.9 Primarily the underground cable route will be installed using open cut methods, however where obstacles such as roads, watercourses, railway lines and other utilities need to be crossed, trenchless methods will be considered. Routeing would aim to minimise the number of trenchless crossings required.

2.2.10 Existing infrastructure such as pipelines, other cables (existing and proposed), railway lines (operational and disused/dismantled), roads, watercourses and canals that would need to be crossed during cable installation along a potential route corridor has therefore been noted as part of this assessment.

Figure 2.4 Cable installation

Cable Depth

2.2.11 For typical open cut installation across agricultural land, the cable will be installed within a trench approximately 1.5m deep with a minimum depth of cover of 1050mm (1.05m). Protective tiles will be placed above the cable at a minimum depth of 900mm. This depth may vary depending on the depth of land drainage and other buried services. Where cable is installed within or alongside roads the cable depth is typically shallower (750mm to top of protective cover) depending on the presence of other services. Alternative installation methods will be used depending on the infrastructure being crossed.

2.2.12 The deeper the cable is buried the less efficient the heat dissipation which affects the efficiency of the cable to transmit electricity. Where trenchless installation methods are used (e.g. when crossing natural obstacles such as rivers, or other infrastructure such as railway lines) this also affects the efficiency of the cable due to the cable being installed deeper than normal as well as the cable being contained within a duct.

2.2.13 A balance needs to be achieved such that the depth of the cable installation provides protection to the cable and the land use or obstacles being crossed, allows the cable to operate efficiently and, as much as possible, does not significantly affect existing agricultural land use or management and maintenance of other infrastructure. This balance is a key design consideration in ensuring that Viking Link provides the capacity to import/export 1400 MW of electricity.

Cable Jointing

2.2.14 Adjacent cable sections are installed in the trench (and/or pulled through ducts) and are connected together at joint bays. The exact number of joint bays will depend on the cable route

and constraints present. The dimensions of joint bays vary depending on the cable manufacturers final design, however, for the purpose of this assessment an area of excavation approximately 15 m by 5 m has been assumed with a concrete slab (or similar) installed providing a clean base for jointing operations.

2.2.15 Jointing operations require clean and dry conditions, so covers or cabins will be temporarily erected at jointing locations. Due to the precise nature of engineering employed, joint bays could remain open for several weeks to allow for trench and joint bay excavation, cable pulling, jointing and reinstatement. No permanent above ground structures will be required at joint bays.

Figure 2.5 Cable jointing operation

Other Temporary Construction Requirements

2.2.16 Installation works will require temporary construction facilities to be established at various locations along the underground cable route. These may result in a wider working area adjacent to the working width in some sections or require temporary land take “off site” separate from the working width. This includes temporary access to the working width, areas required for water management and / or drainage and temporary compounds for storage, lay-down, site offices and welfare facilities.

Reinstatement

2.2.17 The cable working width and temporary construction areas will be reinstated following construction and returned to their original use. NGVL will retain a right of access to a 15 m wide permanent easement above the cables for monitoring and maintenance. Above ground markers

will be required to identify the location of joint bays, and along the cable route at field boundaries, asset crossings and where there are changes in direction however, no inspection chambers or manhole covers will be required along the DC cable route.

2.3 Summary

2.3.1 The exact configuration of the underground cable route depends on a number of factors including the constraints or obstacles which are present, prevailing ground conditions, the length of each cable section, suitability of jointing positions as well as the number of bends and topography of the route. The selection of a preferred cable routeing corridor therefore requires a thorough review of a wide range of technical factors as well as environmental constraints.

2.3.2 Table 2.1 provides a summary of the key technical and physical characteristics of underground DC cables.

Table 2.1 Underground DC Cables – Summary of Key Characteristics

Factor	Description
Working width	Up to 30 m
Trench width/depth	Approximately 1.5 m wide and up to 1.5 m deep*
Joint bay footprint	Approximately 75 m^2 (based on 15 m by 5 m)
Operating voltage	500 kV
Cable diameter	Up to 150 mm (to outer edge)
Weight of cable	40-50 kg/m
Bending radius	Approximately 3.5 m radius (subject to cable manufacturer)
Trench Backfill material	Variable – excavated soil and sub-soil and cement bound sand

* Note the depth and width are subject to local ground conditions, drainage and presence of other utilities.

3 Approach to Routeing

3.1 Introduction

3.1.1 The overall objective of the route corridor assessment is the identification of potential cable route corridor options which are considered to best balance reducing impacts on the environment and the local community with technical and engineering feasibility. Potential cable route corridors will then be taken forward to the UK Onshore Scheme Phase 2 Consultation with the local community and stakeholders with feedback received used to identify a preferred route corridor and inform the development of a detailed cable route.

3.2 Overview of Approach to Routeing

3.2.1 The approach to cable routeing is illustrated in Figure 3.1. It promotes the integrated and iterative consideration of potential impacts on the environment and local communities alongside technical and engineering feasibility. From the outset it is recognised that early consideration of environmental impacts provides an effective opportunity for mitigation through route corridor identification and selection and subsequently through detailed cable routeing, design and installation. The approach comprises three steps:

- Step 1 – Identification of Cable Route Search Area: identification of a search area based on the preferred landfall and converter station sites and taking into account environmental constraints including designated sites (landscape, ecology and archaeology), physical constraints, communities as well as proximity to the road network.
- Step 2 – Development and assessment of cable route corridors: identification and assessment of potential cable route corridors considering potential impacts on the environment and local community alongside basic technical and engineering factors including installation methods and access requirements.
- Step 3 – Development of route alignment: identification of a preferred cable route corridor and development of a final cable route taking into account feedback received from the UK Onshore Scheme Phase 2 Consultation as well as further consideration of impacts on the environment and local communities along detailed technical and engineering requirements.

3.2.2 This report describes the process up to and including Step 2, the output of which is alternative cable route corridor options typically up to 1km wide (unless constraints present require them to be narrower) which will be taken forward to the UK Onshore Scheme Phase 2 Consultation. The results of this consultation will be considered as part of Step 3 and be used to select a preferred route corridor and inform the development of the cable route which will form part of the final design of the UK Onshore Scheme.

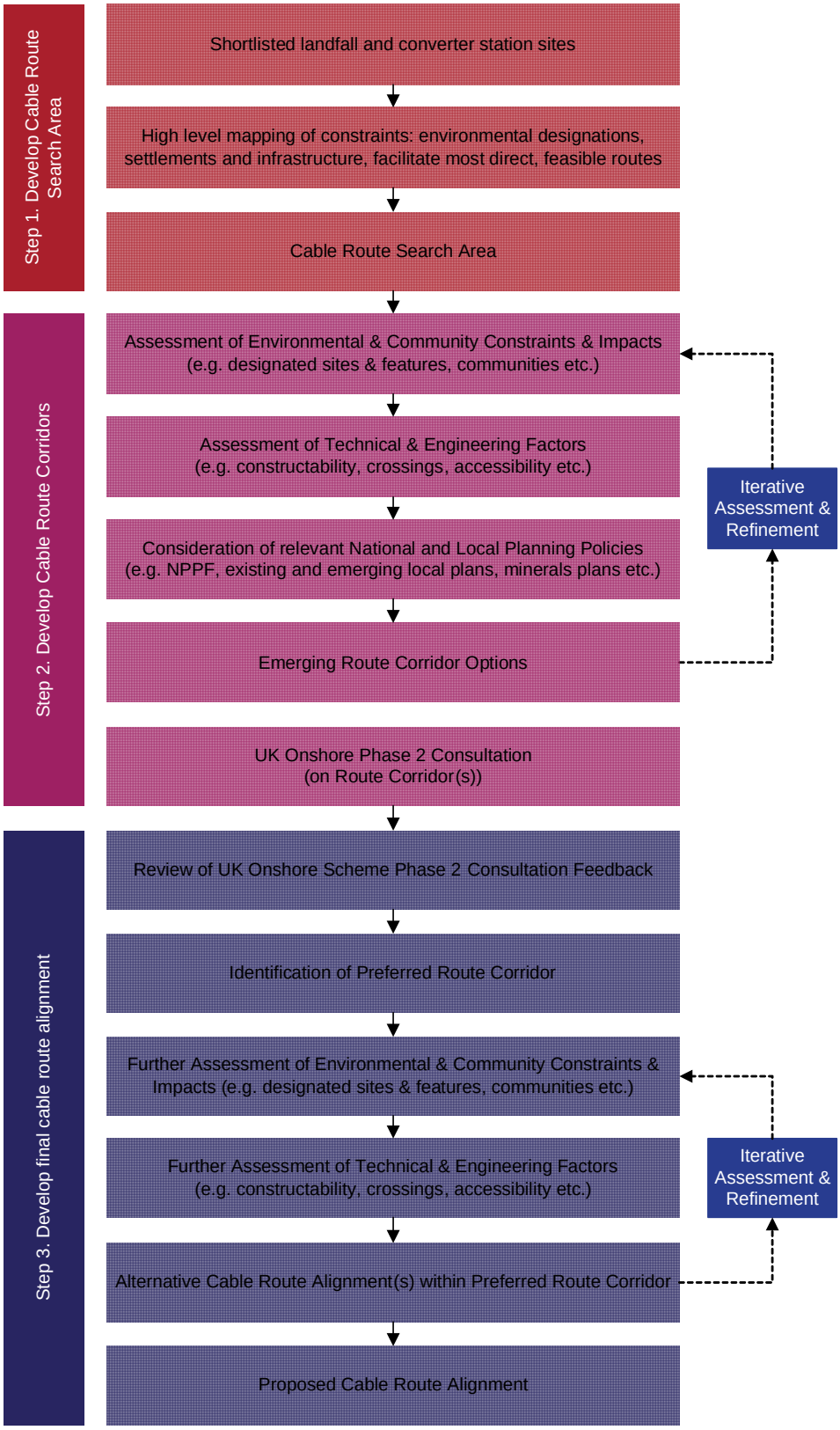

Figure 3.1 Approach to Cable Routeing

3.3 Technical & Engineering Considerations

3.3.1 Based on the description of underground cables including installation methods and temporary requirements described in Chapter 2, Table 3.1 sets out the key technical and engineering considerations which inform the identification and assessment of potential route corridors.

Table 3.1 Cable Routeing Summary of Technical & Engineering Considerations

Technical aspect	Key considerations
Constructability	Considers the feasibility of cable installation taking into account potential physical and environmental constraints to construction including topography (steep slopes) or other obstacles to be crossed including watercourses, roads, railways and other infrastructure.
Working area requirements	Considers the capability and suitability of the route corridor to accommodate construction footprint including the working width and other temporary facilities.
Accessibility	Considers accessibility for construction taking into account the local road network, proximity to the nearest A road, obstacles to construction access and the potential need for additional "off-site" access to the working areas.

3.4 Environmental & Planning Considerations

3.4.1 Table 3.2 sets out the key environmental considerations which inform the identification and assessment of potential route corridors. This includes consideration of the physical environment including built and natural heritage as well as potential impacts on local communities and key land uses. The assessment has been informed by a combination of a desk study of published information as well as site surveys in order to gain appreciation of the study area.

Table 3.2 Cable Routeing Summary of Environmental Considerations

Environmental aspect	Key considerations
Settlement, Community & Tourism	Considers settlements and recreational facilities within or close to potential route corridor and the proximity of potential visual receptors and Noise Sensitive Receptors (NSRs) (inc. local community and visitors/tourists). This includes the extent to which they may be affected during cable installation by noise as well as visual impacts.
Geology & Hydrogeology	Considers the solid and drift geology along the potential route corridor and to what extent it may pose an engineering constraint. This includes considering the potential to affect groundwater, designated sites (RIGS and SSSIs), Mineral Safeguard Areas, and the risk of encountering contaminated land and Unexploded Ordnance (UXO).

Table 3.2 Cable Routeing Summary of Environmental Considerations	
Environmental aspect	**Key considerations**
Hydrology	Considers the proximity to, or extent of potential route corridors within flood risk zones as well as the locations of watercourses, drains or other surface water features, including the presence of flood defences and how they may require to be crossed.
Agriculture & Soils	Considers the potential temporary loss of agricultural land taking into account Agricultural Land Classification and soil characteristics including type of soil resource and its vulnerability as well as the presence of any agri-environment stewardship schemes.
Landscape	Considers the potential to affect landscape designations including AONBs, AGLVs and registered parks and gardens as well as landscape character and key features which contribute to landscape quality within the route corridors.
Ecology	Considers the potential to directly affect ecological interests including designated and non-designated sites, priority and other important habitats such as woodland and grazing marshes as a result of cable installation works.
Archaeology & Heritage	Considers the potential of route corridors to affect designated and non-designated archaeological or heritage assets both directly (physical impacts) and indirectly (setting impacts) as well as the potential to encounter unrecorded archaeology.

3.4.2 In addition to the above consideration has also been given to planning issues. This has comprised a review of key extant and emerging national/local planning policy and other material considerations that may influence the feasibility of potential cable route corridors.

3.5 Stakeholder Engagement

3.5.1 As illustrated in Figure 3.1, stakeholder engagement with key parties including LPAs, statutory bodies and stakeholder organisations has helped to inform the development and assessment of route corridors. NGVL understands the importance and value of the early involvement of stakeholders in the development and assessment of potential route corridor options.

3.5.2 Stakeholder engagement to date has comprised workshops to explain the emerging findings of route corridor selection studies which were being undertaken in order to gain initial informal feedback and ensure routeing considerations were focused on appropriate issues.

3.5.3 A full list of stakeholders with whom NGVL have met and discussed the project with is contained within Appendix B.

4 Assessment of Cable Route Corridors

4.1 Identification of the Cable Route Search Area

Overview

4.1.1 At the outset of the development of the UK Onshore Scheme a large study area was established as illustrated in Figure 1.3. In order to ensure underground cable routeing was appropriately focused a review of the study area was undertaken. As a result of the review, a Cable Route Search Area was identified which would facilitate the development of alternative route corridors between the landfall and converter station. The development of the Cable Route Search Area considered the following:

- Phase 1 Consultation Landfalls and Converter Station: the locations of the shortlisted landfalls and converter stations which were taken forward to Phase 1 Consultation.
- Major environmental designations: the location and distribution of statutory designated sites including landscape, ecological and heritage designations within the study area.
- Areas of settlement and the primary road network: the geographic size, location and distribution of settlements within the study area as well as the location of A-roads.
- Physical environmental constraints: including consideration of topography, major watercourses and areas of flood risk within the study area.

UK Onshore Scheme Phase 1 Consultation Landfalls and Converter Stations

4.1.2 In April 2016 NGVL published a Site Selection Report (SSR)[9]. This described the results of an assessment of potential landfall and converter station sites and identified shortlists of potential landfall (LF1a, LF1 and LF2) and converter station (CS1, CS3, CS5, and CS9) sites which were taken forward to Phase 1 Consultation. These shortlisted sites were used as a starting point for developing the extents of the Cable Route Search Area.

4.1.3 Landfalls LF1a, LF1 and LF2 (see Figure 4.1) are located to the north east of the study area and occupy a relatively short section of the Lincolnshire coastline approximately 5km long from Sandilands in the north to Anderby in the south. This section of the coastline forms the eastern extent of the Cable Route Search Area.

- LF1a - this landfall site is located on a strip of coastline approximately 450 m long, located 0.5 km south of the village of Sandilands.
- LF1 - this landfall site is located on a strip of coastline approximately 2 km in length, 3.5 km north east of the village of Huttoft.

[9] UK Onshore Scheme Site Selection Report available from http://viking-link.com/documents

- LF2 - this landfall site is located on a strip of coastline approximately 950 m long. LF2 lies to the south of LF1.

4.1.4 Converter stations CS1, CS3, CS5 and CS9 (see Figure 4.1) lie to the south west of the study area. All of the shortlisted converter station sites are located within 5km of the connection point to the electricity transmission network at Bicker Fen 400 kV substation.

- CS1 – the site lies approximately 1.2 km to the south/ south west of the connection point to Bicker Fen 400kV Substation and is located within South Holland District Council's (SHDC) area. It occupies an approximate area of 28.11 ha over one field.
- CS3 – the site lies approximately 2 km to the north of and is located within Boston Borough Council's (BBC) area. It occupies an approximate area of 8.84 ha split over two fields.
- CS5 – the site lies approximately 2.9 km north-east of the connection point to Bicker Fen 400kV Substation and is located within BBC's area. The site has an irregular shape occupying an approximate area of 47.2 ha split over three fields.
- CS9 – the site lies immediately adjacent to the connection point to Bicker Fen 400kV Substation and is located within BBC's administration. It occupies an area of approximately 11 ha comprising one field.

Major Environmental Designations

4.1.5 There are a number of statutory environmental designations located within and adjacent to the study area as illustrated in Figure 4.1. This includes the Lincolnshire Wolds Area of Outstanding Natural Beauty, Saltfleetby-Theddlethorpe Dunes & Gibraltar Point Special Area of Conservation (SAC), Saltfleetby - Theddlethorpe Dunes Sites of Special Scientific Interest (SSSI), Humber Estuary Special Protection Area (SPA), The Wash SPA, Willoughby, Hoplands, Fulsby and Troy Woods SSSIs as well as a significant number of Scheduled Monuments. In developing the Cable Route Search Area consideration has been given to the location and distribution of these and the extent to which the designated sites or their designated features can be avoided during the development of cable route corridors. The majority of designated sites such as Sites of Special Scientific Interest (SSSI) or Scheduled Monuments occupy relatively small or discrete areas and can be avoided in developing cable route corridors. The Lincolnshire Wolds AONB, however, occupies a significant area with over 66km^2 extending into the study area. One of the aims of routeing is to avoid designated sites where possible, where this is not possible routeing must take into account the features and interests of the designated site with the aim of reducing potential impacts as much as possible. In the case of the Lincolnshire Wolds AONB, given the underground nature of the cable, it was decided to include the southern section of the AONB in the Cable Route Search Area. This allows for the development and assessment of potential route corridors within the AONB whilst taking account of the important landscape features which contribute to its designation.

Areas of Settlement and the Primary Road Network

4.1.6 There are a significant number of settlements within the study area ranging in size from isolated individual properties to small villages and larger towns (see Figure 4.1). In developing the Cable Route Search Area consideration has been given to the location and distribution of these and the extent to which they can be avoided during the development of cable route corridor options. It is preferable to avoid settlements as much as possible in order to reduce the potential for temporary disturbance during installation (for example, temporary noise and visual impacts as well as impacts resulting from construction traffic).

4.1.7 There are a number of A-class roads present within the study area and these are highlighted in Figure 4.1. In developing the Cable Route Search Area a key consideration has been ensuring that it is accessible from A-roads for as much of its length as possible. Access is variable throughout the search area with a number of A-roads criss-crossing particularly to its eastern and western extents close to the landfall and converter station respectively. Notable roads which form the strategic road network in the study area include the A16, A17, A52 and A158.

Physical Environmental Constraints

4.1.8 The physical environmental features which have been considered in developing the Cable Route Search Area include topography and watercourses. Whilst in broad terms land within the study area is predominantly flat it does gently rise up away from the coast towards the north-west of study area. Elevation ranges between approximately 0 and 150 m Above Ordinance Datum (AOD).

4.1.9 There are a considerable number of watercourses and drains located throughout the study area. As a result it is not possible to avoid all of the watercourses and drains in developing cable route corridors but an important consideration is reducing the total number of crossings a route corridor might require. As illustrated in Figure 4.1 the number of watercourses is much higher to the east and south of the study area closer to the coast. This also corresponds to areas which are generally at a higher risk of flooding.

The Cable Route Search Area

4.1.10 The Cable Route Search Area which resulted from the review of the UK Onshore Scheme study area is illustrated in Figure 4.2. It occupies an area of almost 600km^2 and extends for approximately 60 km from the Lincolnshire coast in the east to Bicker Fen in the west. The Cable Route Search Area allows for the development of alternative route corridors between any of the shortlisted landfalls and converter stations taken forward to the UK Onshore Scheme Phase 1 Consultation whilst considering environmental and technical constraints including:

- Landscape constraints: included consideration of the Lincolnshire Wolds AONB and Area of Great Landscape Value (AGLV), registered Parks and Gardens as well as landscape character with the aim of developing route corridors which avoid important landscape features.

- Archaeological and heritage constraints: included consideration of designated heritage assets including scheduled monuments and listed buildings with the aim of developing route corridors which ensure direct impacts on designated assets are avoidable.
- Ecological constraints: included consideration of designated sites as well as other areas or features of ecological importance such as priority habitats with the aim of developing route corridors which ensure impacts on ecological interests are avoidable or can be reduced.
- Agricultural constraints: included consideration of Agricultural Land Classification and agri-environment schemes with the aim of developing route corridors which provide opportunities to avoid or reduce impacts on agricultural interests.
- Geological constraints: included consideration of geological and hydrogeological interests and risks including SSSIs, RIGS and mineral safeguarding areas with the aim of developing route corridors which provide opportunities to avoid or reduce direct impacts.
- Settlement constraints: included consideration of settlement and tourism interests with the aim of developing route corridors which provide opportunities to avoid sensitive areas and reduce impacts as much as possible.
- Access constraints: included consideration of the primary road network with the aim of ensuring the number of crossing points are reduced or are sensitively positioned as well as providing opportunities for access to route corridors.

Initial Route Corridors

4.1.11 A review of the Cable Route Search Area resulted in the identification of five route corridors as illustrated on Figure 4.3. Three route corridors were identified (A, B and C) which provide alternative routes from the Phase 1 Consultation shortlisted landfalls and onwards around the different constraints which are present in the east of the study area including the Lincolnshire Wolds AONB, Gunby Estate and the Lincolnshire Coastal Grazing Marshes at Burgh le Marsh. In forming a continuous route from the landfall to converter station only one of these corridors would be required. To the west two route corridors (D and E) connect from corridors A, B and C in the vicinity of Stickford on the A16 and from here provide opportunities to connect to the Phase 1 Consultation shortlisted converter stations.

Table 4.1 Initial Cable Route Corridors

Option	Description	Approximate Length
Route Corridor A (RCA)	From the Phase 1 Consultation Landfalls (LF1a, LF1 and LF2) to north of Stickford. This is the most northern route corridor.	29km (from most northern landfall to north of Stickford))
Route Corridor B (RCB)	From the Phase 1 Consultation Landfalls (LF1a, LF1 and LF2) to the east of Stickford. This is the central option of the three route corridors from the coast.	28km (from most northern landfall to east of Stickford))

Table 4.1 Initial Cable Route Corridors		
Option	**Description**	**Approximate Length**
Route Corridor C (RCC)	From the Phase 1 Consultation Landfalls (LF1a, LF1 and LF2) to the east of Stickford. This is the most southern route corridor from the landfalls.	32km (from most northern landfall to east of Stickford)
Route Corridor D (RCD)	From Stickford to Swineshead Bridge. This is a wide corridor which would allow for onward routes to be developed from A, B or C to the north of search area for converter stations.	24km (from Stickford to Swineshead Bridge)
Route Corridor E (RCE)	From Swineshead Bridge to the Phase 1 Consultation Converter Stations (CS1, CS3, CS5 and CS9).	5km (from Swineshead Bridge to the most southern converter station)

4.1.12 These initial route corridors form the basis of the assessment of alternative route corridor options in subsequent sections of this report.

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PRODUCED: LC

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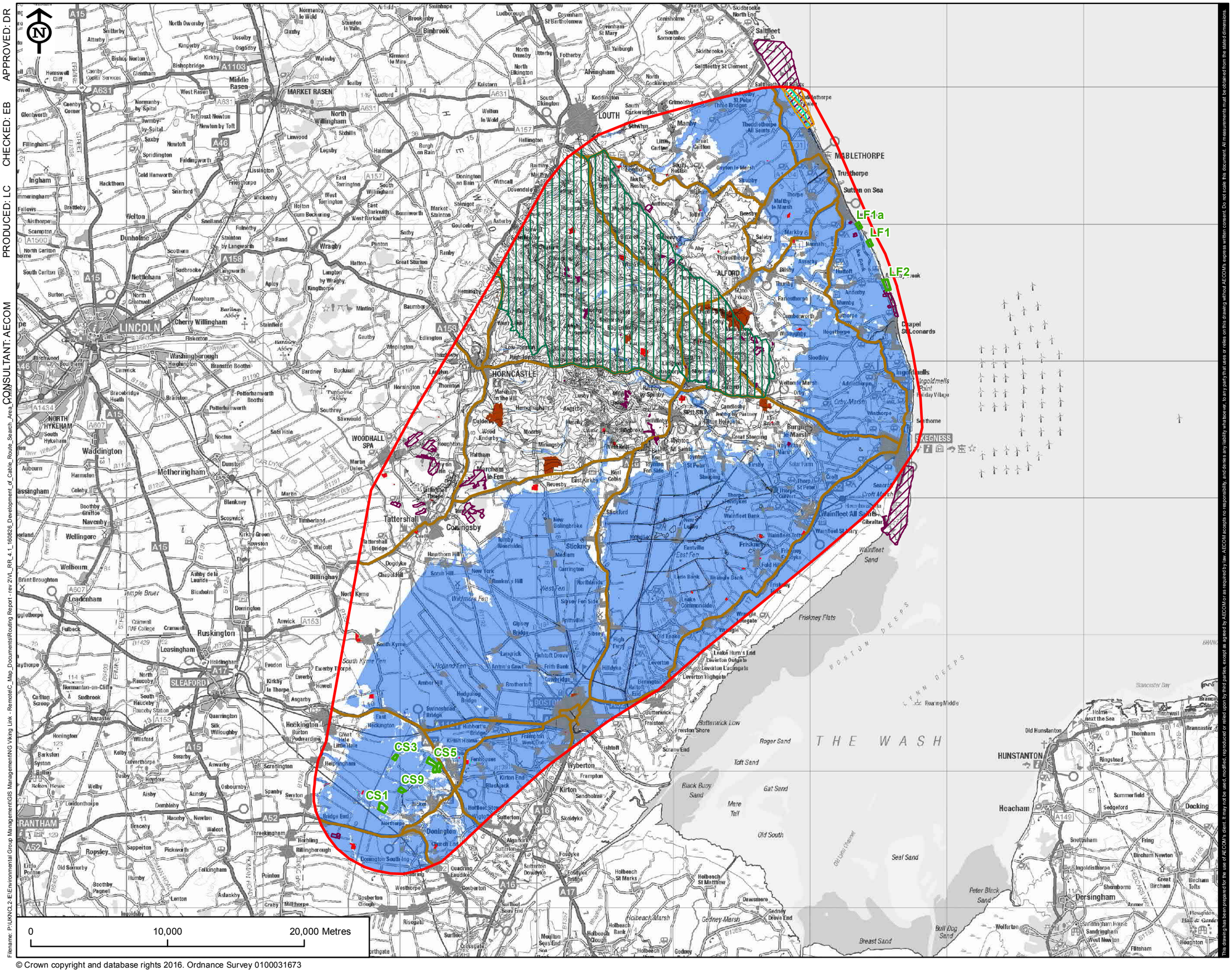

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LEGEND

- UK Onshore Scheme Study Area
- Shortlisted Landfall and Converter Station Sites
- A Road
- 10m Contour (OS Terrain 5)
- Area of Outstanding Natural Beauty
- Special Protection Area
- Special Area of Conservation
- Site of Special Scientific Interest
- Scheduled Monument
- Registered Park and Garden
- Urban Region
- Flood Risk Zones

REVISION:

REV.	DATE	DESCRIPTION
1	26/08/16	ORIGINAL ISSUE

FIGURE NO.

VL_160826_RR4.1

FIGURE TITLE

FIGURE 4.1
DEVELOPMENT OF CABLE ROUTE SEARCH AREA

SHEET NUMBER

1 of 1

NOTES

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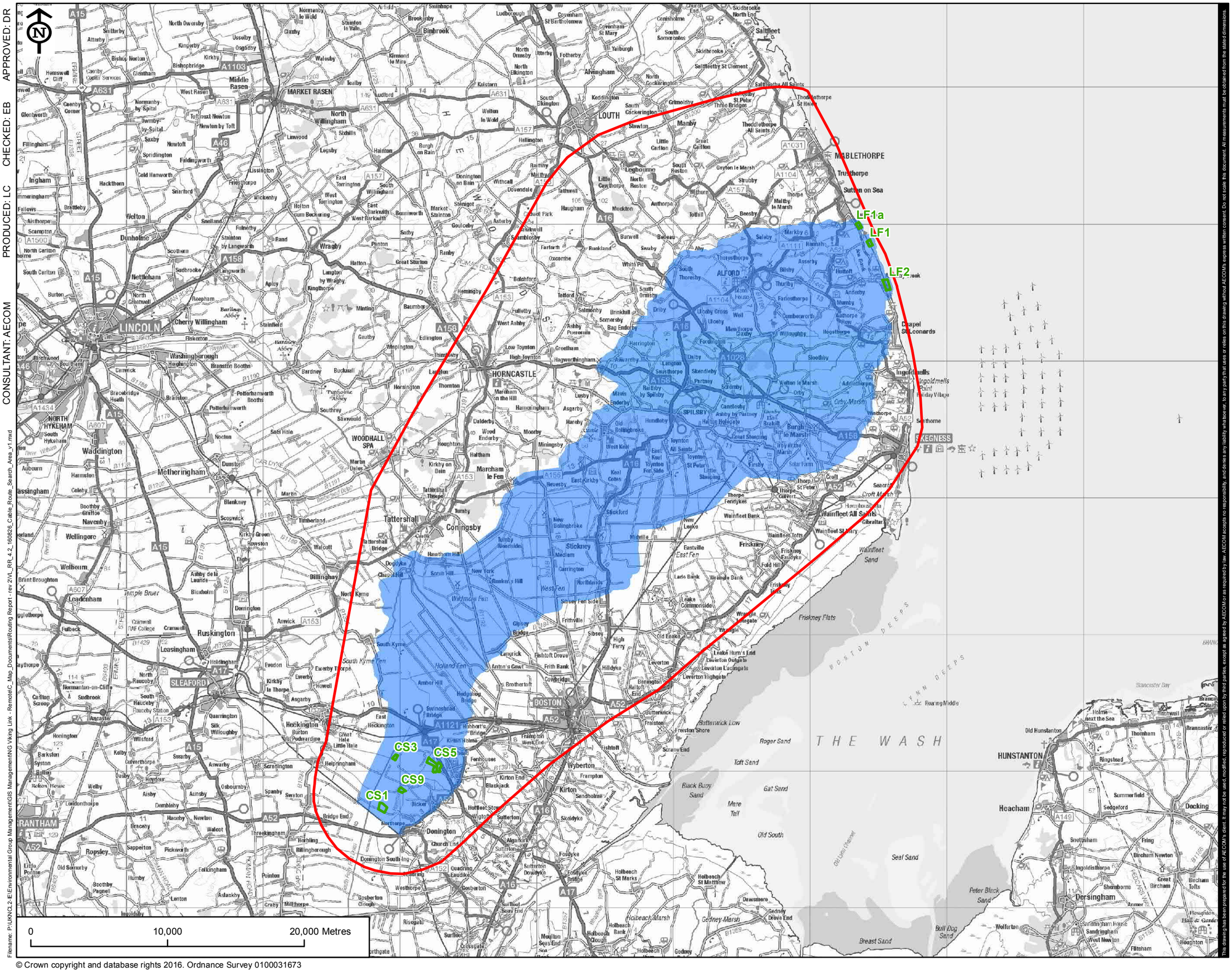
CONSULTANT: AECOM



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VikingLink

LEGEND

- UK Onshore Scheme Study Area
- Shortlisted Landfall and Converter Station Site
- Cable Route Search Area

REVISION:

REV.	DATE	DESCRIPTION
1	26/08/16	ORIGINAL ISSUE

FIGURE NO.

VL_160826_RR4.2

FIGURE TITLE

FIGURE 4.2
CABLE ROUTE
SEARCH AREA

SHEET NUMBER

1 of 1

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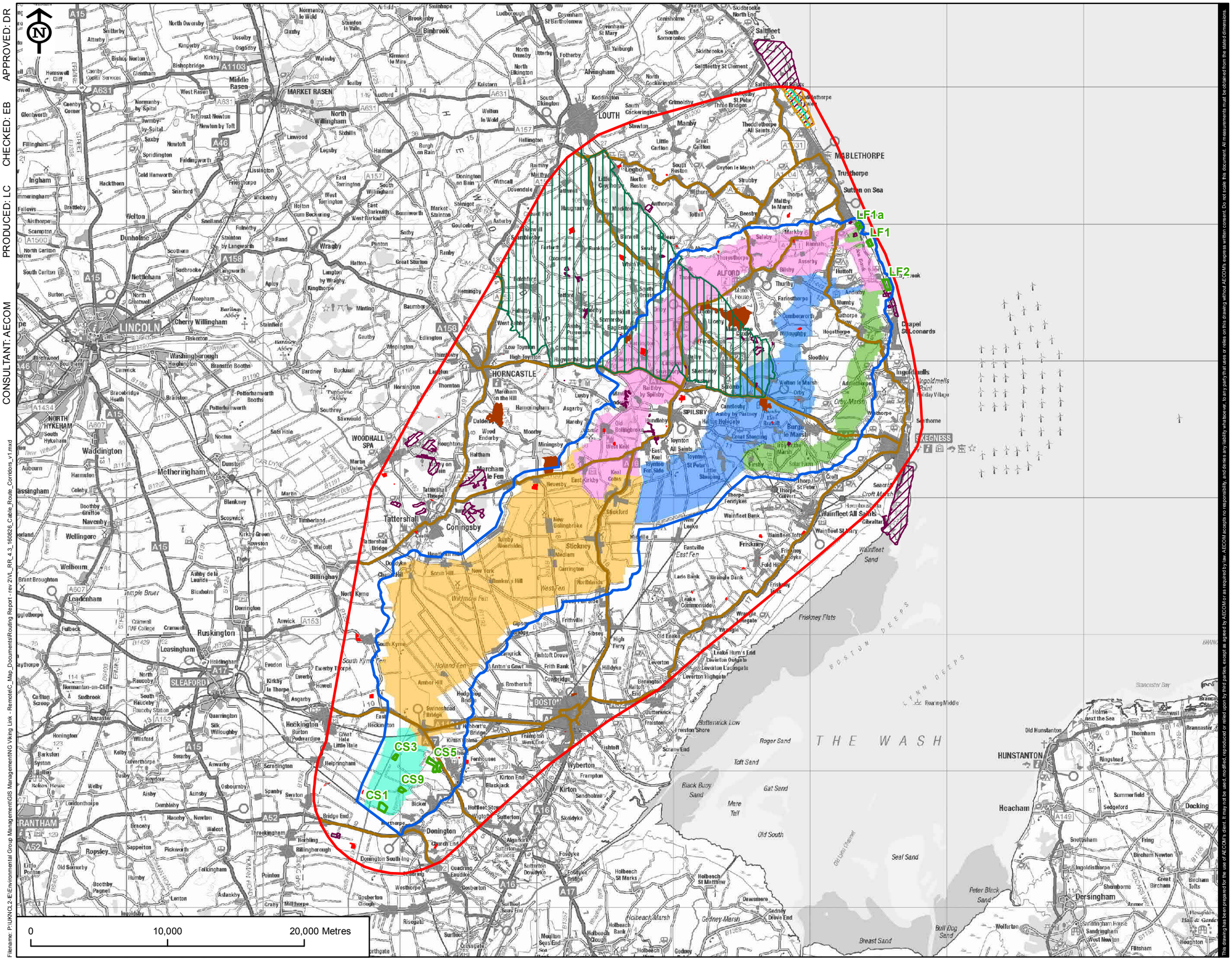
LF1a
LF1
LF2
CS1
CS3
CS5
CS9
LOUTH
MABLETHORPE
Saltfleet
Sutton on Sea
ALFORD
SPILSBY
HORNCASTLE
LINCOLN
MARKET RASEN
WOODHALL SPA
Tattershall
Coningsby
Wainfleet All Saints
Friskney
Chapel St Leonards
Ingoldmells
SKEGNESS
BOSTON
Wainfleet Sand
Friskney Flats
BOSTON DEEPS
LYNN DEEPS
THE WASH
Roger Sand
Toft Sand
Gat Sand
Mere Tail
Old South
Seal Sand
Peter Black Sand
Bull Dog Sand
Breast Sand
Holbeach Marsh
Gedney Marsh
Wyberton
Kirton
Donington
Heckington
Sleaford
Ruskington
Leadenham
Waddington
Metheringham
Welton
Nettleham
Cherry Willingham
Washingborough
Branston
Bracebridge Heath
Wellingore
Welbourn
Navenby
Bassingham
Brant Broughton
Temple Bruer
Billinghay
Dunholme
Wragby
Market Rasen
Louth
Alford
Spilsby
Burgh le Marsh
Wainfleet
Friskney
Croft
Seacroft
Skegness
Ingoldmells
Chapel St Leonards
Sutton on Sea
Mablethorpe
Saltfleet
Alvingham
Grimoldby
Manby
Theddlethorpe All Saints
Theddlethorpe St Helen
Withern
Tetney
Holton le Clay
Waltham
Immingham
Cleethorpes
Grimsby
Humberston
Healing
Stallingborough
Laceby
Ulceby
Brocklesby
Barnetby le Wold
Caistor
Market Stainton
Louth
Hallington
Legbourne
Raithby
Maltby le Marsh
Strubby
Gayton le Marsh
Great Carlton
Little Carlton
Theddlethorpe All Saints
Saltfleetby St Clement
Saltfleet
Skidbrooke
Conisholme
Covenham St Bartholomew
Covenham St Mary
Yarburgh
Fotherby
Utterby
North Ormsby
North Elkington
South Elkington
Keddington
Ludford
Kelstern
Welton le Wold
Binbrook
Brookenby
Ludborough
Swinhope
Hainton
Sixhills
Legsby
Linwood
Cold Hanworth
Snarford
Wickenby
Friesthorpe
Lissington
Fillingham
Ingham
Hackthorn
Scampton
Aisthorpe
Fiskerton
Reepham
Stainfield
Bardney
Tattershall
Coningsby
Tumby Woodside
Stickney
Stickford
New Bolingbroke
Revesby
Boston
Frampton
Kirton
Wyberton
Donington
Heckington
Sleaford
Ruskington
Leasingham
Cranwell
Anwick
Digby
Scopwick
Blankney
Martin
Timberland
Walcott
Billinghay
Coningsby
Tattershall
Woodhall Spa
Horncastle
Mareham le Fen
Revesby
Bardney
Langworth
Lincoln
Skegness
Ingoldmells
Chapel St Leonards
Hunstanton
Heacham
Docking
Dersingham
Sandringham
Snettisham
Ringstead
Thornham
Brancaster
Holme next the Sea
Old Hunstanton
Wainfleet Bank
Friskney Tofts
Leake Commonside
Wrangle
Leverton
Benington
Butterwick
Fraiston
Freiston Shore
Frithville
Sibsey
Hillyard
Fishtoft
Frampton West End
Kirton End
Sutterton
Algarkirk
Fosdyke
Holbeach St Marks
Holbeach St Matthew
Holbeach
Holbeach Bank
Holbeach Clough
Gedney
Gedney Drove End
Dawsmere
Moulton Seas End
Surfleet Seas End
Surfleet
Crossgate
Risegate
Gosberton
Quadring
Donington South Ing
Donington
Bicker
Swineshead Bridge
Kirton Holme
Fenhouses
Hubbert's Bridge
Hedgehog Bridge
Anton's Gowt
Fishtoft Drove
Frith Bank
Cowbridge
Butterwick Low
Freiston Shore
Scrane End
Old Leake
Leake Hurn's End
Leverton Outgate
Leverton Lucasgate
Leverton Highgate
Leake Commonside
Wrangle Bank
Wainfleet Tofts
Wainfleet St Mary
Wainfleet All Saints
Friskney Eaudyke
Fold Hill
Eastville
East Fen
Lade Bank
Wrangle Bank
Thorpe St Peter
Thorpe Culvert
Thorpe Fendykes
Croft
Seacroft
Croft Marsh
Orby Marsh
Addlethorpe
Sloothby
Hogsthorpe
Willoughby
Mumby
Anderby
Huttoft
Hannah
Asserby
Bilsby
Thurlby
Farlesthorpe
Camberworth
Markby
Saleby
Thoresthorpe
Alford
Mareham on the Hill
Hameringham
Asgarby
Hareby
Miningsby
Moorby
Haltham
Dalderby
Wood Enderby
Roughton
Tattershall Thorpe
Tattershall Bridge
Dry Doddington
Scrub Hill
New York
Bunker's Hill
Wildmore Fen
Holland Fen
Amber Hill
South Kyme
North Kyme
Kirkby Green
Rowston
Digby
Ashby de la Launde
Bloxholm
Dorrington
Anwick
Cranwell RAF College
Cranwell
Fulbeck
Leadenham
Temple Bruer
Navenby
Boothby Graffoe
Wellingore
Welbourn
Brant Broughton
Aubourn
Harmston
Celsby
Dunston
Martin Dales
Timberland
Blankney
Scopwick
Kirkby Green
Rowston
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Celsby
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Martin Dales
Timberland
Blankney
Scopwick
Kirkby Green
Rowston
Digby
Ashby de la Launde
Bloxholm
Dorrington
Anwick
Cranwell RAF College

4.2 Assessment of Route Corridor A

Introduction

4.2.1 Route Corridor A (RCA) is illustrated below with a larger scale plan provided at the end of this section. It is the most northerly of the route corridor options under consideration. Whilst it is partly routed through the Lincolnshire Wolds AONB it benefits from good access via the existing road network and provides the opportunity to avoid lower lying coastal areas which typically require a larger number of watercourse crossings.

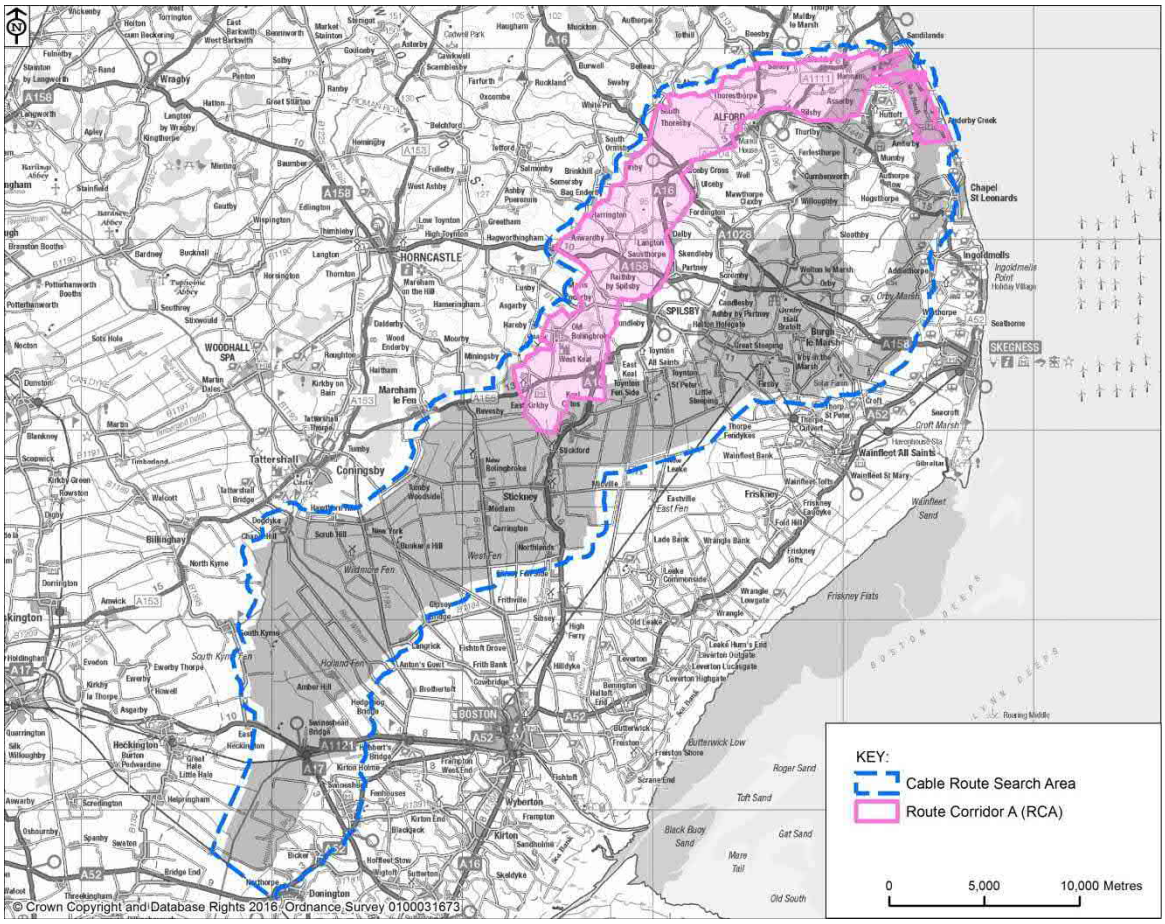

Figure 4.4 Route Corridor A

4.2.2 RCA runs west from the coast crossing the A52 north of Huttoft, and the A1111 and A1104 to the north of Bilsby and Alford respectively. It then runs parallel with the A1104 and A16, crossing the A16 north of the Ulceby Cross roundabout. RCA runs through part of the Lincolnshire Wolds AONB where the land reaches a height of 95 m AOD at Langton Hill. As it descends it crosses the A158 west of Partney; the B1195 west of Spilsby and the A158 between East Kirkby and West Keal and terminates north of Hagnaby Lock.

Technical & Engineering Considerations

Constructability

4.2.3 Between the shortlisted landfalls (LF1a, LF1 and LF2) and Alford, RCA crosses the coastal lowlands which consist predominantly of flat, agricultural land divided by drains; and characterised by small settlements and individual properties widely dispersed along roads, which would not present a significant constraint to construction.

4.2.4 West of Alford RCA climbs into the Lincolnshire Wolds where the land use continues to be predominantly agricultural but with more undulating topography, fewer watercourses and more woodland. In the area around Sutterby and Langton the steep slopes show evidence of landslip in places which would need to be avoided by cable routeing. Due to the combination of steep potentially unstable slopes, areas of woodland and designated sites including a quarry (also designated as a Regionally Important Geological Site (RIGS)) and Scheduled Monuments, routeing through this area would need to consider these constraints to construction. Initial assessments indicate that it would be possible to construct a cable route through this area, however, further investigations will be required to confirm a detailed route alignment.

4.2.5 Within the remainder of the corridor no significant insurmountable constraints to routeing of the cables have been identified.

4.2.6 In general RCA comprises open, agricultural land with small settlements and properties widely dispersed along roads. There is sufficient undeveloped land within the corridor to accommodate the working areas required for the installation of the cables and associated temporary construction compounds.

Infrastructure

4.2.7 RCA contains a number of roads which may need to be crossed using trenchless techniques including six A roads and a B road. There is sufficient undeveloped land adjacent to these roads within the corridor to accommodate the temporary working areas required for construction.

4.2.8 The corridor crosses two dismantled railways, the alignments of which are not in cutting or embankment within the corridor and are therefore unlikely to present a constraint to construction.

4.2.9 Near the coast RCA is crossed by a network of drains, this part of the corridor falls within the Lindsey Marsh Internal Drainage Board (LMDB) district. Within the chalk landscape of the Lincolnshire Wolds there are fewer watercourses, however those present are chalk streams (such as River Lymn) which are of ecological importance (see Ecology below).

4.2.10 An Anglian Water pipeline between Covenham Water Treatment Works and Boston Transfer enters RCA for a section, running near Aswardby, Raithby by Spilsby, Old Bolingbroke and East Kirkby and continues south within Route Corridor D (RCD). Subject to the final route this may need to be crossed.

4.2.11 A summary of the infrastructure that a cable route would potentially need to cross within RCA is presented in Table 4.2.

Table 4.2 Route Corridor A – Road and Infrastructure Crossings		
Type	Notable crossings include...	Approx. No. of Crossings
A and B-class roads	A52, A1111, A1104, A16/ A1028, A158, A155 and B1195	7
Other minor roads	-	11
Operational railway	n/a	0
Disused railway	Sutton on Sea – Firsby Junction, Louth – Firsby Junction	2
Underground utilities	Anglian Water Covenham – Boston Pipeline	2

Accessibility

4.2.12 From the shortlisted landfalls (LF1a, LF1 and LF2), a cable route alignment within RCA would allow for a haul road connection to the A52 using the cable construction working width.

4.2.13 Within RCA, the layout of the road network means that A and B roads cross the corridor at frequent intervals (A52, A1111, A1104 A16/ A1028, A158, B1195, A155), which would provide relatively good access for construction traffic including cable delivery.

4.2.14 There are steep slopes within RCA which may be a constraint to construction traffic using the working width for access to other parts of the corridor. This would need to be taken into consideration when cable routeing within RCA (including potential for slope re-profiling and off-site accesses).

4.2.15 There would be increased traffic movements during the construction period. Careful planning of construction traffic would be required to take into account the busy tourist season on the Lincolnshire coast. A construction traffic management plan would be implemented to keep the impact to a minimum.

Environmental Considerations

Overview

4.2.16 The following subsections describe the environmental considerations present within or adjacent to RCA highlighting those features which are considered to be more sensitive and should be avoided or, if unavoidable, which may require additional mitigation including consideration of the timing of installation and the use of alternative installation methods. The objective of the following sub-sections is to highlight specific constraints and/or sensitivities which help to inform the assessment, and if feasible, the refining of RCC to a narrower corridor. Reference should also be made to the thematic constraints plans contained in Appendix C which illustrate the constraints described in the following subsections.

Settlement, Community & Tourism

4.2.17 Subject to routeing the potential impacts of the underground cable on settlement and community and tourism interests in RCA are generally limited to temporary disturbance during installation. This includes temporary noise and visual impacts resulting from installation works as well as impacts resulting from the movement of construction traffic.

4.2.18 Relative to other corridors RCA is well settled with a number of smaller scattered villages and individual properties present throughout. This includes (from east to west) Asserby, Markby, South Thoresby, Sutterby, Raithby, Old Bolingbroke, Hagnaby and West Keal as illustrated in Figure 4.4. Within the eastern sections of RCA, residential properties, businesses and facilities are primarily located along main transport routes (such as the A1111), with agriculture the main land use outside of these areas. The number and size of rural villages increases further to the west of RCA.

4.2.19 Specific tourism or recreational interests within RCA include Sandilands Golf Course and Lincolnshire Coastal Country Park (LCCP) at the eastern extent of RCA as well as the Lincolnshire Wolds AONB, Old Bolingbroke Castle and the Lincolnshire Aviation Heritage Centre at East Kirkby at the western extent of RCA. There are also a number of recreational routes, for example Public Rights of Ways (PROWS), cycle and equestrian routes present within RCA.

4.2.20 In the main settlements, community and tourism interests within RCA are considered to be avoidable in refining the route corridor such that direct impacts can be prevented, however, it is recognised that some disturbance as a result of installation works will be unavoidable. Where there is the potential for significant disturbance to occur detailed mitigation proposals will be developed related to how and when installation works are undertaken.

Geology & Hydrogeology

4.2.21 Subject to route selection impacts on geology and hydrogeology include the loss or sterilisation of geological resources, impacts on groundwater and encountering or causing contamination or encountering UXO.

4.2.22 A description of the underlying solid and drift geology is contained in Appendix D, neither are considered to pose a significant constraint to cable routeing within RCA. Key geological routeing constraints or considerations within RCA are illustrated in in Figure 4.4 and include:

- Designated aquifers including the White and Grey Chalk Group, a Principal Aquifer which extends across the majority of RCA.
- Groundwater Source Protection Zones (SPZ) which include a SPZ towards the eastern extent of RCA between the areas of Thoresthorpe and Sutterby.
- Chalk streams present within the AONB which include the River Lymn and its tributaries.
- A geological SSSI; Sea Bank Clay Pits to eastern extent of RCA close the shortlisted landfalls.
- Local Geological Sites (LGS) including sites at Langton Hill and Dalby Hill Chalk Quarry close to the centre of RCA and at West Keal Hill towards the east of RCA.

- A small number of discrete areas of potential contaminated land comprising historic landfills at Bilsby and Harrington Lane.
- Areas of elevated UXO risk such as at Royal Air Force (RAF) East Kirkby at the eastern extent of RCA.

4.2.23 A number of these constraints are relatively small occupying discrete areas and as such are considered to be avoidable, however, others such as the designated aquifer or chalk streams cannot be avoided and would require careful consideration of alternative installation methods.

Hydrology

4.2.24 Subject to routeing and specific installation methods an underground cable within RCA has the potential to impact on the watercourses which the corridor crosses. This includes impacts on water quality as well as hydrology. As noted at the outset of this section one of the benefits of RCA is it requires fewer watercourse crossings (when compared to other route corridors) and is routed in a mainly western direction parallel to the main catchment flow.

4.2.25 The exact number of watercourses which would be crossed will depend on the specific detailed alignment within RCA. For the purposes of assessing route corridors and to allow for comparison between them a simple count of the number of watercourses has been undertaken. This provides an indication of the potential number of watercourse crossings. Within RCA the total number of watercourses which may require to be crossed is 54. A breakdown of potential crossings is provided in Table 4.3. This includes crossings of riparian and maintained watercourses as well as crossings of larger watercourses such as the River Lymn.

4.2.26 As noted above and illustrated in Figure 4.4 chalk streams are also present within RCA. Any detailed route alignment would require crossing chalk streams such as the River Lymn and its tributaries. Crossings of chalk streams are considered to be feasible, however, they would require to be carefully designed and installed using trenchless crossing methods.

4.2.27 According to the Environment Agency's Flood Map for Planning (from Rivers and the Sea)[10] the majority of RCA avoids areas at higher risk of flooding. Those areas which are at higher risk of flooding are flood zones 2 (land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% – 0.1%) in any year) and flood zone 3 (land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year). This includes the eastern extent of RCA extending from the coast inland approximately as far as Markby and the western extent of RCA next to the River Lymn.

[10] Environment Agency, Flood Map for Planning

Table 4.3 Route Corridor A – Watercourse Crossings		
Type	Notable crossings include...	Approx. No. of Crossings
Main river	Wold Grift Drain, Langton Beck, River Lymn and Hagnaby Beck	5
IDB Maintained watercourse	Bilsby Tank Trap Drain and Saleby Sewer	6
Riparian/other watercourse	-	43

Agriculture & Soils

4.2.28 Agricultural land use is prevalent throughout RCA so avoiding impacts is not always feasible, however, through careful routeing potential impacts can be reduced. The potential impacts of the underground cable route within RCA relate to the temporary loss of agricultural land and the temporary disturbance of agricultural activities as well as the loss of or damage to soil resources.

4.2.29 The Agricultural Land Classification (ALC) is a standardised method[11] for classifying agricultural land according to its versatility, productivity and workability, based upon inter-related parameters including climate, relief, soil characteristics and drainage. These factors form the basis for classifying agricultural land into one of five grades (with Grade 3 land divided into Subgrades 3a and 3b), ranked from excellent (Grade 1) to very poor (Grade 5). Land of excellent (ALC Grade 1), very good (Grade 2) and good (Subgrade 3a) agricultural quality is defined as best and most versatile (BMV) land, which is afforded a degree of protection against development within planning policy.

4.2.30 The Provisional 1:250,000 ALC map does not provide a distinction between Subgrade 3a and 3b and hence cannot be used to determine the area and proportion of BMV land. Therefore, to inform the assessment a more precise classification based on the distribution of soil associations and percentages of component soil series has been undertaken using LandIS NATMAP data (LandIS Dataset), as described in Appendix E. The ALC estimates for RCA are summarised in Table 4.4.

4.2.31 A review of the Provisional 1:250,000 ALC Map for the East Midlands Region and secondary soil association mapping (LandIS Dataset), indicates that the majority of RCA is underlain by land which is classed as Grade 2 (very good quality); Subgrade 3a (good quality) and Subgrade 3b (moderate quality). As such, approximately two-thirds of RCA is classed as BMV agricultural land (66.7%).

Table 4.4 Route Corridor A – Agricultural Land Classification		
ALC Grade	Area (ha)	Percent (%)
ALC Grade 1**	0.0	0.0

[11] MAFF, 1998. Agricultural Land Classification of England and Wales: Revised guidelines and criteria for grading the quality of agricultural land.

Table 4.4 Route Corridor A – Agricultural Land Classification		
ALC Grade	Area (ha)	Percent (%)
ALC Grade 2**	2708.3	34.2
ALC Subgrade 3a*	2566.2	32.4
ALC Subgrade 3b*	2509.5	31.7
ALC Grade 4**	128.8	1.6
ALC Grade 5**	0.0	0.0
Total	**7912.8**	**100.0**

*Calculated using LandIS NATMAP data and Provisional 1:250,000 ALC mapping for the East Midlands Region[9].

** Calculated from Provisional 1:250,000 ALC mapping for the East Midlands Region[9]

4.2.32 A review of soil resources which are present in the routes corridors has been undertaken based on information contained within Soils and their use in Eastern England[12] and associated 1:250,000 soils mapping; in combination with the 1:250,000 scale digital LandIS Dataset.

4.2.33 The soil associations present in RCA are summarised in Table 4.5. RCA is dominated by slowly permeable stagnogley soils (51.1%; Holderness, Wickham 2 and Salop associations), followed by shallow, freely draining brown rendzinas (16.3%; Andover 1 association).

4.2.34 There are no peaty or organic rich soils present within RCA, however, the Cuckney 2 soil association which is considered to be at high risk of water and wind erosion[13] is located within RCA around Langton. Where sensitive soil associations are present but cannot be avoided careful soil handling and storage will be required to reduce impacts. Descriptions of soil associations, and their component soil series, are provided in Appendix E.

Table 4.5 Route Corridor A – Soil Associations			
Map Code	Soil Association	Area (ha)	Percent (%)
513	Cannamore	25.3	0.3
543	Arrow	61.5	0.8
544	Banbury	23.8	0.3
343h	Andover 1	1287.6	16.3
511e	Swaffham Prior	100.5	1.3
541r	Wick 1	57.7	0.7
551c	Cuckney 2	747.7	9.4
571n	Tathwell	413.8	5.2

[12] Soil Survey of England and Wales, 1984 “Soils and their Use in Eastern England”

[13] Knox et al. (2015). ‘Research to develop the evidence base on soil erosion and water use in agriculture: Final Technical Report. pp147’

Table 4.5 Route Corridor A – Soil Associations			
Map Code	Soil Association	Area (ha)	Percent (%)
711f	Wickham 2	1622.5	20.5
711m	Salop	714.0	9.0
711u	Holderness	1705.1	21.5
813c	Fladbury 2	192.2	2.4
813g	Wallasea 2	731.8	9.2
821b	Blackwood	229.3	2.9
	Total	**7912.8**	**100.0**

4.2.35 A significant number of Agri-Environment Schemes are located throughout Lincolnshire, consequently the assessment of RCA has focused on identifying organic stewardships schemes. Three entry level organic schemes are present within or on the boundaries of RCA as illustrated in Figure 4.4, however, they are considered to be avoidable in the development of a detailed route alignment. These are:

- Fields owned by AH Goddard located east of Bilsby.
- Fields owned by Dalby Hall Organic Farms located south of Ulceby.
- Fields owned by Eden Farms located east of Old Bolingbroke.

Landscape

4.2.36 Subject to routeing potential impacts on landscape relate to the loss of key landscape features and/or temporary effects on landscape character as a result of the installation works. As much as possible key landscape features are to be avoided/retained, however, if this is not possible for technical reasons landscape reinstatement and/or enhancement may be required.

4.2.37 The landscape character of RCA varies considerably, from the wide coastal plain inland from the landfalls, to the rolling farmland of the Lincolnshire Wolds. In general the landscape is well settled, with numerous smaller villages, hamlets and scattered properties particularly in sections of the route corridor around main transport routes and the wider road network. Land use is predominantly agricultural, with arable farming and food production the focus on the lower-lying ground and coastal plain. The linear and geometric patterns of the drains which cross the landscape and define field boundaries are a strong element within the landscape and coupled with the intensive land use indicate a landscape much changed by human influence. The landscape character of the Lincolnshire Wolds is more diverse.

4.2.38 RCA is routed through the Lincolnshire Wolds AONB for between 7.5 and 9 km subject to the development of a detailed route. In developing a route through the AONB consideration has been given to the features which contribute to the importance and quality of the landscape and the extent to which they can be avoided. This involved a review of published landscape

character information relating to the Lincolnshire Wolds AONB nested in national, regional and local level assessments.

4.2.39 Review and interpretation of these documents in conjunction with on-site appraisal has aided in identification of the key characteristic features and elements of the AONB landscape. This exercise also helped to inform at what scale (national, regional, local) the features are important, and in which discrete character areas of the Lincolnshire Wolds AONB they are found. The identified features are listed below and shown on Figure 5 in Appendix C.

- Vegetation and land cover, including woodland and trees, hedgerows and roadside verges;
- Topographic features – important ridgelines, skylines and local highpoints;
- Watercourses;
- Settlement – pattern, vernacular and setting;
- Historic windmills – heritage landscape feature;
- Other built features – roads, wind turbines and other infrastructure.

4.2.40 In addition to the identified physical features of the AONB landscape within RCA, various perceptual qualities also contribute to the impression of the character of the landscape. These include:

- Variable sense of scale and enclosure resulting from topography, woodland, trees and hedgerows;
- Locally strong sense of tranquillity and naturalness, away from the main transport routes;
- Strong landscape pattern defined by hedgerows and variable agricultural land use; and
- Contrast with flatter, low-lying landscapes of the fens and coastal plains.

4.2.41 The findings of the routeing exercise indicate that it would be possible to develop a cable route within the Lincolnshire Wolds AONB without substantially altering its landscape character in the long-term. This is as a result of the following reasons:

- Once constructed the cable route will be underground, with no above ground elements within the AONB;
- There is sufficient separating distance from, and between, sensitive features, such that careful routeing could avoid the majority of key characteristic components of the AONB;
- The rolling nature of the topography and prevalence of trees would help limit the extent of apparent change during construction;
- Where temporary loss of key features is required to facilitate construction, in most cases these will be able to be reinstated and replaced, limiting potential long term change;
- Temporary construction facilities such as construction compounds, could be located outside of the AONB; and
- Successful installation of other linear underground infrastructure through the Lincolnshire Wolds AONB and other sensitive landscapes without significant long term effects.

4.2.42 In addition to the AONB, RCA also includes parts of the Lincolnshire Wolds Area of Great Landscape Value (AGLV) and the LCCP.

4.2.43 The AGLV was originally identified in the 1967 Lindsey County Development Plan and as a regionally designated landscape is of lesser importance than the national-level AONB. However the two designated areas are adjoining and there will inevitably be physical and visual characteristics inherent to both.

4.2.44 Desk based review of the East Lindsey Local Plan, the various national regional and local landscape character assessments and appraisal in the field have identified the following key characteristics of the AGLV:

- Small to medium scale, with a strong landscape pattern defined by agricultural land use and land cover and hedge-lined roads and field boundaries;
- Largely intact, rural landscape with local sense of tranquillity and enclosure;
- Scattered and variable settlement pattern, with numerous small to medium sized villages; and
- Gently sloping and rolling topography forming a transition from the larger scale, flatter, open and more intensely farmed fenland to the smaller scale rolling landscape of the AONB.

4.2.45 As described above the findings of the routeing exercise identified that while characteristic features of the AGLV are found within RCA, the nature of the underground cable mean that it would be possible to develop a route within this designated area without substantially affecting the landscape character in the long-term.

Ecology

4.2.46 A review of statutory and non-statutory designated sites as well as priority habitats within and adjacent to RCA has been undertaken. These constraints are illustrated on Figure 4.4. Notable constraints include:

- Subject to selection of the preferred landfall there is the potential for onwards routeing to result in impacts on the Sea Banks Clay Pit SSSI and on Sandilands Golf Course and Dunes Local Wildlife Site (LWS), Huttoft Car Terrace to Marsh Yard Dunes LWS/Lincolnshire Wildlife Trust Reserve (LWTR) and Anderby Marsh LWTR.
- Subject to selection of the preferred landfall there is the potential for onwards routeing to result in direct impacts on part of the Anderby and Huttoft of the Lincolnshire Coastal Grazing Marsh Project (LCGMP).
- Along the inland section a number of SSSIs including Dalby Hill SSSI, Mavis Enderby Valley SSSI Hundleby Clay Pit SSSI and Keal Carr SSSI are located on the immediate extents or just outside of RCA. Due to their distance from the corridor none are likely to be affected.

- Pockets of Ancient Woodland are present and are designated either at the national or local level depending on quality. It is anticipated that all woodland can be avoided in the development of a detailed route alignment.
- There are a number of local designations within the route corridor including LWSs, LWTRs, Sites of Nature Conservation Interest (SNCI) and Roadside Nature Reserves (RNR). These typically occupy small discrete areas and are considered likely to be avoidable.
- Priority habitats within RCA are predominantly deciduous woodland, with small numbers of floodplain grazing marsh and good quality grassland. RCA is the only corridor with pockets of calcareous grassland priority habitat. Due to their scattered nature, it is anticipated that the majority can be avoided through routeing or if not possible through the use of alternative installation methods.
- A key pinch point is at Langton, where detailed routeing would be required to avoid non-statutory sites including Langton Sheepwalks LWS, Smiths Wood SNCI, Callow Carr LWS as well as deciduous woodland and good quality grassland and calcareous grassland priority habitats.

4.2.47 Most ecological constraints can be avoided during the development of a detailed route alignment within RCA. A number of the identified constraints within the AONB also correspond to features which have been identified as contributing to the AONB for example pockets of woodland reinforcing the importance of avoidance. In some instances where routeing requirements mean that constraints are unavoidable the use of trenchless installation methods would be considered in order to prevent or reduce impacts.

Archaeology & Heritage

4.2.48 In developing and assessing RCA consideration has been given to designated and non-designated heritage assets comprising both built and below ground assets. This has included a review of the Lincolnshire Historic Environment Record (HER) and the National Heritage List for England (NHLE) data sets. Designated assets are illustrated in Figure 4.4 at the end of this section. Due to the large number of assets the data set has been reviewed by period to aid interpretation and links between assets.

4.2.49 A significant number of assets within RCA relate to the remains of medieval settlements and field systems including Aswardby and Fordington both of which are designated as Scheduled Monuments. In total RCA comprises ten Scheduled Monuments, 69 Listed Buildings (Five Grade I, seven Grade II* and 57 Grade II Listed) two Grade II Listed Registered Parks and Gardens, and three conservation areas. There are also 556 non-designated assets within RCA which vary in size and are well distributed throughout. Of the 556 heritage assets, 153 are Prehistoric in date, 55 Roman, 19 Early Medieval, 126 Medieval, 38 Post Medieval, 109 Modern and 56 are of unknown date.

4.2.50 The assessment does not include the results of Historic England's farmstead Survey as these sites predominantly date to the Post Medieval Period, additionally as a number of these assets are extant they should be avoided by the cable routeing where possible.

4.2.51 Direct physical impacts on designated assets, e.g. Scheduled Monuments and listed buildings are considered to be avoidable in developing a detailed route alignment as they typically occupy small discrete areas, however, there would be temporary or indirect impacts on their setting during installation. To reduce this as much as possible a separation distance of 50m to all designated heritage assets has been established.

4.2.52 As far as possible routeing aims to avoid non-designated assets, however, the extent and distribution of these within RCA mean that in some instances direct impacts may be unavoidable, particularly when considering other constraints on route selection. Whilst direct impacts on non-designated assets will in some cases be unavoidable, it is important to consider the potential contemporaneity of heritage assets. The setting of heritage assets is informed in part by nearby contemporary assets consequently clusters of assets of similar periods should be avoided where possible.

Planning Considerations

4.2.53 RCA considers a route through the southern part of Lincolnshire Wolds AONB up to 9 km in length. As such the principal planning policy considerations are those set at a national and local level on development within and through an AONB. As RCA falls within East Lindsey District Council, the East Lindsey District Local Plan 2007 is the current extant planning policy to be considered. Policy C11 'Lincolnshire Wolds Area of Outstanding Natural Beauty and Areas of Great Landscape Value' sets out the key policy tests in this regard.

4.2.54 The National Planning Policy Framework (NPPF) (2012) also requires consideration, as the most recently adopted policy on this subject, in particular paragraphs 115 and 116 which set out the assessment criteria applications are required to consider, should development be proposed within an AONB.

4.2.55 In addition consideration should be given to the emerging East Lindsey Local Plan which will guide growth and development in East Lindsey up to 2031. This emerging plan has limited weight but will be regarded as a material consideration and one which should continue to be reviewed as the cable route is developed.

Refined Route Corridor A

4.2.56 RCA is considered to provide opportunities to develop feasible cable routes, however, in order to focus this it has been further refined. The aim of refining RCA was to develop a narrower route corridor (approximately 1km wide for its length) whilst taking into account the technical, environmental and planning considerations described above as well as confirmation of, in particular, the preferred landfall site (LF1a at Sandilands in East Lindsey) as well as the preferred

converter station site (CS1 at North Ing Drove in South Holland). The refined RCA is illustrated in Figure 4.5 below with a larger scale plan at the end of this section.

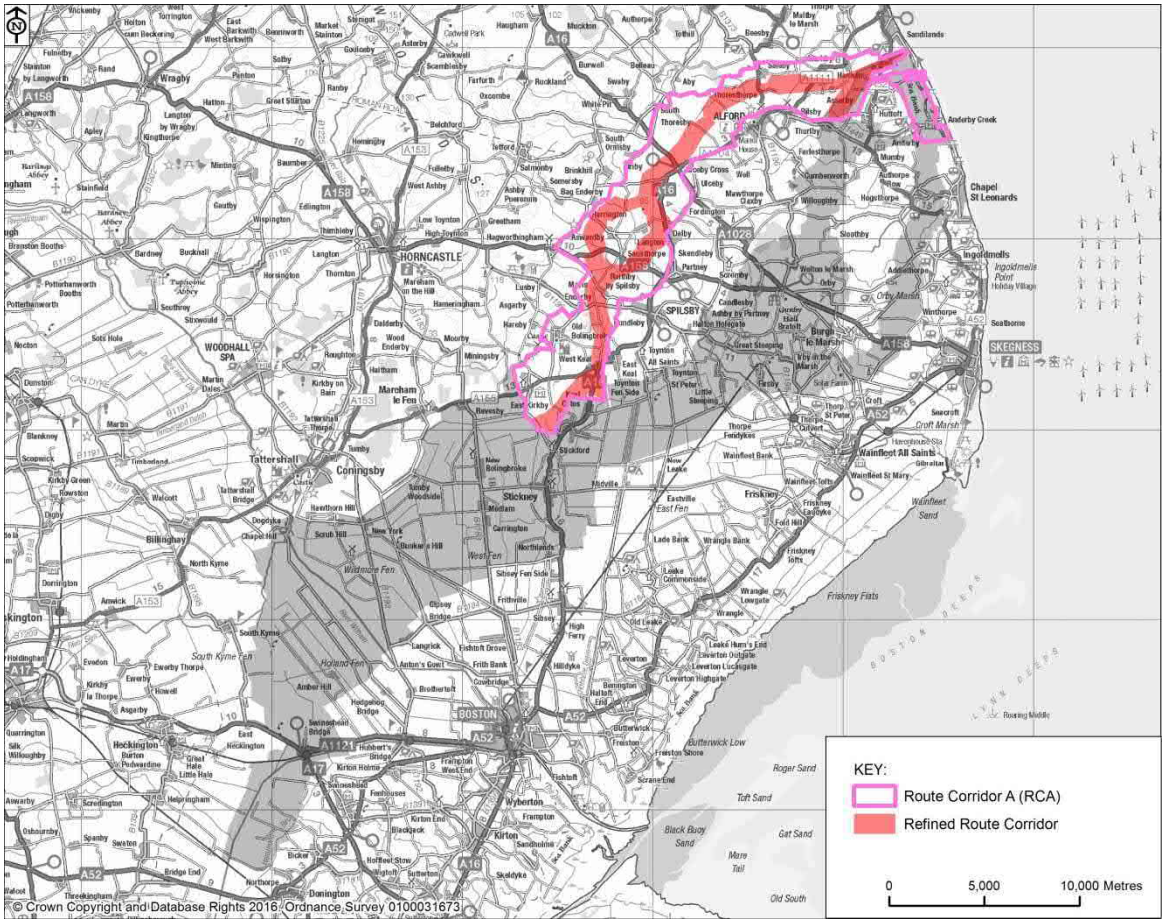

Figure 4.5 Refined Route Corridor A

4.2.57 The key constraints which have informed the refinement of RCA include (from east to west):

- Routeing away from the landfall the route corridor has been narrowed occupying open fields adjacent to the Anderby and Huttoft LCGMP.
- Moving inland RCA has been narrowed to approximately 0.5 km wide for short sections in order to provide some separation from the settlements of Markby and Asserby (located to north and south respectively) and Saleby and Thoresthorpe (also located to north and south respectively) and reduce the potential for disturbance during installation works.
- The refined RCA follows a relatively direct route through the Lincolnshire Wolds AONB for approximately 8km subject to detailed routeing. It largely avoids (or provides the opportunity to avoid) landscape features which are considered to contribute to the landscape designation including woodland, hedgerows and ridges or high points. Some features such as hedgerows cannot be completely avoided and would be an important consideration in landscape reinstatement and enhancement.

- RCA splits at Langton providing two alternative routes avoiding steep slopes which show evidence of landslip. The split also ensures the settlements of Langton, Aswardby and Sausthorpe are avoided. The number and distribution of heritage assets in this area mean that complete avoidance of non-designated assets is not possible, however, the refined corridor ensures that direct impacts on designated assets can be avoided.
  - The eastern part of RCA avoids areas of potential landslip, runs closer to the A16 offering better potential for access but is closer to Dalby and includes a number of constraints including areas of locally designated woodland, designated and non-designated heritage assets from the HER and RIGS sites.
  - The western part of RCA avoids Langton and Aswardby and associated designated heritage assets but is closer to Sutterby. The corridor includes a number of constraints including areas of potential landslip, locally designated calcareous grassland and an Anglian Water pipeline.
- The eastern and western splits rejoin to the north of Raithby where a small number of ecological and heritage constraints are present. Ecological constraints comprise the Mavis Enderby Valley SSSI and Manor Farm LWS to the west of the refined corridor. Heritage constraints comprise a ridge and furrow system (from the HER) and Raithby conservation area to the east of the refined corridor.
- From Raithby to East and West Keal a small number of constraints are present within the refined corridor including priority habitat and non-designated heritage sites (from the HER). Subject to detailed routeing not all of these constraints are avoidable and site specific mitigation may be required for example habitat reinstatement and/or pre-construction archaeological investigation.

Summary of Assessment of Route Corridor A

4.2.58 Table 4.6 sets out the key technical and environmental factors identified for RCA.

Table 4.6 Route Corridor A – Key Assessment Findings

Factor	Findings
Local Planning Authority	East Lindsey District Council
Approx. Length	29 km (subject to detailed routeing)
Approx. no. of crossings	76 (subject to detailed routeing)

Table 4.6 Route Corridor A – Key Assessment Findings	
Factor	**Findings**
Key technical constraints and opportunities	· Sufficient space available to facilitate construction including opportunities for siting temporary facilities. · Relatively small number of road crossings (A, B and minor roads) and watercourse crossings required. · Frequency of A and B roads offers good opportunities for direct construction access from the existing road network. · Potentially challenging topography with some localised steep slopes which could constrain access in sections. · Area around Langton comprises some steeper slopes and some evidence of historic landslips · Notable utility crossings include the Anglian Water pipeline which may require to be crossed more than once subject to detailed routeing.
Key environmental constraints and opportunities	· Settlements and scattered individual properties are largely avoided but do create some narrow pinch points along the refined RCA including between Asserby and Marksby, Saleby and Thoresthorpe and East and West Keal. · The constraints which are present are avoidable but do combine with other constraints to create a pinch point (e.g. Local Geological Site at Langton Hill) or may inform selection of installation methods (e.g. crossing of chalk streams and working within SPZ). · Generally more elevated and “drier” requiring fewer watercourse crossings, however, chalk stream crossings would be required. · Approximately two thirds of the land underlying RCA is considered to BMV agricultural land. · The corridor is routed through the AONB, however, it follows a relatively direct route and generally avoids key landscape features. Some landscape features such as hedgerows may not be avoided and more specific mitigation would be required including landscape reinstatement and enhancement, however, it is considered possible to develop a route through the AONB without resulting in long term impacts on its character. · Designated and non-designated ecological sites are present within and on the margins of the refined RCA but impacts could be avoided in developing a detailed route. · Designated and non-designated archaeological and heritage assets are widespread throughout the corridor. Designated assets are all avoidable (with a 50m separation distance), however, due to the distribution of non-designated assets some impacts would be unavoidable and mitigation measures would need to be agreed.

Table 4.6 Route Corridor A – Key Assessment Findings	
Factor	**Findings**
Conclusion	The refined RCA provides opportunities to develop technically feasible cable routes which largely avoid environmental constraints and settlement. Key benefits of RCA include opportunities for access from existing roads (reducing the amount of temporary access which may be required) as well as the requirement for fewer crossings (in particular watercourse crossings). In some instances environmental constraints such as the AONB or heritage interests may not be avoided by routeing, however, specific mitigation could be developed to reduce potential impacts such as landscape reinstatement and enhancement and pre-construction archaeological investigation.

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CONSULTANT: AECOM

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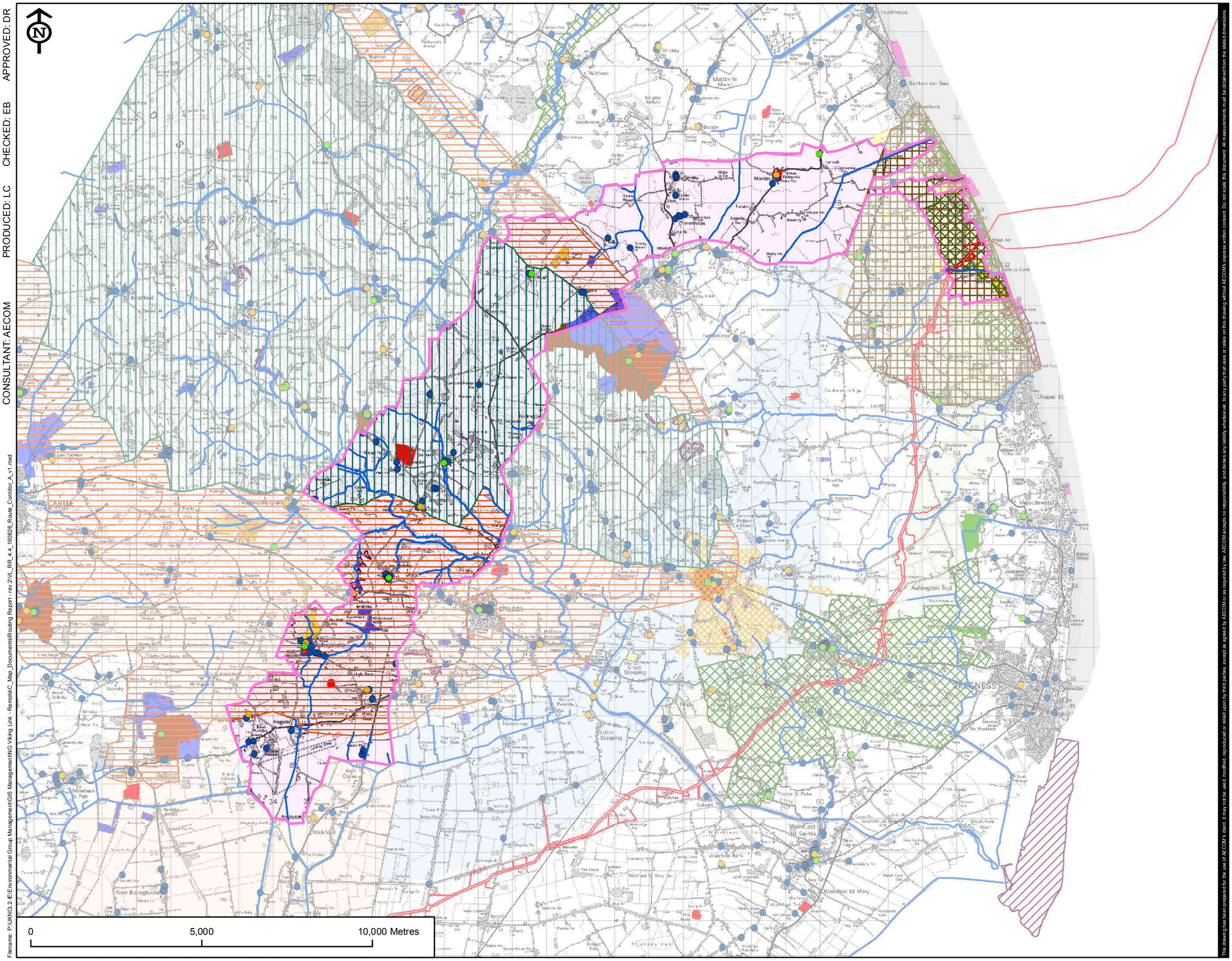
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EAST LINDSEY DISTRICT
Sutton on Sea
Mablethorpe
Trusthorpe
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Legbourne
Ludford
Fotherby
Grimoldby
Manby
Great Carlton
Ashington End
Ingoldmells
Chapel St
Hogsthorpe
Wainfleet All Saints
Wainfleet St Mary
Wainfleet Bank
Thorpe St Peter
Firsby
Little Steeping
Great Steeping
Toynton St Peter
Toynton Fen Side
Hagnaby
Stickford
New Bolingbroke
Boston
Frieskney Fen
Friskney
Orby
Burgh le Marsh
Croft
Croft Marsh
Gunby
Ashby
Bratoft
Irby
Hogsthorpe
Scremby
Hundleby
Aswardby
Halton Holgate
Gunby Hall
Gunby Park
Gunby Park Farm
Gunby Park Farm Ponds
Gunby Park Farm Pond
Gunby Park Farm Pond
Gunby Park Farm Pond

APPROVED: DR

CHECKED: EB

PRODUCED: LC

CONSULTANT: AECOM

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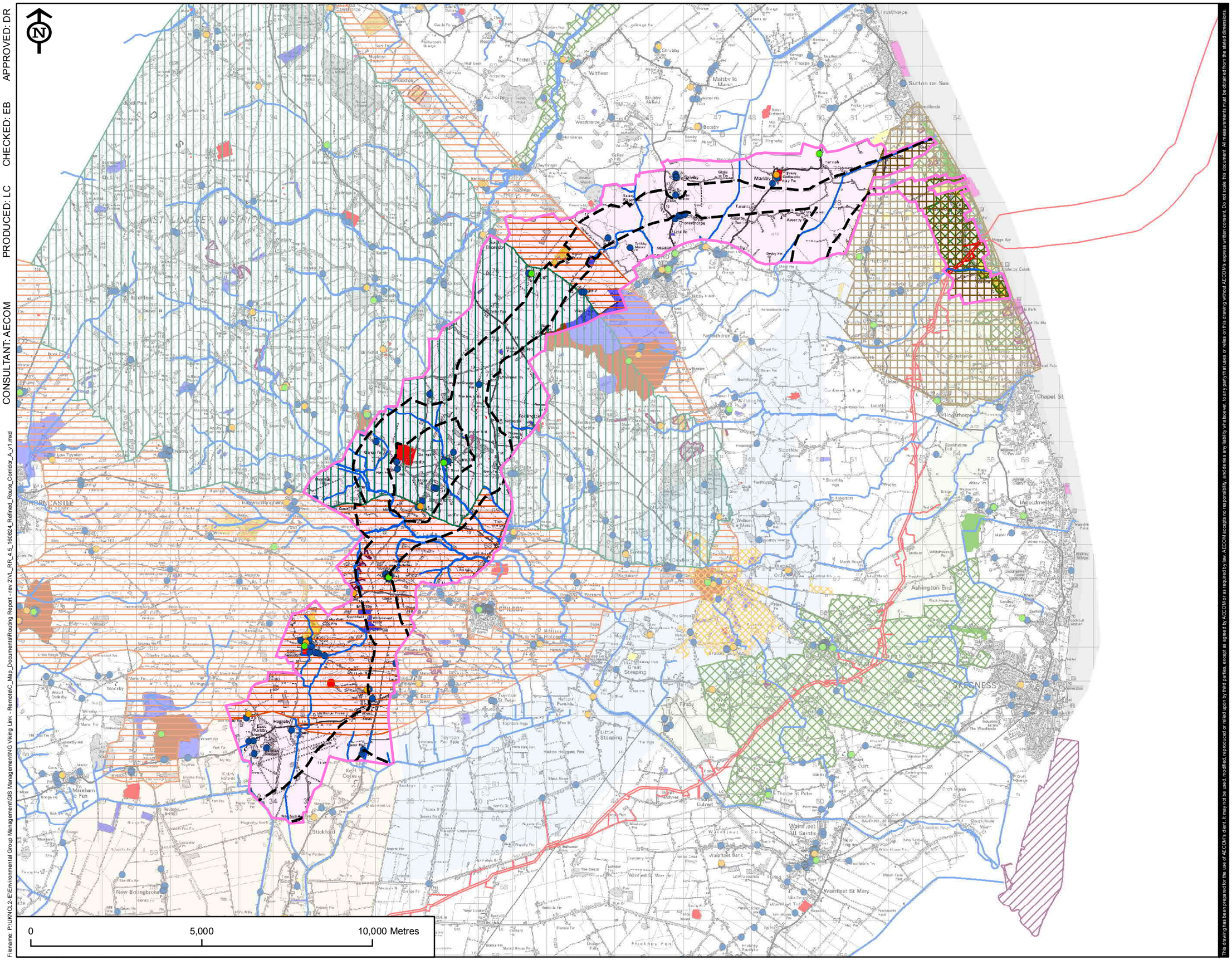

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VikingLink

LEGEND

- Refined Cable Route Corridor
- Route Corridor A (RCA)
- Area of Outstanding Natural Beauty
- Area of Great Landscape Value
- Registered Park and Garden
- Golf Course
- Caravan Park
- National Trust land around Gunby Hall
- Lincolnshire Coastal Country Park
- Main Rivers, Drains and Chalk Streams
- Listed Building - Grade I
- Listed Building - Grade II*
- Listed Building - Grade II
- Scheduled Monument
- Lincolnshire Coastal Grazing Marsh Project (LCGMP)
- Site of Special Scientific Interest
- Lincolnshire Wildlife Trust Reserve
- Regionally Important Geological/Geomorpholo... Site
- Site of Nature Conservation Importance
- Triton Knoll Development Consent Order limits

REVISION:

REV.	DATE	DESCRIPTION
1	26/08/16	ORIGINAL ISSUE

FIGURE NO.

VL_160826_RR_4.5

FIGURE TITLE

FIGURE 4.5 - REFINED ROUTE CORRIDOR A KEY CONSTRAINTS

SHEET NUMBER

1 of 1

NOTES

Date:	Scale at A3:
26/08/16	1:100,000

4.3 Assessment of Route Corridor B

Introduction

4.3.1 Route Corridor B (RCB) is illustrated below and a larger scale plan is also provided at the end of this section. RCB provides opportunities for a shorter crossing of the Lincolnshire Wolds AONB as well as opportunities to avoid it completely, however, the latter would require routes within or in closer proximity to the National Trust estate land surrounding Gunby Hall and within the Burgh le Marsh Coastal Grazing Marshes which form part of the LCGMP.

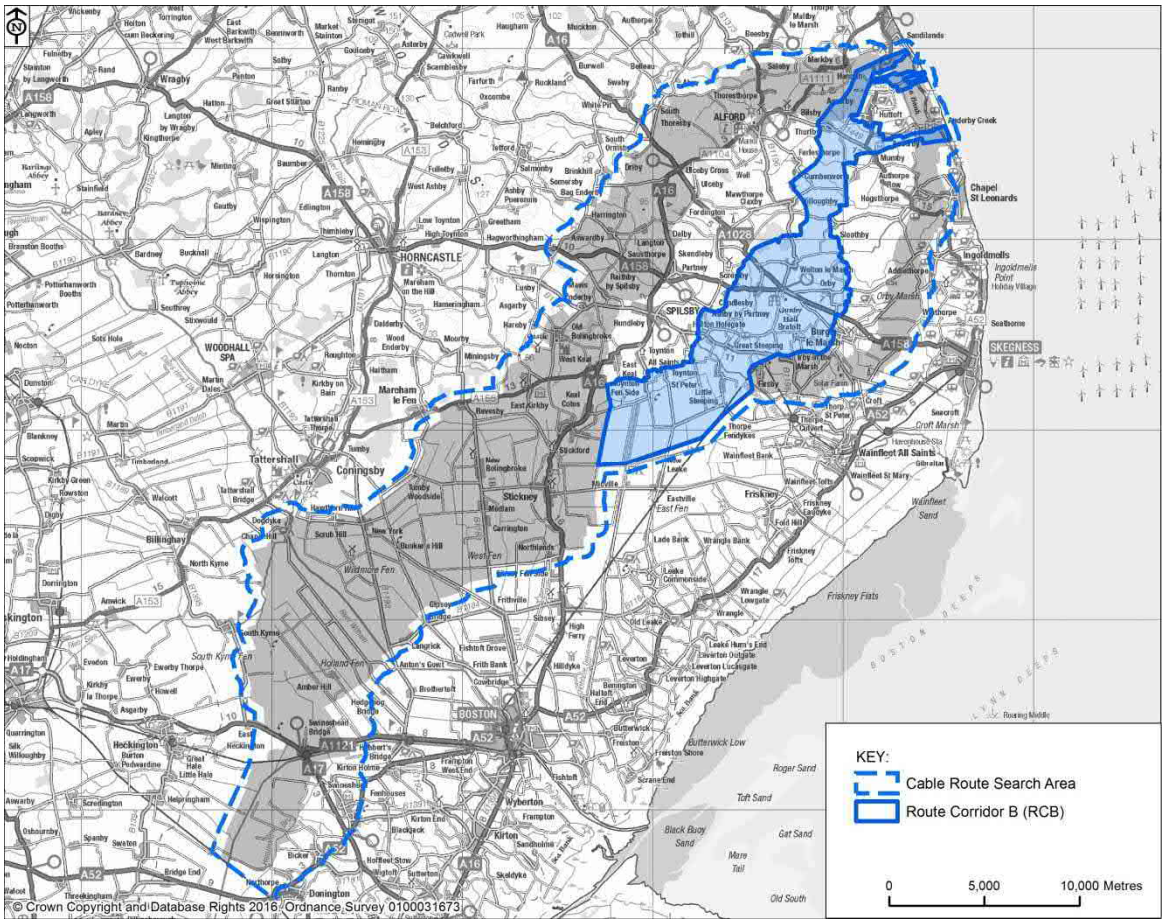

Figure 4.6 Route Corridor B

4.3.2 RCB follows the same route as RCA away from the coast in a western direction crossing the A52 then turns south crossing the B1449 between Thurlby and Mumby). It continues south west across the low lying coastal plain to run between Willoughby and Sloothby and then runs south crossing the A158 between Gunby and Burgh le Marsh. RCB then turns south west towards Bratoft and Great Steeping where it crosses the B1195 and turns south to cross the Steeping River to the east of Little Steeping. To the west of the Steeping River, it crosses flat very low lying fenland including large drains such as Hobhole Drain between Little Steeping and Stickford where it joins RCD.

Technical & Engineering Considerations

Constructability

4.3.3 Between the shortlisted landfalls (LF1a, LF1 and LF2) and Sloothby, RCB crosses the Lincolnshire coastal lowlands which consist predominantly of flat, agricultural land divided by drains; and characterised by small settlements and individual properties widely dispersed along roads, which would not present a significant constraint to construction.

4.3.4 Between Sloothby and Great Steeping there are more areas of woodland that would need to be avoided. The east of the corridor is flat agricultural land divided by hedgerows and a relatively dense network of drains. In addition, there is a relatively dense network of poor quality minor roads lined by residential properties and farms, including the linear settlements of Orby, Burgh le Marsh, Irby in the Marsh and Great Steeping which would present a challenge to routeing and access on top of other constraints in this area. The west of the corridor rises over the "toe" of the Lincolnshire Wolds where there are fewer watercourses; settlements and properties are more widely dispersed and the road network is less dense (requiring fewer crossings) but comprises larger roads providing better access (see below). The topography is gently undulating and therefore suitable for construction.

4.3.5 South west of Great Steeping, the Steeping River which has raised flood defence embankments along both banks for the majority of its length within RCB would need to be crossed. To the west of the corridor the flood defences are notably smaller than in the east. To the west of Steeping River RCB crosses flat, open, agricultural land divided by a dense network of drains, some substantial and a network of narrow, poor quality minor roads, many running adjacent to drains. This area is predominantly peat fenland (see Geology) which could present difficult ground conditions for cable installation due to a high water content and ground instability. In addition, there is potential for the future exposure of the cables either due to the buoyancy of cables within the peat (i.e. cables floating to the surface) or conversely due to peat shrinkage reducing the depth of cover over the cables in the future. There is potential within the corridor to reduce the length of cable laid within peat areas.

4.3.6 The combination of the high number of drain/road crossings and the ground conditions would present a challenge to construction through this area, however careful routeing could reduce these constraints.

Infrastructure

4.3.7 RCB is crossed by a number of roads, including two A roads and three B roads, which may need to be crossed using trenchless techniques, depending on the cable alignment. There is sufficient undeveloped land adjacent to these roads within the corridor to accommodate the working areas required for construction (albeit potential crossing points along the B1195 are restricted by development). Between Sloothby and Great Steeping a route alignment through the eastern part of the corridor would require more minor road crossings

4.3.8 The corridor crosses two dismantled railways the alignments of which are not in cutting or embankment within the corridor and are therefore unlikely to present a constraint to construction.

4.3.9 On the coastal plain RCB is crossed by a network of drains, between the coast and Steeping River this part of the corridor falls within LMDB district; west of Steeping River the corridor falls within Witham Fourth Internal Drainage Board (WFIDB) district. The network of drains becomes denser and the drains more substantial further south within the corridor including the Steeping River and associated flood defence banks, which would need to be crossed, and Hobhole Drain which has roads adjacent to both banks, which may be avoidable within the corridor. Within the chalk landscape of the Lincolnshire Wolds, to the west of RCB, there are fewer watercourses.

4.3.10 A natural gas pipeline runs through the western part of the corridor between Scremby and Candlesby the alignment of which is still to be confirmed with the operator. Depending on the alignment of the cable within RCB, this pipeline may need to be crossed by the cable route.

4.3.11 A summary of the infrastructure that a cable route would potentially need to cross within RCB is presented in Table 4.7.

Table 4.7 Route Corridor B – Infrastructure Crossings

Type	Notable crossings include...	Approx. No. of Crossings
A and B-class roads	A52, A158, B1449 and B1195	4
Other minor roads	-	22
Operational railway	n/a	0
Disused railway	Sutton -on-Sea – Firsby Junction Louth – Firsby Junction	2
Underground utilities	Natural gas pipeline	1

Accessibility

4.3.12 From the shortlisted landfalls (LF1a. LF1, and LF2), a cable route alignment within RCB would allow for a haul road connection to the A52 using the cable construction working width.

4.3.13 RCB is less well served by suitable road access for cable delivery (compared to RCA). Between the B1449 at Thurlby and the A158 near Gunby the corridor is served by minor roads running east from the B1196 which are particularly poor in the area north of Orby which is characterised by narrow hedged lanes. This area could be avoided by routeing to the west where the B1196, A1028 and A158 would provide better access. Between the A158 and B1195 the network of minor roads would need to be assessed. Although the eastern part of the corridor is served by more roads, few are likely to be suitable for access by construction vehicles due to their size, the number of bends and the preference to avoid access routes through local villages, where possible. The B1195 itself passes through many villages to connect to the A road system.

4.3.14 Between the B1195 at Great Steeping and the A16 Stickford the road network is characterised by long, straight, narrow roads, many running adjacent to drains in a north–south or east–west direction forming a broken grid with 90 degree bends. The roads show evidence of significant subsidence across this area of peat fenland, however there are fewer road side boundary features that might be a barrier to access. Roads running north outside of the area underlain by peat are lined by properties such as the villages of Halton Fenside, Toynton St Peter and Toynton Fen Side. Access through this area would need to be assessed further.

4.3.15 Steeping River is a potential obstacle to construction traffic to the west of the B1195 at Great Steeping, depending on the crossing point of the cable route. The width of the river channel could be crossed using a temporary bailey bridge or similar structure, however, access would need to take into consideration the integrity of the flood defence banks either side of the river channel. The flood defences are lower within the west of the corridor.

4.3.16 The Boston – Skegness railway could be avoided within RCB preventing the need for access across the railway line.

4.3.17 There would be increased traffic movements during the construction period. Careful planning of construction traffic would be required to take into account the busy tourist season on the Lincolnshire coast. The A158 is noted as a particularly busy route during the tourist season. A traffic management plan would be implemented to keep the impact to a minimum.

Environmental Considerations

Overview

4.3.18 The following subsections describe the environmental considerations present within or adjacent to RCB highlighting those features which are considered to be more sensitive and should be avoided or, if unavoidable, which may require additional mitigation including consideration of the timing of installation and the use of alternative installation methods. The objective of the following sub-sections is to highlight specific constraints and/or sensitivities which help to inform the assessment, and if feasible, the refining of RCB to a narrower corridor. Reference should also be made to the thematic constraints plans contained in Appendix C which illustrate the constraints described in the following subsections.

Settlement, Community & Tourism

4.3.19 The potential impacts of the underground cable on settlements, communities and tourism interests within RCB are similar to those outlined above for RCA, namely temporary disturbance during installation. This includes temporary noise and visual impacts resulting from the installation works as well as impacts resulting from the movement of construction traffic.

4.3.20 RCB is relatively well settled with a number of smaller scattered villages and individual properties present throughout. Settlements are illustrated in Figure 4.6 and include Welton le Marsh, Orby, Candlesby and Great Steeping as well as the outskirts of Burgh le Marsh. Great Steeping is the largest settlement within RCB with a number of local businesses and facilities present. Within

RCB businesses are primarily located either within settlements or along the main road network (for example an aggregates quarry to the east of the A1028, a fishery to the north of the A158 and holiday accommodation within Anderby).

4.3.21 In addition to Sandilands Golf Course, LCCP and the AONB specific tourism or recreational interests within RCB include:

- Gunby Hall (a Grade I listed house) and surrounding National Trust estate land including Monksthorpe Chapel, located at the foot of the Lincolnshire Wolds
- Various nature reserves, including Wolla Bank Pit at the coast near Anderby, Heath's Meadow near Bratoft, and Willoughby Meadow near Willoughby.
- Northcote Heavy Horse Centre – an animal welfare charity and horse rescue centre to the north of Great Steeping, which runs annual activities and events for visitors.
- There are also a number of recreational routes within RCB including PROWs as well as cycle and equestrian routes.

4.3.22 In the main settlements, communities and tourism interests within RCB are considered to be avoidable, however, there are some pinch points present where the route corridor is in close proximity to settlements including Orby, Welton le Marsh and Burgh le Marsh. In refining the route corridor direct impacts can be prevented, however, some temporary or short term disturbance as a result of installation works will be unavoidable. Where there is the potential for significant disturbance to occur detailed mitigation proposals will be developed related to how and when installation works are undertaken.

Geology & Hydrogeology

4.3.23 A description of the underlying solid and drift geology within RCB is contained in Appendix D; neither are considered to pose a significant constraint to development of the cable route. Key geological routeing constraints or considerations within RCB are illustrated in in Figure 4.4 and include:

- The White and Grey Chalk Group, a designated Principal Aquifer which extends across the eastern half of RCB.
- Groundwater Source Protection Zones (SPZ) are present within RCB at the northern end of the corridor.
- Chalk streams are present within the north and east of RCB at Burland Beck and where the River Lymn meets the Steeping River.
- A geological SSSI; Sea Bank Clay Pits to eastern extent of RCB close to the shortlisted landfalls.
- A Site Specific Minerals Safeguarding Area around Bassingham Lane, north of Scremby on the A1028 associated with Highfield Quarry.
- A small number of discrete areas of potential contaminated land comprising historic landfills at Candlesby and Bratfoft.
- Areas of elevated UXO risk such at former RAF facilities at Orby and Spilsby.

4.3.24 A number of these constraints are relatively small occupying discrete areas and as such are considered to be avoidable, however, others such as the designated aquifer or chalk streams cannot be avoided and would require careful consideration of alternative installation methods.

Hydrology

4.3.25 The exact number of watercourses which would require to be crossed will depend on the specific alignment within RCB, however, for the purposes of assessing the route corridor an estimate has been made. Within RCB the total number of watercourses which may require to be crossed is 108. This includes multiple crossings of field drains and maintained watercourses as set out in Table 4.8. Larger watercourse crossings including a crossing of the Steeping River are also required.

4.3.26 There are two chalk streams present within RCB as illustrated in Figure 4.6; Burlands Beck to the north and east and the River Lymn where it meets the Steeping River to the south and west of the route corridor. As with RCA whilst crossings of chalk streams are considered to be feasible they would require careful installation methods to be used in order to prevent significantly impacting them.

4.3.27 A review of the Environment Agency's Flood Map for Planning (from Rivers and the Sea) indicates that there are areas of RCB at risk of flooding. Those areas which are at higher risk of flooding, e.g. flood zones 2 and 3 include the eastern extent of RCB and the western extent of RCB between Burgh le Marsh and Stickford.

Table 4.8 Route Corridor B – Watercourse Crossings

Type	Notable crossings include…	Approx. No. of Crossings
Main river	Willoughby High Drain, Lady Wath's Beck, River Lymn/Steeping River and Halton Fenside	7
IDB Maintained watercourse	South Fen Drain, Cloot Drain, Thurlby Drain, Rutters Drain, Royalty Drain and Hobhole Drain	22
Riparian/other watercourse	-	79

Agriculture & Soils

4.3.28 A review of the Provisional ALC 1:250,000 mapping for the East Midlands Region and secondary soil association mapping (LandIS Dataset), indicates that the majority of RCB is underlain by land which is predominantly classed as Grade 2 (very good quality), and Grade 3; with an even split between Subgrade 3a (good quality) and 3b (moderate quality). Therefore, the majority of the RCB is BMV agricultural land (70.5%). The ALC estimates for RCB are summarised in Table 4.9.

Table 4.9 Route Corridor B – Agricultural Land Classification		
ALC Grade	Area (ha)	Percent (%)
ALC Grade 1**	0.0	0.0
ALC Grade 2**	1905.3	41.1
ALC Subgrade 3a*	1365.0	29.4
ALC Subgrade 3b*	1370.6	29.5
ALC Grade 4**	0.0	0.0
ALC Grade 5**	0.0	0.0
Total	**4640.9**	**100.0**

*Calculated using LandIS NATMAP data and Provisional 1:250,000 ALC mapping for the East Midlands Region[9].

** Calculated from Provisional 1:250,000 ALC mapping for the East Midlands Region[9]

4.3.29 The soil associations present in RCB are summarised in Table 4.10. The corridor is dominated by slowly permeable stagnogley soils (47.7%; Holderness and Salop associations), followed by deep stoneless clayey soils (36.4%; Downholland 1 and Downholland 2 associations).

4.3.30 A large area of soil belonging to the Downholland 1 (851a) and Downholland 2 (851b) associations is located between Little Steeping in the North and Midville in the South, extending across the entire southern section of RCB. These clayey soils have an organic rich surface horizon and therefore could require specific management beyond standard soil handling and storage guidelines. Descriptions of soil associations, and their component soil series, are provided in Appendix E.

Table 4.10 Route Corridor B – Soil Associations			
Map Code	Soil Association	Area (ha)	Percent (%)
541r	Wick 1	115.9	2.5
711m	Salop	63.6	1.4
711u	Holderness	2150.2	46.3
813c	Fladbury 2	8.2	0.2
813g	Wallasea 2	616.0	13.3
851a	Downholland 1	272.3	5.9
851b	Downholland 2	1414.7	30.5
	Total	**4640.9**	**100.0**

4.3.31 A land holding located close to Irby in the Marsh has several land parcels registered within an organic entry level plus higher level stewardship scheme. It occupies approximately 45ha, as

illustrated in Figure 4.6. However, the size and location of this scheme means that the land could be avoided through the development of detailed route alignments.

Landscape

4.3.32 RCB was originally intended to avoid the Lincolnshire Wolds AONB, however, following initial stakeholder engagement regarding the alternative route corridors, RCB was widened at its western extent in order to allow for routeing opportunities to the west of Gunby Hall to be considered as well as those to the east which would avoid it.

4.3.33 In developing RCB within the south eastern extent of the AONB consideration has been given to the features which contribute to the importance and quality of the landscape and the extent to which they can be avoided. An appreciation of the key features of the AONB, and cable routeing exercise, is described above for RCA.

4.3.34 RCB includes the edge of the AONB and although the overall character is largely similar, some of the key features of the AONB are less evident in this area. The principal features identified in this area relate to vegetation and land cover, including woodland and trees, hedgerows and roadside verges. As with RCA, it is considered that it would be possible to develop a cable route within the Lincolnshire Wolds AONB without substantially altering the character of this designated landscape in the long-term.

4.3.35 Other landscape considerations within RCB include Gunby Registered Park and Garden (RPG), two areas of the Lincolnshire Wolds AGLV and the LCCP.

4.3.36 Gunby Hall RPG covers an area of approximately 50ha, bounded to the north by the A158 Skegness Road, to the west by Gunby Lane, and to the south and east by farmland. The grounds are largely enclosed by mature woodland planting to the north and west but are more open to the south and east, giving views to the surrounding farmland. Large parts of the surrounding farmland are under National Trust ownership and the relationship between Gunby RPG and its context has been considered as part of the routeing exercise. Although the cable route would be underground, the prevalence of parkland trees and policy woodlands would make it difficult to successfully route the cable through this landscape without resulting in long-term effects.

4.3.37 With respect to the AGLV, the key characteristics and considerations for establishing a route through this regionally designated landscape are described in paragraphs above. The nature of the cable means that it is considered possible to develop a cable route within this designated area without substantially altering its key characteristics in the long-term.

4.3.38 The landscape character of RCB is more consistent than the variable character of RCA. Many of the same character areas are shared between the two corridors, however, RCB includes a greater extent of coastal plain and fenland landscapes and a relatively small area of rolling farmland along the southern fringe of the Lincolnshire Wolds. In general, fewer sensitive landscape elements have been identified within RCB, with the exception of the areas within the AONB, AGLV and around Gunby RPG.

Ecology

4.3.39 A review of statutory and non-statutory designated sites as well as priority habitats within and adjacent to RCB has been undertaken. These constraints are illustrated on Figure 4.6. Notable constraints include:

- Subject to selection of the preferred landfall there is the potential for onwards routeing to result in impacts on the Sea Banks Clay Pit SSSI and on Anderby Creek Sand Dunes LWS and Anderby Marsh LWTR.
- Subject to selection of the preferred landfall there is the potential for onwards routeing to result in direct impacts on part of the Anderby Target Area of the Lincolnshire Coastal Grazing Marsh Project.
- A section of the corridor, to the south of Bratoft, encroaches into the north western margins of the Burgh le Marsh Target Area of the LCGMP. Habitats in this area are currently agricultural rather than floodplain grazing marsh.
- There are no statutory designated sites within RCB, however there are a small number of local designations including Local Wildlife Sites and Sites of Nature Conservation Interest, the majority being to the north, east and south of Gunby. These typically occupy small discrete areas and should be avoidable.
- No Ancient Woodland is identified within RCB, although broadleaved woodland priority habitat is present with the majority around Gunby. Other priority habitats are present and include a scattering of floodplain grazing marsh and good quality grassland. It is anticipated that these can be avoided through routeing or if not possible through installation methods.
- RCB is mostly constrained around Gunby where designations are associated with Gunby Hall, however a route to the east of here would enable constraints to be avoided.

4.3.40 It is anticipated that the majority of constraints can be avoided during development of a detailed route alignment within RCB. The main pinch point is to the east of Gunby. Whilst the constraints in this area can be avoided by routeing further to the east this means RCB encroaches into the north western margins of Burgh le Marsh LCGMP and would result in some direct impacts. Where direct impacts are unavoidable consideration would need to be given to habitat reinstatement. Subject to routeing requirements the use of trenchless installation methods could also be considered where avoidance of particular constraints is not possible.

Archaeology & Heritage

4.3.41 There are a number of both built and below ground designated and non-designated heritage assets located within RCB as illustrated in Figure 4.6. This includes:

- Six Scheduled Monuments, 50 Listed Buildings (one Grade I, 11 Grade II * and 38 Grade II Listed) and one Grade II Listed Registered Park and Garden.
- 354 non-designated assets recorded by Lincolnshire HER are located throughout RCB. A significant proportion of these date to the Early Medieval and Medieval Period (117 heritage assets) and typically include the remains of settlements and ridge and furrow

earthworks. This is also supported by the data provided by the National Trust. According to this there are 764 Medieval sites, 332 Post Medieval, 10 Prehistoric, 10 sites of unknown date, one Roman and one Early Medieval within the corridor at the site of Gunby Hall. Although this data supports the general trend of the HER data, there is some duplication. Further non-designated assets within this route corridor according to the HER include 61 Prehistoric assets, 32 Roman, 30 Post Medieval, 85 Modern and 29 assets of unknown date.

- The assessment does not include the results of Historic England's farmstead Survey as these sites predominantly date to the Post Medieval Period, additionally as these assets are predominantly extant they should be avoided.
- Gunby Hall, a registered Park and Garden and its surrounding grounds which are owned by the National Trust. Within the grounds there are a number of listed buildings including Gunby Hall itself (grade II)

4.3.42 Direct physical impacts on designated assets, e.g. Scheduled Monuments and listed buildings are considered to be avoidable in developing detailed route alignments, however, there would be temporary or indirect impacts on their setting during installation. To reduce this as much as possible a separation distance of 50m to all designated heritage assets has been established.

4.3.43 Direct impacts on Gunby Hall listed building and registered park are avoidable in developing route alignments, however, routes would require to be (1) in the surrounding land owned by the National Trust or (2) north in the AONB or (3) south in Coastal Grazing Marsh.

4.3.44 As far as possible routeing aims to avoid non-designated assets, however, the extent and distribution of these mean that in some instances direct impacts may be unavoidable, particularly when considering other constraints on route selection. Whilst direct impacts on non-designated assets will in some cases be unavoidable, it is important to consider the potential contemporaneity of heritage assets. The setting of heritage assets is informed in part by nearby contemporary assets consequently clusters of assets of similar periods should be avoided where possible.

Planning Considerations

Planning Policy

4.3.45 RCB considers a route through the most southern part of Lincolnshire Wolds AONB up to 3 km in length. As such the principle planning policy considerations are those at a national and local level on development in and through an AONB. As the corridor falls within East Lindsey District Council, the East Lindsey District Local Plan 2007 is the current extant planning policy to be regarded. Policy C11 'Lincolnshire Wolds Area of Outstanding Natural Beauty and Areas of Great Landscape Value' sets out the key policy tests in this regard.

4.3.46 The NPPF (2012) also requires consideration, as the most recently adopted policy on this subject, in particular paragraphs 115 and 116 which set out the assessment criteria applications are required to consider, should development be pursued in an AONB. RCB also lies within a

Natural Trust property and estate; as such relevant historic landscape and monuments settings policies require consideration. RCB also encroaches into the Burgh le Marsh LCGMP, consultation with the Lincolnshire Coastal Grazing Marshes Partnership and reference to the Landscape Partnership Scheme 2011-2014 would be required.

4.3.47 In addition consideration should be given to the emerging East Lindsey Local Plan which will guide growth and development in East Lindsey up to 2031. This emerging plan has limited weight but will be regarded as a material consideration and one which should continue to be reviewed as the cable route is developed.

4.3.48 RCB also crosses part of a Minerals Safeguarding Area (which the A1028 bisects), as such the adopted 2006 Lincolnshire County Council Core Strategy and Development Management Policies (CSDWP) and saved policies from the Lincolnshire Minerals Local Plan (1991) and Lincolnshire Waste Local Plan (2006) are relevant and will need to be assessed accordingly.

Refined Route Corridor B

4.3.49 RCB is considered to provide opportunities to develop feasible cable routes, however, in order to focus this it has been further refined. The aim of refining RCB was to develop a narrower route corridor (approximately 1km wide for its length) whilst taking into account the technical, environmental and planning considerations above as well as confirmation of in particular, the preferred landfall and converter station sites (LF1a and CS1). The refined RCB is illustrated in Figure 4.7 below with a larger scale plan at the end of this section.

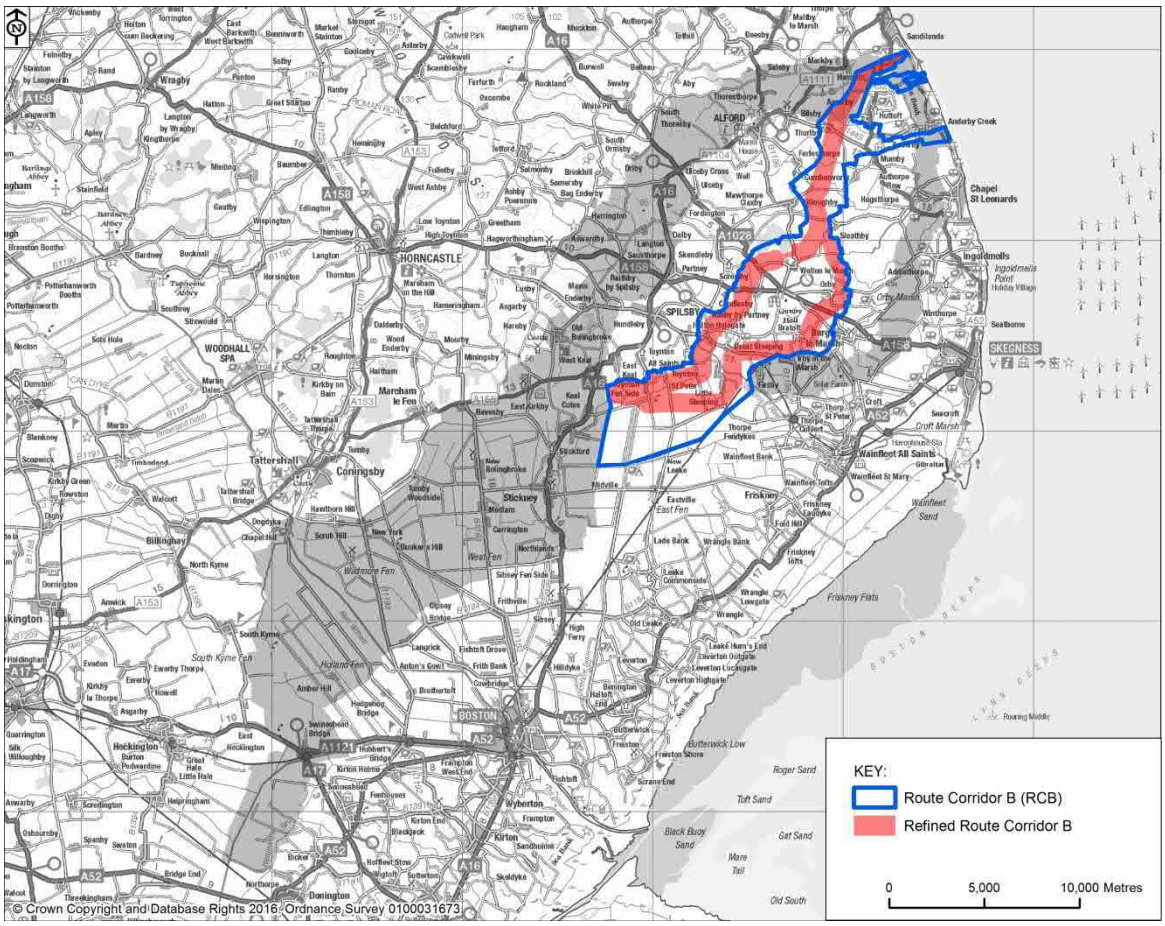

Figure 4.7 Refined Route Corridor B

4.3.50 The key constraints which have informed the refinement of RCB include (from east to west):

- Routeing away from the landfall the route corridor has been narrowed occupying open fields adjacent to the Anderby and Huttoft LCGMP.
- RCB has been refined so that it largely avoids settlements, however, moving inland there are a number of small settlements located on the margins of the corridor including Thurlby, Mumby, Bonthorpe, Willoughby and Sloothby. These are typically connected by roads which cross the corridor.
- Within this section of RCB a small number of non-designated heritage assets are present. The distribution of these assets means that some are located partly or wholly within the corridor. Where these constraints cannot be avoided by detailed routeing additional site specific mitigation may be required.
- North of Hasthorpe RCB splits in two in order to avoid Gunby Estate and its surrounding land. This comprises an option to the west partly routed through the AONB and an option to the east routed closer to settlements and partly through the Burgh le Marsh LCGMP and National Trust land.
    - The eastern corridor avoids the 'core' area comprising Gunby Hall and surrounding land but is in closer proximity to Orby, Firsby and Little Steeping. Linear development

associated with these settlements presents a constraint to construction. The corridor has been narrowed as far as possible but due to the number and distribution of constraints in the area a number of constraints are located within or adjacent to RCB including small pockets of National Trust land, non-designated heritage assets from the HER and the northern most parts of the Burgh le Marsh LCGMP. The eastern corridor is served by small local roads and fewer A and B class roads offering poorer potential for access and would require a crossing of the Steeping River including flood defence banks which may be a further constraint to construction access. The eastern corridor has been refined to avoid the need to cross Hobhole Drain and minimise construction through peat areas.

- The western corridor also avoids the 'core' area comprising Gunby Hall and surrounding land but is routed for approximately 3km through the Lincolnshire Wolds AONB. Comparatively it encounters fewer constraints and is shorter than the eastern alignment. Constraints which are present include non-designated heritage assets and non-statutory ecological designations and a Mineral Safeguarding Area. The western corridor is served by A and B class roads at regular intervals offering better potential for access and would allow a crossing of the Steeping River where the flood defence banks are less substantial.

- The eastern and western splits rejoin to the west of Little Steeping. Within this section of the refined route there are no major constraints which influence the extent of the corridor. SNCIs are located to the north of the corridor but can be avoided in developing detailed routes.

Summary of Assessment of Route Corridor B

4.3.51 Table 4.11 sets out the key technical and environmental factors identified for RCB.

Table 4.11 Route Corridor B – Key Assessment Findings

Factor	Findings
Local Planning Authority	East Lindsey District Council
Approx. Length	28 km (subject to detailed routeing)
Approx. no. of crossings	137 (subject to detailed routeing)

Table 4.11 Route Corridor B – Key Assessment Findings	
Factor	**Findings**
Key technical constraints and opportunities	· Sufficient space available to facilitate construction including opportunities for siting temporary facilities albeit the eastern corridor is more constrained by linear settlement. · Relatively small number of A and B road crossings but high number of minor road crossings required. · Lower frequency of A and B roads offers fewer opportunities for direct construction access from the existing road network, although the western corridor would offer better access opportunities. · Higher number of watercourse crossings, including Steeping River with flood defence banks, compared to RCA but fewer compared to RCC. · Potentially challenging ground conditions with some localised peat. · Notable utility crossings include a natural gas pipeline (alignment to be confirmed).

Table 4.11 Route Corridor B – Key Assessment Findings	
Factor	**Findings**
Key environmental constraints and opportunities	· Through refining RCB, settlements are largely avoided preventing direct impacts, however, some remain in close proximity increasing the potential for disturbance. In a number of places the roads which require to be crossed are the key transport routes between settlements and the coast. · The constraints which are present are avoidable as they occupy small discrete areas; this includes a site specific Minerals Safeguarding Area north of Scremby and historic landfills at Candlesby and Bratoft. Other geological/hydrogeological constraints may inform the selection of installation methods (e.g. crossing of chalk streams and working within SPZ). · RCB requires a significant number of watercourses and field drains (subject to routeing 108) to be crossed including chalk streams. · Almost three quarters of the land underlying RCB is considered to BMV agricultural land. · RCB includes an option to develop a relatively short direct route (approximately 3km) through the southernmost part of the AONB. It provides opportunity to avoid key features which contribute to the landscape designation such as woodland, however, other features such as hedgerows may not be avoided and more specific mitigation would be required including landscape reinstatement and enhancement. A with RCA it is considered possible to develop a route through the AONB without resulting in long term impacts on its character. · Designated and non-designated ecological sites are present within and on the margins of the refined RCB including the Burgh le Marsh LCGMP. For the most part impacts could be avoided in developing a detailed route, however, some site specific reinstatement may be required where particular constraints (such as the LCGMP) cannot be avoided. · Gunby Hall and its surrounding land are largely avoided but subject to detailed routeing short sections of cable may be required to cross National Trust land. · Designated and non-designated archaeological and heritage assets are widespread throughout RCB. Designated assets are all avoidable (with a 50m separation distance), however, due to the distribution of non-designated assets some impacts would be unavoidable and a working method (e.g. controlled strip and record) would require to be agreed.

Table 4.11 Route Corridor B – Key Assessment Findings	
Factor	**Findings**
Conclusion	The refined RCB provides opportunities to develop technically feasible cable routes as well as avoid the majority of environmental constraints and settlements. The benefits of RCB will depend on the detailed route selected, for example avoiding Gunby Hall and the AONB requires a longer route in closer proximity to settlement with more watercourse crossings and would result in direct impacts on the Burgh le Marsh LCGMP, whilst a shorter route could be developed avoiding Gunby Hall but this would require approximately 3km of route to developed through the AONB. For both options specific mitigation would be required to reduce potential impacts such as landscape and/or habitat reinstatement and enhancement.

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CONSULTANT: AECOM

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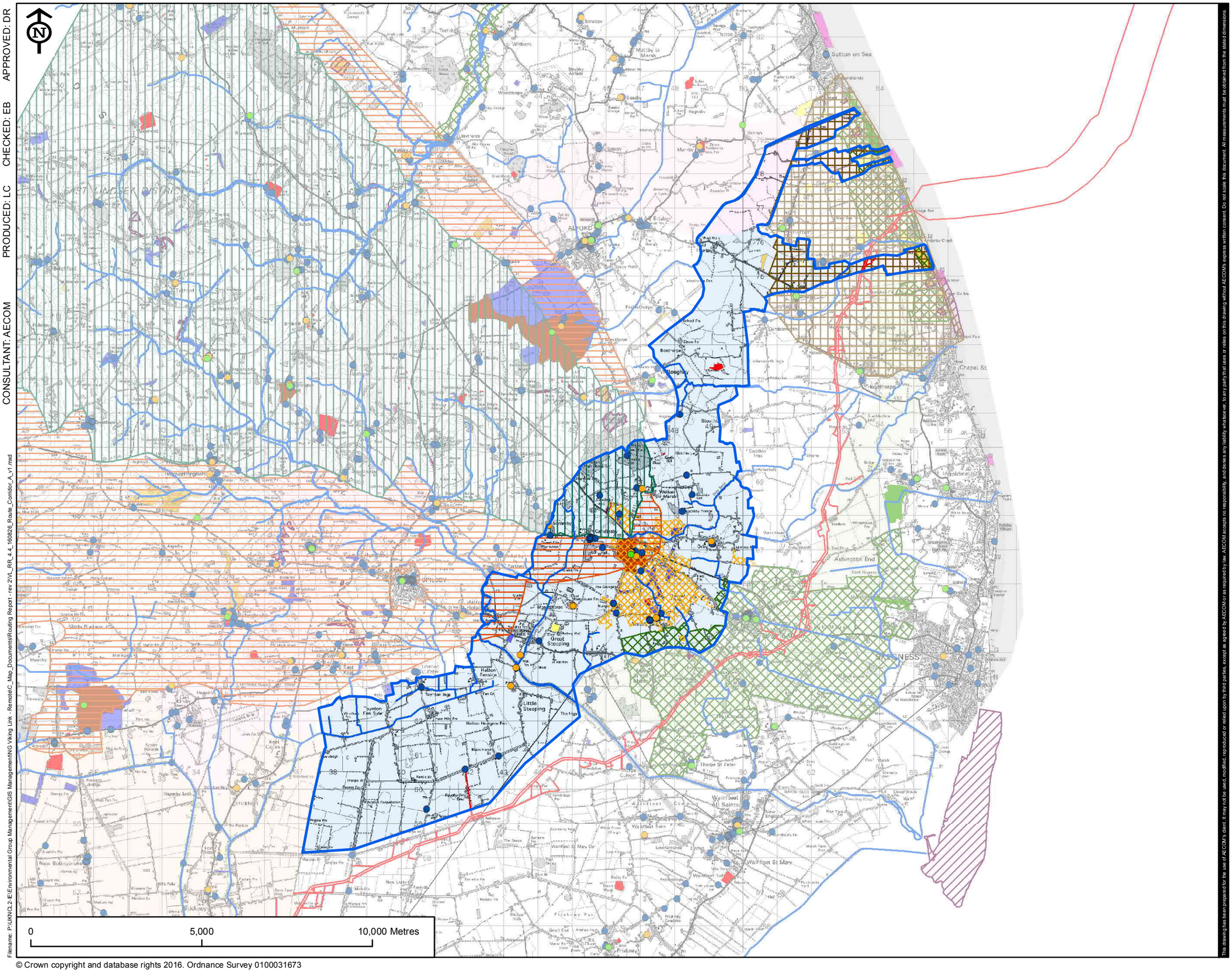

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VikingLink

LEGEND

- Route Corridor B (RCB)
- Area of Outstanding Natural Beauty
- Area of Great Landscape Value
- Registered Park and Garden
- Golf Course
- Caravan Park
- National Trust land around Gunby Hall
- Lincolnshire Coastal Country Park
- Main Rivers, Drains and Chalk Streams
- Listed Building - Grade I
- Listed Building - Grade II*
- Listed Building - Grade II
- Scheduled Monument
- Lincolnshire Coastal Grazing Marsh Project (LCGMP)
- Site of Special Scientific Interest
- Lincolnshire Wildlife Trust Reserve
- Regionally Important Geological/Geomorpholo... Site
- Site of Nature Conservation Importance
- Triton Knoll Development Consent Order limits

REVISION:

REV.	DATE	DESCRIPTION
1	26/08/16	ORIGINAL ISSUE

FIGURE NO.

VL_160826_RR_4.6

FIGURE TITLE

FIGURE 4.6
ROUTE CORRIDOR B
KEY CONSTRAINTS

SHEET NUMBER

1 of 1

NOTES

Date: 26/08/16

Scale at A3: 1:100,000

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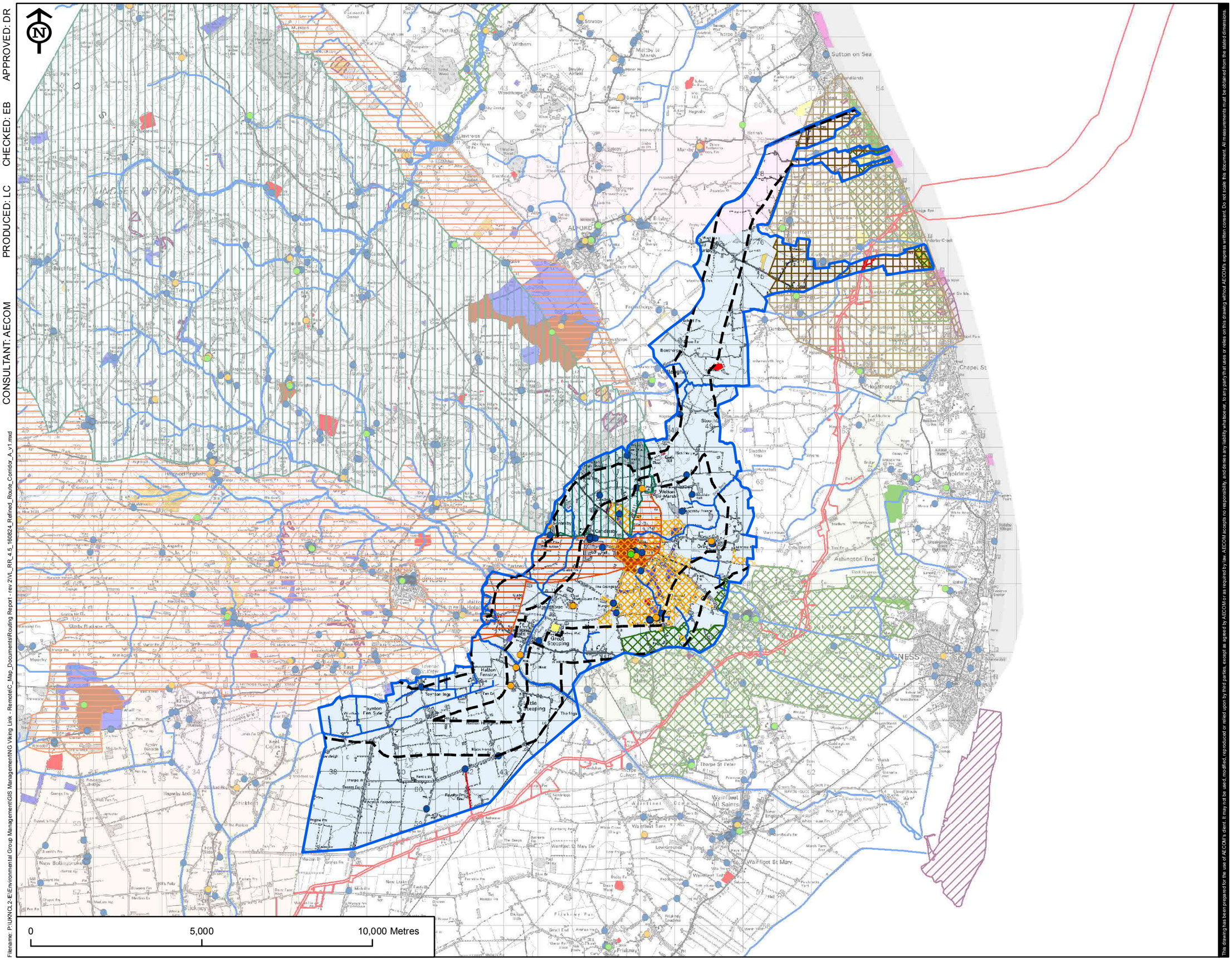
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Sutton on Sea
Mablethorpe
Withern
Maltby le Marsh
Authorpe
Woodthorpe
Saleby
Alford
Bilsby
Marshchapelle
Gunby
Gunby Hall
Gumberstone
Bottesford
Hogsthorpe
Chapel St Leonards
Stockwith
Welton le Marsh
Candlesby
Orby
Ashington End
Grout Steeping
Little Steeping
Halton Fenside
Toynton Fen Side
Toynton Fen
Toynton Inge
Thorpe St Peter
Wainfleet All Saints
Wainfleet Sands
Wainfleet St Mary
Friskney
Friskney Eaudyke
Frithville
Hagnaby Lock
Hagnaby
Moorby
Belleau
Belleau Pelaw
Tetford
Bilsby
Hemingby
Hemingby Lodge
Hemingby Fen
Hemingby Fen Side
Hemingby Fen Side Fm
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Hemingby Fen Side Fm

4.4 Assessment of Route Corridor C

Overview of Route Corridor

4.4.1 Route Corridor C (RCC) is illustrated in below and in Figure 4.8 at the end of this section. It runs south, parallel to the coast and between Hogsthorpe and Chapel St Leonards where it crosses the A52. The corridor continues south south west, across the low lying coastal plain, moving inland from the coast to avoid the settlements of Ingoldmells and Skegness and crosses the A158 to the east of Burgh le Marsh. It then turns west and runs south of Burgh le Marsh to Irby in the Marsh where it crosses the B1195 and joins RCB.

Figure 4.8 Route Corridor C

Technical & Engineering Considerations

Constructability

4.4.2 RCC runs through flat open agricultural land of the Lincolnshire coastal lowlands between Sutton on Sea and Burgh le Marsh which is divided by a dense network of drains. Cable installation through this corridor would require a relatively high number of watercourse/drain crossings compared to other corridors.

4.4.3 The generally undeveloped countryside within the corridor is divided by a network of local roads, many with properties strung along them or ribbon development, such as that between Anderby and Anderby Creek and between Hogsthorpe and Chapel St Leonards, which would be a constraint to the alignment of a cable route within this corridor.

4.4.4 There is currently sufficient undeveloped land available to accommodate the working width, HDD operations (where required) and associated temporary construction compounds and laydown areas within RCC, however, where the corridor coincides with the proposed alignment of the Triton Knoll Offshore Wind Farm Electrical System onshore cables (hereafter referred to as the Triton Knoll onshore cable route) the land available for construction may be significantly constrained.

Infrastructure

4.4.5 RCC is crossed by a number of roads, including two A roads and a B road, which may need to be crossed using trenchless techniques, depending on the cable alignment. There is sufficient undeveloped land adjacent to these roads within the corridor to accommodate the working areas required for construction.

4.4.6 The corridor is crossed by a dense network of drains. The corridor falls within the LMDB district. A cable route within this corridor would require a high number of drain crossings.

4.4.7 The proposed alignment of the Triton Knoll onshore cable route would run parallel to this corridor. This would comprise 18 No. buried high voltage AC cables. The Triton Knoll onshore cable route would cross RCC twice. Once at the coast, occupying one of the few gaps in development along Sea Road, Anderby and thus placing a further constraint on cable routeing within the corridor at that location. The second crossing of the Triton Knoll onshore cable route would be to the south of Burgh le Marsh where the Triton Knoll onshore cable route coincides with a number of other constraints including The Hollies Solar Farm, Croft End (and associated wind turbines); Lincoln Farm Solar Farm, Irby in the Marsh; and the Boston – Skegness railway. The combination of these infrastructure constraints and environmental constraints in the same area would severely challenge the feasibility of routeing the cables at this location.

4.4.8 A summary of the infrastructure that a cable route would potentially need to cross within RCC is presented in Table 4.12.

Table 4.12 Route Corridor C – Infrastructure Crossings

Type	Notable crossings include…	Approx. No. of Crossings
A and B-class roads	A52, A158, B1195	3
Other minor roads	-	16
Operational railway	Nottingham–Skegness (avoidable)	2
Disused railway	-	0

Table 4.12 Route Corridor C – Infrastructure Crossings		
Type	Notable crossings include…	Approx. No. of Crossings
Underground utilities	Proposed Triton Knoll Electrical System onshore cable route (18 No. buried cables)	2

Accessibility

4.4.9 From the shortlisted landfall options, a cable route alignment within RCC would not allow for a direct access from the A52 within the cable construction working width to the landfall. A separate "offsite" access would be required from the A52 north or south of Huttoft to the landfall.

4.4.10 There are fewer A and B roads crossing RCC (compared to RCA and RCB), therefore the corridor is less well served by suitable road access for cable delivery. At the coast the minor roads linking to the A52 are narrow and poor quality and often lined by residential properties. Between the A52 at Hogsthorpe and the A158 at Burgh le Marsh the road network is sparse. A few relatively straight and open minor roads cross the corridor which connect east to the A52 within the tourist resorts of Ingoldmells and Winthorpe or west to the A158. These roads are of variable quality. Further south between the A158 at Burgh le Marsh and the B1195 at Firsby the corridor is served by poor quality narrow minor roads lined by properties and hedgerows, which would need to be further assessed for suitability for access by construction traffic. The B1195 itself passes through many villages to connect to the A road system.

4.4.11 A cable route within RCC would need to be routed between the B1195 at Firsby and the A16 at Stickford (within RCB) where the road network is characterised by narrow roads which show evidence of significant subsidence and routeing would include a crossing of Steeping River where the flood defence banks may be a further constraint to construction access.

4.4.12 The Boston – Skegness railway could be avoided within RCC preventing the need for access across the railway line via minor roads.

4.4.13 There would be increased traffic movements during the construction period. Careful planning of construction traffic would be required to take into account the busy tourist season on the Lincolnshire Coast. The A158 is noted as a particularly busy route during the tourist season and RCC would bring construction works closer to the tourist areas on the coast. A traffic management plan would be implemented to keep the impact to a minimum.

Environmental Considerations

Overview

4.4.14 The following subsections describe the environmental considerations present within or adjacent to RCC highlighting those features which are considered to be more sensitive and should be avoided or, if unavoidable, which may require additional mitigation including consideration of the timing of installation and the use of alternative installation methods. The objective of the

following sub-sections is to highlight specific constraints and/or sensitivities which help to inform the assessment, and if feasible, the refining of RCC to a narrower corridor. Reference should also be made to the thematic constraints plans contained in Appendix C which illustrate the constraints described in the following subsections.

Settlement, Community & Tourism

4.4.15 RCC typically avoids settlements, however, a number are located on its margins such as Hogsthorpe, Chapel St Leonards, Burgh le Marsh and Irby in the Marsh. There are also isolated rural properties scattered throughout the route corridor. RCC passes particularly close to the village of Hogsthorpe where a number of community facilities are present.

4.4.16 Tourism interests within RCC include a significant number of caravan parks typically located on the margins of the corridor - for example immediately to the east of the route corridor in the Anderby Creek and Chapel St Leonards areas, sites to the north and south of Orby Road on the outskirts of Ingoldmells, and a caravan park to the east of Burgh le Marsh.

4.4.17 As noted in relation to RCA and RCB, the LCCP stretches along the coast from Sandilands south to Chapel St Leonards and inland as far as the villages of Huttoft, Anderby, Mumby and Hogsthorpe, and is a popular location for residents and visitors particularly during the summer holiday season.

4.4.18 The England Coast Path is a new National Trail being created all around England's coast. The trail is opening in sections and will be complete in 2020. Both the Sutton Bridge to Skegness (92km) and Skegness to Mablethorpe (26km) sections are expected to be ready in 2018.

4.4.19 Other tourist and recreation destinations within or immediately adjacent to RCC include:

- Skegness Golf Centre - located adjacent to the corridor at Addlethorpe. The Sandilands Golf Club is located to the north of the corridor.
- Skegness Stadium - stock car race track, with events held throughout the year, with racing taking place at weekends between March and November.
- Wolla Bank Pit Nature Reserve - located inland to the south of Anderby Creek.
- Willow's Farm - a pick-your-own business to the west of Chapel St Leonards, with a farm shop open.

Geology & Hydrogeology

4.4.20 The underlying solid and drift geology within RCC is not considered to pose a significant constraint to development of the cable route. Key geological routeing constraints or considerations within RCC are illustrated in Figure 4.4 and include:

- The White and Grey Chalk Group, a designated Principal Aquifer which extends across the eastern half of RCC.
- An area of elevated unexploded ordnance (UXO) risk is present to the west of Huttoft Bank Farm in the north of the corridor.

- There is potential for contamination associated with Skegness Racing Stadium, approximately 1.5 km north-west of Ashington End, and an electricity substation approximately 2.8 km east of Burgh Le Marsh.
- Lincolnshire Coastal Grazing Marsh is present in much of the west of the corridor (except for a small area to the far west), as well as a small area to the far north of the corridor.

4.4.21 A number of these constraints are relatively small occupying discrete areas and as such are considered to be avoidable, however, others such as the designated aquifer cannot be avoided and would require careful consideration of installation methods.

Hydrology

4.4.22 The exact number of watercourses which would require to be crossed will depend on the specific alignment within RCC, however, for the purposes of assessing the route corridor an estimate has been made as set out in Table 4.13. Within RCC the total number of watercourses which may require to be crossed is 111. This is higher than both RCA and RCB and includes multiple crossings of field drains and maintained watercourses running perpendicular to the main catchment flows. The Steeping River is located at the western extent of RCC and would also require to be crossed.

4.4.23 A review of the Environment Agency's Flood Map for Planning (from Rivers and the Sea) indicates that the majority of RCC lies within an area of higher risk of flooding, e.g. flood zones 2 and 3.

Table 4.13 Route Corridor C – Watercourse Crossings

Type	Notable crossings include…	Approx. No. of Crossings
Main river	Willoughby High Drain, Little River Lymn and Cowcroft Drain, Steeping River	7
IDB Maintained watercourse	Anderby Main Drain, Mousewater Drain, Four Hundred Acre Drain, Burgh Marsh Drain, Irby Beck and Wold Drain.	18
Riparian/other watercourse	-	86

Agriculture & Soils

4.4.24 A review of the Provisional 1:250,000 ALC Mapping for the Eastern Region indicates that the majority of RCC is underlain by land which is predominantly classed as Grade 3 (good to moderate quality) with smaller areas of Grade 2 (very good quality) also present.

4.4.25 During the initial assessment of the route a number of technical constraints affecting the feasibility of RCC were identified. Consequently, secondary soil association mapping (LandIS

Dataset) was not purchased for this route corridor meaning a differentiation between Subgrade 3a and 3b; and a calculation of the area and proportion of BMV land within RCC cannot be made.

4.4.26 Whilst there are no organic soils in RCC, this option would have to utilise the southern section of RCB which is located on organic rich soils (Downholland 1 (851a) and Downholland 2 (851b) associations). From the available 1:250,000 soil map, it would not be possible for routeing to avoid these organic rich soils, which could require specific management beyond standard soil handling and storage guidelines.

4.4.27 A land holding located close to Irby in the Marsh has several land parcels registered within an organic entry level plus higher level stewardship scheme. It occupies a significant area (approximately 45 ha) as illustrated in Figure 4.8, approximately 5 ha of which extends into RCC. The size and location of this Agri-Environment scheme means that the land could be avoided through the development of detailed route alignments.

Landscape

4.4.28 RCC avoids the Lincolnshire Wolds AONB and AGLV as well as the Registered Park and Garden at Gunby Hall. This corridor passes through the LCCP from close to its northern boundary at Sandilands to its southern boundary at Chapel St Leonards. As described previously, the proposed cable route would be underground and therefore long term effects on the landscape character of the LCCP would be limited.

4.4.29 There are no other landscape related designations within the route corridor therefore the key consideration is the extent to which it would impact on landscape character and the features which contribute to this.

4.4.30 The landscape character of RCC is characterised by the wide, low-lying drained coastal outmarsh plain and fringes of the inland middle marsh. This is an open, large scale landscape often with expansive, although low-level views and only occasional containment from fragmented hedgerows or settlement. In general, the landscape is well settled with numerous smaller villages, hamlets and scattered properties. Land use is predominantly mixed agriculture with both arable and pasture. The linear and geometric patterns of the extensive network of drains, ditches and dykes which cross the landscape and define field boundaries are a strong element within the landscape and coupled with the intensive land use indicate a landscape much changed by human influence. The pattern and size of fields varies throughout the area giving a complexity to the otherwise relatively uniform landscape and making crossing the area by road more difficult.

4.4.31 There are few distinct landscape features within this route corridor that would potentially be affected by the cable route in the long-term. This is a result of the underground nature of the cable and the presence of few landscape features and elements that would be difficult to reinstate or replace.

Ecology

4.4.32 A review of statutory and non-statutory designated sites as well as priority habitats within and adjacent to RCC has been undertaken. These constraints are illustrated on Figure 4.8 and include:

- Subject to selection of the preferred landfall there is the potential for onwards routeing to result in impacts on the Sea Banks Clay Pit SSSI.
- Subject to selection of the preferred landfall there is the potential for onwards routeing to result in direct impacts on part of the Anderby Target Area of the LCGMP.
- One statutory designated site, Bratoft Meadows SSSI is located within RCC to the south east of Bratoft. This site occupies a small area and is avoidable.
- RCC is routed through an extensive section of the Burgh le Marsh Target Area of the LCGMP. The extent of this site means that it cannot be avoided.
- Along the coast there are a number of non-statutory designated sites including Sandilands Golf Course and Dunes Local Wildlife Site (LWS), Huttoft Car Terrace to Marsh Yard Dunes LWS/Lincolnshire Wildlife Trust Reserve (LWTR) and Anderby Marsh LWTR.
- Away from the coast non-statutory sites are sparse within RCC, with an LWTR at Bratoft and just one LWS and one SNCI clipping the southern boundary of the corridor to the east of Burgh le Marsh. Due to their scattered nature, it is anticipated that these sites can be avoided during detailed routeing.
- Several areas of priority habitat are present within RCC and in places extend across the full width of the corridor. This includes coastal grazing marshes south east of Hogsthorpe adjacent to the A52 and at Burgh le Marsh (the latter also form part of the coastal grazing marshes project). Due to the extent of these areas of habitat some direct impacts would be unavoidable. A very small number of broadleaved woodland and good quality grassland priority habitat pockets are present but it is anticipated that these can be avoided.
- Key constraint is the LCGMP Burgh le Marsh area which is unavoidable and the extensive floodplain grazing marsh priority habitat areas, some of which extend across the entire corridor width.

4.4.33 RCC will cross an extensive section of the Burgh le Marsh LCGMP. In addition several areas of floodplain grazing marsh priority habitat extend across the width of the corridor and will be unavoidable. It is possible that the risks to routeing through these areas could be reduced following detailed ecological survey which may identify areas of lower ecological value or where this habitat does not actually exist, however, as the LCGMP is ongoing a route through this area has the potential to impact future plans for improving the grazing marshes.

Archaeology & Heritage

4.4.34 There are a number of designated and non-designated archaeological and heritage assets, both built and below ground within RCC as illustrated in Figure 4.8. The designated assets comprise 13 listed buildings (Grade II* listed Church of All Saints and 12 Grade II Listed) which are

predominantly located on the margins of the route corridor. Half of the Grade II Listed Buildings are located to the south of Firsby, three of these relate to the Church of St Andrew. There are no Scheduled Monuments or Registered Parks and Gardens within this corridor. All of the designated assets are considered to be avoidable in developing a route alignment, however, there is the potential to impact their setting during cable installation (construction phase).

4.4.35 There are 143 known non-designated heritage assets located throughout this route corridor. The most represented period is Medieval (63) and relate to medieval settlements and ridge and furrow field systems. The remainder of the non-designated assets recorded by the HER comprise seven Prehistoric, 17 Roman, one Early Medieval, 13 Post Medieval, 34 Modern and eight assets of unknown date.

4.4.36 The assessment does not include the results of Historic England's farmstead Survey as these sites predominantly date to the Post Medieval Period, additionally as these assets are predominantly extant they should be avoided by the cable routing.

4.4.37 Direct physical impacts on designated assets, e.g. Scheduled Monuments and listed buildings are considered to be avoidable in developing detailed route alignments, however, there would be temporary or indirect impacts on their setting during installation. To reduce this as much as possible a separation distance of 50m to all designated heritage assets has been established.

4.4.38 As far as possible routeing aims to avoid non-designated assets, however, the extent and distribution of these mean that in some instances direct impacts may be unavoidable, particularly when considering other constraints on route selection. Whilst direct impacts on non-designated assets will in some cases be unavoidable, it is important to consider the potential contemporaneity of heritage assets. The setting of heritage assets is informed in part by nearby contemporary assets consequently clusters of assets of similar periods should be avoided where possible.

Planning Considerations

Planning Policy

4.4.39 As RCC falls within East Lindsey District Council, the East Lindsey District Local Plan 2007 is currently extant planning policy to be considered. Key considerations include Policy A3 (Local Areas and Settlement Hierarchy) and Policy C15 (Coastal Conservation Areas) in regards to the coastal residential development areas and scattered rural properties around the corridor, additionally, the Lincolnshire Coastal Country Park is located to the northern part of the corridor where Policy REC6 (Local Country Parks) is to be considered. The significant number of watercourses within RCC also requires reflection to Policy ENV21 (River corridors) from the East Lindsey District Local Plan 2007.

4.4.40 The LCGMP is a significant consideration within the southern part of the corridor, consultation with the Lincolnshire Coastal Grazing Marshes Partnership and reference to the Landscape Partnership Scheme 2011-2014 may also be required.

4.4.41 In addition consideration should be given to the emerging East Lindsey Local Plan which will guide growth and development in East Lindsey up to 2031. This emerging plan has limited weight but will be regarded as a material consideration and one which should continue to be reviewed as the cable route is developed.

Summary of Assessment of Route Corridor C

4.4.42 Given the significant constraints present within and which could be affected by RCC this option was discounted and has not been subject to any further refinement. Table 4.14 sets out the key technical and environmental factors identified for RCC.

Table 4.14 Route Corridor C – Key Assessment Findings

Factor	Findings
Local Planning Authority	East Lindsey District Council
Approx. Length	Approx. 32 km (subject to detailed routeing but would also require routeing within RCB to form a continuous route connection to RCD)
Approx. no. of crossings	134 (subject to detailed routeing)
Key technical constraints and opportunities	· Sufficient space available to facilitate construction including opportunities for siting temporary facilities, however, the proximity of RCC to the proposed Triton Knoll onshore cable route would place an additional constraint on the land available for construction in areas already restricted by other constraints e.g. linear development. · Relatively small number of road crossings (A, B and minor roads) required. · Lower frequency of A and B roads offers fewer opportunities for direct construction access from the existing road network. · Cable installation through this corridor would require a high number of watercourse/ drain crossings compared to other corridor options including Steeping River with flood defence banks. · Potentially challenging ground conditions with some localised peat (onward routeing within RCB). · Notable utilities crossings include the proposed Triton Knoll onshore cable route (18 No.) which may require to be crossed more than once subject to detailed routeing.

Table 4.14 Route Corridor C – Key Assessment Findings	
Factor	**Findings**
Key environmental constraints and opportunities	· Settlements are largely avoided, however, there are isolated properties scattered throughout the route. There are also a significant number of caravan parks within the vicinity of RCC. · There are no significant geological constraints present within RCC. Areas of potentially contaminated land or UXO risk can generally be avoided or mitigated if required. · RCC would require a high number of watercourse crossings, including both field drains and maintained watercourses. The number of crossings would be significantly higher than RCA or RCB. · The majority of RCC is underlain by grade 3 agricultural land, which may be classified as BMV. · RCC avoids the Lincolnshire Wolds AONB and AGLV, as well as the Registered Park and Garden at Gunby Hall. Apart from the LCCP, there are no other landscape designations that could be impacted on. · There are two statutory designated sites (Sea Banks Clay Pit SSSI and Bratoft Meadows SSSI) located within RCC. RCC would also require routeing through LCGMP including Anderby Target Area and an extensive section of the Burgh-le-Marsh Target Area of the LCGMP which cannot be avoided. · There are a number of designated and non-designated archaeological and heritage assets, both built and below ground within RCC. All of the designated sites are considered avoidable; however, due to the distribution of non-designated assets some impacts would be unavoidable.
Conclusion	The number of watercourses within RCC presents a significant technical and environmental constraint to the construction of the cable route. Whilst it would be possible to avoid statutory ecological designations and designated heritage assets, it is not possible to avoid the LCGMP and direct impacts would occur on the Burgh le Marsh Target Area of the LCGMP. The proximity of RCC to the proposed Triton Knoll Windfarm onshore cable route would place an additional constraint on the land available for construction in areas already restricted by other constraints and would potentially require more than one crossing of the 18 No. Triton Knoll cables. Due to the lower frequency of A and B roads direct access to the corridor is reduced. As a result of the combined constraints above, RCC was discounted and was not subject to further refinement.

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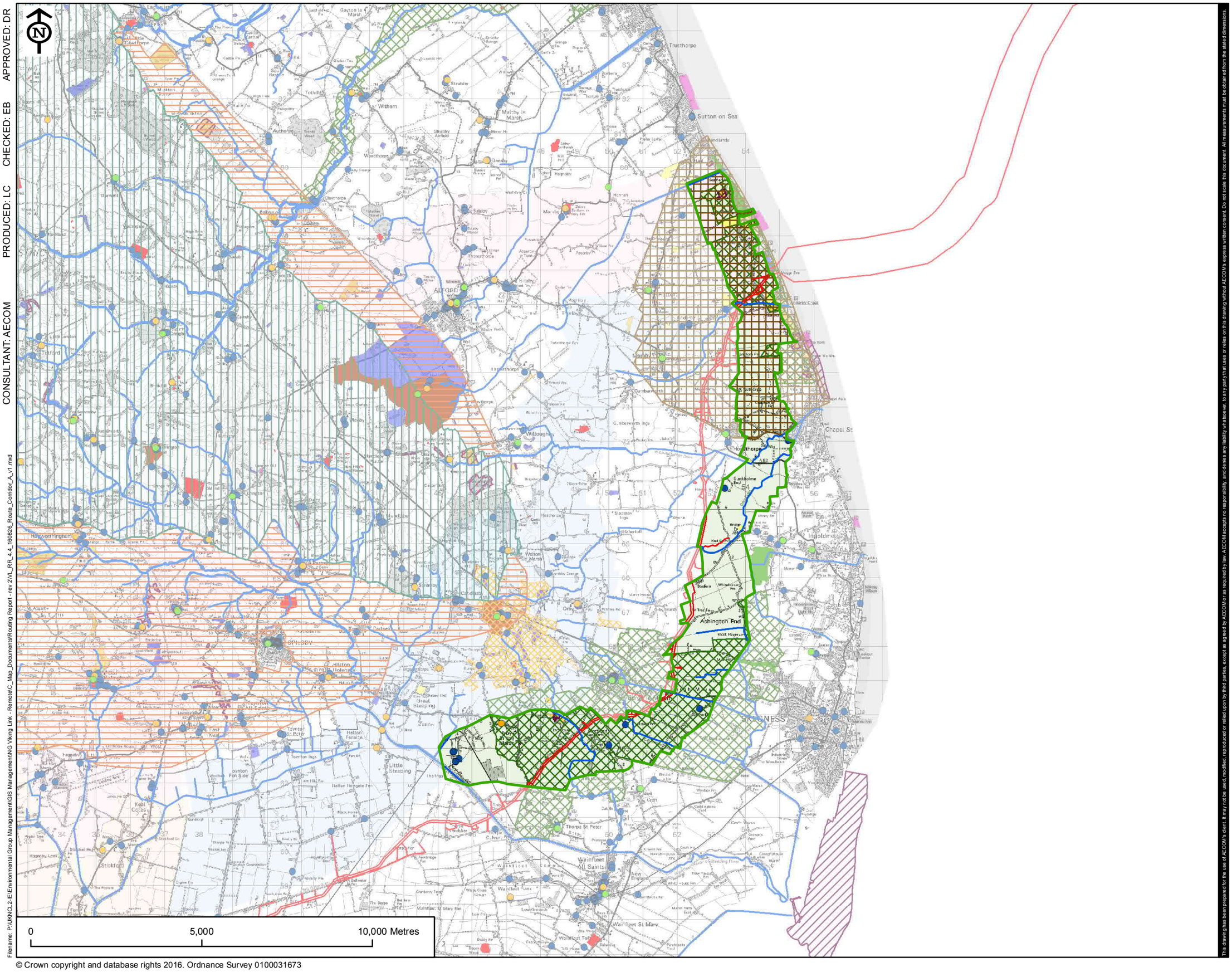
CONSULTANT: AECOM



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VikingLink

LEGEND

- Route Corridor C (RCC)
- Area of Outstanding Natural Beauty
- Area of Great Landscape Value
- Registered Park and Garden
- Golf Course
- Caravan Park
- National Trust land around Gunby Hall
- Lincolnshire Coastal Country Park
- Main Rivers, Drains and Chalk Streams
- Listed Building - Grade I
- Listed Building - Grade II*
- Listed Building - Grade II
- Scheduled Monument
- Lincolnshire Coastal Grazing Marsh Project (LCGMP)
- Site of Special Scientific Interest
- Lincolnshire Wildlife Trust Reserve
- Regionally Important Geological/Geomorpholo... Site
- Site of Nature Conservation Importance
- Triton Knoll Development Consent Order limits

REVISION:

REV.	DATE	DESCRIPTION
1	26/08/16	ORIGINAL ISSUE

FIGURE NO.

VL_160826_RR_4.8

FIGURE TITLE

FIGURE 4.8
ROUTE CORRIDOR C
KEY CONSTRAINTS

SHEET NUMBER

1 of 1

NOTES

Date:	Scale at A3:
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4.5 Assessment of Route Corridor D

Overview of Route Corridor

4.5.1 Route Corridor D (RCD) is illustrated in Figure 4.9. It is a wider corridor (5–8km wide) into which all previous route corridor options connect. It covers an area from the A16 (between Keal Cotes and Northlands) running south west to the A17 (between East Heckington and Swineshead Bridge); bordered to the north by the A155 and Catchwater Drain and to the west by Kyme Eau and the B1395 (between South Kyme and East Heckington). Northlands, Gipsey Bridge and Langrick mark the southern boundary of the corridor. Within the corridor potential cable routes would need to cross Medlam Drain, the B1183, Newham Drain, West Fen Drain, the B1192, River Witham, North Forty Foot Drain, the A1121 and/or the A17 as well as the Nottingham to Skegness railway and South Forty Foot Drain before entering RCE.

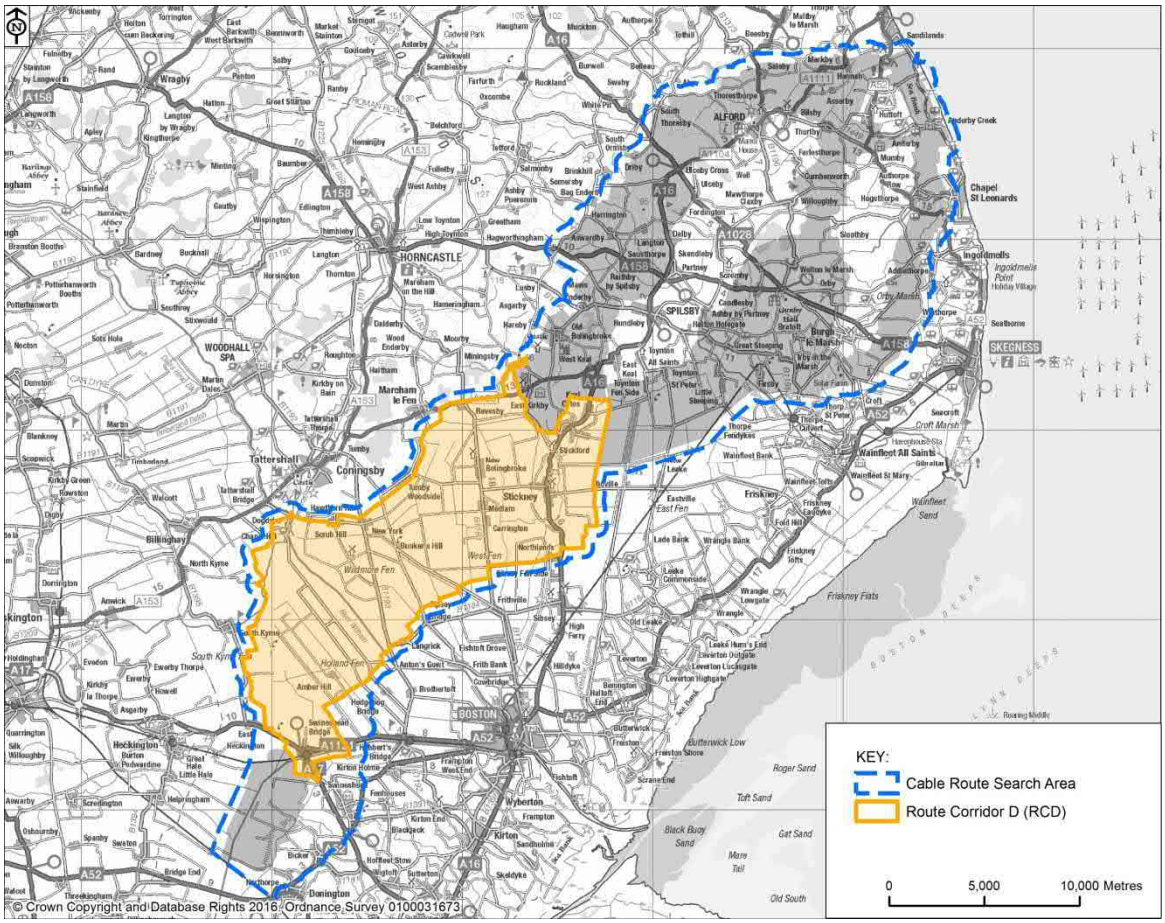

Figure 4.9 Route Corridor D

Technical & Engineering Considerations

Constructability

4.5.2 RCD covers an area of low lying fenland consisting predominantly of flat, open, agricultural land divided by a dense network of drains and characterised by small settlements and individual

properties widely dispersed along roads, which would not present a significant constraint to construction. There are linear settlements along the main roads through the area such as Stickney, Stickford and Keal Cotes along the A16; and New Bolingbroke and Medlam along the B1183; which would need to be avoided by a cable route.

4.5.3 There is sufficient undeveloped land available to accommodate construction working width, HDD operations (where required) and associated temporary construction compounds and laydown areas.

Infrastructure

4.5.4 RCD is crossed by a number of long straight roads running north to south, including two A roads and two B roads, which would need to be crossed using trenchless techniques. These are connected by minor roads to form a broken grid system. There is sufficient undeveloped land adjacent to these roads within the corridor to accommodate the working areas required for construction (albeit potential crossing points along the A16, B1183 are restricted by development). In the south east of the corridor, the A1121 runs adjacent to South Forty Foot Drain and the Boston – Nottingham railway which, depending on the alignment may need to be crossed together by a cable route, however, this would then require a crossing of the A17 immediately to the south of the railway level crossing at Swineshead Bridge (see RCE Accessibility).

4.5.5 RCD is crossed by a dense network of drains, many substantial. Many large drains will need to be crossed by a cable route through this corridor. The corridor falls within the Witham Fourth Internal Drainage Board (WFIDB) district to the east of the River Witham and Black Sluice IDB (BSIDB) district to the west. The River Witham is a wide navigable waterway with raised flood defence embankments along both banks which flows north to south and so would have to be crossed using trenchless methods by a cable route on any alignment within RCD. (see Accessibility below).

4.5.6 The line of a dismantled railway runs along the eastern embankment of the River Witham between Boston and Tattershall and would be crossed as part of the trenchless watercourse crossing. The line of another dismantled railway is indicated on mapping between Coningsby and New Bolingbroke but is not discernible within the corridor.

4.5.7 The Anglian Water pipeline between Covenham Water Treatment Works and Boston Transfer crosses RCD, running south from East Kirkby, between Stickford and Stickney and continues to the east of the A16 past Northlands. This would need to be crossed by a cable route within RCD.

4.5.8 There is an airfield at East Kirkby associated with the Lincolnshire Aviation Heritage Centre which consists of a grass strip which is operational. There is a concrete runway to the east which is crossed by a minor road south of Hagnaby Priory. It is understood this landing strip is not currently operational.

4.5.9 The proposed alignment of the Triton Knoll onshore cable route would run parallel with the southern boundary of this corridor and would pass through the corridor just to the north of

Swineshead Bridge. Depending on the alignment of the Viking Link cable route within RCD, a crossing may be required. .

4.5.10 A proposed windfarm at Heckington Fen which has planning consent, would be located within the south west of RCD and would require an electricity connection to Bicker Fen Substation, the alignment of which is still to be determined. A current planning application to Boston Borough Council indicates that the connection could be a combination of buried cables along the A17 to Swineshead Bridge and then overhead lines south across South Forty Foot Drain and the Boston-Nottingham railway. The infrastructure associated with this proposed development will be an additional constraint (together with the proposed Triton Knoll onshore cable route) within this part of the corridor.

4.5.11 A summary of the infrastructure that a cable route would potentially need to cross within RCD is presented in Table 4.15.

Table 4.15 Route Corridor D – Infrastructure Crossings

Type	Notable crossings include…	Approx. No. of Crossings
A and B-class roads	A16, B1183, B1192, A17	4
Other minor roads		12
Operational railway	-	0
Disused railway	Coningsby – New Bolingbroke Boston - Tattershall	1
Underground utilities	Anglian Water Covenham – Boston Pipeline Proposed Triton Knoll Electrical onshore cable route (18 No. buried cables) (avoidable) Proposed Heckington Wind Farm electrical connection	2

Accessibility

4.5.12 Within RCD the broken grid layout of the road network to the east of the River Witham means that the corridor is crossed north–south by the A16, B1183 and B1192 and a couple of minor roads. These roads are connected outside of the corridor by the B1184 to the south and A155/A153 to the north, which would provide access for cable delivery. Minor roads connecting east – west within the corridor are typically narrow and poor quality.

4.5.13 Many of the drains within the corridor have roads running adjacent to them which may present a challenge to allow construction access across the drains without obstructing the use of the adjacent roads.

4.5.14 River Witham is a major constraint within this corridor. Due to its width and because it is a navigable waterway it would be a challenge to bridge it. The assessment has therefore looked at access via existing public roads. These are at Langrick Bridge to the south and Tattershall

Bridge to the north with no access even by minor roads existing with in this 11.8km stretch of the River Witham.

4.5.15 It is understood that Langrick Bridge is on an HGV route, and there is no weight restriction on the bridge, however traffic crossing the bridge is controlled by traffic signals and there is a 90-degree bend in the road on both sides of the crossing which would restrict the length and width of vehicle able to use this crossing. From Langrick Bridge construction traffic would be able to connect to roads on both sides of the river crossing (via the B1192 / B1184). From Tattershall Bridge construction traffic would need to travel further via the B1192 and A153 through Coningsby and Tattershall from the east and existing road connections to the west side of the river would need to pass through Chapel End. This route would need to be assessed for suitability for construction traffic.

4.5.16 To the west of the River Witham the corridor is served by long straight minor roads which connect south to the B1192 and A1121. The quality of these roads deteriorates the further to the north you go and connections to the north are barred by Kyme Eau drain (apart from a narrow road through Chapel Hill), thus restricting road access to this part of the corridor. Further to the west the corridor is crossed by the A17 which would be the only major road access to a cable route between the River Witham and South Forty Foot Drain.

4.5.17 Accessibility is therefore more favourable towards the south of RCD.

Environmental Considerations

Overview

4.5.18 The following subsections describe the environmental considerations present within or adjacent to RCD, highlighting those features which are considered to be more sensitive and should be avoided or, if unavoidable, which may require additional mitigation including consideration of the timing of installation and the use of alternative installation methods. The objective of the following sub-sections is to highlight specific constraints and/ or sensitivities which help to inform the refining of RCD to a narrower corridor. Reference should also be made to the thematic constraints plans contained in Appendix C which illustrate the constraints described in the following subsections.

Settlement, Community & Tourism

4.5.19 Subject to routeing the potential impacts of the underground cable on settlements and tourism interests in RCD are generally limited to temporary disturbance during installation. This includes temporary noise and visual impacts resulting from installation works as well as impacts resulting from the movement of construction traffic.

4.5.20 There are a number of settlements present within RCD, generally located to the north and east of the route corridor. This includes Stickford, Keal Cotes, Stickney, New Bolingbroke and Swineshead Bridge as illustrated in Figure 4.9. The western part of the route corridor is more

sparsely populated. There are scattered individual properties present throughout the route corridor.

4.5.21 Specific tourism or recreational interests within RCD include the Battle of Britain Memorial Flight Visitor Centre at Coningsby located just outside of RCD to the north of Hawthorn Hill, the Bubblecar Museum located a Langrick, the Alternative Animal Sanctuary located near New York, South Kyme Golf Club located immediately to the west of the route corridor and Hagnaby Fen Nature Reserve. There are several camping and caravan sites within RCD, as well as a number of recreational routes, including PROWs, cycle and waterway routes (Witham Navigable Drains).

4.5.22 Constraints within RCD are considered to be avoidable in refining the route corridor such that direct impacts can be prevented, however, it is recognised that some disturbance as a result of installation works will be unavoidable. Where there is the potential for significant disturbance to occur detailed mitigation will be developed related to how and when installation works are undertaken.

Geology & Hydrogeology

4.5.23 Subject to route selection impacts on geology and hydrogeology include the loss or sterilisation of geological resources, impacts on groundwater, encountering or causing contamination or encountering UXO.

4.5.24 A description of the underlying solid and drift geology is contained in Appendix D, neither are considered to pose a significant constraint to cable routeing within RCD. Key geological routeing constraints or considerations within RCD are illustrated in in Figure 4.9 and include:

- Designated aquifers;
- Areas of potential contaminated land including historic landfills at Stickney;
- Two Mineral Safeguarding Areas (MSAs) in the north and centre of RCD; and
- Areas of elevated UXO risk such as at RAF East Kirkby to east of RCD.

4.5.25 A number of these constraints are relatively small occupying discrete areas and as such are considered to be avoidable. One of the MSAs extends to the south-west of RCD, which could be avoided if the alignment was routed towards the south of the corridor. If the cables were routed through an MSA this could result in severance and sterilisation of mineral resources; careful routeing and mitigation would be required to minimise the impact.

Hydrology

4.5.26 The exact number of watercourses which would require crossing will depend on the specific detailed alignment within RCD. For the purposes of assessing route corridors and to allow for comparison between them a simple count of the number of watercourses has been undertaken. This provides an indication of the potential number of watercourse crossings. Within RCD the total number of watercourses which may require to be crossed is 137. A breakdown of potential crossings is provided in Table 4.16. This includes multiple crossings of maintained watercourses

such as Newham Drain, West Fen and South Forty Foot Drain. Larger watercourse crossings which would be required include a crossing of the River Witham.

4.5.27 A review of the Environment Agency's Flood Map for Planning (from Rivers and the Sea) indicated that the majority of RCD is within areas which are at higher risk of flooding (i.e. Flood Zones 2 and 3).

Table 4.16 Route Corridor D – Watercourse Crossings

Type	Notable crossings include…	Approx. No. of Crossings
Main river	East Fen Catchwater, East Fen Catchwater, Hagnaby Beck, River Witham and Head Dyke.	9
IDB Maintained watercourse	Medlam Drain, Newham Drain, Houghbridge Drain and Castledyke Drain	33
Riparian/other watercourse	-	95

Agriculture & Soils

4.5.28 A review of the Provisional 1:250,000 ALC Mapping for the East Midlands Region indicates that the agricultural land within RCD is primarily classed as ALC Grade 2 (very good quality), with areas of Grade 3 (good to moderate quality) present where RCA and RCD converge, and areas of Grade 1 (excellent quality) present at Holland Fen where the RCD and RCE converge. As such, over 95% of RCD is classed as BMV agricultural land.

Table 4.17 Route Corridor D – Agricultural Land Classification

ALC Grade	Area (ha)	Percent (%)
ALC Grade 1**	1232.8	7.8
ALC Grade 2**	13087.3	83.0
ALC Subgrade 3a*	878.9	5.6
ALC Subgrade 3b*	573.3	3.6
ALC Grade 4**	0.0	0.0
ALC Grade 5**	0.0	0.0
Total	**15772.3**	**100.0**

*Calculated using LandIS NATMAP data and Provisional 1:250,000 ALC mapping for the East Midlands Region[9].

** Calculated from Provisional 1:250,000 ALC mapping for the East Midlands Region[9]

4.5.29 The soil associations present in RCD are summarised in Table 4.18 below. RCD is dominated by deep stoneless clay soils of the Wallasea 2 associations (60.8%). A small area of Downholland 2 association has been mapped (1%), these clayey soils have an organic rich surface horizon and

therefore could require specific management beyond standard soil handling and storage guidelines. However, this soil association is considered to be avoidable in the development of a detailed route alignment.

Table 4.18 Route Corridor D – Soil Associations

Map Code	Soil Association	Area (ha)	Percent (%)
513	Cannamore	32.4	0.2
511e	Swaffham Prior	25.5	0.2
711f	Wickham 2	223.2	1.4
711m	Salop	1560.8	9.9
711r	Beccles 1	101.3	0.6
711s	Beccles 2	1275.1	8.1
812b	Wisbech	895.0	5.7
812c	Agney	605.9	3.8
813c	Fladbury 2	1.0	0.0
813g	Wallasea 2	9587.1	60.8
821b	Blackwood	1299.5	8.2
851b	Downholland 2	165.5	1.0
	Total*	**15772.3**	**100.0**

4.5.30 Three organic level Agri-Environment Schemes are present within RCD as illustrated in Figure 4.9, however, they are considered to be avoidable in the development of a detailed route alignment. These are:

- A 30ha area belonging to Eden Farm located south of Hagnaby Lock (entry level).
- A 17ha area belonging to Strawberry Fields located south of Hagnaby Lock (entry level).
- A 121ha area belonging to JF & J Edwards & Sons located west of Hagnaby Lock (entry plus higher level).

Landscape

4.5.31 There are no landscape related designations within RCD. The landscape character of RCD is broadly characterised by flat, low-lying drained fenland. The northern fringes of the corridor are flat to gently undulating or rolling river terrace and fenside woodland and farmland. The fenland landscape is sparsely populated with widely scattered farmsteads and occasional small linear hamlets. The river terrace and fenside woodland and farmland landscape to the north is well-settled with small villages, individual properties and farmsteads throughout. Land use is predominantly agriculture, with intensive arable farming and food production the focus on the fens, while to the north of RCD the land use is generally mixed arable and pastoral agriculture,

fragmented by a slightly greater frequency of woodland. The linear and geometric patterns of the extensive network of drains, ditches and dykes which cross the landscape and define field boundaries are a strong element within the fenland landscape and, coupled with the intensive land use, indicate a landscape much changed by human influence. The northern fringes of RCD exhibit a more diverse landscape, which provides a degree of contrast with the homogeneity of the fenland landscape to the south.

4.5.32 There are few sensitive landscape features within RCD, with the exception of occasional woodland blocks scattered throughout the area, particularly in the north. These and other features are sufficiently spaced to allow a cable route to be developed that avoids landscape features and minimises potential effects.

Ecology

4.5.33 A review of statutory and non-statutory designated sites as well as priority habitats within and adjacent to RCD has been undertaken. These constraints are illustrated on Figure 4.9 and include:

- There are no statutory designations or Ancient Woodland within RCD. The nearest SSSIs are Fulsby Wood and Troy Wood which both lie to the north of the route corridor.
- There are four non-statutory designations within the RCD including West Fen Catchwater, Revesby Bridge, Low Grounds Plantation and Stickney Picnic Site, all of which are designated SNCI. These occupy small areas and could be avoided in developing detailed route alignments.
- South Forty Foot Drain LWS crosses the southern extent of RCD. This cannot be avoided in routeing but crossing by alternative installation methods will enable effects on this site to be avoided.
- Priority habitats are present within the route corridor including areas of coastal and flood plain grazing marsh, lowland fens and woodland. These are scattered over the entire corridor with a slightly higher density in the eastern extent. They occupy relatively small areas and can be avoided during detailed routeing or by alternative installation methods where habitats are associated with linear features such as drains.
- No major pinchpoints, but two linear features South Forty Foot Drain LWS and Holland Dike (with adjacent floodplain grazing marsh priority habitat) will need to be crossed. If undertaken using alternative installation methods then impacts will be avoided.

4.5.34 The majority of ecological constraints can be avoided during the development of a detailed route alignment within RCD. Two areas where constraints will need to be crossed are South Forty Foot Drain LWS and Holland Dike (with adjacent floodplain grazing marsh priority habitat), however if undertaken using alternative installation methods, impacts can be avoided.

Archaeology & Heritage

4.5.35 There are a number of both above and below ground designated and non-designated archaeological and heritage assets within RCD as illustrated in Figure 4.9.

4.5.36 Designated assets within RCD relate mainly to listed buildings. There is a single Scheduled Monument, Revesby Abbey, located in the north east of RCD close to where it converges with RCA. There are also 45 Listed Buildings (two Grade II* and 43 Grade II Listed) and one Conservation Area. All of these assets are considered to be avoidable in developing a route alignment, however, there is the potential to impact their setting during cable installation.

4.5.37 There are 281 known non-designated heritage assets present throughout RCD. The most represented period is modern (92). The remainder of these assets consist of 64 Prehistoric, 30 Roman, 9 Early Medieval, 34 Medieval, 32 Post Medieval and 20 assets of unknown date.

4.5.38 Direct physical impacts on designated assets e.g. Scheduled Monuments and listed buildings are considered to be avoidable in developing route alignments, however, there would be temporary or indirect impacts on their setting during installation. To reduce this as much as possible a separation distance of 50m to all designated heritage assets has been established.

4.5.39 As far as possible routeing aims to avoid non-designated assets, however, the extent and distribution of these mean that in some instances direct impacts may be unavoidable, particularly when considering other constraints on route selection. Whilst direct impacts on non-designated assets will in some cases be unavoidable, it is important to consider the potential contemporaneity of heritage assets. The setting of heritage assets is informed in part by nearby contemporary assets consequently clusters of assets of similar periods should be avoided where possible.

Planning Considerations

Planning Policy

4.5.40 As RCD falls within East Lindsey District Council, North Kesteven District Council and Boston Borough Council, the East Lindsey District Local Plan 2007 North Kesteven Local Plan 2007, Boston Borough Local Plan 1999 and Interim Plan (Non-Statutory Development Control Policy) 2006 are the current extant planning policies to be considered. NGVL are aware of the number of watercourses that run through the corridor, therefore regard will need to be had, as appropriate, to Policy ENV21 'River Corridors' from East Lindsey District Local Plan 2007 and Policy G4 'Safeguarding the Water environment' from Boston Borough Local Plan 1999.

4.5.41 RCD also lies within a Minerals Safeguarding Area, the adopted Lincolnshire Mineral and Waste Local Plan 2016, Core Strategy and Development Management Policy, being adopted as the first part of the policy, which replaces the Lincolnshire Minerals Local Plan (1991) and the Lincolnshire Waste Local Plan (2006) will require consideration. The emerging Site Locations document, due to be the second part, has little weight but will be regarded as a material consideration.

4.5.42 NGVL recognises the emerging East Lindsey Local Plan which will guide growth and development in East Lindsey up to 2031. The emerging plan has limited weight but will be regarded as a material consideration and one which NGVL will continue to review and monitor.

4.5.43 NGVL also note the Emerging Central Lincolnshire Local Plan, to which North Kesteven are in the process of jointly preparing with City of Lincoln Council (CLC) and West Lindsey District Council (WLDC). The emerging Local Plan is relatively advanced and so should be afforded material weight for decision making purposes.

4.5.44 Furthermore SHDC, BBC and LCC are in the process of jointly preparing a new Local Plan, which will guide growth and development across South East Lincolnshire up to 2036. Once adopted, the South East Lincolnshire Local Plan will progressively replace the saved policies of the Boston Borough Local Plan and Interim Plan, NGVL will consider this emerging plan in the development of RCD.

Refined Route Corridor D

4.5.45 RCD is considered to provide opportunities to develop feasible cable routes, however, in order to focus this it has been further refined. The aim of refining RCD was to develop a narrower route corridor (approximately 1km wide for its length) whilst taking into account the technical, environmental and planning considerations above as well as confirmation of the preferred landfall site (LF1a at Sandilands in East Lindsey) and converter station site (CS1 at North Ing Drove in South Holland). The refined RCD is illustrated in Figure 4.10 below with a larger scale plan at the end of this section.

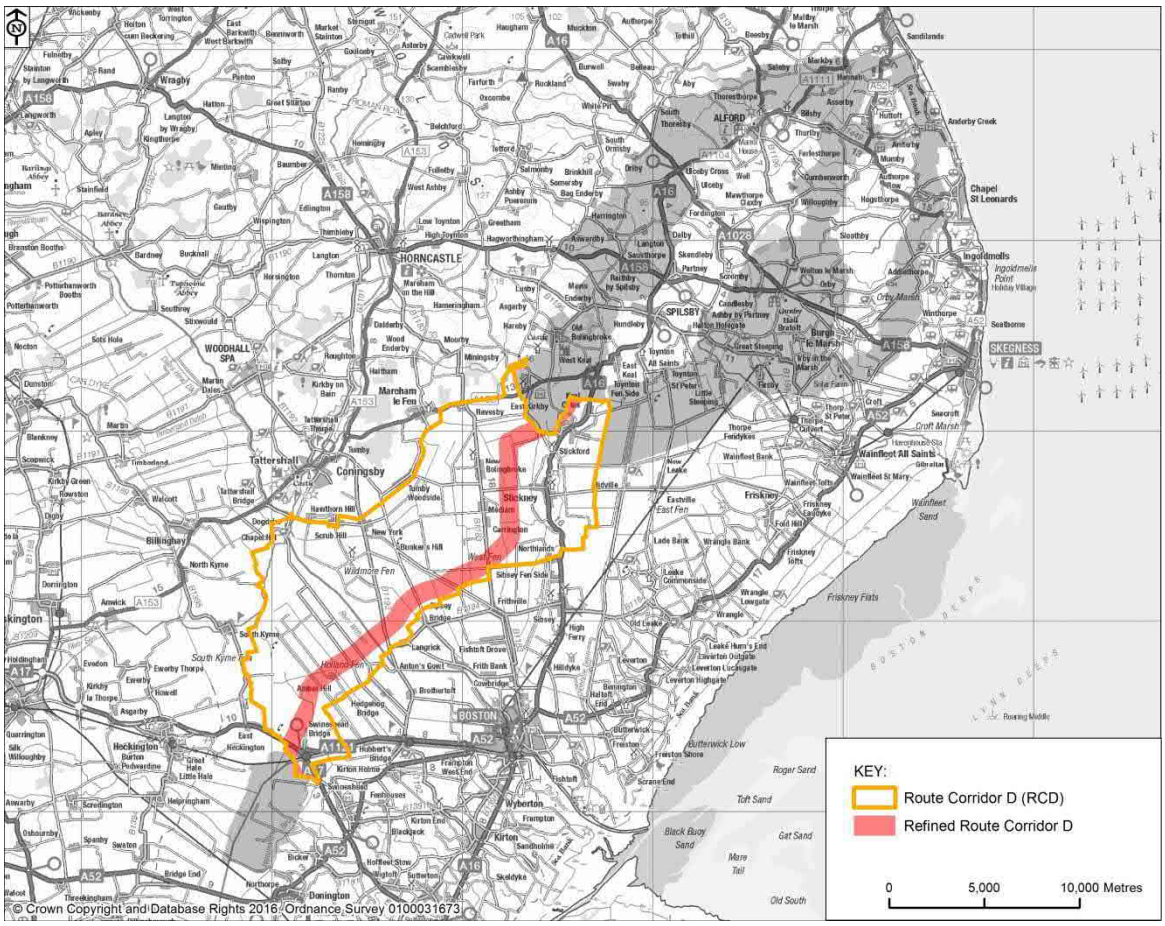

Figure 4.10 Refined Route Corridor D

4.5.46 The key constraints which have informed the refinement of RCD include (from east to west):

4.5.47 The key constraints which have informed the refinement of RCD include (from east to west):

- RCD has been refined so that it avoids the extensive area of peat to the east of the A16 and runs south to the west of the A16.
- The corridor therefore avoids linear settlements along the A16 including Keal Cotes, Stickford, Stickney and Northlands; as well as New Bolingbroke and Medlam on the B1183.
- The corridor largely avoids Sand and Gravel Mineral Safeguarding Areas around Coningsby and Wildmore Fen with only the southern boundary of the MSA encroaching into RCD.
- The refined RCD would allow a crossing of the River Witham close to Langrick Bridge and cable routeing through the south of the original route corridor where the existing road network would better accommodate construction traffic.

Summary of Assessment of Route Corridor D

4.5.48 Table 4.19 sets out the key technical and environmental factors identified for RCD.

Table 4.19 Route Corridor D – Key Assessment Findings	
Factor	**Findings**
Local Planning Authority	East Lindsey, North Kesteven and Boston Borough
Approx. Length	24 km (subject to detailed routeing)
Approx. no. of crossings	152 (subject to detailed routeing)
Key technical constraints and opportunities	· Sufficient space available to facilitate construction including opportunities for siting temporary facilities. · Relatively small number of road crossings (A, B and minor roads) required. · Frequency of A and B roads offers opportunities for direct construction access from the existing road network. · High number of watercourse crossings, many with roads running adjacent to them, which would require consideration during crossing design. · River Witham navigable waterway with flood defence banks, would present a constraint to construction access. Langrick Bridge is a potential crossing point for construction traffic. · Notable utility crossings include an Anglian Water pipeline and proposed electrical connection for Heckington Fen Wind Farm.
Key environmental constraints and opportunities	· RCD avoids settlements including Stickney, Stickford and New Bolingbroke which lie outside of the corridor. · The Sand and Gravel Mineral Safeguarding Areas are largely avoided with only the southernmost part of one Area extending into RCD. This will prevent severance or sterilisation of mineral resources. · RCD requires a significant number of watercourses and field drains (subject to routeing 137) to be crossed. · The majority of land within RCD is used for agriculture with over 95% is classed as BMV agricultural land. · There are no significant landscape constraints present within or adjacent to RCD. · There are no significant ecological constraints present within or RCD. A small number of SNCIs are present, however, these occupy small areas outside of the corridor. · There are fewer designated and non-designated archaeological and heritage assets present within RCD. Non-designated assets predominantly comprise records of 19th century farm buildings located in and out of the corridor.

Table 4.19 Route Corridor D – Key Assessment Findings	
Factor	**Findings**
Conclusion	The refined RCD provides opportunities to develop technically feasible cable routes. There are fewer environmental constraints or settlements present within RCD compared with other corridors and those which are present are avoidable. Land is predominantly agricultural with fewer designated sites present. The key constraints which have influenced the routeing of RCD include the location and extent of Mineral Safeguarding Areas, major watercourse crossings such as the River Witham and the layout of the road network which influences accessibility.

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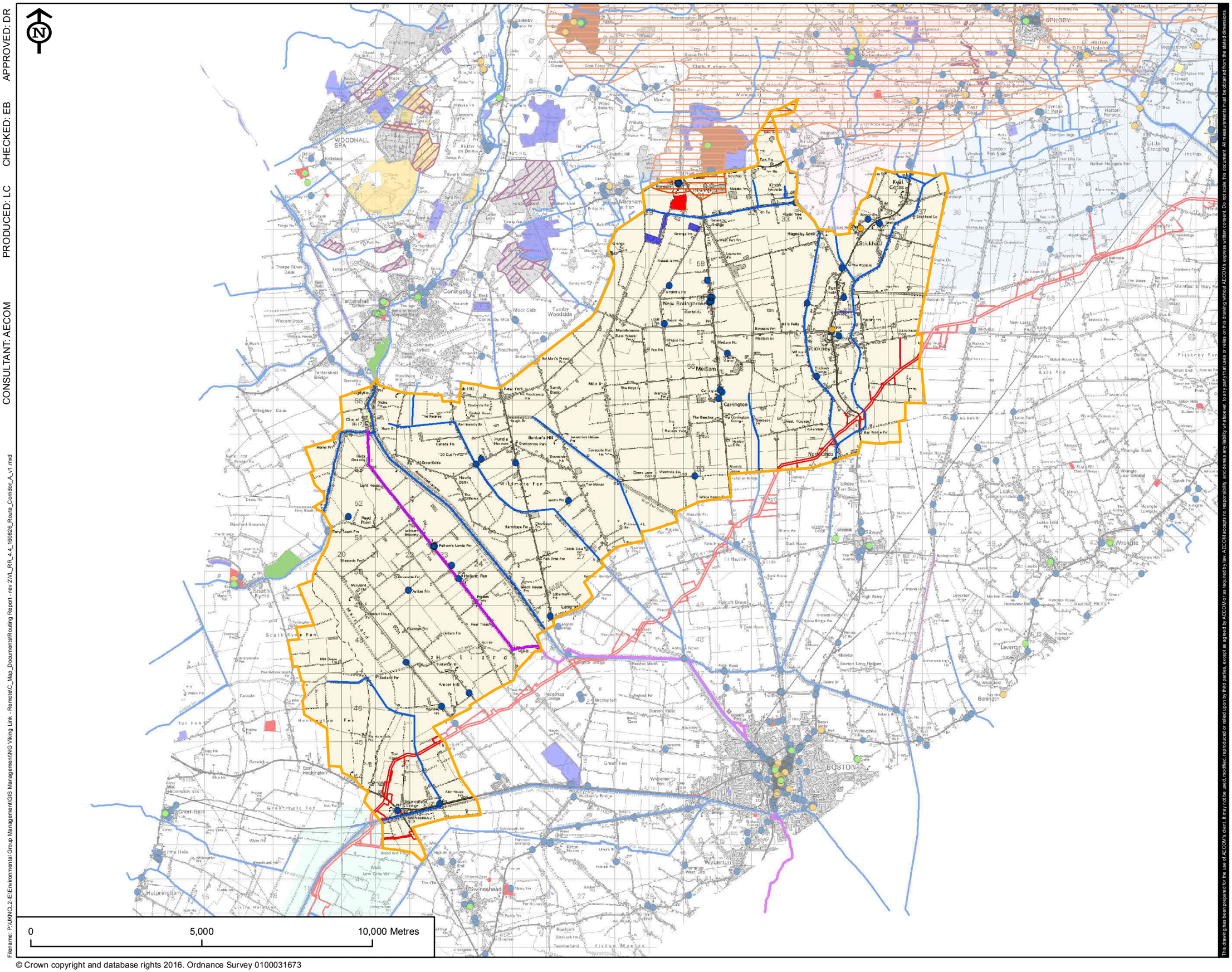
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Little Steeping
Halton Holegate
Halton Fenside
Toynton All Saints
Toynton St Peter
Toynton Fen Side
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Stickford
Stickney
New Bolingbroke
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Kyme Tower
Kyme Fen
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Kyme Bridge
Carrington
Mediam
Wildmore Fen
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Palmers Lands Fen
Amber Hill
Sandy Bank
Bunker's Hill
Hundle Houses
New York
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Moorby
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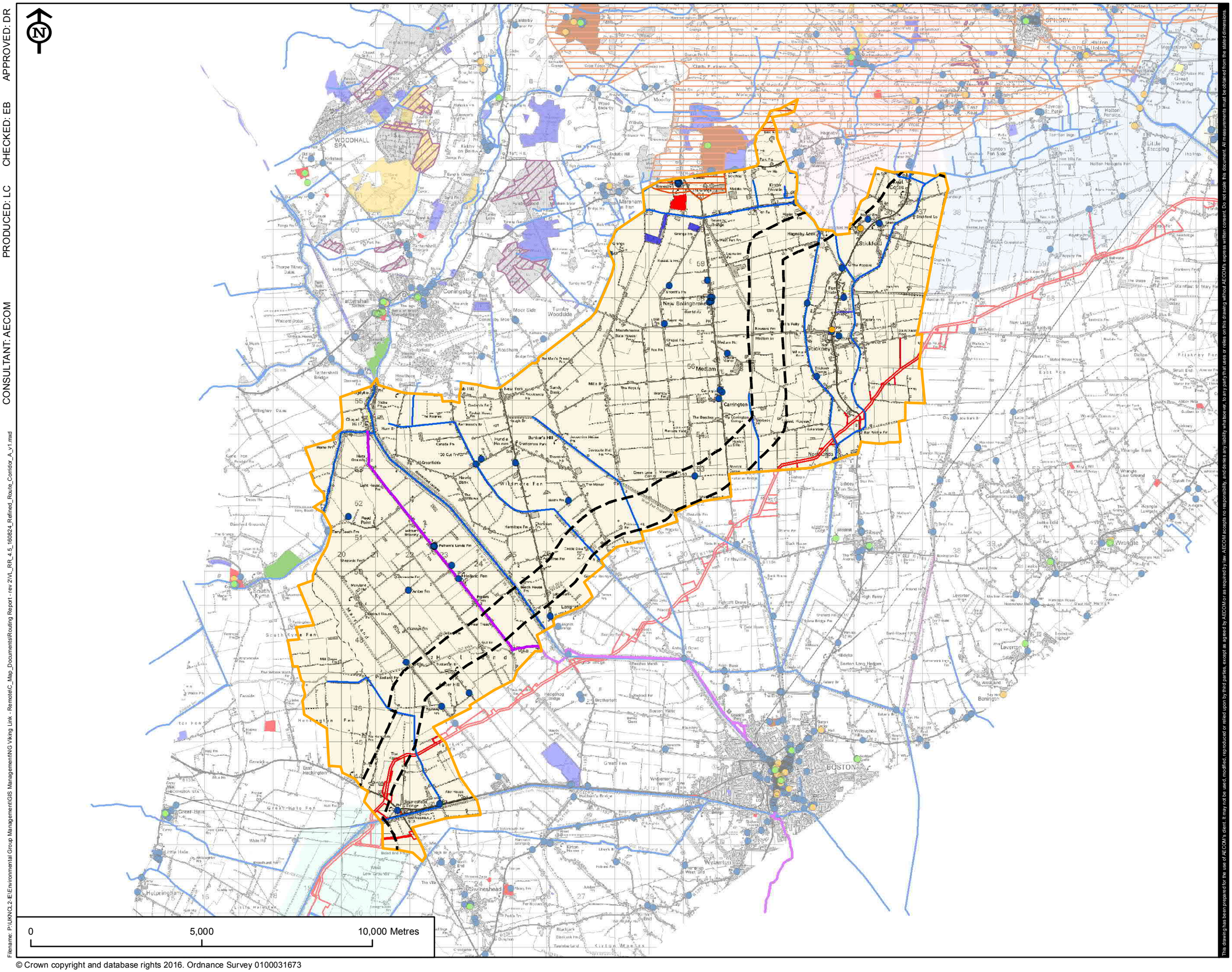
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Hagnaby Lock
Stickford
Fen Side
New Bolingbroke
Mesham
Stickney
Carrington
Northolmes
Wildmore Fen
Langriggs
Frithville
Sibsey
Wrangle
Leverton
Boston
Wyberton
Swineshead
Great Hale
Heckington
South Kyme
Helpringham
Little Hale
Great Fen
Hobhole Bridge
Hubberts Bridge
Kirton Marsh
Blackjack
Blackjack Fen
Taumbaland
Clayhithe
Bicker Bridge
Swineshead Bridge
Bicker Fen
Holland Fen
Hemington Fen
Merryland
Mill Drain
Sutterby
Sutterby Fen
Sutterby Bridge
Hedgehog Bridge
Bechertoft
Boston Water
Great Fen
Wyberton Fen
Wyberton Fen Bridge
Hubberts Bridge
Kirton Marsh
Kirton Meares

4.6 Assessment of Route Corridor E

Overview of Route Corridor

4.6.1 Route Corridor E (RCE) is illustrated in Figure 4.11 below and at the end of this section. It is roughly delineated by the Boston–Nottingham railway to the north and the Lincoln to Peterborough railway to the south west and follows either side of South Forty Foot Drain from Swineshead Bridge to North Ing. The villages of Northorpe and Bicker are located close to the A52 to the south east outside of the corridor.

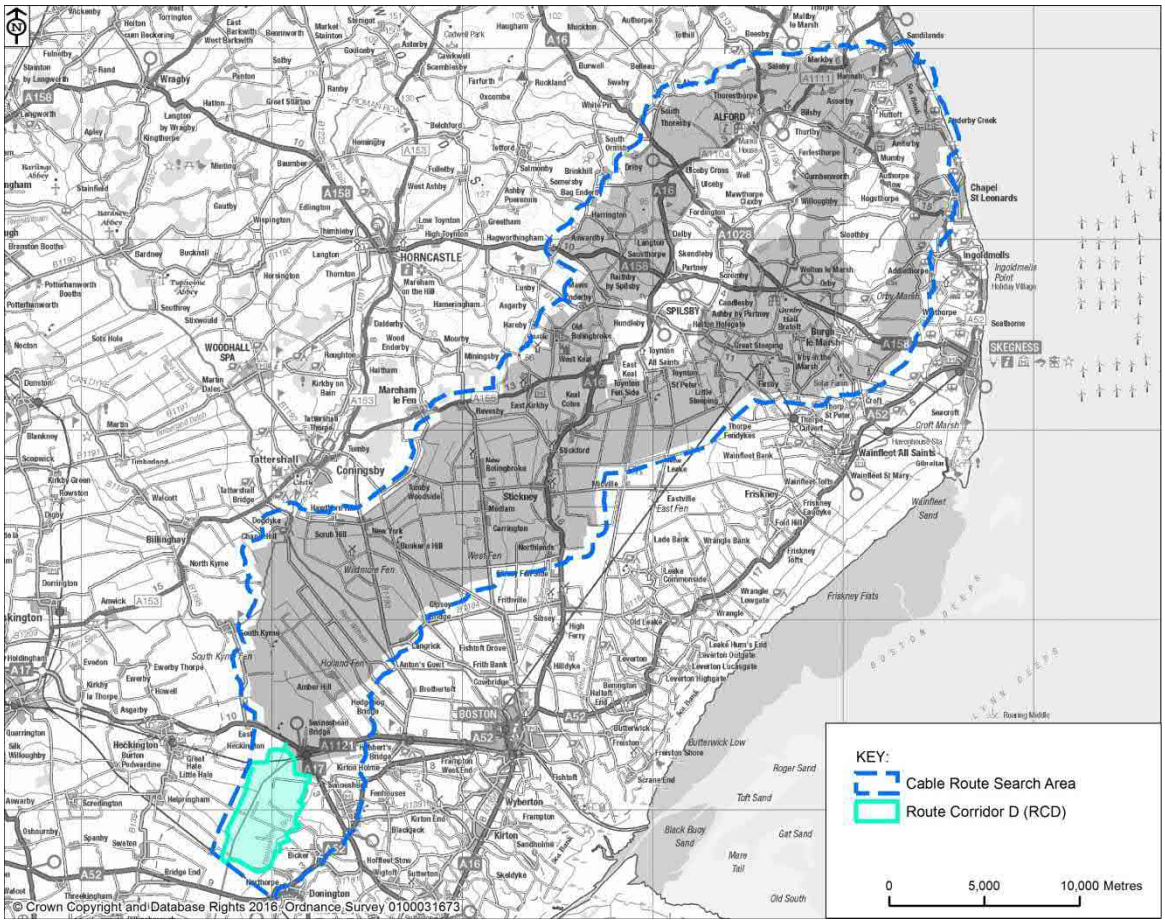

Figure 4.11 Route Corridor E

Technical & Engineering Considerations

Constructability

4.6.2 RCE consists predominantly of flat, open agricultural land divided by drains; individual properties dispersed along minor roads would not present a significant constraint to routeing of the cables within this corridor.

4.6.3 There is sufficient undeveloped land available to accommodate construction working width, HDD operations (where required) and associated temporary construction compounds and laydown areas.

Infrastructure

4.6.4 The most significant constraints for construction within RCE would be the Boston–Nottingham railway which runs east to west and South Forty Foot Drain which flows south to north; both would need to be crossed by trenchless methods and would be an obstacle to construction traffic (see Accessibility below). To the east of the corridor the railway runs immediately adjacent to the northern bank of South Forty Foot Drain so the two could be crossed together; to the west of the corridor they diverge, so two crossings would be required.

4.6.5 RCE is crossed by a number of minor roads which would need to be crossed by a cable route.

4.6.6 In addition to South Forty Foot Drain, RCE is crossed by a network of drains. The corridor falls within the Black Sluice Internal Drainage Board (BSIDB) district.

4.6.7 A natural gas pipeline crosses RCE from East Heckington in the north west and runs to the east of Bicker in the south east. This would need to be crossed by a cable route within RCE.

4.6.8 Other existing infrastructure within RCE includes Bicker Fen Substation which is surrounded by a number of wind turbines of Bicker Fen Windfarm. In addition, a number of high voltage overhead power lines radiate out from Bicker Fen Substation. These structures would need to be avoided by a cable route.

4.6.9 The proposed alignment of the Triton Knoll onshore cable route would run adjacent to the east bank of South Forth Foot Drain within RCE to a proposed substation and on into Bicker Fen Substation.

4.6.10 The proposed electrical connection between Heckington Fen Windfarm and Bicker Fen Sub-station would also run through this area. A current planning application submitted to Boston Borough Council indicates an underground cable along the A17 to Swineshead Bridge and an overhead line across the Boston – Nottingham railway and South Forty Foot Drain near College Farm, and south to Hammond Beck at Bar Bridge, then underground cable along Hammond Beck however, this application is still to be determined and the full alignment is still to be confirmed.

4.6.11 A summary of the infrastructure that a cable route would potentially need to cross within RCE is presented in Table 4.20.

Table 4.20 Route Corridor E – Infrastructure Crossings

Type	Notable crossings include…	Approx. No. of Crossings
A and B-class roads	-	0
Other minor roads	-	3

Table 4.20 Route Corridor E – Infrastructure Crossings		
Type	**Notable crossings include…**	**Approx. No. of Crossings**
Operational railway	Boston – Nottingham	1
Disused railway	-	0
Underground utilities	Natural gas pipeline Proposed Triton Knoll Electrical System onshore cable route (18 No. buried cables) Proposed Heckington Wind Farm electrical connection	3

Accessibility

4.6.12 The road system within RCE consists of minor roads predominantly running south east to north west from the A17 and A52 in the east of the corridor or from the B1394 outside the corridor to the west. There are several obstacles to construction traffic within RCE. These include the Boston-Nottingham railway to the north, the South Forty Foot Drain and associated flood embankments to the north and west and the Peterborough- Lincoln railway to the south. South Forty Foot Drain is a navigable waterway and local wildlife site and the width of the channel and flood defence embankments would make creation of a temporary construction access a challenge. The assessment has therefore identified existing public road access across these obstacles into RCE.

4.6.13 Access to the east side of the corridor would be via the A17 across the Boston – Nottingham railway and South Forty Foot Drain together at Swineshead Bridge or via the A52 across South Forty Foot Drain at Donington High Bridge and the Peterborough to Lincoln railway at Donnington. (The requirement for slow or large vehicles to ring for permission before crossing Swineshead level crossing on the A17 has been noted. It is understood there is no weight limit in relation to the Swineshead level crossing or the Swineshead Bridge, but Lincolnshire Highways would need to be contacted prior to the movement of loads over 100 tonnes).

4.6.14 Existing minor road access from these main roads into the corridor would require access through local villages and/or via narrow single track roads which would not be suitable for large construction traffic. There is potential to use an existing haul road from the A52 and/or new temporary haul roads may need to be constructed to allow access for cable route construction in the eastern part of the corridor.

4.6.15 Access to and from the A17 for construction traffic would need to be carefully considered particularly in the vicinity of the Swineshead Level Crossing where traffic management measures may be required to prevent the risk of traffic backing up across the level crossing.

4.6.16 Existing public road access to the west side of the corridor would either require access via the B1394 over the Peterborough to Lincoln railway through local villages with residential properties, and via roads with bends and narrow single track roads which could be a constraint to large construction traffic; or via a minor road from the A17 over the Boston to Nottingham railway. (The

requirement for slow or large vehicles to ring for permission before crossing the level crossing on the minor road has been noted). Some road improvement works would be required and a new temporary haul road would need to be constructed to allow access for cable route construction in the western part of the corridor.

4.6.17 The railway crossings would need to be checked for accessibility and the potential risk of grounding of low loads.

Environmental Considerations

Overview

4.6.18 The following subsections describe the environmental considerations present within or adjacent to RCE, highlighting those features which are considered to be more sensitive and should be avoided or, if unavoidable, which may require additional mitigation including consideration of the timing of installation and the use of alternative installation methods. The objective of the following sub-sections is to highlight specific constraints and/ or sensitivities which help to inform the refining of RCE to a narrower corridor. Reference should also be made to the thematic constraints plans contained in Appendix C which illustrate the constraints described in the following subsections.

Settlement, Community & Tourism

4.6.19 Subject to routeing the potential impacts of the underground cable on settlements and tourism interests in RCE are generally limited to temporary disturbance during installation. This includes temporary noise and visual impacts resulting from installation works as well as impacts resulting from the movement of construction traffic.

4.6.20 Settlements are located to the eastern and southern side of RCE including Bicker, Donington and Northorpe as illustrated in Figure 4.11 Route Corridor E. A number of individual properties are present throughout the route corridor.

4.6.21 Recreational routes of note within RCE include The South Forty Foot Drain, also known as the Black Sluice Navigation, which is an artificial drainage river that runs north-south to the west of the villages of Bicker and Donington, to the western side of RCE. The South Forty Foot Drain provides 19 miles of navigation into the west of Boston and was re-opened in 2009. In addition, there are a number of PROW present, notably running north/ south along South Forty Foot Drain and Hammond Beck and in a north-west/ south-east direction alongside local roads in Helpringham Fen and along Helpringham Eau.

4.6.22 Constraints within RCE are considered to be avoidable in refining the route corridor such that direct impacts can be prevented, however, it is recognised that some disturbance as a result of installation works will be unavoidable. Where there is the potential for significant disturbance to occur detailed mitigation will be developed related to how and when installation works are undertaken.

Geology & Hydrogeology

4.6.23 Subject to route selection within RCE impacts on geology and hydrogeology include the loss or sterilisation of geological resources, impacts on groundwater and encountering or causing contamination.

4.6.24 A description of the underlying solid and drift geology is contained in Appendix D, neither are considered to pose a significant constraint to cable routeing within RCE. There are occasional areas that could be considered to have a contaminated land potential, however these are likely to occupy discrete areas and as such are considered to be avoidable. There are no other geological routeing constraints or considerations within RCE.

Hydrology

4.6.25 The exact number of watercourses which would require to be crossed will depend on the specific alignment within RCE, however, for the purposes of assessing the route corridor an estimate has been made. RCE is shorter than all of the other route corridors so the total number of watercourses which may require to be crossed (23) is lower (see Table 4.21). This includes multiple crossings of maintained watercourses.

4.6.26 A review of the Environment Agency's Flood Map for Planning (from Rivers and the Sea) indicates that the majority of RCE is within areas which are at higher risk of flooding, e.g. flood zones 2 and 3.

Table 4.21 Route Corridor E – Watercourse Crossings

Type	Notable crossings include…	Approx. No. of Crossings
Main river	South Forty Foot Drain	1
IDB Maintained watercourse	Great Hale Eau, Brand End Drain, Mill Drain and Middle Fen Drove Drain.	7
Riparian/other watercourse	-	15

Agriculture & Soils

4.6.27 A review of the Provisional 1:250,000 ALC Mapping for the East Midlands Region indicates that the agricultural land within RCE is classed as ALC Grade 1 (excellent quality) and ALC Grade 2 (very good quality). All agricultural land within the route corridor is therefore BMV agricultural land. The ALC estimates for RCE are summarised in Table 4.22. As all land was identified as Grades 1 and 2, there was no requirement to differentiate between Subgrade 3a and 3b using the LandIS NATMAP data.

Table 4.22 Route Corridor E – Agricultural Land Classification		
ALC Grade	Area (ha)	Percent (%)
ALC Grade 1**	1669.4	51.8
ALC Grade 2**	1553.4	48.2
ALC Subgrade 3a*	0.0	0.0
ALC Subgrade 3b*	0.0	0.0
ALC Grade 4**	0.0	0.0
ALC Grade 5**	0.0	0.0
Total	**3222.8**	**100.0**
*Calculated using LandIS NATMAP data and Provisional 1:250,000 ALC mapping for the East Midlands Region[9]. ** Calculated from Provisional 1:250,000 ALC mapping for the East Midlands Region[9]		

4.6.28 The soil associations present in RC E are summarised in Table 4.23. RCE is dominated by the deep stoneless clayey soils of the Wallasea 2 association (68.6%). There are no peaty or organic rich soils present within RCE. Descriptions of soil associations, and their component soil series, are provided in Appendix E.

Table 4.23 Route Corridor E – Soil Associations			
Map Code	Soil Association	Area (ha)	Percent (%)
812b	Wisbech	827.4	25.7
812c	Agney	184.2	5.7
813g	Wallasea 2	2211.2	68.6
	Total*	**3222.8**	**100.0**
*Excludes non-agricultural land			

4.6.29 There are no Organic stewardship schemes present in the route corridor.

Landscape

4.6.30 The landscape character of RCE is characterised by flat, low-lying reclaimed fenland. This is a largely homogenous area defined by a man-made intensive arable landscape laid out in regular geometric patterns defined by a network of roads, trackways, drainage ditches, and dykes. Within the route corridor the fenland landscape is generally sparsely populated with widely scattered farmsteads and occasional small linear hamlets. The South Forty Foot Drain and associated embankment is a relatively strong linear feature within this landscape. Other built elements such as Bicker Wind Farm and large scale overhead powerlines are modern landmark

features and traffic along the A17 is a further degrading element. Overall, this is a simple, large scale open landscape, containing few sensitive landscape features.

4.6.31 There are very few landscape features within RCE that could not be reinstated or replaced with relative ease, with the exception of a small number of woodland blocks and shelterbelts. These features are sufficiently spaced to allow a cable route to be developed that avoids landscape features and minimises potential impacts.

Ecology

4.6.32 A review of statutory and non-statutory designated sites as well as priority habitats within and adjacent to RCE has been undertaken. These constraints are illustrated on Figure 4.11 and include:

- Two non-statutory designated sites are South Forty Foot Drain LWS which bisects the corridor and will have to be crossed by alternative installation methods and Old Forty Foot Drain to South Forty Foot Drain LWS in the west of the corridor. Both LWSs may need to be crossed and these may require alternative installation methods
- Several small areas of coastal floodplain and grazing marsh priority habitat and a small area of broadleaved woodland are present within RCE. Due to their scattered nature, it is anticipated that these can be avoided through detailed routeing or if not possible through alternative installation methods where adjacent to South Forty Foot Drain LWS.

4.6.33 Priority habitat constraints within RCE are generally avoidable by detailed routeing, apart from those adjacent to South Forty Foot Drain LWS which can be avoided by alternative installation methods. Two LWSs may need to be crossed and these may require alternative installation methods.

Archaeology & Heritage

4.6.34 Within RCE archaeological and heritage constraints comprise 14 non-designated assets as illustrated in Figure 4.11, there are no designated assets. The non-designated assets are both above and below ground. These include one prehistoric site, four Roman, one Medieval, three Post Medieval and five sites of unknown date. Whilst it is preferable to avoid these sites the number and distribution of assets means that some direct impacts are unavoidable.

4.6.35 As far as possible routeing aims to avoid non-designated assets, however, the extent and distribution of these mean that in some instances direct impacts may be unavoidable, particularly when considering other constraints on route selection. Whilst direct impacts on non-designated assets will in some cases be unavoidable, it is important to consider the potential contemporaneity of heritage assets. The setting of heritage assets is informed in part by nearby contemporary assets consequently clusters of assets of similar periods should be avoided where possible.

Planning Considerations

Planning Policy

4.6.36 As RCE falls within North Kesteven District Council, Boston Borough Council and South Holland District Council, the adopted policies to be considered are North Kesteven District Local Plan 2007, Boston Borough Local Plan 1999, Interim Plan (Non-Statutory development control policy) 2006, South Holland Local Plan 2006. The NPPF (2012) also requires consideration.

4.6.37 RCE crosses a number of watercourses and drains, consideration of South Holland Local Plan 2006 and Policy SG8 (Water efficiency), Policy SG9 (Development and flood risk) will be required.

4.6.38 The emerging South East Lincolnshire Local Plan brings together South Holland and Boston Borough with one combined local plan, along with the emerging Central Lincolnshire Local Plan which is to be adopted December 2016. These emerging plans have limited weight but will be regarded as a material consideration and will continue to be reviewed in developing the detailed cable route.

Refined Route Corridor E

4.6.39 RCE is considered to provide opportunities to develop feasible cable routes, however, in order to focus this it has been further refined. The aim of refining RCE was to develop a narrower route corridor (approximately 1km wide for its length) whilst taking into account the technical, environmental and planning considerations above as well as confirmation of the preferred landfall site (LF1a at Sandilands in East Lindsey) and, in particular, the preferred converter station site (CS1 at North Ing Drove in South Holland). The refined RCE is illustrated in Figure 4.12 below with a larger scale plan at the end of this section.

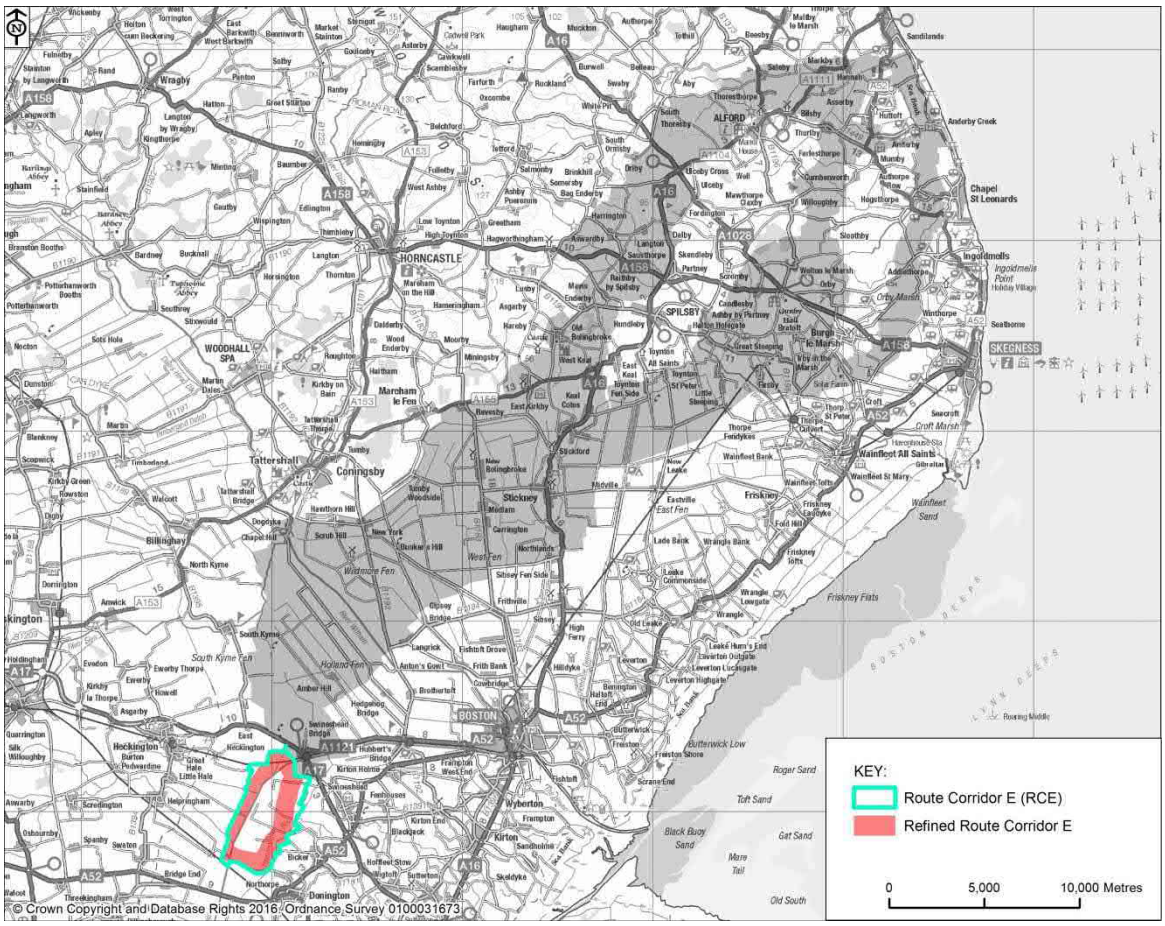

Figure 4.12 Refined Route Corridor E

4.6.40 The key constraints which have informed the refinement of RCE include:

- Existing infrastructure in the centre of RCE including Bicker Fen Wind Farm and Bicker Fen Substations (NGET and Western Power Distribution (WPD)) and associated overhead power lines. RCE splits providing two alternative route corridor options that avoid the existing infrastructure; a corridor to the east and a corridor to the west of South Forty Foot Drain.
- The two corridors avoid, as far as possible, the proposed alignment of the Triton Knoll onshore cable route that runs adjacent to the east bank of South Forty Foot Drain.
  - The eastern corridor would require a crossing of the Triton Knoll onshore cable route to the north of RCE;
  - The western corridor would avoid the need to cross the Triton Knoll onshore cable route.
- The Boston-Nottingham railway and South Footy Foot Drain would need to be crossed by a cable route and would present a constraint to construction access.
  - The eastern corridor would allow the Boston-Nottingham railway and South Footy Foot Drain to be crossed together in one crossing with construction access via the A17 and construction of a haul road / or potential use of the proposed Triton Knoll access road;

- The western corridor would require crossing the Boston–Nottingham railway separately to the South Forty Foot Drain with construction access via an existing minor road which also requires a level crossing across the railway. This would require road improvements and the construction of a haul road for construction access to the west side of South Forty Foot Drain but there is no existing access across the drain from the southern part of this corridor.

- An area of non-designated heritage assets which lie in the area surrounding Bicker Fen Substations, in the centre of RCE would be avoided by both corridor options.
- The western split of RCE follows a relatively direct route to the west of South Forty Foot Drain, and where possible avoids isolated properties.

Summary of Assessment of Route Corridor E

4.6.41 Table 4.24 sets out the key technical and environmental factors identified for RCE.

Table 4.24 Route Corridor E – Key Assessment Findings

Factor	Findings
Local Planning Authority	North Kesteven and Boston Borough
Approx. Length	7 km (subject to detailed routeing)
Approx. no. of crossings	30 (subject to detailed routeing)
Key technical constraints and opportunities	· Sufficient space available to facilitate construction including opportunities for siting temporary facilities. · The most significant constraints for construction would be the Boston–Nottingham railway which runs east to west and South Forty Foot Drain which flows south to north, which would both need to be crossed by trenchless methods and be an obstacle to construction traffic. · RCE served by minor roads only. Construction access would require the construction of new temporary haul roads and/or the use of existing and proposed development access roads to avoid the use of local public roads through villages. · Other infrastructure including Bicker Fen Substation which is surrounded by a number of wind turbines of Bicker Fen Windfarm, and a number of high voltage overhead power lines from Bicker Fen Substation are avoidable. · Notable utility crossings include a natural gas pipeline; the proposed alignment of the Triton Knoll onshore cable route; and proposed Heckington Wind Farm electrical connection (the latter two avoided by the western corridor).

Table 4.24 Route Corridor E – Key Assessment Findings	
Factor	**Findings**
Key environmental constraints and opportunities	· Settlements (including Bicker, Donington and Northorpe) are avoided, however a number of individual properties are present throughout the corridor. · No geological constraints have been identified within RCE; there may be occasional areas with contaminated land potential, however these are considered to be avoidable. · The majority of RCE lies within Flood Zones 2 & 3. · South Forty Foot Drain flows through RCE in a north-south direction, and delineates the eastern boundary of the refined western corridor. · All the land within RCE is considered to be BMV agricultural land. · RCE is a simple, large scale open landscape, containing few sensitive landscape features. · There are no statutory designated ecological sites present within RCE. There are a number of non-statutory designated sites present, but impacts could be avoided in developing a detailed route. · There are no designated assets. There are 14 non-designated assets, both above and below ground. Due to the distribution of non-designated assets some impacts would be unavoidable and pre-construction archaeological investigations may be required.
Conclusion	The refined RCE provides opportunities to develop technically feasible cable routes whilst largely avoiding existing infrastructure and environmental constraints. In some instances, constraints may not be avoided by routeing, however, specific mitigation could be developed to reduce potential impacts such as those on non-designated heritage interests or by developing temporary haul roads for construction access.

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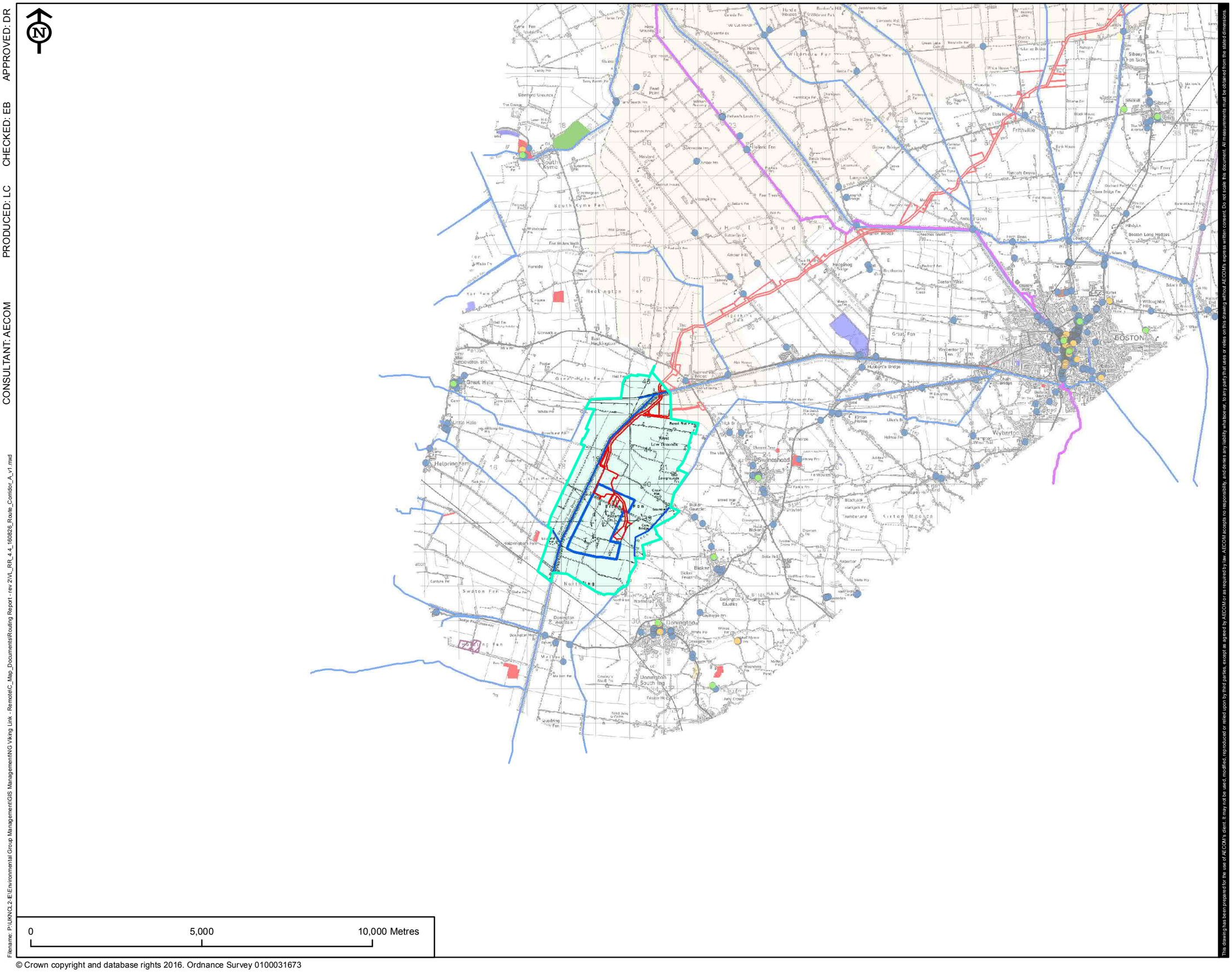
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Haverhill Bridge
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CONSULTANT: AECOM

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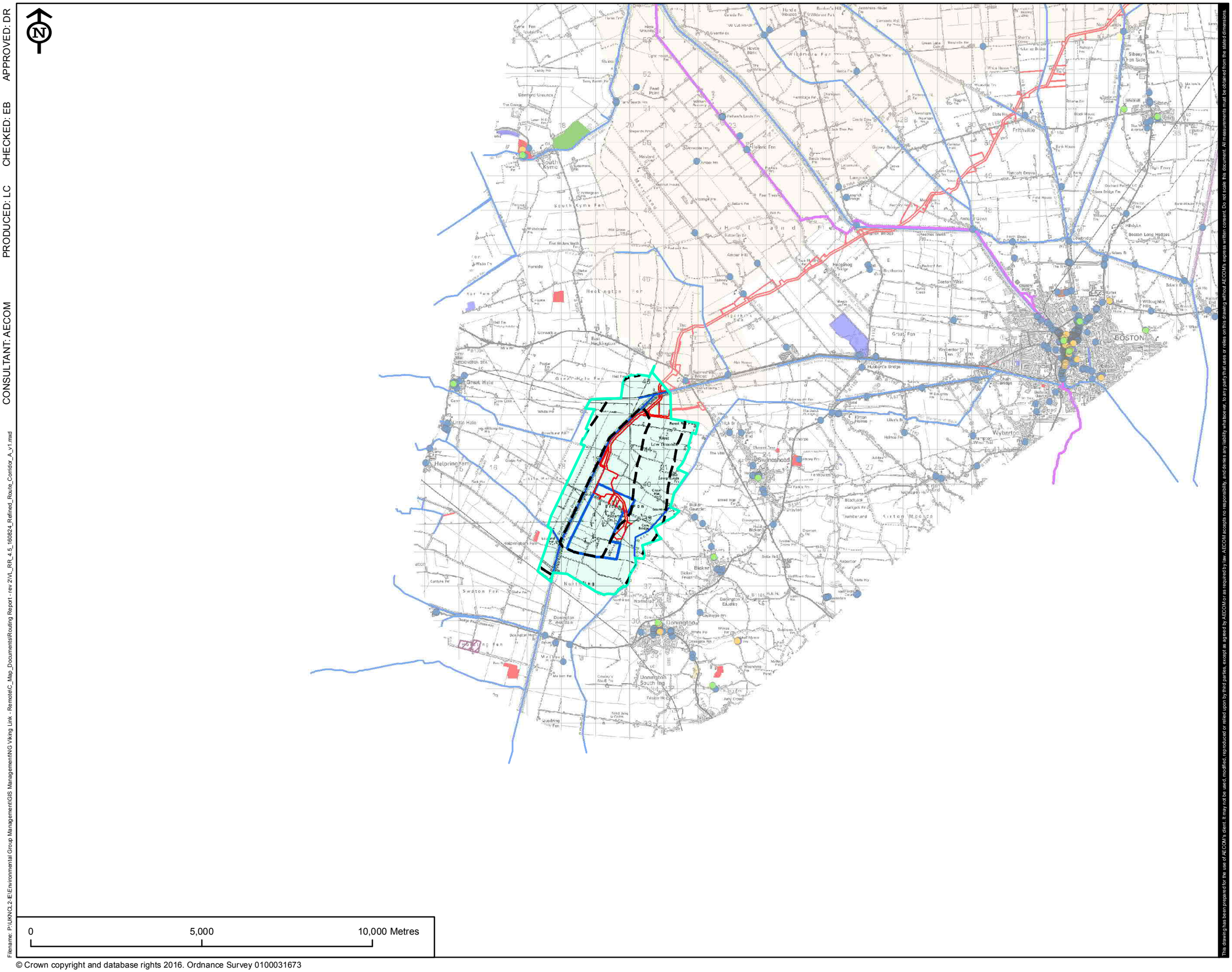

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VikingLink

LEGEND

- Refined Cable Route Corridor
- Route Corridor E (RCE)
- Registered Park and Garden
- Golf Course
- Caravan Park
- Sustrans National Cycle Route
- Main Rivers, Drains and Chalk Streams
- Listed Building - Grade I
- Listed Building - Grade II*
- Listed Building - Grade II
- Scheduled Monument
- Site of Special Scientific Interest
- Lincolnshire Wildlife Trust Reserve
- Regionally Important Geological/Geomorpholo... Site
- Site of Nature Conservation Importance
- Triton Knoll Development Consent Order limits
- Bicker Fen Wind Farm Boundary (Approx.)

REVISION:

REV.	DATE	DESCRIPTION
1	26/08/16	ORIGINAL ISSUE

FIGURE NO.

VL_160826_RR_4.12

FIGURE TITLE

FIGURE 4.12 - REFINED ROUTE CORRIDOR E KEY CONSTRAINTS

SHEET NUMBER

1 of 1

NOTES

Date: 26/08/16

Scale at A3: 1:100,000

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4.7 Route Corridor Options for Phase 2 Consultation

Overview

4.7.1 Through an iterative assessment process RCA, RCB, RCD and RCE have all been identified as providing feasible opportunities to develop a cable route. RCC has been discounted as it is considered to be less preferable taking into account technical and environmental constraints.

4.7.2 Different combinations of the refined RCA or RCB and RCD and RCE can provide a continuous route corridor which will connect the preferred landfall site (LF1a) at Sandilands, East Lindsey to the preferred converter station site (CS1) at North Ing Drove, South Holland. In broad terms there are two options as illustrated in Figure 4.13 and Figure 4.14; hereafter referred to as the Purple Route Corridor (comprising parts of RCA, RCD and RCE) and the Orange Route Corridor (comprising parts of RCB, RCD and RCE). It is these continuous route corridors from the preferred landfall to the preferred converter station which are the subject of Phase 2 Consultation.

The Purple Route Corridor

4.7.3 The Purple Route Corridor is illustrated in Figure 4.13. Subject to detailed routeing it is up to 63.9km long routeing through East Lindsey (approximately 48.7 km), Boston Borough (approximately 8.6 to 13.8 km), North Kesteven (approximately 0 to 5.7 km) and South Holland (approximately 0.9 to 1.4 km).

4.7.4 From the preferred landfall at Sandilands to east of Stickford the Purple Route Corridor is in more elevated land through the Lincolnshire Wolds AONB. Within the AONB the Purple Route Corridor provides two alternative options for avoiding an area of settlement and some technically challenging topography. From here it descends south west into the lower lying fens where land is almost entirely agricultural. It is routed through agricultural land until it reaches the preferred converter station in South Holland.

4.7.5 The Purple Route Corridor is considered to be technically feasible, however, crossings and access do pose a constraint which require further consideration. The number of infrastructure crossings is broadly comparable with the Orange Route Corridor, however, the number of watercourse crossings required is far fewer. There are fewer A and B roads present which could provide direct access to the corridor which could increase the lengths of temporary haul road required for construction traffic. In addition there are a number of constraints which present obstacles to construction access such as Steeping River, River Witham, Boston–Nottingham railway and South Forty Foot Drain.

4.7.6 The Purple Route Corridor avoids settlements and scattered individual properties for the majority of its length but a number of settlements are located on its margins such as Asserby, Raithby, and East and West Keal. There is one pinch point where the corridor narrows between Saleby and Thoresthorpe. By avoiding settlements as much as possible disturbance during construction can be reduced.

4.7.7 The Purple Route Corridor avoids the majority of designated environmental sites or interests with the exception of the AONB. In developing a detailed route within the AONB consideration will need to be given to the landscape features which contribute to the site's designation such as woodland and hedgerows. The majority of features are considered to be avoidable such that in the long term a cable route developed within the Purple Route Corridor is not expected to result in any long term impacts on landscape character.

4.7.8 The Purple Route Corridor generally avoids of environmental constraints including non-designated sites. The exception to this is non-designated heritage assets which due to their number and distribution cannot be avoided. Subject to detailed routeing taking into account the relationship of these sites with other designated heritage interests, as well as other factors, site specific mitigation would be required including pre-construction archaeological investigations.

The Orange Route Corridor

4.7.9 The Orange Route Corridor is illustrated in Figure 4.14. Subject to detailed routeing it is up to 67.4km long routeing through East Lindsey (approximately 48.1 to 52.2 km), Boston Borough (approximately 8.6 to 13.8 km), North Kesteven (approximately 0 to 5.7 km) and South Holland (approximately 0.9 to 1.4 km).

4.7.10 From the preferred landfall at Sandilands to east of Stickford the Orange Route Corridor is in low lying coastal plains. In this area in order to avoid Gunby Hall and surrounding estate land it comprises two options, the first option requiring a relatively short route through AONB and the second option a longer route crossing more watercourses, closer to settlements and routed through the Burgh le Marsh Target Area of the LCGMP. From here it follows a western route through the lower lying fens where land is almost entirely agricultural. It is routed through agricultural land until it reaches the preferred converter station in South Holland.

4.7.11 The Orange Route Corridor is considered to be technically feasible, however, crossings and access do pose a constraint which require more consideration. The number of infrastructure crossings is broadly comparable with the Purple Route Corridor, however, the number of watercourse crossings required as part of the Orange Route Corridor is significantly higher. There are fewer A and B roads present which could provide direct access to the corridor which could increase the lengths of temporary haul road required for construction traffic. In addition there are a number of constraints which present obstacles to construction access such as Steeping River, River Witham, Boston–Nottingham railway and South Forty Foot Drain.

4.7.12 The Orange Route Corridor avoids settlements and scattered individual properties for the majority of its length but in a few places is in closer proximity to them including at Orby, Bratoft and Great and Little Steeping where the settlements are located immediately adjacent to the corridor. There is also a pinch point where the corridor narrows significantly north of Welton le Marsh. By avoiding settlements as much as possible disturbance during construction can be reduced.

4.7.13 The Orange Route Corridor generally avoids the majority of designated environmental sites or interests. In avoiding Gunby Hall, a Registered Park and Garden and its surrounding estate the Orange Route Corridor includes an option through the AONB for approximately 3 km. In developing a detailed route within the AONB consideration will need to be given to the landscape features which contribute to the site's designation such as woodland and hedgerows. The majority of features are considered to be avoidable such that in the long term a cable route developed within the Orange Route Corridor is not expected to result in any long term impacts on landscape character.

4.7.14 The alternative route provided by the Orange Route Corridor is routed through the north western part of the Burgh le Marsh Target Area of the LCGMP. Routeing through this area would require more detailed consideration of the feasibility of mitigation options including reinstatement. The Orange Route Corridor also cannot avoid non-designated heritage assets due to their number and distribution cannot be avoided. Subject to detailed routeing taking into account the relationship of these sites with other designated heritage interests, as well as other factors, site specific mitigation would be required including pre-construction archaeological investigations.

Summary of Route Corridor Options

4.7.15 Table 4.25 provides a summary of the Purple and Orange Route Corridors including key routeing constraints and opportunities identified for both through technical and environmental assessments.

Table 4.25 Route Corridor Options – Summary of Assessment			
Key Routeing Consideration	**Purple Route Corridor (*RCA, RCD and RCE*)**	**Orange Route Corridor (*RCB, RCD and RCE*)**	**Comparative Considerations**
Total Length (*based on maximum*)	63.8 to 63.9 km from the preferred landfall site (LF1a) at Sandilands in East Lindsey to the preferred converter station site (CS1) at North Ing Drove in South Holland.	63.2 to 67.4 km from the preferred landfall site (LF1a) at Sandilands in East Lindsey to the preferred converter station site (CS1) at North Ing Drove in South Holland.	Subject to detailed routeing the overall lengths of the Purple and Orange Route Corridors are similar. The longest option is formed by the Orange Route Corridor where it is routed east and south of Gunby Hall and the surrounding estate land. The shortest option is formed by the Orange Route Corridor where it is routed through the AONB.
Approx. no. of Crossings (*based on maximum*)	Subject to detailed routeing the Purple Route Corridor would require up to 221 no. crossings of roads, watercourses or other infrastructure.	Subject to detailed routeing the Orange Route Corridor would require up to 338 no. crossings of roads, watercourses or other infrastructure.	Both the Purple and Orange Route Corridors could require a significant number of crossings including watercourses, field drains, roads and other infrastructure. Overall the Purple Route Corridor requires fewer crossings as the eastern part of the route is required to cross far fewer watercourses.
Constructability	The Purple Route Corridor comprises predominantly open agricultural land with sufficient space available to facilitate construction including opportunities for siting temporary construction facilities subject to consideration of other constraints (for example no temporary facilities would be sited within the AONB) Potentially challenging topography is present in localised areas such as the steep slopes around Langton and Sutterby however, slopes with evidence of historic landslips could be avoided during detailed routeing.	The Orange Route Corridor comprises predominantly open agricultural land with sufficient space available to facilitate construction including opportunities for siting temporary facilities subject to the consideration of other constraints. Should a route within the AONB be developed no temporary facilities would be located within the designation. Elsewhere the Orange Route Corridor including access to it is constrained by linear settlement around Orby, Burgh le Marsh, Irby in the Marsh and Great Steeping. Potentially challenging ground conditions are present within the Orange Route Corridor with some localised peat deposits present to the west of Little Steeping.	Both Route Corridors would accommodate the construction works and facilities required to install the cables albeit with some restrictions in localised areas. Steep slopes in localised areas of the Purple Route Corridor would require careful routeing and consideration of construction methods. The combination of environmental constraints and linear development would require careful routeing in areas of the Orange Route Corridor. These latter areas could be avoided by selecting the western corridor in RCB. The Orange Route Corridor would also have the potential to encounter peat which could present difficult ground conditions during construction.
Infrastructure	Subject to detailed routeing, the Purple Route Corridor requires a relatively small number of road crossings (A, B and minor roads). In the main crossings of operational railway lines have been avoided with the exception of the Boston-Nottingham railway north of the approach to the preferred converter station. Notable utility crossings include an Anglian Water pipeline which may require to be crossed more than once subject to detailed routeing, a natural gas pipeline, proposed Heckington Wind Farm electrical connection (buried cable) and proposed Triton Knoll onshore cable route (subject to detailed routeing)	The Orange Route Corridor crosses fewer A and B road but higher number of minor road crossings required including a number of minor roads which connect coastal settlements. In the main crossings of operational railway lines have been avoided with the exception of the Boston-Nottingham railway north of the approach to the preferred converter station. Notable utility crossings include two natural gas pipelines, an Anglian Water pipeline, proposed Heckington Wind Farm electrical connection (buried cable) and proposed Triton Knoll onshore cable route (subject to detailed routeing)	Whilst the Orange Route Corridor crosses fewer A and B roads than the Purple Route Corridor it requires more road crossings in total due to the number of minor roads to be crossed. Based on available information the Purple Route Corridor requires more crossings of other utilities. Both Route Corridors would require a crossing of the Boston–Nottingham railway. The number of infrastructure crossings required for the Purple and Orange Route Corridors is comparable. Subject to other factors it is preferable to reduce the total number of crossings required as much as possible, however, no insurmountable crossing constraints have been identified.
Accessibility	The eastern part of the Purple Route Corridor is considered to benefit from good access options. There a number of A and B roads present which offer relatively direct construction access from the existing road network. The west of the Purple Corridor is comparatively more constrained as A and B roads are less frequent. Potential obstacles to construction access include the River Witham, Boston–Nottingham railway and South Forty Foot Drain.	The Orange Route Corridor is more constrained in terms of access. A and B roads are less prevalent meaning that there are fewer opportunities for direct construction access from the existing road network. Potential obstacles to construction access include the Steeping River (due to flood defence banks); River Witham, Boston–Nottingham railway and South Forty Foot Drain.	Overall, the Purple Route Corridor is better served by the existing road network offering relatively good opportunities for construction access, particularly in the east of the corridor although steep slopes could constrain access in localised areas. The Orange Route Corridor has more sections where the local road network is less suitable for construction access and potentially more obstacles to construction access.

Table 4.25 Route Corridor Options – Summary of Assessment			
Key Routeing Consideration	**Purple Route Corridor (*RCA, RCD and RCE*)**	**Orange Route Corridor (*RCB, RCD and RCE*)**	**Comparative Considerations**
Settlement, Community & Tourism	Settlements and scattered individual properties are present along sections of the route corridor, however, the majority of these are avoided. The eastern part of the corridor is generally more settled with a larger number of small towns and villages present in the vicinity. There remains the potential for some temporary short term disturbance during construction such as noise, visual or traffic but this could be further reduced through more specific mitigation. There are a number of different visitor attractions close to and/or within the Purple Route Corridor including Sandilands Golf Course, LCCP and the Lincolnshire Wolds AONB as well as various PROWs. Through a combination of routeing and selection of installation methods no direct impacts are likely, however, some temporary short term disturbance is possible.	Similar to the Purple Route Corridor, there are more settlements present along the eastern parts of the Orange Route Corridor including some which are located adjacent to the corridor. The section of the route corridor which runs south/south west from the landfall to Hasthorpe crosses a number of minor roads which connect coastal settlements. There remains the potential for some temporary short term disturbance during construction such as noise, visual or traffic but this could be further reduced through more specific mitigation. There are a number of different visitor attractions close to and/or within the Orange Route Corridor including Sandilands Golf Course, LCCP and Gunby Hall as well as various PROWs. Through a combination of routeing and selection of installation methods no direct impacts are likely, however, some temporary short term disturbance is possible.	The Purple and Orange Routes both tend to avoid settlements for the majority of their lengths, however, in some places the Orange Route Corridor is in closer proximity to relatively large settlements (for example Orby and Welton le Marsh). For both options there is some temporary short term disturbance during construction is likely, however, this is considered to be mitigable. There are a number of visitor interests which are common to both route corridors (e.g. Sandilands Golf Course and LCCP to the east as well as various PROWs), however, the key differentiators are the AONB potentially affected by the Purple and Orange Route Corridors and Gunby Hall and surrounding estate potentially affected by the Orange Route only. As above for both options some temporary short term disturbance to visitors is possible.
Geology & Hydrogeology	The underlying geology within the Purple Route Corridor does not pose a constraint to the development of a detailed cable route. The geological constraints which are present are either avoidable in developing a detailed route (for example areas of potential contamination or Mineral Safeguarding Areas) or may inform the installation methods used (for example working within a groundwater SPZ or crossing a chalk stream.	The development of a detailed cable route within the Orange Route Corridor is not constrained by the underlying geology. Those constraints which are considered sensitive have been avoided as much as possible and in those areas which are unavoidable such groundwater SPZ further consideration of installation methods may be required.	Both routes avoid similar constraints including potentially contaminated land (in particular historic landfills), areas of UXO risk and Mineral Safeguarding Areas. The Orange Route Corridor encounters an additional Mineral Safeguarding Area north of Scremby. Both corridors also include sections routed through groundwater SPZs, however, this is not considered to be a routeing constraint.
Hydrology	The Purple Route Corridor requires up to 168 watercourse crossings. This includes main rivers, maintained watercourses and field drains. Subject to detailed routeing multiple crossings of chalk streams would also be required. The Purple Route Corridor benefits from being more elevated in the eastern section requiring less watercourse crossings. The western part of the corridor is routed through lower lying and heavily drained agricultural land requiring a significant number of crossings of field drains.	The Orange Route Corridor requires up to 271 watercourse crossings. This includes main rivers, maintained watercourses and field drains as well as chalk streams. The Orange Route Corridor is lower lying for much of its length with the eastern section routed through low lying coastal plains and the western section through heavily drained agricultural land. A section of the eastern part of the Orange Route Corridor runs perpendicular/ part perpendicular to the main catchment flows which could increase disturbance of drainage during construction works.	Whilst both route corridors require a significant number of watercourse crossings the Orange Route Corridor requires a higher number overall. This is due to the increased number of watercourses crossed by the eastern part of the route corridor where it crosses through flatter low lying coastal plains in the east. For either route corridor a detailed watercourse crossing strategy will be needed to inform mitigation requirements.
Agriculture & Soils	Land use within the Purple Route Corridor is dominated by agriculture. Through review of ALC and soil association mapping (LandIS Dataset) the majority of the Purple Route Corridor is underlain by BMV agricultural land. Temporary disturbance of agricultural land is unavoidable, however, specific mitigation requirements would be developed to reduce this as far as possible. This includes management measures with respect to soil handling and storage.	Land use within the Orange Route Corridor is also dominated by agriculture. Through review of ALC and soil association mapping (LandIS Dataset) the majority of the Orange Route is underlain by BMV agricultural land. As with the Purple Route temporary disturbance of agricultural land is unavoidable and specific mitigation would be developed to reduce this as far as possible.	Both routes are underlain by BMV agricultural land for the majority of their lengths, however, the eastern part of the Purple Route Corridor is underlain by slightly less BMV than the eastern part of the Orange Route Corridor. Notwithstanding this for either option some temporary disturbance of agricultural land would occur during installation. Specific mitigation requirements would be tailored according to the route corridor to ensure effective management, handling and storage of soil so that in the long term agricultural land use can resume.

Table 4.25 Route Corridor Options – Summary of Assessment			
Key Routeing Consideration	**Purple Route Corridor (*RCA, RCD and RCE*)**	**Orange Route Corridor (*RCB, RCD and RCE*)**	**Comparative Considerations**
Landscape	Subject to detailed routeing, the Purple Route Corridor requires up to 8km of cable route through the Lincolnshire Wolds AONB. Whilst the AONB is of national importance in developing the Purple Route consideration has been given to the key features which contribute to the landscape including woodland, hedgerows and ridge lines. It is considered that a cable route could be developed through the AONB without substantially altering its landscape character in the long term, however, it would require more detailed landscape reinstatement or enhancement. Impacts would be temporary with no permanent above ground elements. There is sufficient distance from, and between, sensitive features, such that careful routeing could avoid the majority of key characteristic components of the AONB such as woodland, where features cannot be avoided such as hedgerows these could be reinstated.	Subject to detailed routeing, the Orange Route Corridor requires up to 3km of cable route through the Lincolnshire Wolds AONB. Similar to the Purple Route it is considered that long term impacts on the AONB can be prevented as (1) sensitive features can be avoided or reinstated and (2) there would be permanent above ground development. The Orange Route Corridor also provides the opportunity to avoid the AONB in its entirety. However, this requires a longer overall route in closer proximity to and potentially impacting on other constraints. The selection of a route option would require balancing the potential impacts on the AONB with those on settlement, ecological and heritage interests outside of the AONB.	Both routes, subject to detailed routeing, have the potential to impact on the AONB. The Purple Route Corridor requires a longer section through the AONB and in simple quantitative terms could be considered to be potentially more impacting, however, that does not take account of the opportunities to mitigate through detailed routeing and avoid sensitive features as well as landscape reinstatement or enhancement. Long term impacts on the AONB could be prevented for both the Purple and Orange Routes Corridors but in selecting a route through the AONB over the alternative which avoids it (Orange Route Corridor) would require to be justified taking into account the requirements of NPPF.
Ecology	There are no major ecological constraints present within or immediately adjacent to the Purple Route Corridor. Statutory designations are avoided and priority habitats or non-statutory designations (for example LWSs or SNCIs) which are present within the route corridor can typically be avoided by detailed routeing or selection of less intrusive installation methods.	The Orange Route Corridor largely avoids major ecological constraints, however, subject to detailed routeing the corridor avoiding the AONB would require routeing through and result in direct impacts on the Burgh le Marsh Target Area of the LCGMP. Due to other constraints which are present the northern part of the LCGMP is unavoidable. Other constraints which are present such as priority habitats or non-statutory designations can typically be avoided by detailed routeing or selection of less intrusive installation methods.	Both the Purple and Orange Route Corridors largely avoid ecological designations. The exception to this, subject to detailed routeing, is the Orange Route Corridor assuming a route avoiding the AONB is preferred. This route would be more ecologically impacting than the Purple Route Corridor due to direct impacts on the Burgh le Marsh Target Area of the LCGMP. Dependent on the extent of the route within the LCGMP the impacts on it may be partly mitigated through habitat reinstatement.
Archaeology & Heritage	The Purple Route Corridor avoids directly impacting on designated heritage assets. Scheduled Monuments have been avoided, those which are present within the route corridor typically occupy a small area and can be avoided by at least 50 m in developing a detailed route. Non-designated heritage assets cannot all be avoided due to the number and distribution, particularly to the east of the route corridor. These assets range from small find spots to crop marks to ridge and furrow field systems. Where possible it is preferable to avoid non-designated assets, particularly where they may form part of the historic landscape and/or have a relationship with designated assets. Where non-designated assets cannot be avoided site specific mitigation may be required.	The Orange Route Corridor also avoids directly impacting designated heritage assets. It has been routed to avoid as much as possible, Gunby Hall and the surrounding estate, however, a number of non-designated assets fall within the corridor. As with the Purple Route Corridor due to their number and distribution complete avoidance on non-designated assets may not be possible. Where non-designated assets cannot be avoided site specific mitigation may be required.	Designated and non-designated heritage assets are present throughout both the Purple and Orange Route Corridors. For both options, designated assets are avoidable through the application of a minimum 50 m separation distance, however, impacts on non-designated assets may not be avoided due to the high number and distribution of those which are present. Impacts on these assets would require site specific mitigation. Whilst direct impacts on non-designated assets will in some cases be unavoidable, in developing a detailed route an important to consideration will be avoiding clusters of assets of similar periods where possible.

APPROVED: DR
CHECKED: EB
PRODUCED: LC
CONSULTANT: AECOM

MABLETHORPE
Trusthorpe
Sutton on Sea
Sandilands
Mablethorpe
Legbourne
Louth
Alford
Anderby Creek
Chapel St Leonards
Ingoldmells
Ingoldmells Point Holiday Village
Seathorne
SKEGNESS
Wainfleet All Saints
Wainfleet St Mary
Wainfleet Sand
Friskney Flats
BOSTON DEEPS
LYNN DEEPS
Roaring Middle
THE WASH
Roger Sand
Toft Sand
Black Buoy Sand
Gat Sand
Mare Tail
Old South
Seal Sand
Peter Black Sand
Butterwick Low
HUNSTANTON
Old Hunstanton
Heacham
Snettisham
Ingoldisthorpe
Dersingham
Hornsea
Spilsby
Horncastle
Woodhall Spa
Metheringham
Tattershall
Coningsby
Stickney
Boston
Sleaford
Ruskington
Leasingham
Heckington
Kirton
Donington
Wainfleet
Friskney
Wainfleet Tofts
Wainfleet St Mary
Gibraltar
Croft
Seacroft
Croft Marsh
Thorpe Culvert
Thorpe St Peter
Wainfleet Bank
Friskney Eaudyke
Fold Hill
Friskney Tofts
Wrangle Bank
Wrangle Lowgate
Wrangle
Leake Commonside
Old Leake
Leake Hurn's End
Leverton Outgate
Leverton Lucasgate
Leverton Highgate
Benington
Butterwick
Freiston
Freiston Shore
Scrane End
Fishtoft
Wyberton
Frampton
Kirton
Sandholme
Skeldyke
Fosdyke
Sutterton Dowdyke
Fosdyke Bridge
Holbeach St Marks
Holbeach St Matthew
Dawsmere
Algarkirk
Sutterton
Wigtoft
Hofleet Stow
Kirton End
Blackjack
Frampton West End
Kirton Holme
Swineshead
Swineshead Bridge
Fenhouses
Hubbert's Bridge
Hilldyke
High Ferry
Sibsey
Frithville
Gipsey Bridge
Sibsey Fen Side
Northlands
Wildmore Fen
Stickford
New Bolingbroke
Midville
Eastville
East Fen
New Leake
Lade Bank
Tumby
Tumby Woodside
Tattershall Thorpe
Tattershall Bridge
Dogdyke
Chapel Hill
Scrub Hill
New York
Bunker's Hill
Hawthorn Hill
Billinghay
North Kyme
South Kyme
South Kyme Fen
Anwick
Cranwell
Cranwell RAF College
Dorrington
Ashby de la Launde
Bloxholm
Digby
Walcott
Timberland
Blankney
Scopwick
Kirkby Green
Rowston
Martin
Martin Dales
Tattershall Thorpe
Mareham le Fen
Mareham on the Hill
Revesby
East Kirkby
Miningsby
Hareby
Old Bolingbroke
West Keal
Keal Cotes
Toynton All Saints
Toynton St Peter
Toynton Fen Side
Little Steeping
Great Steeping
Ashby by Partney
Halton Holegate
Gunby Hall
Bratoft
Burgh le Marsh
Irby in the Marsh
Orby
Orby Marsh
Winthorpe
Addlethorpe
Sloothby
Welton le Marsh
Scremby
Candlesby
Partney
Dalby
Skendleby
Hundleby
Spilsby
Raithby by Spilsby
Hagworthingham
Asgarby
Mavis Enderby
Lusby
Moorby
Wood Enderby
Dalderby
Roughton
Haltham
Kirkby on Bain
Tattershall
Southrey
Stixwould
Bucknall
Bardney
Langton
Thornton
Horncastle
Low Toynton
High Toynton
Greetham
Tetford
Salmonby
Brinkhill
Somersby
Bag Enderby
Ashby Puerorum
Driby
South Ormsby
Ulceby Cross
Ulceby
Mawthorpe
Claxby
Fordington
Willoughby
Cumberworth
Farlesthorpe
Thurlby
Bilsby
Asserby
Hutoft
Anderby
Mumby
Authorpe Row
Hogsthorpe
Saleby
Beesby
Maltby le Marsh
Thorpe
Withern
Strubby
Gayton le Marsh
South Reston
North Reston
Little Cawthorpe
Muckton
Authorpe
Tothill
Belleau
Burwell
Swaby
Aby
Ruckland
Farforth
Maidenwell
Tathwell
Haugham
Cawkwell
Scamblesby
Cawcwell Park
Withcall
Dovendale
Donington on Bain
Market Stainton
Stenigot
Goulceby
Asterby
Sotby
Ranby
Panton
Great Sturton
Hatton
Langton by Wragby
Wragby
Kingthorpe
Baumber
Fulletby
West Ashby
Hemingby
Belchford
Oxcombe
White Pit
Edlington
Wispington
Thimbleby
Horsington
Hameringham
Stainton by Langworth
Langworth
Sudbrooke
Scothern
Nettleham
Reepham
Cherry Willingham
Fiskerton
Stainfield
Apley
Rand
Fulnetby
Snelland
Snarford
Wickenby
Holton cum Beckering
West Torrington
East Torrington
South Willingham
East Barkwith
West Barkwith
Benniworth
Friesthorpe
Faldingworth
Lissington
Legsby
Hainton
Burgh on Bain
Newtoft
Washingborough
Heighington
Branston Booths
Branston
Potterhanworth Booths
Potterhanworth
Nocton
Dunston
Sots Hole
Bardney Abbey
Tupholme Abbey
Barlings Abbey
Cranwell
Leasingham
Holdingham
North Rauceby
South Rauceby
Rauceby Station
Quarrington
Silk Willoughby
Wilsford
Swarby
Aswarby
Scredington
Helpringham
Heydour
Aisby
Aunsby
Osbournby
Dembleby
Haceby
Newton
Walcott
Threekingham
Horbling
Billingborough
Pickworth
Folkingham
Spanby
Swaton
Bicker
Bicker Haven
Bicker Bridge
Bridge End
Northorpe
Donington
Church End
Donington South Ing
Quadring
Sutterton Services
Sea Bank
Sea Bank
Sea Bank

APPROVED: DR

CHECKED: EB

PRODUCED: LC

CONSULTANT: AECOM

MABLETHORPE
Trusthorpe
Sutton on Sea
Sandilands
Legbourne
ALFORD
Chapel St Leonards
Ingoldmells
Ingoldmells Point Holiday Village
Seathorne
SKEGNESS
HORNCASTLE
SPILSBY
WOODHALL SPA
Metheringham
Tattershall
Coningsby
Wainfleet All Saints
Wainfleet St Mary
Friskney
Wainfleet Sand
Friskney Flats
BOSTON DEEPS
LYNN DEEPS
Roaring Middle
THE WASH
Roger Sand
Toft Sand
Black Buoy Sand
Gat Sand
Mare Tail
Old South
Seal Sand
Peter Black Sand
Butterwick Low
Stickney
Wyberton
Kirton
Boston
Donington
Heckington
Sleaford
Ruskington
Leasingham
Billinghay
Wragby
Horncastle
Lincoln
Washingborough
Cherry Willingham
Nettleham
Langworth
Wainfleet Tofts
Friskney Eaudyke
Fold Hill
Friskney Tofts
Wrangle Lowgate
Old Leake
Leake Commonside
Leverton Outgate
Leverton Lucasgate
Leverton Highgate
Benington
Butterwick
Freiston
Freiston Shore
Old Hunstanton
HUNSTANTON
Heacham
Snettisham
Dersingham
Holbeach St Marks
Holbeach St Matthew
Dawsmere
Fosdyke
Sutterton Dowdyke
Fosdyke Bridge
Algarkirk
Sutterton
Wigtoft
Hofleet Stow
Kirton End
Blackjack
Frampton West End
Frampton
Sandholme
Skeldyke
Fishtoft
Swineshead Bridge
Hubbert's Bridge
Kirton Holme
Swineshead
Fenhouses
Helpringham
Heckington
Great Hale
Little Hale
Quarrington
Silk Willoughby
Sleaford
Ruskington
Leasingham
Holdingham
Billinghay
Coningsby
Tattershall
Tattershall Thorpe
Tattershall Bridge
Dogdyke
Chapel Hill
Scrub Hill
New York
Bunker's Hill
Hawthorn Hill
Tumby
Tumby Woodside
Mareham le Fen
Mareham on the Hill
Revesby
East Kirkby
Kirkby on Bain
Roughton
Haltham
Martin Dales
Woodhall Spa
Dunston
Nocton
Blankney
Scopwick
Digby
Ashby de la Launde
Bloxholm
Dorrington
Anwick
Cranwell
Cranwell RAF College
North Kyme
South Kyme
South Kyme Fen
Wildmore Fen
Holland Fen
Timberhill
Langrick
Anton's Gowt
Fishtoft Drove
Frith Bank
Cowbridge
Brotherton
Hedgehog Bridge
Swineshead Bridge
Sibsey Fen Side
Frithville
Sibsey
Gipsey Bridge
Hilldyke
High Ferry
Northlands
West Fen
Stickford
New Bolingbroke
Midville
Eastville
East Fen
New Leake
Wainfleet Bank
Lade Bank
Wrangle Bank
Wrangle
Fenhouses
Swineshead
Donington
Donington South Ing
Church End
Horbling
Billingborough
Threekingham
Swaton
Spanby
Osbournby
Aunsby
Dembleby
Aisby
Heydour
Scredington
Aswarby
Swarby
Ewerby
Ewerby Thorpe
Evedon
Kirkby la Thorpe
Howell
Asgarby
Hubbert's Bridge
Frampton West End
Wainfleet Sand
Friskney Flats
Butterwick Low
Roger Sand
Toft Sand
Black Buoy Sand
Gat Sand
Mare Tail
Old South
Seal Sand
Peter Black Sand
Old Lynn Channel
Roaring Middle
Croft Marsh
Seacroft
Havenhouse Sta
Wainfleet All Saints
Gibraltar
Thorpe St Peter
Thorpe Culvert
Thorpe Fendykes
Wainfleet Bank
Irby in the Marsh
Orby Marsh
Addlethorpe
Winthorpe
Hogsthorpe
Sloothby
Anderby Creek
Anderby
Mumby
Authorpe Row
Huttoft
Sea Bank
Sea Bank
Sea Bank

5 Next Steps

5.1 Approach to Consultation

Overview

5.1.1 The approach to public consultation follows the development of the UK Onshore Scheme. During Phase 1 Consultation NGVL consulted on shortlisted site options for a landfall and converter station. The consultation feedback received was used to identify preferred landfall and converter station sites.

5.1.2 During the second phase of consultation (Phase 2 Consultation) NGVL will consult on the Purple (Figure 5.1) and Orange (Figure 5.2) Route Corridors. The consultation feedback will be used to help identify a preferred route corridor and inform the development of a detailed route within it. Phase 2 consultation will take place from 5th September to 14th October 2016 (inclusive).

Public events

5.1.3 Public consultation events will be held during Phase 2 Consultation at locations close to the Purple and Orange Route Corridors. During Phase 2 Consultation there will be ten events held in the locations set out in Table 5.1. Consultation zones have been identified in vicinity of the route corridors, and residents and businesses within the zones will be invited to take part in the consultation process and encouraged to attend the consultation events. Statutory stakeholders, local authorities, parish and town councils and other community and stakeholder groups will also be invited to take part in the consultation.

5.1.4 Details for the public events are as follows:

Table 5.1 Public Consultation Events

Venue	Date	Time
Bicker Village Hall	Wednesday 7 September	2:00pm- 8:00pm
Sandilands, Grange & Links Hotel	Thursday 8 September	2:00pm-8:00pm
Donington, The Ruby Hunt Centre	Friday 9 September	2:00pm-8:00pm
Stickney Village Hall	Saturday 10 September	12:00pm-4:30pm
Orby Village Hall	Wednesday 14 September	2:00pm-8:00pm
Helpringham Memorial Hall	Thursday 15 September	2:00pm-8:00pm
Alford Corn Exchange	Friday 16 September	2:00pm-8:00pm
Little Steeping Village Hall	Thursday 22 September	2:00pm-8:00pm
Partney, Dalby & Dexthorpe Victory Hall	Monday 3 October	2:00pm-8:00pm

Table 5.1 Public Consultation Events		
Venue	**Date**	**Time**
Hubberts Bridge Community Centre	Tuesday 4 October	2:00pm-8:00pm

5.1.5 Each event will consist of a set of exhibition boards setting out details of the project, along with information about the routeing process, how underground cables are installed and details of the Purple and Orange Route Corridors, including images, diagrams and maps. Members of the project team will be available to talk through the project with attendees and answer questions. Feedback forms will be available for attendees to give their views on the information they have been provided and to let the project team know if there are other considerations which they feel should be taken into account.

5.2 Next Steps

5.2.1 Following the second phase of consultation, the feedback received from consultees will be collated and analysed by the project team. The feedback will be considered, along with analysis from technical and environmental assessments, when deciding on a preferred route corridor and developing a detailed route alignment.

5.2.2 The feedback analysis and conclusions will be published in a consultation feedback report. The report will outline how the feedback from the Phase 2 Consultation has influenced NGVL's choice for its preferred route.

5.2.3 The feedback report will form the basis of the final Consultation Report which will be submitted to the local planning authorities as part of the planning application for the UK Onshore Scheme.

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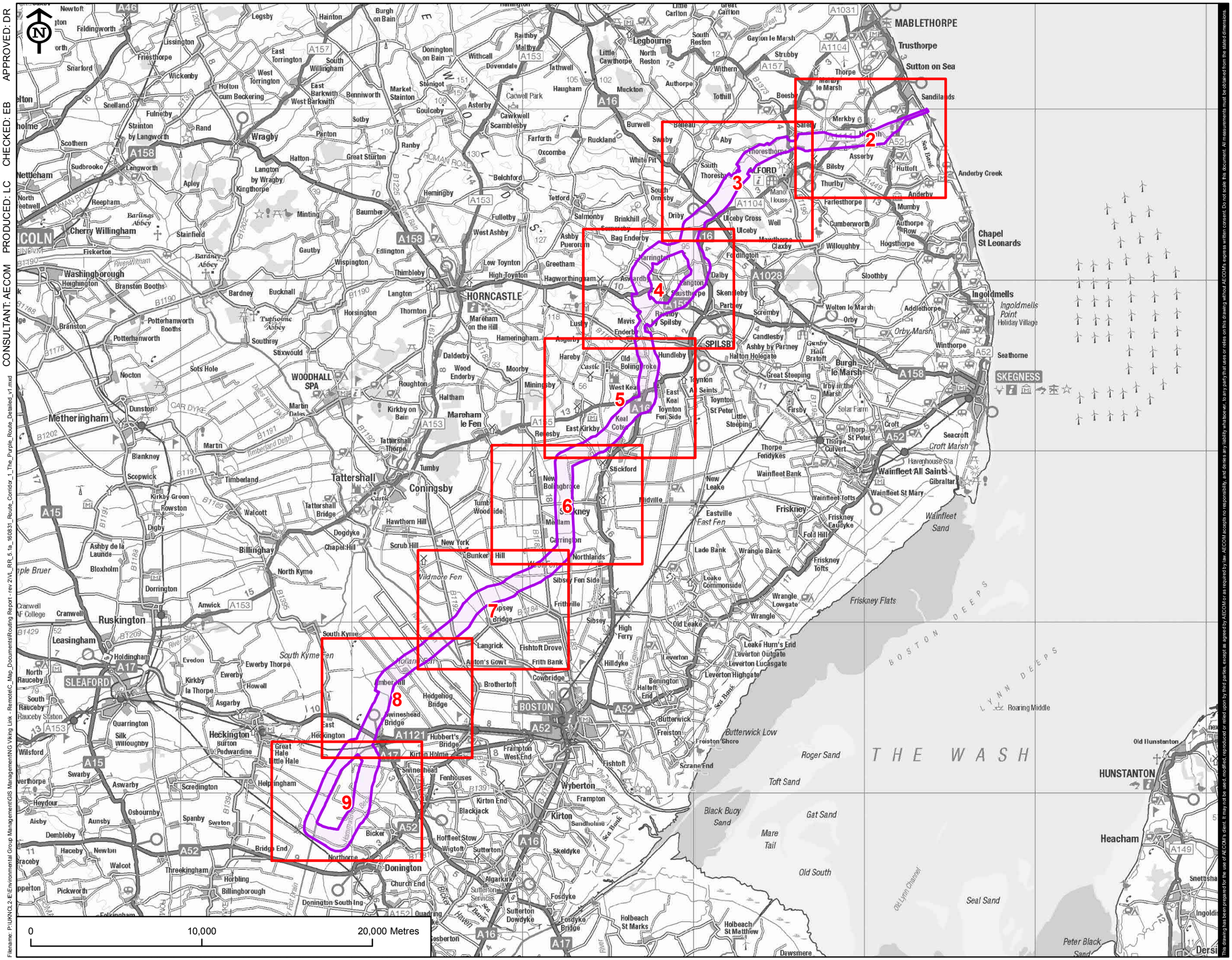
1
2
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MABLETHORPE
Trusthorpe
Sutton on Sea
Sandilands
ALFORD
Chapel St Leonards
Ingoldmells
Ingoldmells Point Holiday Village
Seathorne
SKEGNESS
HORNCASTLE
SPILSB
WOODHALL SPA
Metheringham
Tattershall
Coningsby
Wainfleet All Saints
Friskney
Wainfleet Sand
Friskney Flats
BOSTON DEEPS
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Peter Black Sand
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Heacham
Ruskington
Leasingham
SLEAFORD
BOSTON
Kirton
Donington
Heckington
Wyberton
Sutton Bridge
Holbeach St Marks
Holbeach St Matthew
Dawsmere
Fosdyke
Sutterton
Algarkirk
Donington South Ing
Swineshead Bridge
Hubbert's Bridge
Kirton Holme
Frampton West End
Langrick
Fishtoft Drove
Frith Bank
Anton's Gowt
Sibsey Fen Side
Frithville
Sibsey
Stickford
New Bolingbroke
Mareham le Fen
Mareham on the Hill
Hagworthingham
Horncastle
Woodhall Spa
Martin Dales
Kirkby on Bain
Tattershall Thorpe
Timberland
Billinghay
Dorrington
Anwick
Cranwell
Cherry Willingham
Washingborough
Branston Booths
Potterhanworth Booths
Nocton
Dunston
Blankney
Scopwick
Digby
Ashby de la Launde
Bloxholm
Wragby
Langworth
Baumber
Minting
Stainfield
Fiskerton
Reepham
Fulnetby
Snelland
Friesthorpe
Snarford
Faldingworth
Lissington
Legsby
Hainton
Burgh on Bain
Donington on Bain
Market Stainton
Goulceby
Asterby
Cawkwell
Scamblesby
Hemingby
Fulletby
Low Toynton
High Toynton
Horncastle
Bucknall
Bardney
Langton
Thornton
Horsington
Tupholme Abbey
Southrey
Stixwould
Roughton
Haltham
Moorby
Hameringham
Dalderby
Wood Enderby
Minningsby
Tumby
Woodside
Hawthorn Hill
New York
Scrub Hill
Bunker Hill
Northlands
Carrington
Mellam
Wainfleet Bank
Wainfleet Tofts
Wainfleet St Mary
Croft
Seacroft
Croft Marsh
Havenhouse Sta
Thorpe Culvert
Thorpe St Peter
Thorpe Fendykes
Friskney Eaudyke
Fold Hill
Friskney Tofts
Wrangle Bank
Lade Bank
Eastville
East Fen
New Leake
Leake Commonside
Wrangle Lowgate
Wrangle
Old Leake
Leake Hurn's End
Leverton Outgate
Leverton Lucasgate
Leverton Highgate
Benington
Haltoft End
Butterwick
Freiston
Freiston Shore
Scrane End
Fishtoft
Frampton
Kirton End
Blackjack
Sandholme
Skeldyke
Fosdyke Bridge
Sutterton Dowdyke
Sutterton Services
Hofleet Stow
Wigtoft
Bicker
Bicker Haven
Northorne
Bridge End
Threekingham
Horbling
Billingborough
Folkingham
Swineshead
Fenhouses
Swineshead Bridge
Hedgehog Bridge
Brotherton
Cowbridge
Hilldyke
High Ferry
Sibsey Bridge
Vildmore Fen
South Kyme Fen
Holland Fen
Timber Hill
Hemingby
Tetford
Salmonby
Brinkhill
Bag Enderby
Ashby Puerorum
Farlesthorpe
Mumby
Authorpe Row
Hogsthorpe
Willoughby
Claxby
Sloothby
Orby
Orby Marsh
Addlethorpe
Winthorpe
Burgh le Marsh
Great Steeping
Ashby by Partney
Candlesby
Scremby
Welton le Marsh
Halton Holegate
Gunby Hall
Bratoft
Irby in the Marsh
Firsby
Toynton St Peter
Toynton All Saints
Toynton Fen Side
East Keal
West Keal
Keal Cotes
East Kirkby
Revesby
Mavis Enderby
Hundleby
Old Bolingbroke
Hareby
Asgarby
Ashwardby
Langton
Dalby
Skendleby
Partney
Raithby by Spilsby
Haugham
Tathwell
Muckton
Authorpe
Tothill
Withern
Strubby
Gayton le Marsh
South Reston
North Reston
Little Cawthorpe
Legbourne
Little Carlton
Great Carlton
Belleau
Aby
Swaby
Burwell
Ruckland
Farforth
Oxcombe
Belchford
Donington on Bain
Withcall
Dovendale
Cadwell Park
Asterby
Sotby
Panton
Great Sturton
Hatton
Langton by Wragby
Kingthorpe
Apley
Stainton by Langworth
Scothern
Sudbrooke
Langworth
Nettleham
North Rauceby
South Rauceby
Rauceby Station
Quarrington
Silk Willoughby
Wilsford
Swarby
Aswarby
Scredington
Heydour
Osbournby
Aisby
Aunsby
Dembleby
Haceby
Newton
Walcot
Pickworth
Spanby
Swaton
Bicker
Bridge End
Donington
Church End
Quadring
Sosberton
Holbeach St Marks
Holbeach St Matthew
Dersingham
Snettisham
Ingoldmells
Old Hunstanton
Burnham Market
Burnham Deepdale
Brancaster
Thornham
Hunstanton
Heacham
Sutton Bridge
Wisbech
Tydd St Giles
Gedney Hill
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Wyberton
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Frampton
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Stickford
Friskney
Wainfleet All Saints
Wainfleet St Mary
Croft
Thorpe Culvert
Thorpe St Peter
Thorpe Fendykes
Wainfleet Bank
Wainfleet Tofts

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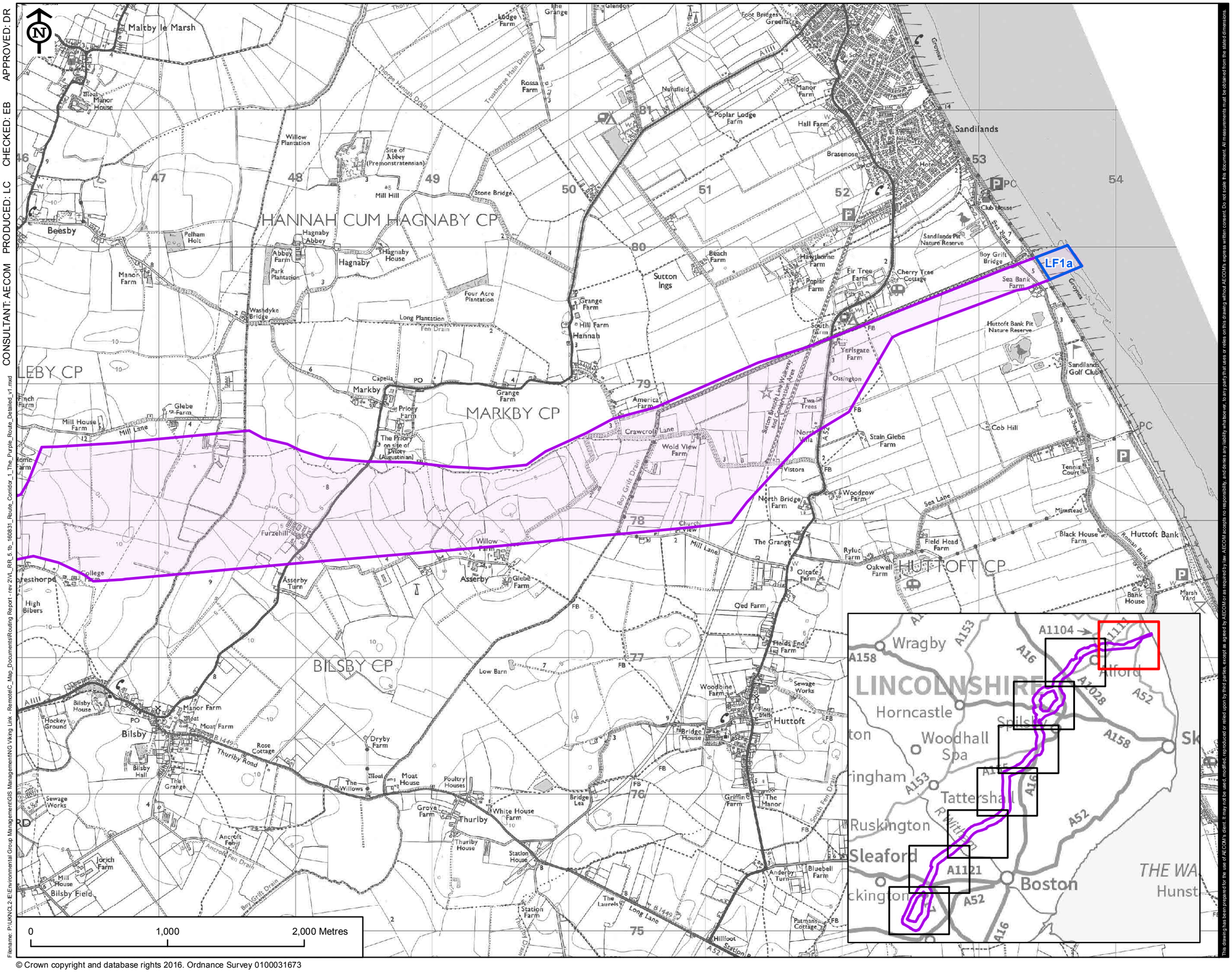

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VikingLink

LEGEND

- Purple Route Corridor
- Preferred Landfall Site

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FIGURE NO.

VL_160831_RR_5.1

FIGURE TITLE

FIGURE 5.1
THE PURPLE ROUTE

SHEET NUMBER

2 of 9

NOTES

SANDILANDS TO THORESTHORPE

Date:	Scale at A3:
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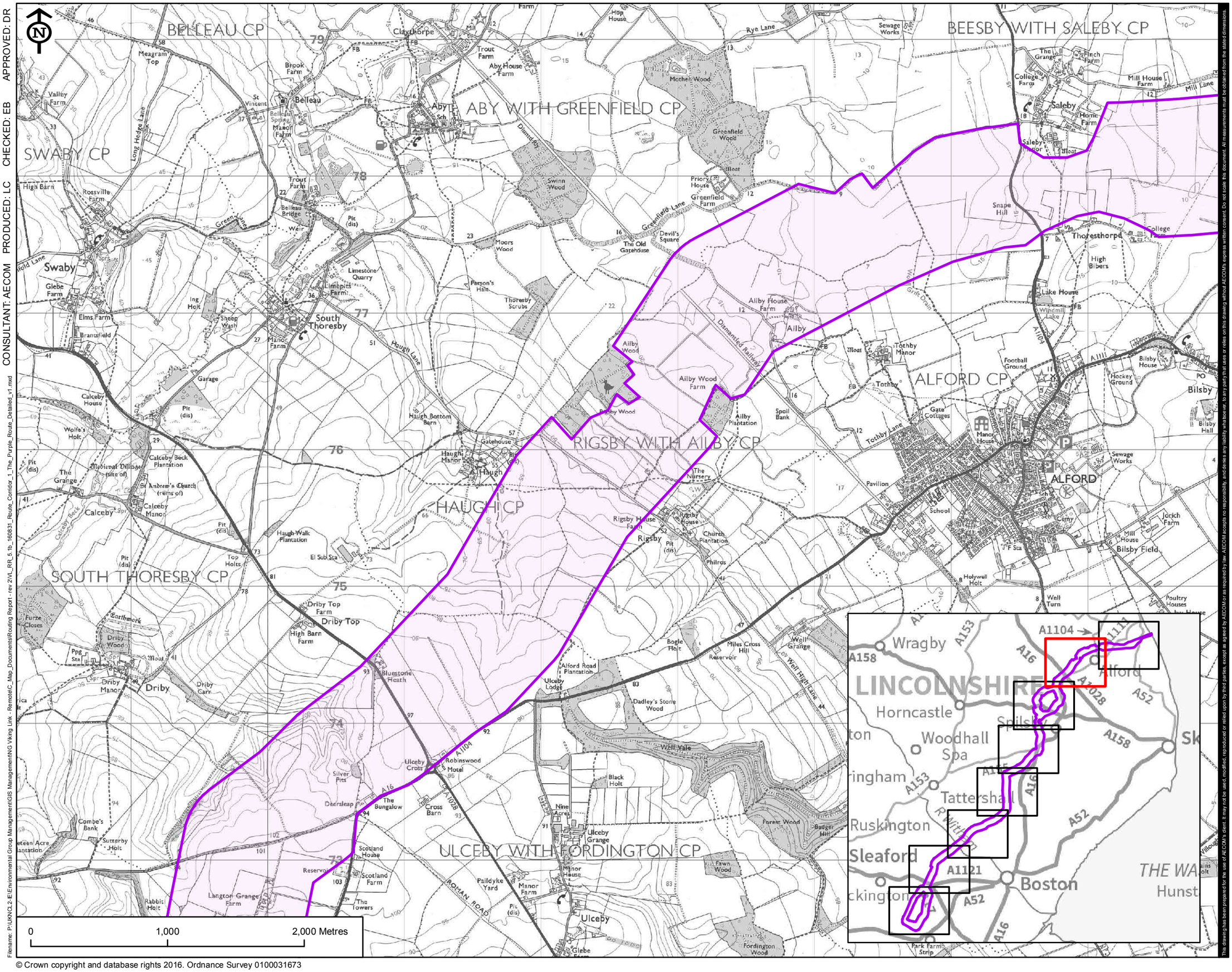

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Purple Route Corridor

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FIGURE NO.

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FIGURE TITLE

FIGURE 5.1
THE PURPLE ROUTE

SHEET NUMBER

3 of 9

NOTES

THORESTHORPE TO ULCEBY

Date: 31/08/16

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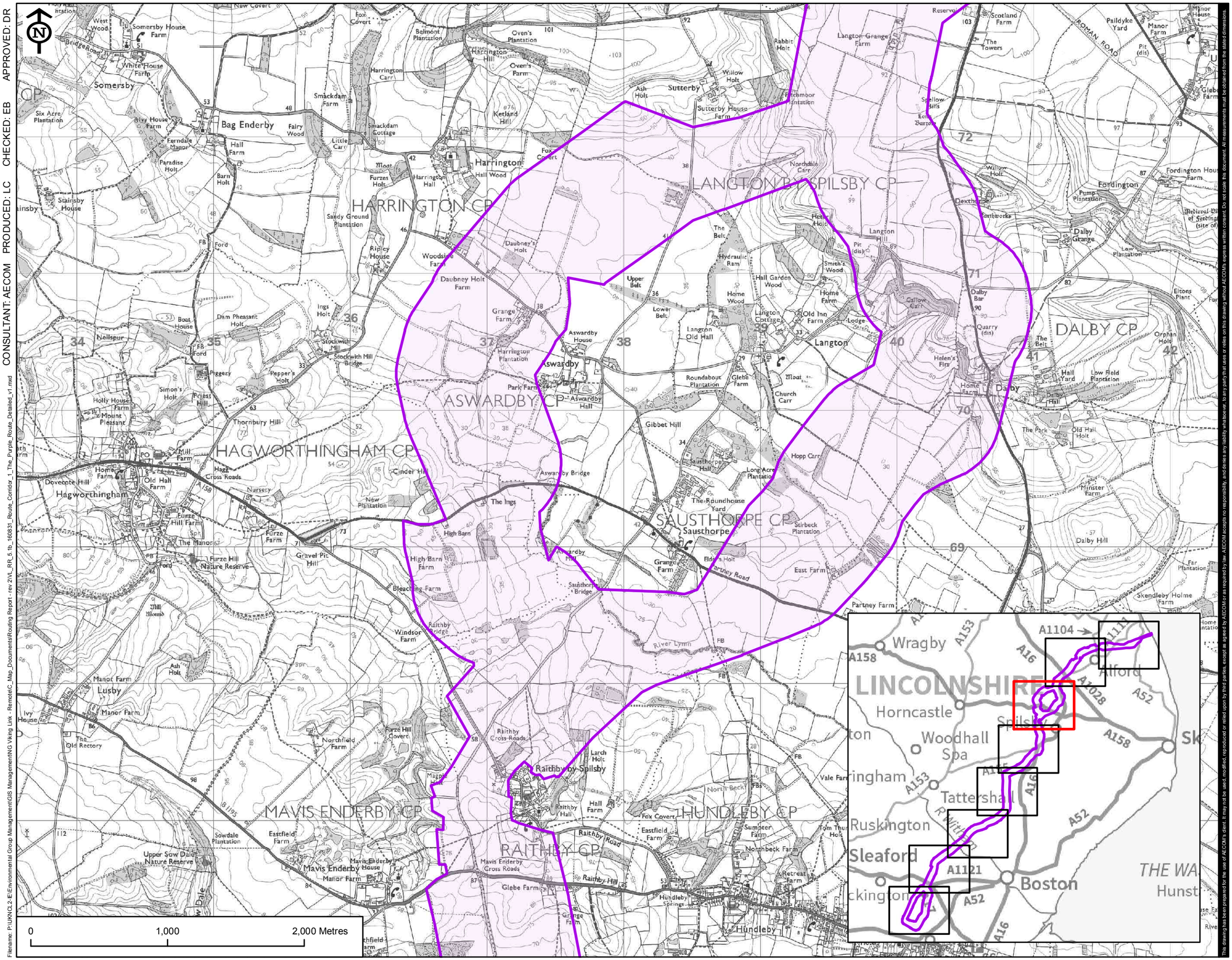

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Purple Route Corridor

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VL_160831_RR_5.1

FIGURE TITLE

FIGURE 5.1
THE PURPLE ROUTE

SHEET NUMBER

4 of 9

NOTES

ULCEBY TO
RAITHBY

Date: 31/08/16

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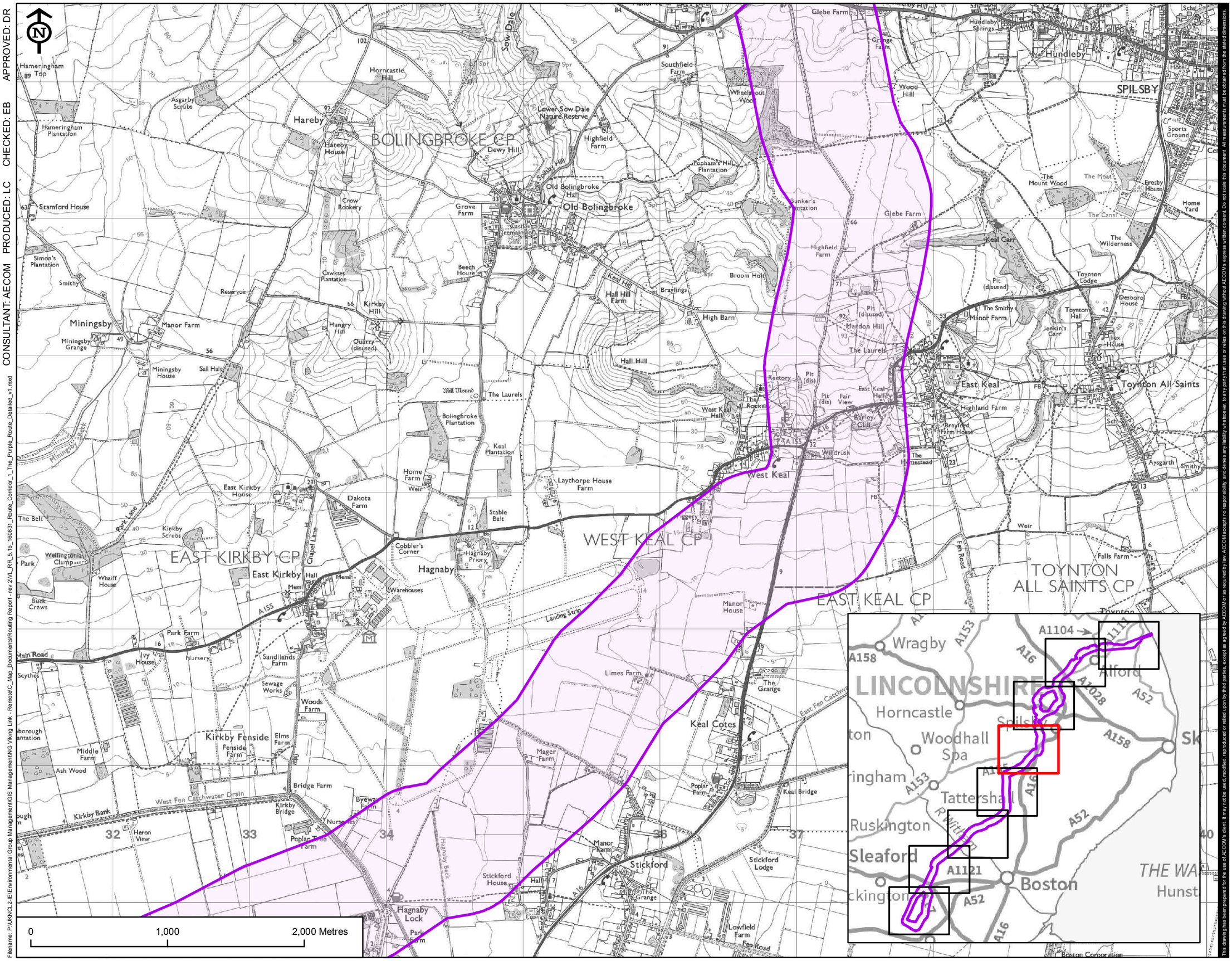

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Purple Route Corridor

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FIGURE TITLE

FIGURE 5.1
THE PURPLE ROUTE

SHEET NUMBER

5 of 9

NOTES

RAITHBY TO
STICKFORD

Date: 31/08/16

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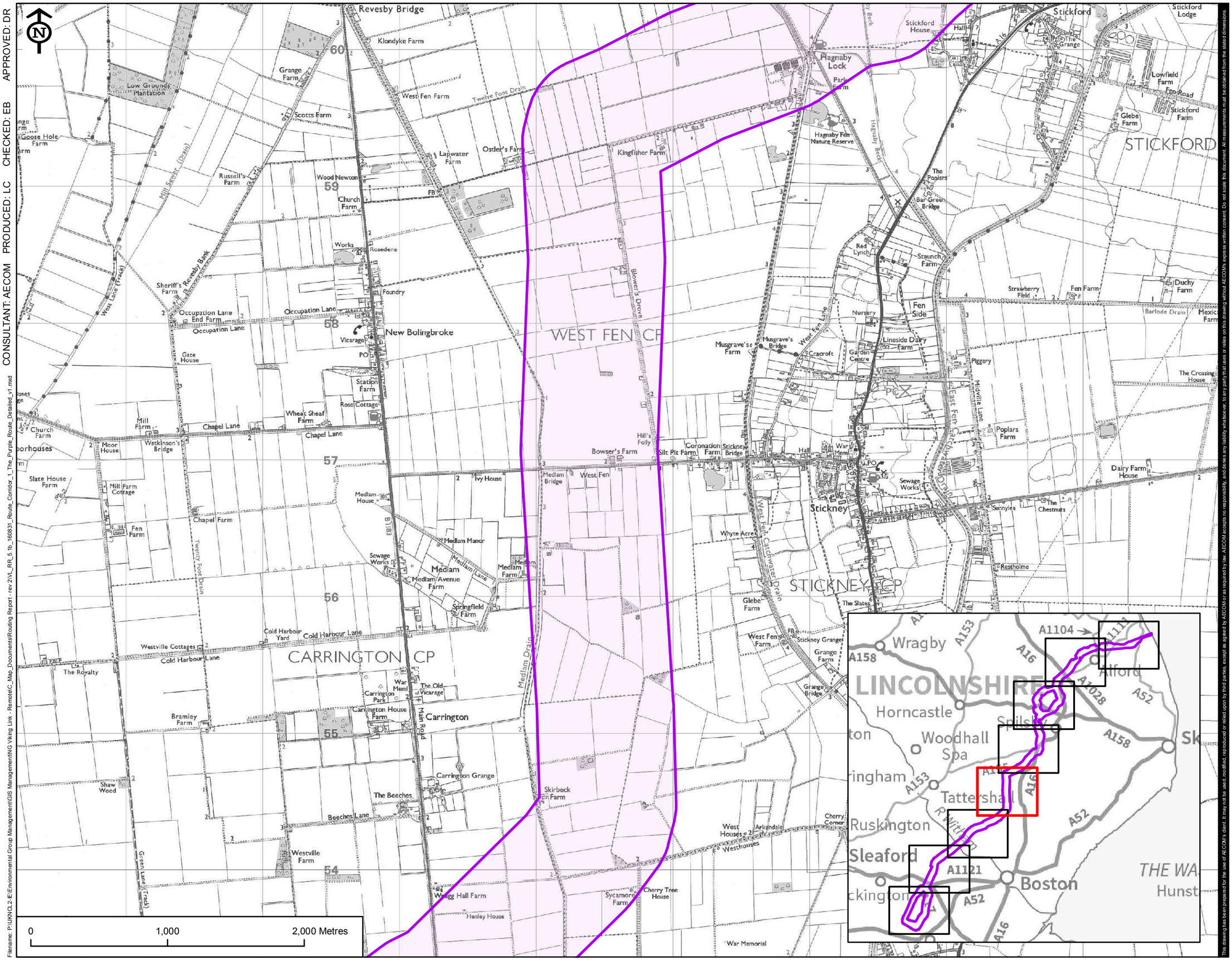

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LEGEND

Purple Route Corridor

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FIGURE NO.

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FIGURE TITLE

FIGURE 5.1
THE PURPLE ROUTE

SHEET NUMBER

6 of 9

NOTES

STICKFORD TO CARRINGTON

Date: 31/08/16

Scale at A3: 1:25,000

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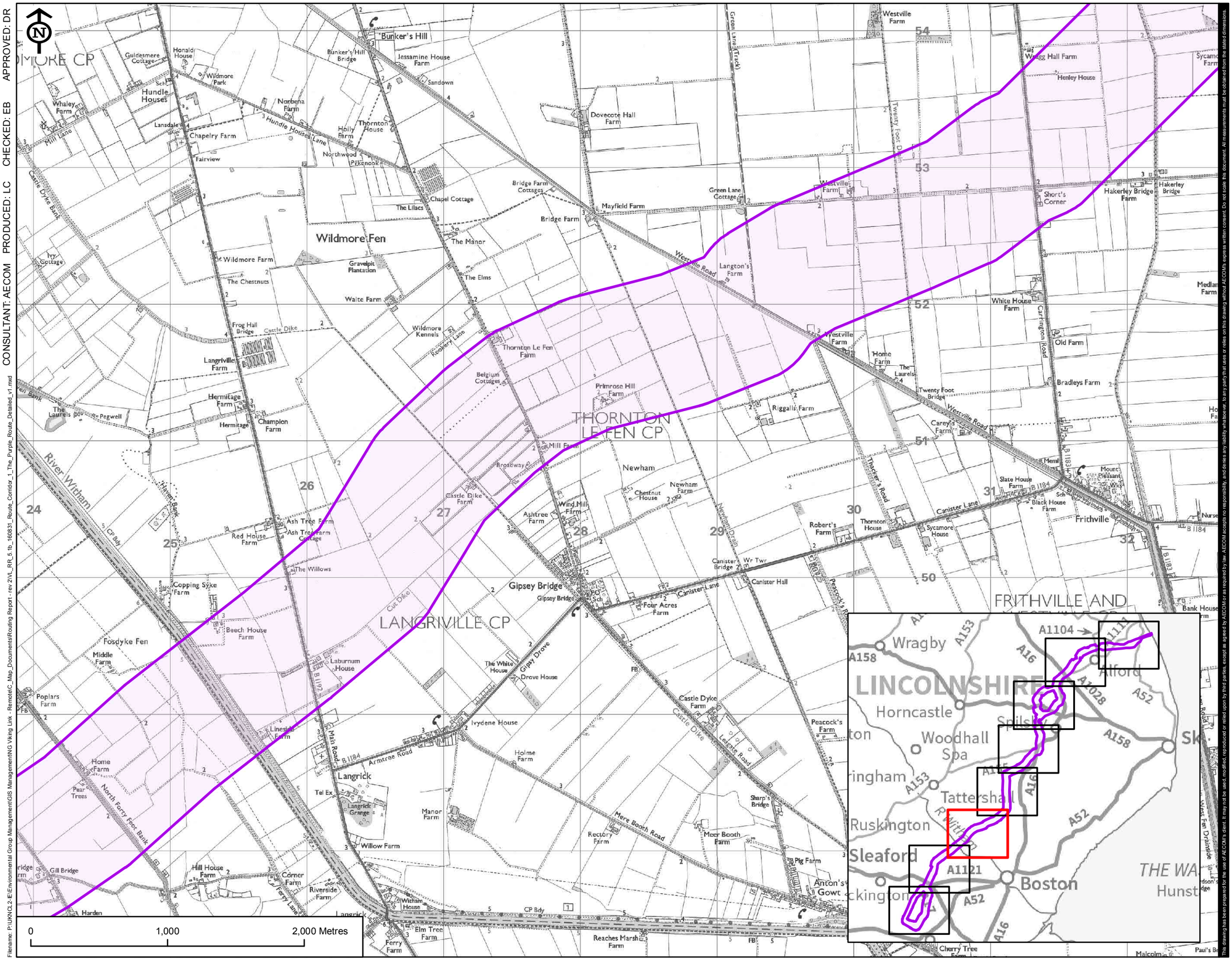

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Purple Route Corridor

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FIGURE NO.

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FIGURE TITLE

FIGURE 5.1
THE PURPLE ROUTE

SHEET NUMBER

7 of 9

NOTES

CARRINGTON TO LANGRICK

Date:	Scale at A3:
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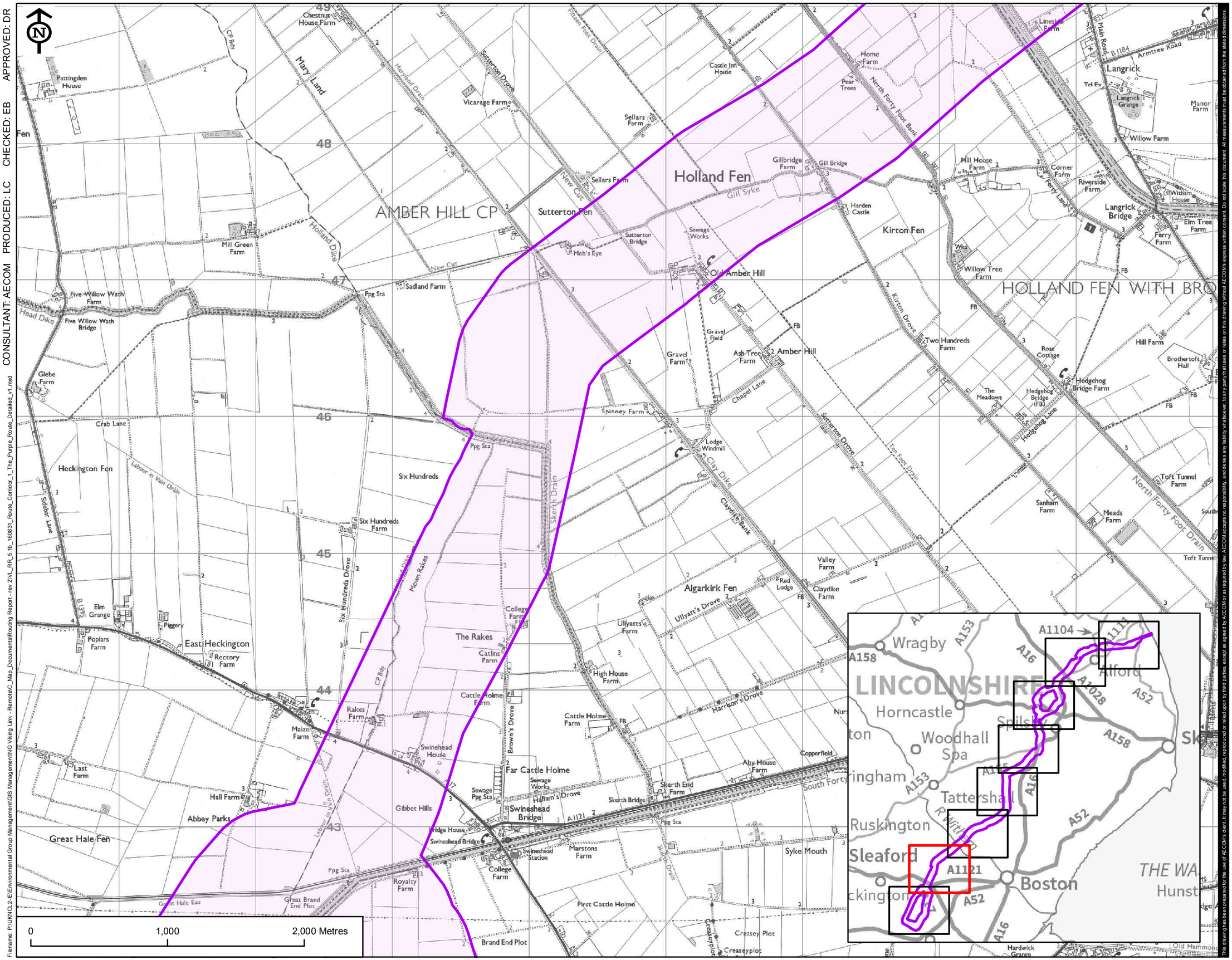

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VikingLink

LEGEND

Purple Route Corridor

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FIGURE NO.

VL_160831_RR_5.1

FIGURE TITLE

FIGURE 5.1
THE PURPLE ROUTE

SHEET NUMBER

8 of 9

NOTES

LANGRICK TO
SWINESHEAD BRIDGE

Date: 31/08/16

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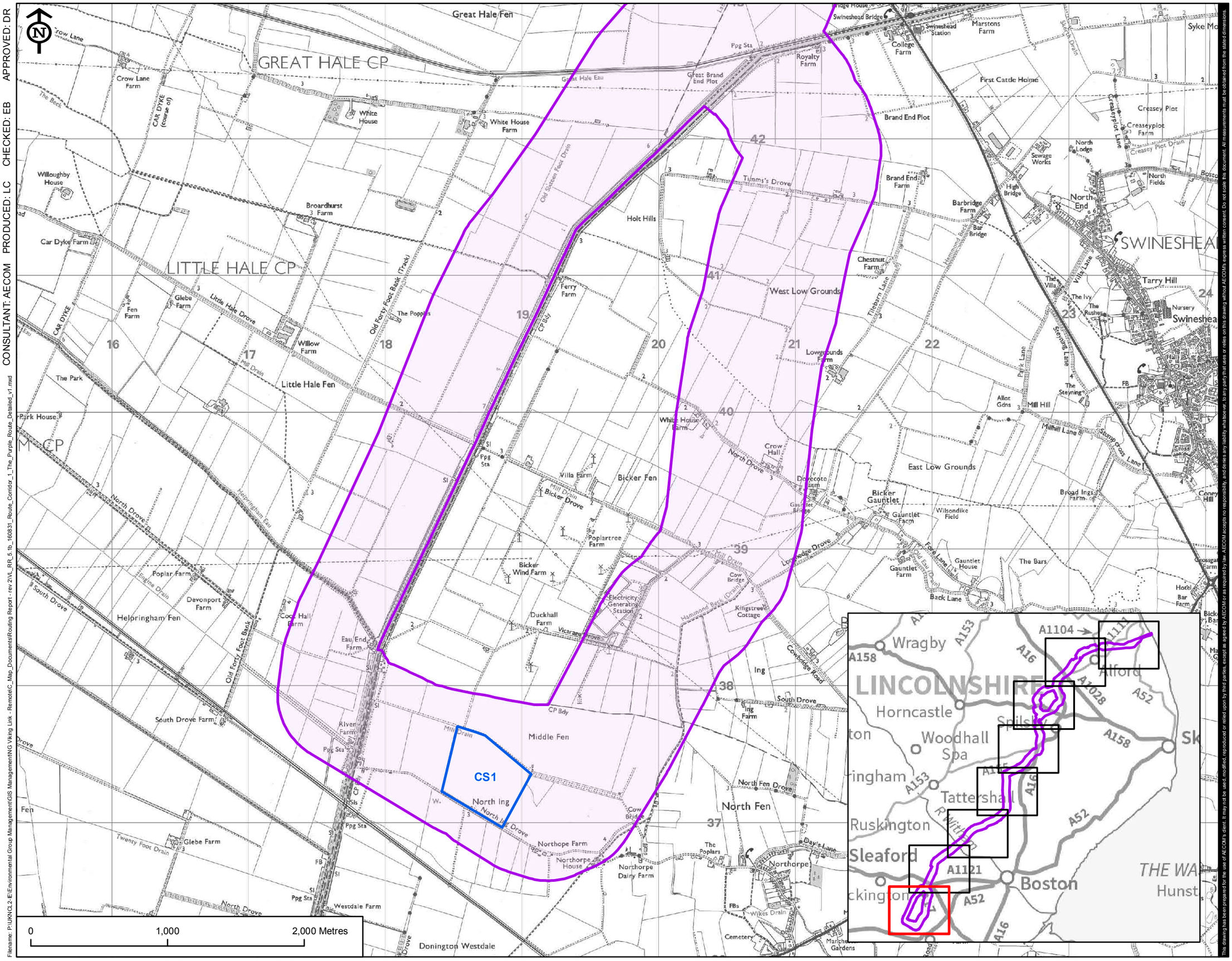

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LEGEND

- Purple Route Corridor
- Preferred Converter Station Site

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FIGURE NO.

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FIGURE TITLE

FIGURE 5.1
THE PURPLE ROUTE

SHEET NUMBER

9 of 9

NOTES

SWINESHEAD BRIDGE TO NORTH ING DROVE

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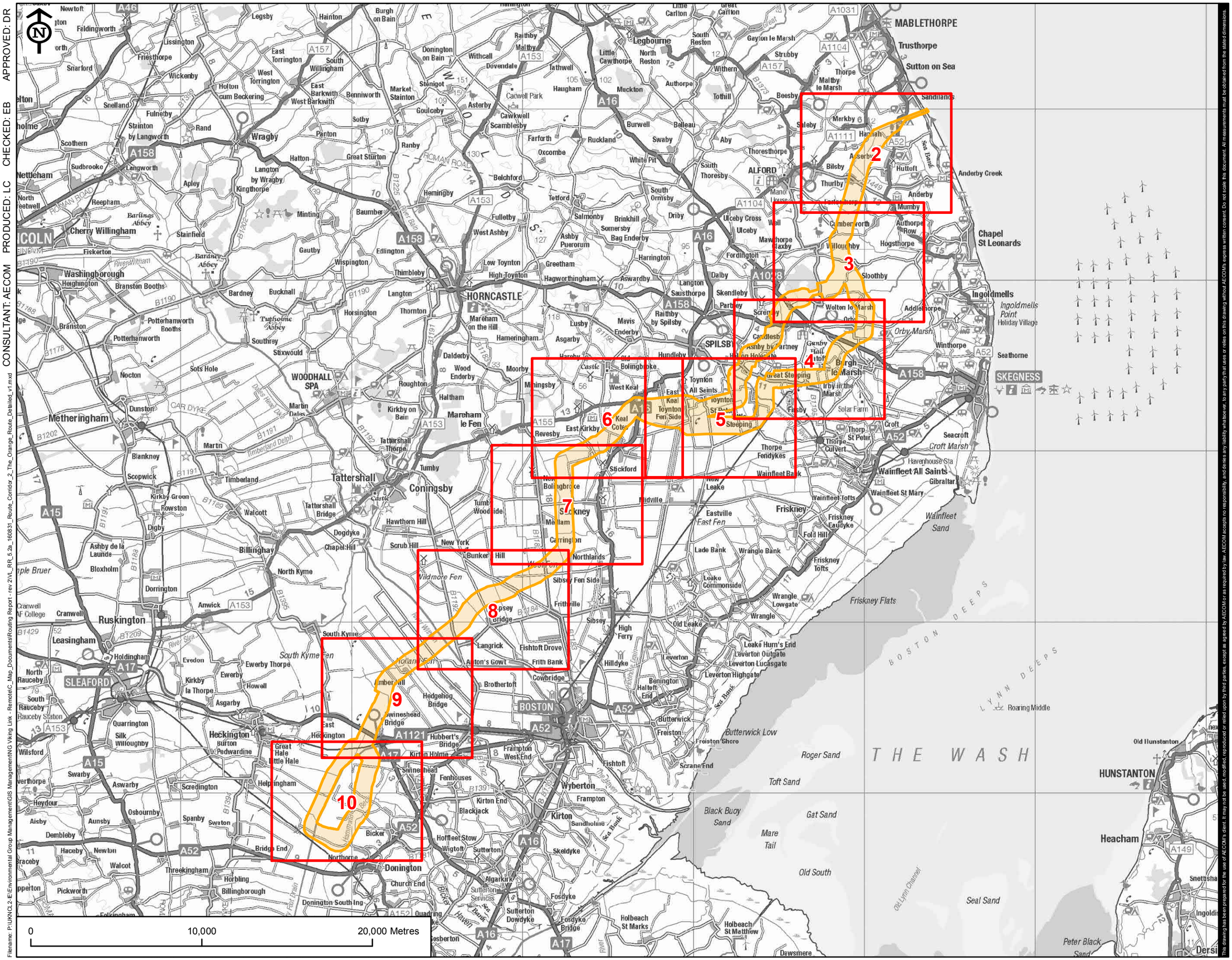

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VikingLink

LEGEND

- Orange Route Corridor
- Drawing Reference

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FIGURE NO.

VL_160831_RR_5.2

FIGURE TITLE

FIGURE 5.2
THE ORANGE ROUTE

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1 of 10

NOTES

OVERVIEW PLAN

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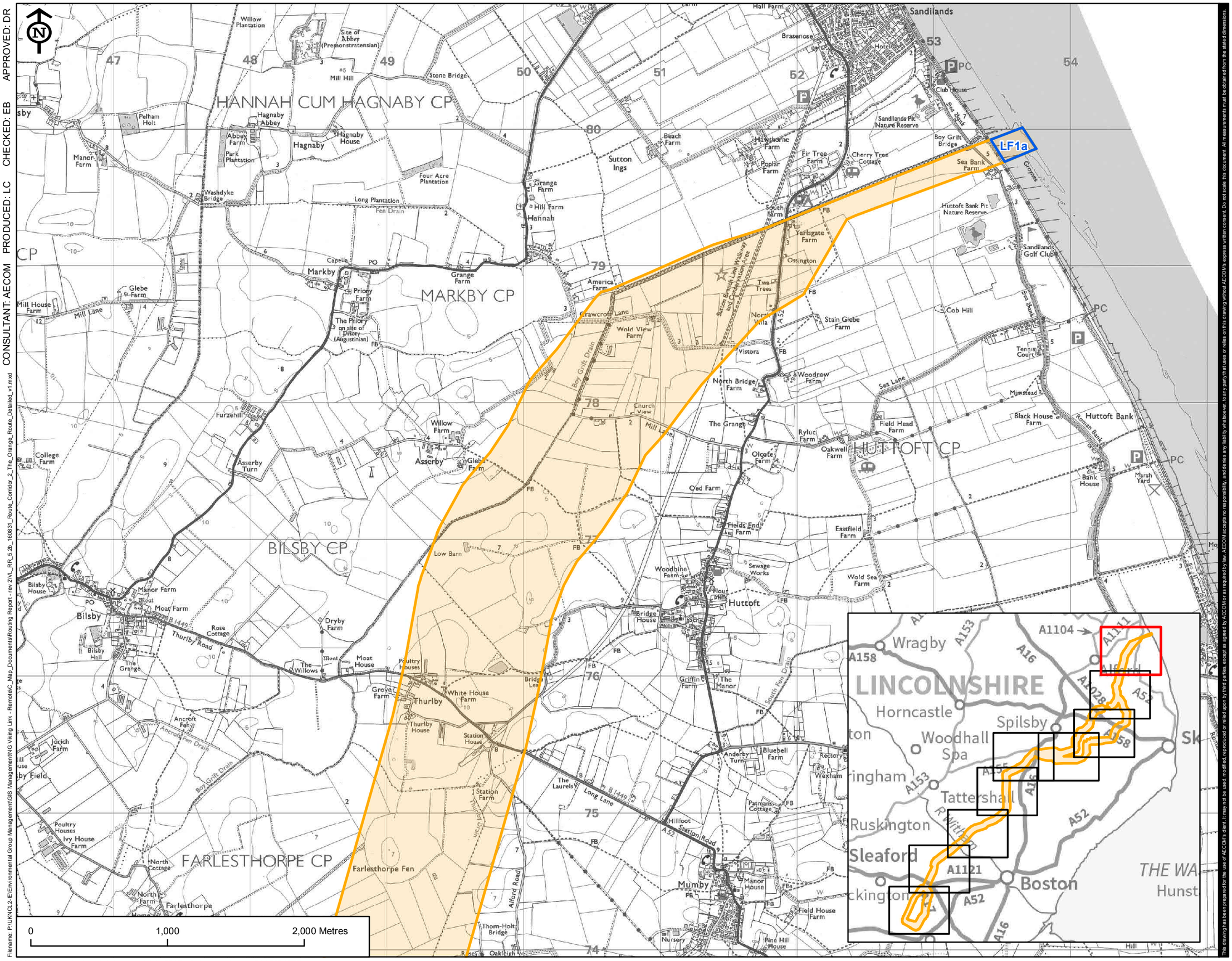

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- Orange Route Corridor
- Preferred Landfall Site

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FIGURE NO.

VL_160831_RR_5.2

FIGURE TITLE

FIGURE 5.2
THE ORANGE ROUTE

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2 of 10

NOTES

SANDILANDS TO FARLESTHORPE

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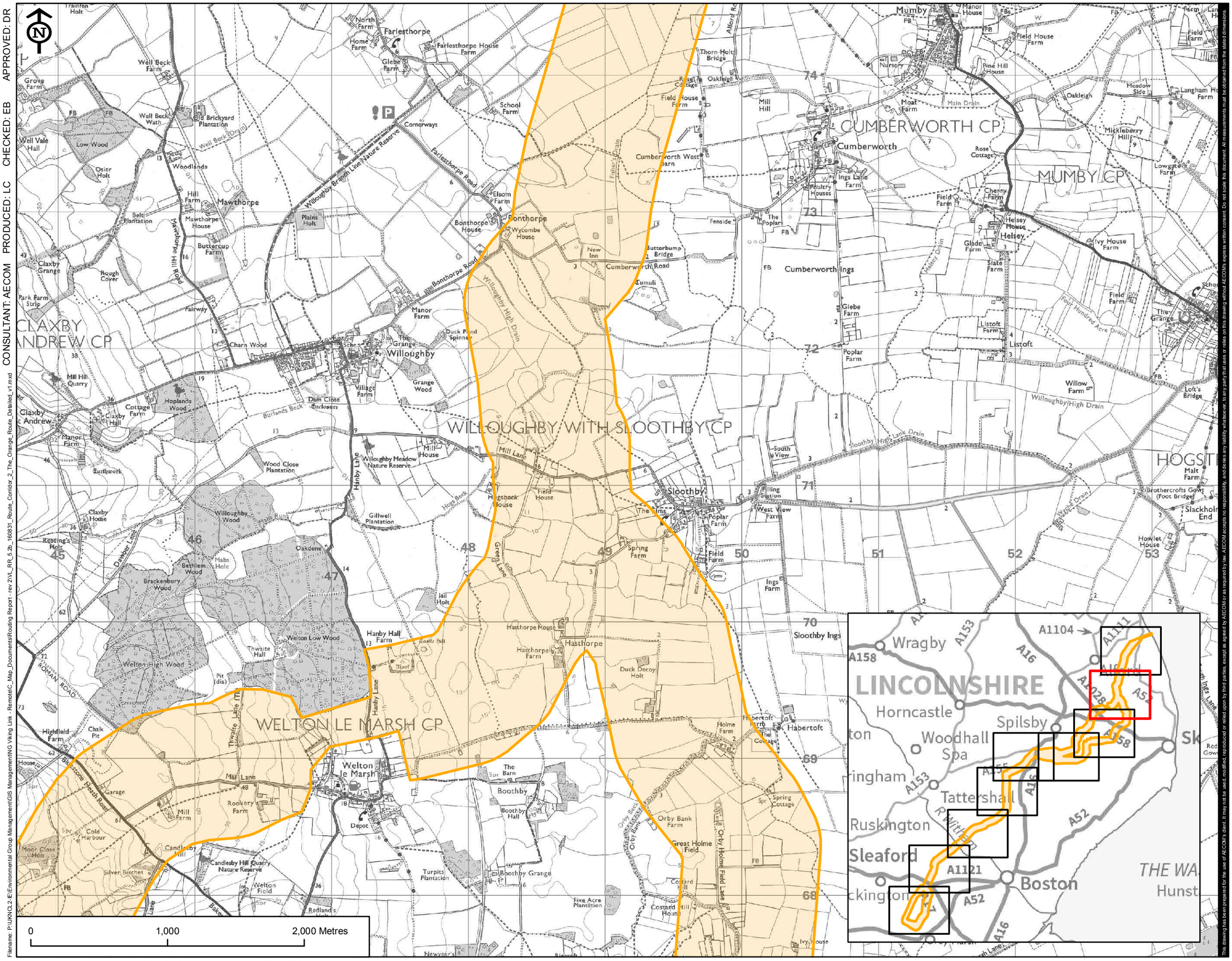

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Orange Route Corridor

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FIGURE NO.

VL_160831_RR_5.2

FIGURE TITLE

FIGURE 5.2
THE ORANGE ROUTE

SHEET NUMBER

3 of 10

NOTES

FARLESTHROPE TO WELTON LE MARSH

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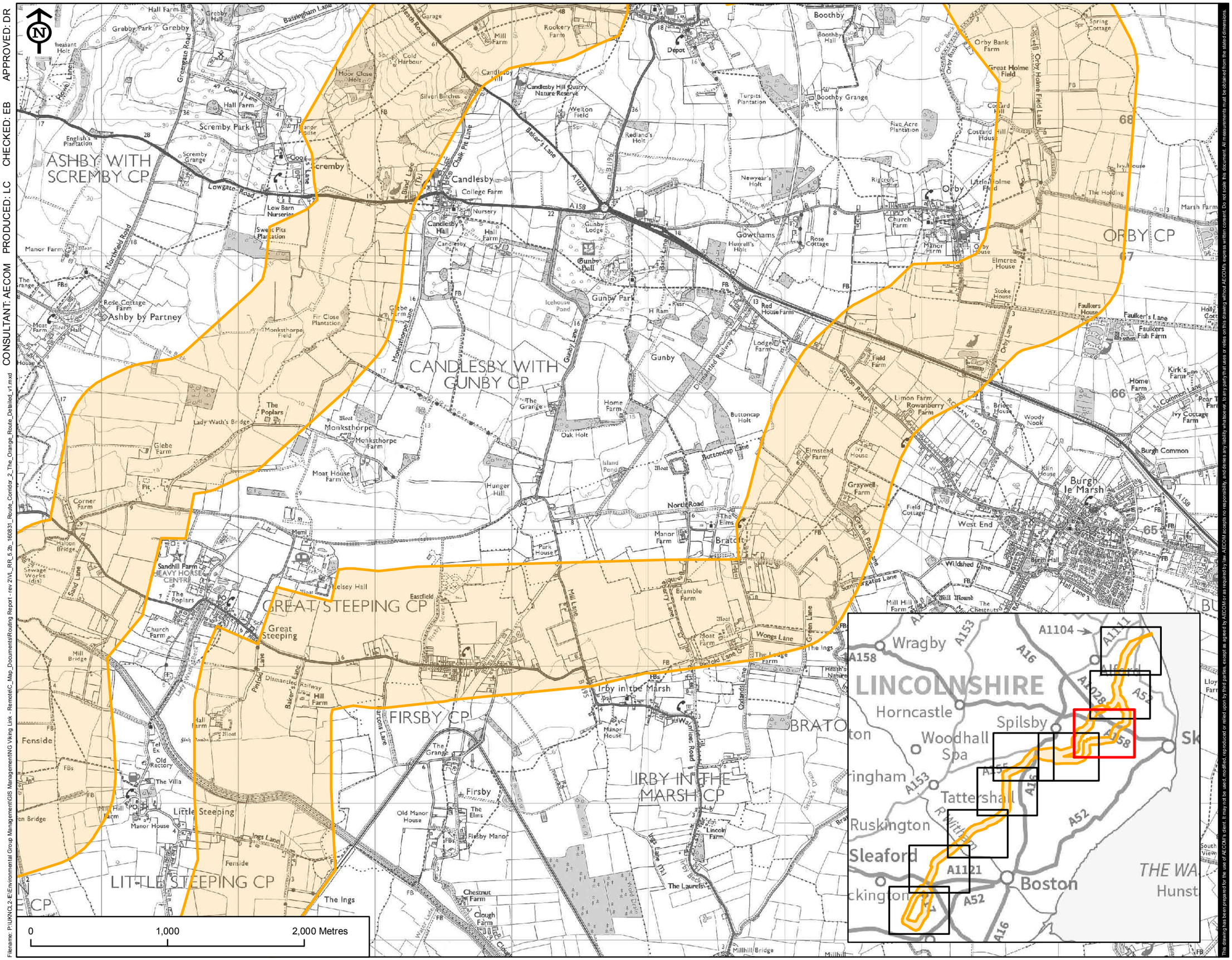

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Orange Route Corridor

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FIGURE NO.

VL_160831_RR_5.2

FIGURE TITLE

FIGURE 5.2
THE ORANGE ROUTE

SHEET NUMBER

4 of 10

NOTES

WELTON LE MARSH TO GREAT STEEPING

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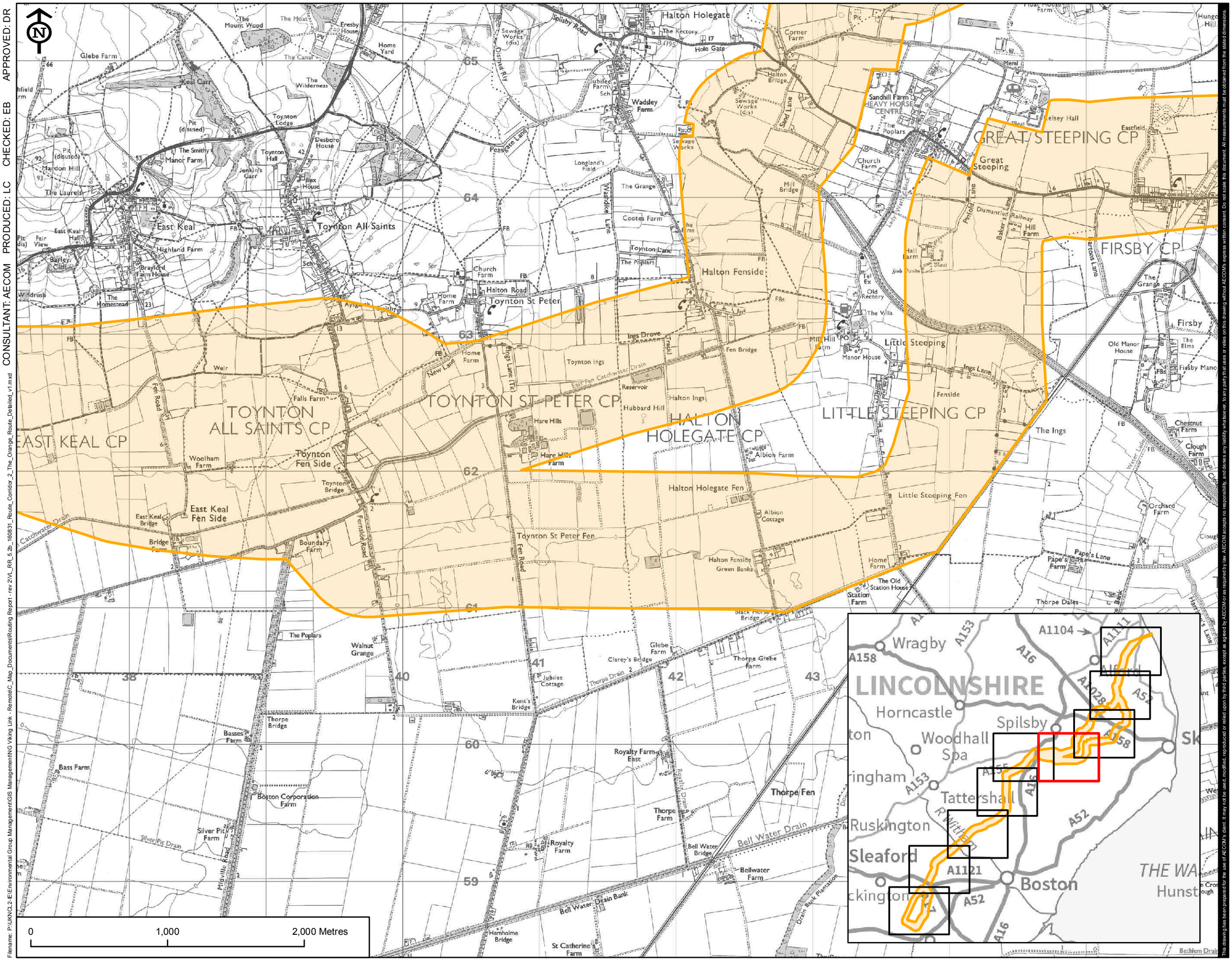

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Orange Route Corridor

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FIGURE NO.

VL_160831_RR_5.2

FIGURE TITLE

FIGURE 5.2
THE ORANGE ROUTE

SHEET NUMBER

5 of 10

NOTES

GREAT STEEPING TO TOYNTON ALL SAINTS

Date: 31/08/16

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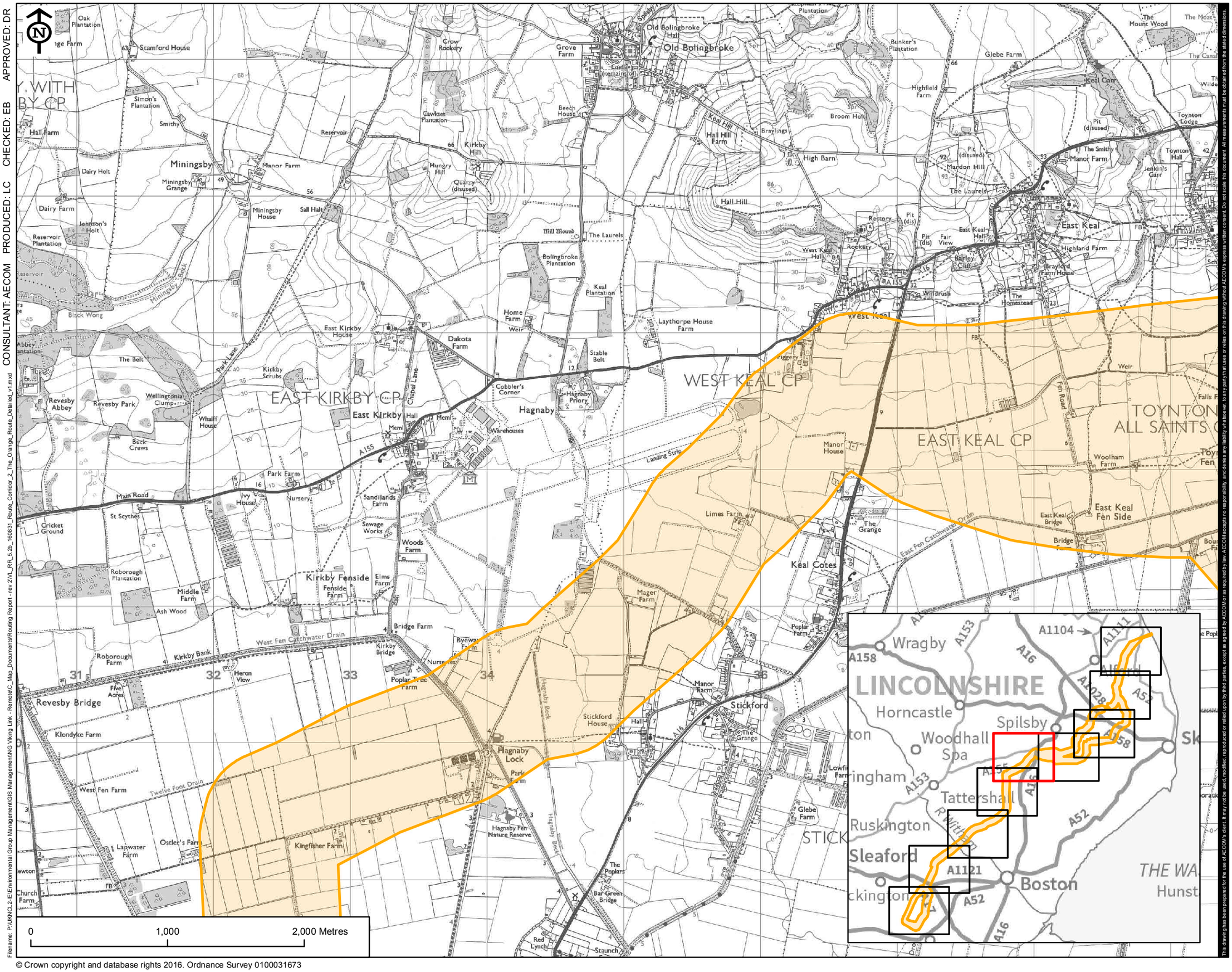

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Orange Route Corridor

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FIGURE NO.

VL_160831_RR_5.2

FIGURE TITLE

FIGURE 5.2
THE ORANGE ROUTE

SHEET NUMBER

6 of 10

NOTES

TOYNTON ALL SAINTS TO STICKFORD

Date: 31/08/16

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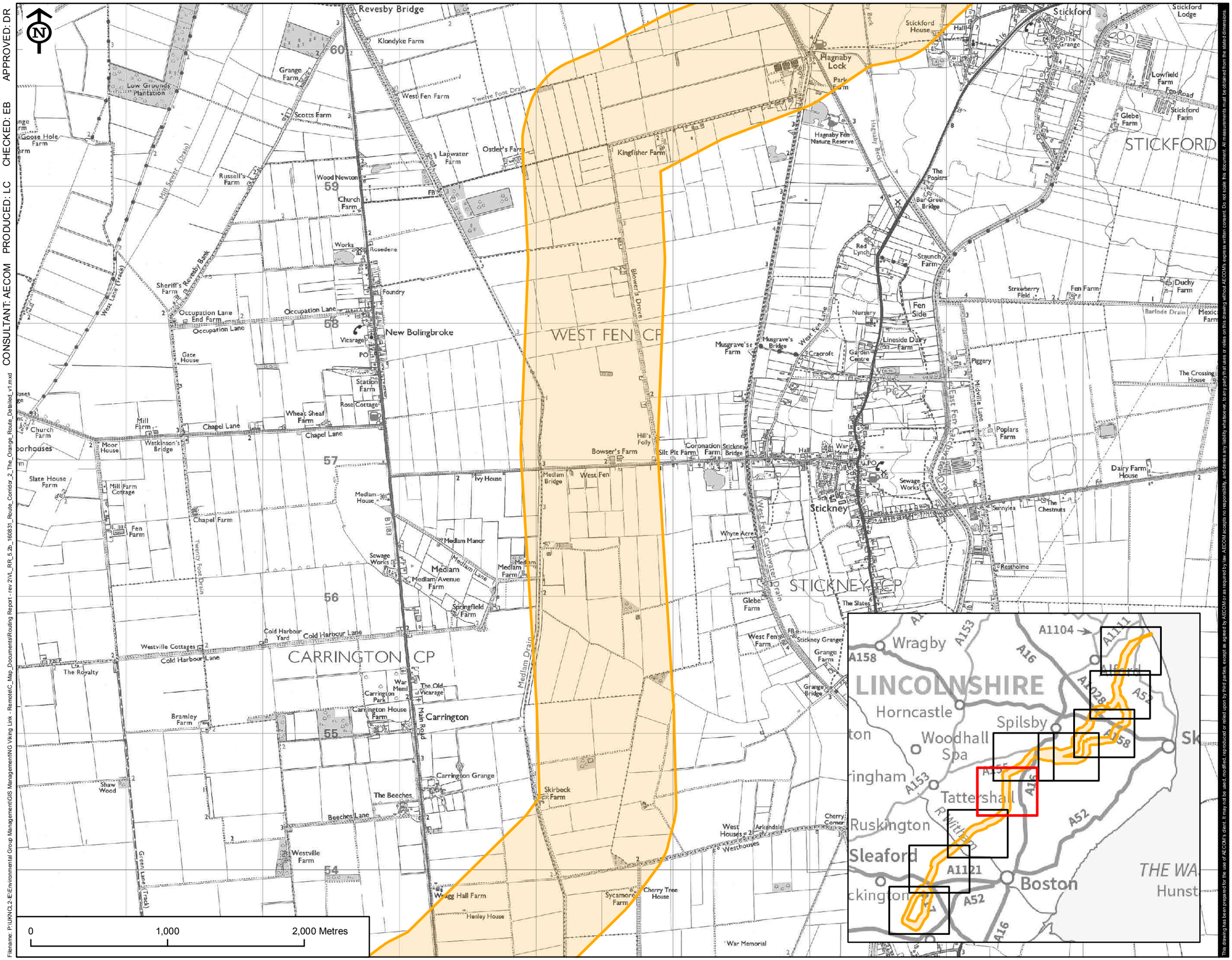

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Orange Route Corridor

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FIGURE NO.

VL_160831_RR_5.2

FIGURE TITLE

FIGURE 5.2
THE ORANGE ROUTE

SHEET NUMBER

7 of 10

NOTES

STICKFORD TO CARRINGTON

Date: 31/08/16

Scale at A3: 1:25,000

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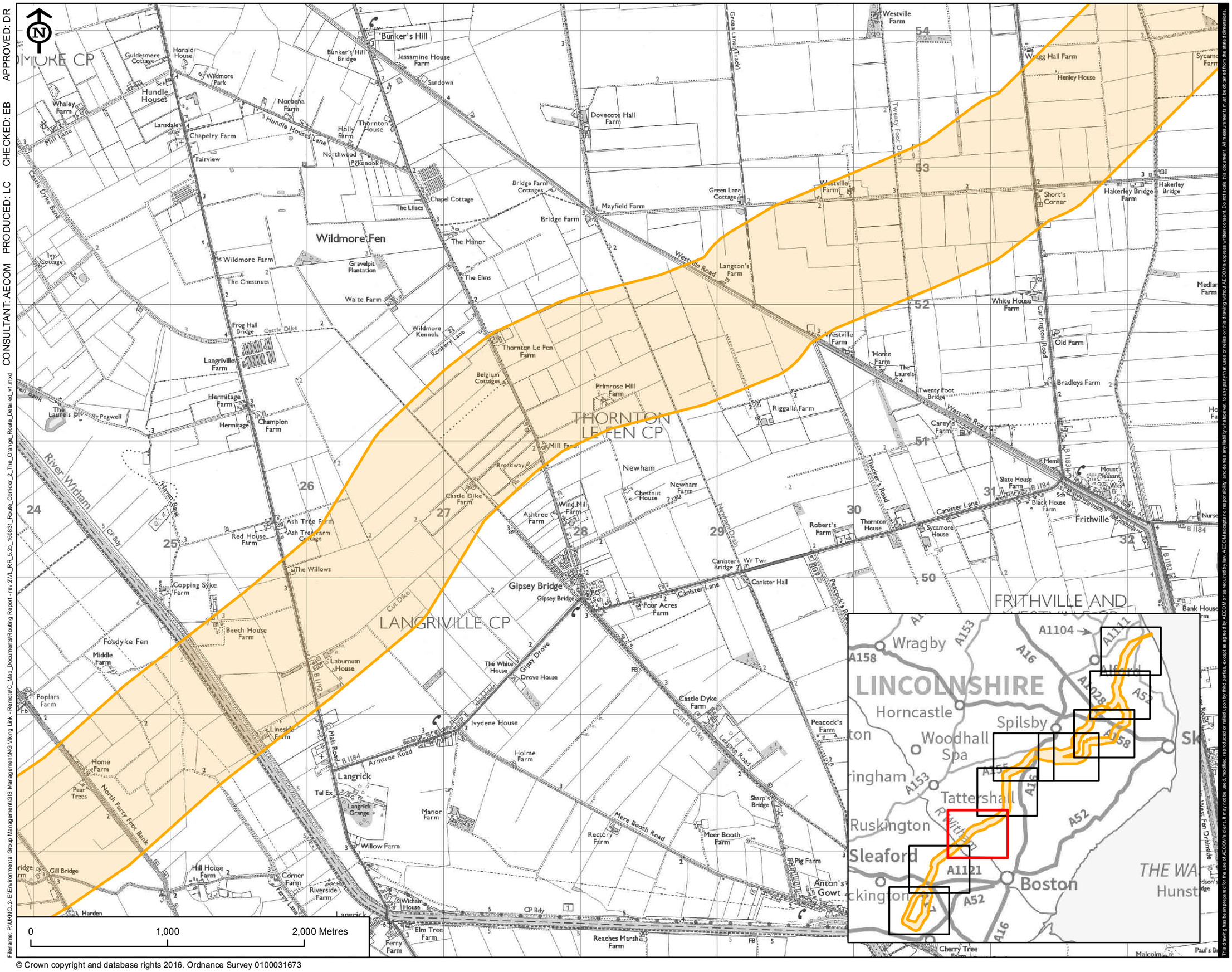

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Orange Route Corridor

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FIGURE NO.

VL_160831_RR_5.2

FIGURE TITLE

FIGURE 5.2
THE ORANGE ROUTE

SHEET NUMBER

8 of 10

NOTES

CARRINGTON TO LANGRICK

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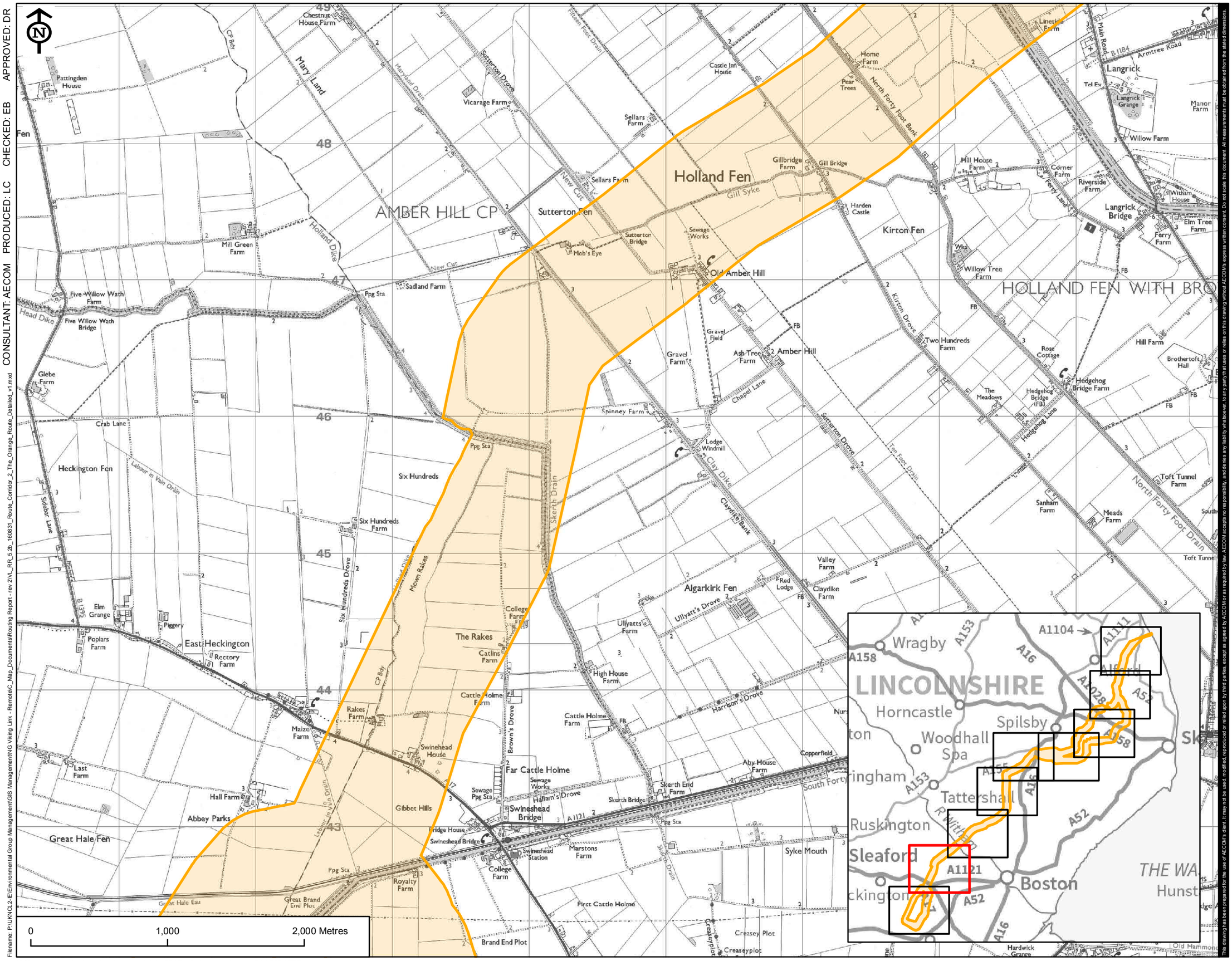

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Orange Route Corridor

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FIGURE NO.

VL_160831_RR_5.2

FIGURE TITLE

FIGURE 5.2
THE ORANGE ROUTE

SHEET NUMBER

9 of 10

NOTES

LANGRICK TO
SWINESHEAD BRIDGE

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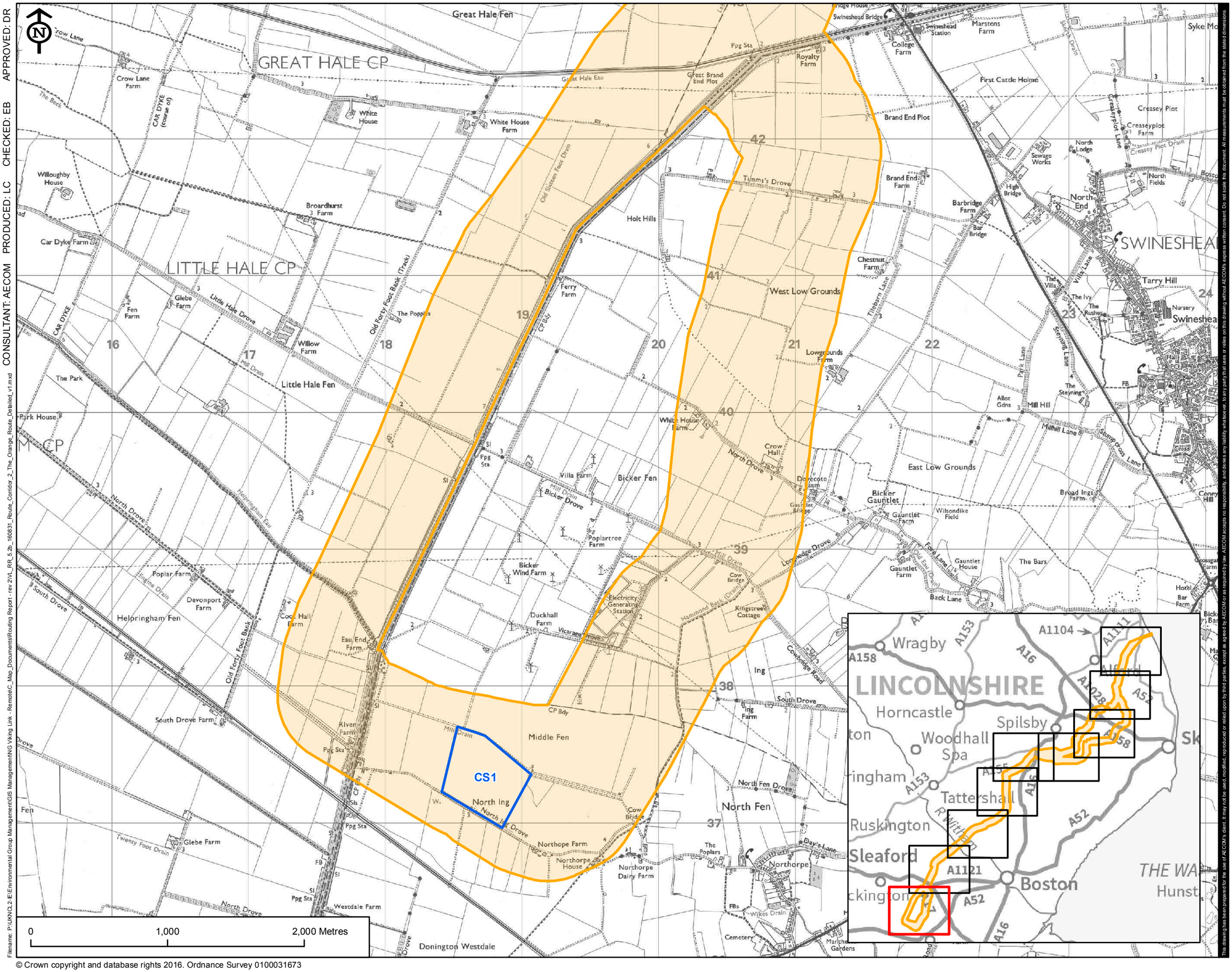

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LEGEND

- Orange Route Corridor
- Preferred Converter Station Site

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FIGURE NO.

VL_160831_RR_5.2

FIGURE TITLE

FIGURE 5.2
THE ORANGE ROUTE

SHEET NUMBER

10 of 10

NOTES

SWINESHEAD BRIDGE TO NORTH ING DROVE

Date:	Scale at A3:
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List of Abbreviations

AC	Alternating Current
AES	Agri-Environmental Schemes
AGLV	Area of Great Landscape Value
AIL	Abnormal Indivisible Loads
ALC	Agricultural Land Classification
AOD	Above Ordnance Datum
AONB	Area of Outstanding Natural Beauty
BBC	Boston Borough Council
BGS	British Geological Survey
BMV	Best and Most Versatile
CBS	Cement Bound Sand
CEMP	Construction Environmental Management Plan
CoCP	Code of Construction Practice
CS	Converter Station
CWS	County Wildlife Sites
DC	Direct Current
DCLG	Department for Communities and Local Government
DEFRA	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
EA	Environment Agency
EC	European Commission
EcIA	Ecological Impact Assessment
EEZ	Exclusive Economic Zones
ELDC	East Lindsey District Council
EMF	Electric and Magnetic Fields
EPS	European Protected Species
EU	European Union
GW	Gigawatt
ha	Hectare
HCA	Homes and Communities Agency
HDD	Horizontal Directional Drilling
HER	Historic Environment Record

HGV	Heavy Goods Vehicles
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
Hz	Hertz
IDB	Internal Drainage Boards
JNCC	Joint Nature Conservation Committee
km	Kilometre
kV	Kilo Volt
LCA	Landscape Character Areas
LCC	Lincolnshire County Council
LCCP	Lincolnshire Coastal Country Park
LCT	Landscape Character Types
LF	Landfall
LGV	Light Goods Vehicles
LMDB	Lindsey Marsh Drainage Board
LNR	Local Nature Reserves
LPA	Local Planning Authority
LWS	Local Wildlife Sites
m	Metres
MAFF	Ministry for Agriculture, Food and Fisheries
MAGIC	Multi-Agency Geographical Information for the Countryside
MHWS	Mean High Water Spring
MI	Mass Impregnated
MLWS	Mean Low Water Spring
MMO	Marine Management Organisation
MNR	Marine Nature Reserves
MSA	Minerals Safeguarding Area
MW	Megawatt
NCA	National Competent Authority
NERC	Natural Environment and Rural Communities
NGET	National Grid Electricity Transmission
NGVL	National Grid Viking Link Limited
NIC	National Infrastructure Commission
NIMF	Nationally Important Marine Features
NKDC	North Kesteven District Council
NMP	National Mapping Programme

NNR	National Nature Reserve
NPPF	National Planning Policy Framework
NPS	National Policy Statements
Ofgem	Office of Gas and Electricity Markets
OS	Ordnance Survey
PCI	Project of Common Interest
PROW	Public Rights of Way
rMCZ	recommended Marine Conservation Zone
RPG	Registered Parks and Gardens
SAC	Special Areas of Conservation
SHDC	South Holland District Council
SNCI	Sites of Nature Conservation Importance
SPA	Special Protection Area
SSR	Site Selection Report
SSSI	Sites of Special Scientific Interest
TEN-E Regulation	Trans-European Energy Regulation
The Project	Viking Link
The Scheme	The UK Onshore Scheme
TJP	Transition Joint Pit
XLPE	Cross-linked Polyethylene Extruded

Appendix A Sources of Information

Sources of information consulted in undertaking the routeing study include those identified in Table 1.

Table 1 Sources of Information

Topic	Sources of Information
General information	· Ordnance Survey (OS) mapping (1:10,000, 1:25,000 and 1:50,000) · Aerial photography
Geology & Hydrogeology	· British Geological Survey Map Sheet No. 116 Skegness, Solid and Drift, 1:50,000 Scale · British Geological Survey Map Sheet No 104 Mablethorpe, Solid and Drift, 1:50,000 Scale · British Geological Survey website www.bgs.ac.uk/geologyofbritain/home.html (historical borehole records database) · Greater Lincolnshire Nature Partnership data request for Local Geological Site records · Lincolnshire Biodiversity Partnership 'Local Geodiversity Action Plan for the Historic County of Lincolnshire, North Lincolnshire & North East Lincolnshire' March 2010 · Lincolnshire County Council 'Core Strategy and Development Management Policies (2016) · Lincolnshire Minerals Local Plan (1991) · Lincolnshire Waste Local Plan (2006) · Multi-Agency Geographic Information for the Countryside (MAGIC) website www.magic.defra.gov.uk · The Planning Inspectorate 'Report to Lincolnshire County Council. Report on the Examination Into the Lincolnshire Minerals and Waste Local Plan Core Strategy and Development Management Policies' 22nd February 2016 · Zetica Unexploded Ordnance Desk based UXO/UXB Constraints/ Hazard Assessment
Hydrology	· Environment Agency Flood Risk Map for Planning http://maps.environment-agency.gov.uk/wiyby/wiybyController?topic=floodmap&layerGroups=default&lang=_e&ep=map&scale=7&x=531500&y=181500 · Internal Drainage Board GIS datasets (Black Sluice IDB, Lindsey Marsh IDB and Witham Fourth IDB).
Agriculture & Soils	· MAFF 1993. 1:250,000 Provisional Agricultural Land Classification Sheet, Eastern Region. · Soil Survey of England and Wales 1984. Soils and their use in Eastern England and accompanying 1:250,000 map Sheet 4: Eastern England. · National Soil Resources Institute, Cranfield University, 1:250,000 scale National Soil Map Dataset (Land Information System (LandIS)) · Multi-Agency Geographic Information for the Countryside (MAGIC) website

Table 1 Sources of Information	
Topic	**Sources of Information**
	www.magic.defra.gov.uk
Landscape	· Natural England (2015) 'National Character Area profile: 43. Lincolnshire Wolds'. · Lincolnshire Wolds Countryside Service and Lincolnshire Wolds Joint Advisory Committee (AONB Partnership) 'Lincolnshire Wolds AONB Management Plan 2013-2018', produced on behalf of Lincolnshire County Council, East Lindsey District Council, West Lindsey District Council, North East Lincolnshire Council and partners; · Lincolnshire Wolds Countryside Service and Lincolnshire Wolds Joint Advisory Committee (AONB Partnership) 'Landscape Character Areas', produced on behalf of Lincolnshire County Council, East Lindsey District Council, West Lindsey District Council, North East Lincolnshire Council and partners; · East Midlands Landscape Partnership (2010) 'East Midlands Region Landscape Character Assessment'; and · ECUS ltd, (2009) 'East Lindsey District Landscape Character Assessment', prepared on behalf of East Lindsey District Council. · Multi-Agency Geographic Information for the Countryside (MAGIC) website www.magic.defra.gov.uk
Ecology	· National Biodiversity Network database · Multi-Agency Geographic Information for the Countryside (MAGIC) website www.magic.defra.gov.uk · Lincolnshire Coastal Grazing Marshes, www.lincsmarshes.org.uk
Archaeology & Heritage	· Lincolnshire County Council's Historic Environment Record · Historic England's National Heritage List for England (Download Designation GIS data) · Historic England's National Monument Record (Historic England Archive)

Appendix B Stakeholder Engagement

Table 1 below identifies stakeholder organisations NGVL has met with during the routeing study.

Table 1 Stakeholder Engagement	
Stakeholder Organisations	
Black Sluice Internal Drainage Board	Lincolnshire Wolds Countryside Service
Boston Borough Council	Lindsey Marsh Internal Drainage Board
East Lindsey District Council	Natural England
Environment Agency	North Kesteven District Council
Historic England	South Holland District Council
Lincolnshire County Council	Witham Fourth Internal Drainage Board
Lincolnshire Wildlife Trust	-

Appendix C Thematic Constraints Plans

Route Corridor A – Thematic Constraints Plans

Table 1 Route Corridor A Thematic Constraints Plans	
Figure No.	**Figure Title**
A1	Topographic Map
A2	Settlement and Tourism Interests
A3	Landscape Designations
A4	Landscape Character
A5	Landscape Features and Interests
A6	Ecology Designations
A7	Archaeology and Heritage – Designated Assets
A8	Archaeology and Heritage – Non-designated Assets
A9	Agricultural Land Classification Mapping
A10	Soil Mapping
A11	Hydrology Constraints
A12	Solid Geology
A13	Drift Geology
A14	Geological Constraints
A15	Infrastructure and Other Development

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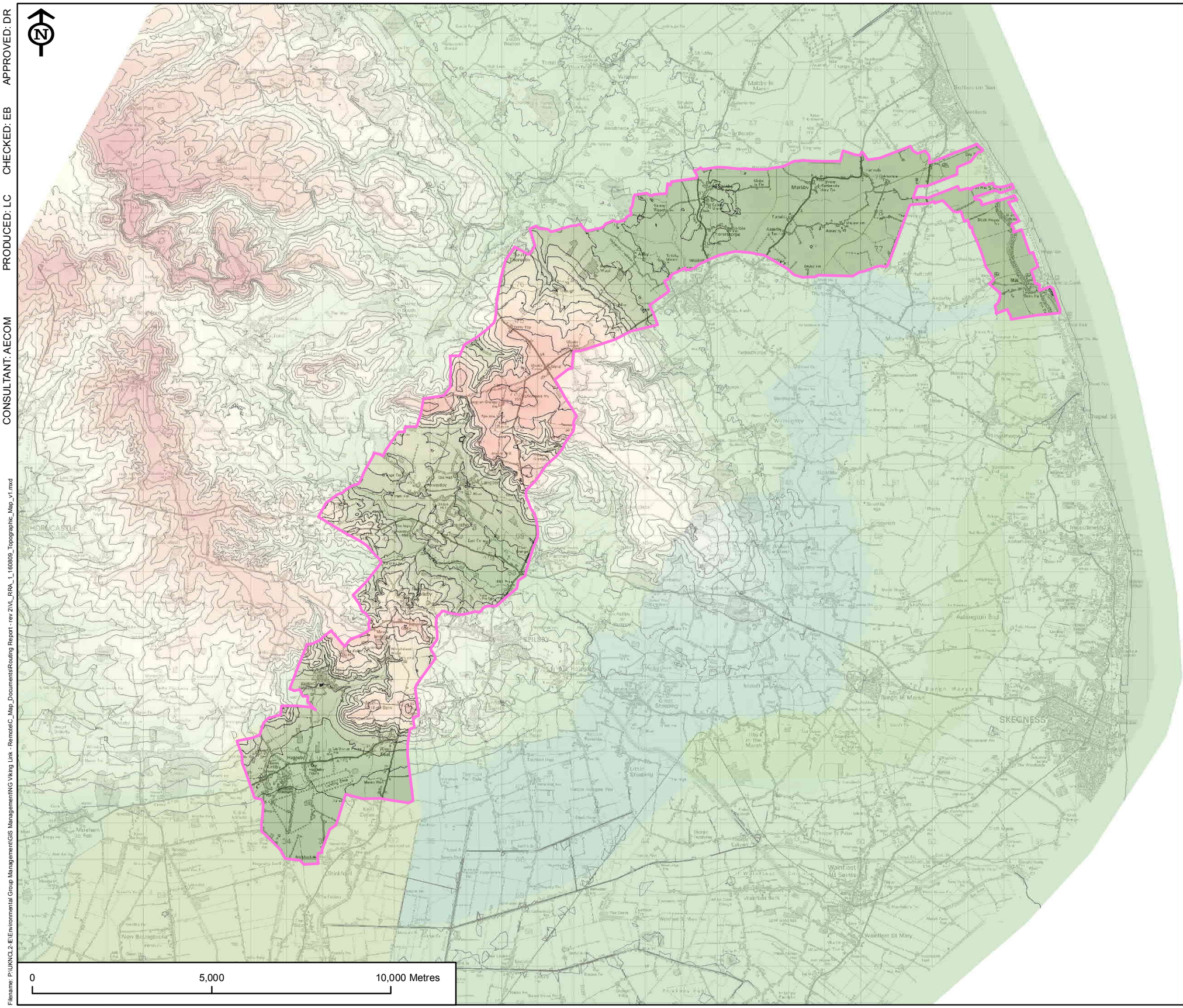

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VikingLink

LEGEND

Cable Route Corridor

A

10m Contour (OS Terrain 5)

Topography

High : 149.68m

Low : 0m

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FIGURE NO.

VL_160809_RRA_A1

FIGURE TITLE

FIGURE A1
TOPOGRAPHIC MAP

SHEET NUMBER

1 of 1

NOTES

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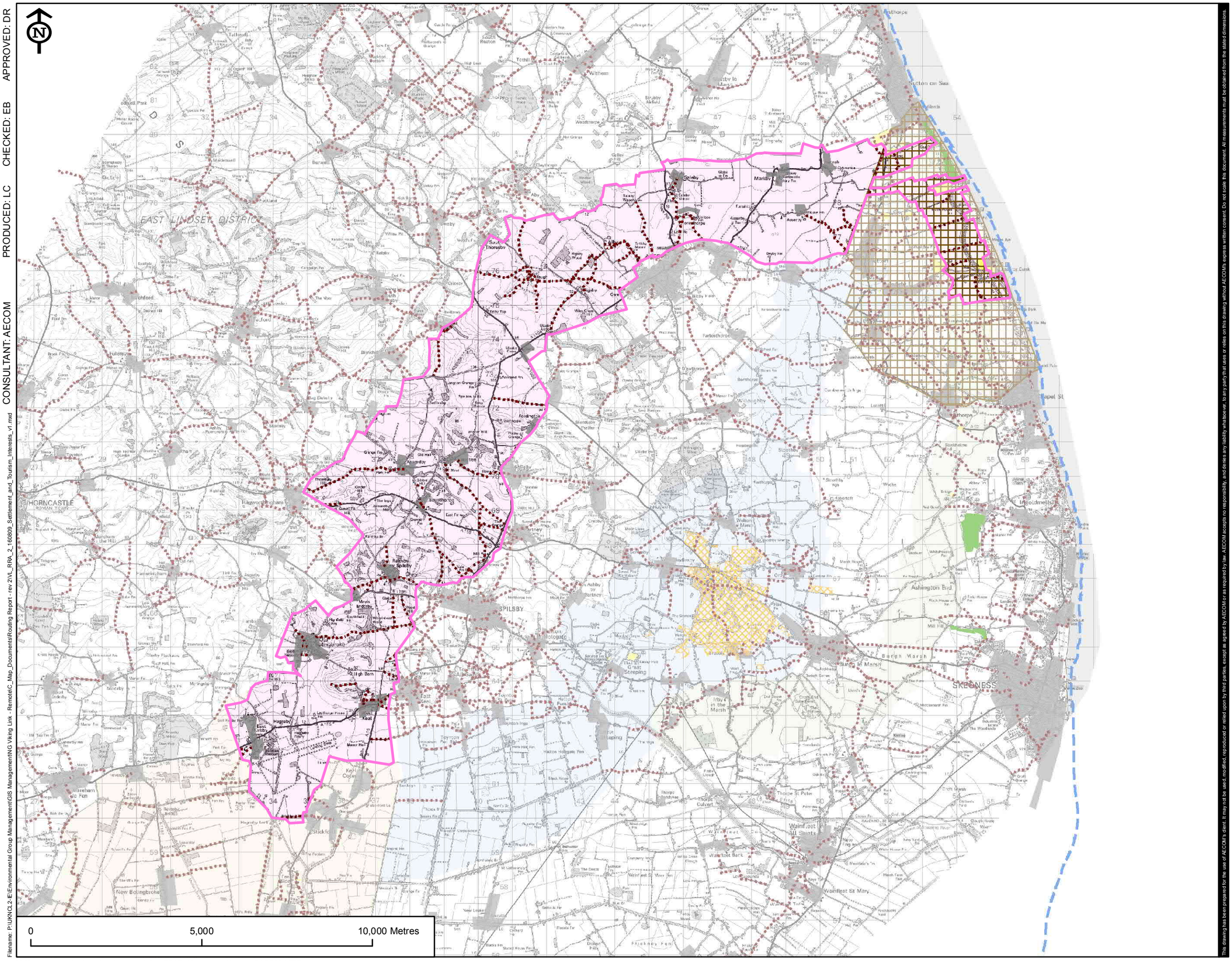

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LEGEND

Cable Route Corridor

- A
- Public Right of Way
- Sustrans National Cycle Route
- Proposed England Coast Path National Trail
- National Trust Land Ownership
- Lincolnshire Coastal Country Park
- Golf Course
- Caravan Park
- Urban Region

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1	09/08/16	ORIGINAL ISSUE

FIGURE NO.

VL_160809_RRA_A2

FIGURE TITLE

FIGURE A2
SETTLEMENT AND TOURISM INTERESTS

SHEET NUMBER

1 of 1

NOTES

Date: 09/08/16

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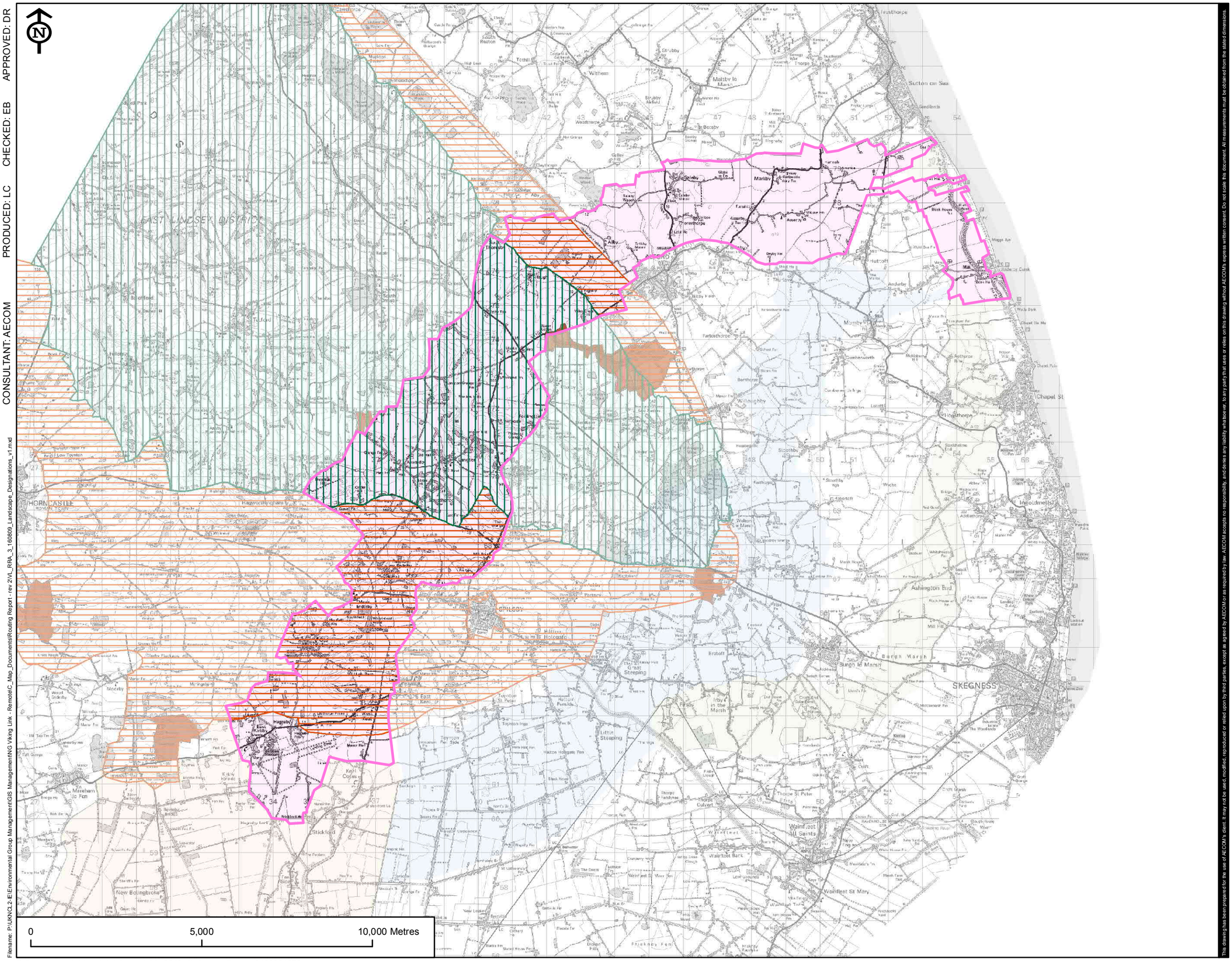
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Louth
Alford
Spilsby
Burgh le Marsh
Ingoldmells
Ashington End
Wainfleet All Saints
Wainfleet St Mary
Thorpe St Peter
Firsby
Irby in the Marsh
Great Steeping
Little Steeping
Toynton St Peter
Toynton Fen Side
Toynton Fen
Toynton Inges
Halton Holgate
Hagnaby
East Kirkby
Stickford
New Bolingbroke
Moreton
Tetford
Farlesthorpe
Withern
Strubby
Maltby le Marsh
Markby
Anderby
Hutoft
Mumby
Chapel St Leonards
Hogsthorpes
Sloothby
Wainfleet Bank
Low Grounds
Frieskney Fen
Friskney
Orby
Burgh Marsh
Bratoft
Gunby
Ulceby
Thurlby
Bilsby
Asgarby
Ashby
Scrivelsby
Dalby
Fotherby
Ailby
Raithby
Maidenwell
Claythorpe
Mumby Fen
Farlesthorpe
Withington
Berthorpe
Sloothby
Wiche
Orby
Bratoft
Burgh Marsh
Firsby
Irby in the Marsh
Thorpe Culvert
Thorpe Fendyke
Wainfleet Bank
Low Grounds
Wainfleet St Mary
Frieskney Fen
Friskney
Dickon Hills
Blacks Fen
Stated House Fen
New Leake
Bestville
Fiddle Fen
Chickard
Sheriff's Fen
New Bolingbroke
Mareham le Fen
Kirkby Forest
Haugh
Haugh Fen
Haugh Lodge
Hagnaby Lodge
Hagnaby Fen
Kelstern
Kelstern Hill
Kelstern Fen
Kelstern Cottages
Kelstern Fen
Kelstern Hill
Kelstern Fen
Kelstern Cottages
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Kelstern Cottages

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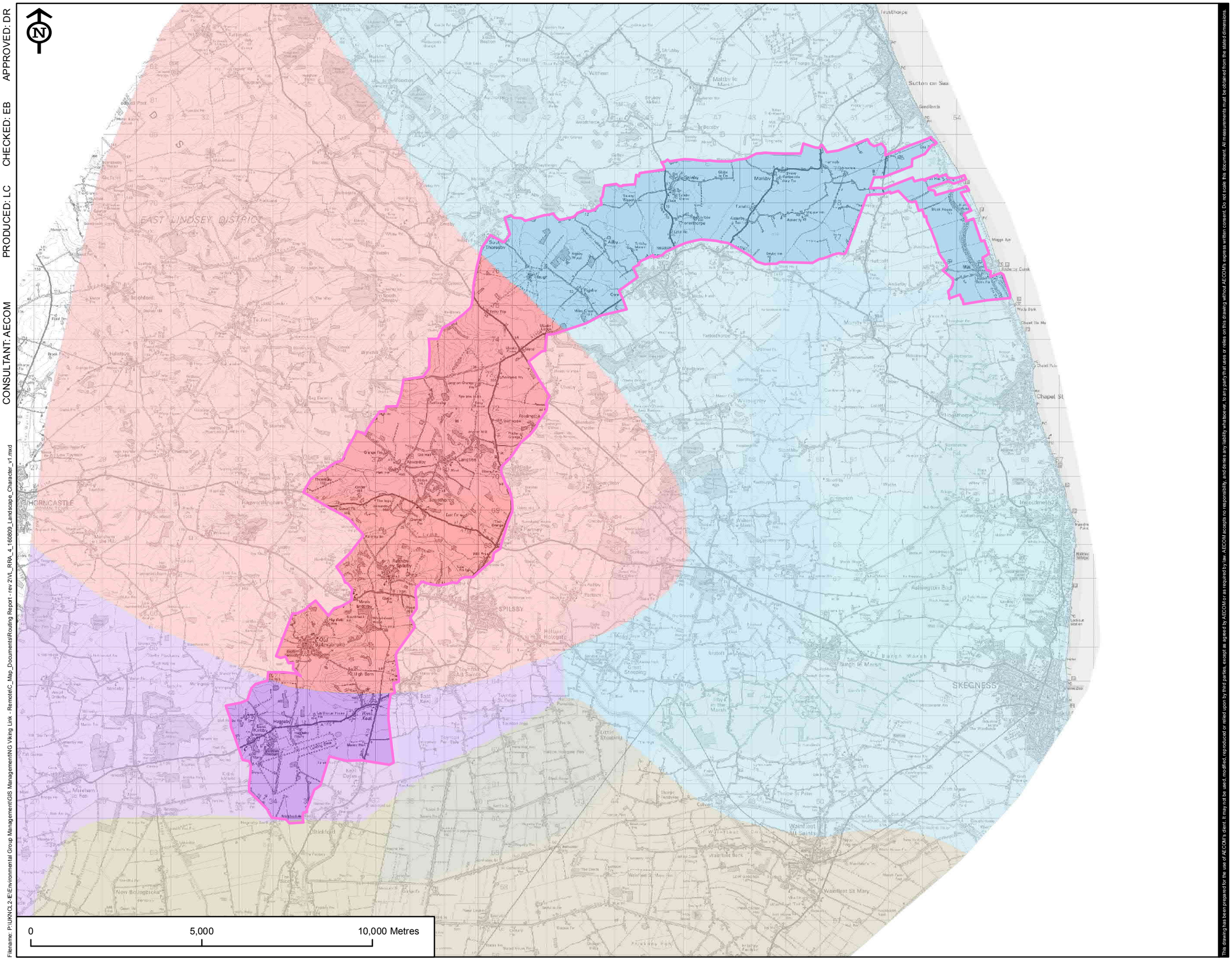

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VikingLink

LEGEND

Cable Route Corridor

- A

National Character Area

- Lincolnshire Coast and Marshes
- Lincolnshire Wolds
- Lincolnshire and Rutland Limestone
- North Lincolnshire Coversands and Clay Vales
- The Fens

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FIGURE NO.

VL_160809_RRA_A4

FIGURE TITLE

FIGURE A4
LANDSCAPE
CHARACTER

SHEET NUMBER

1 of 1

NOTES

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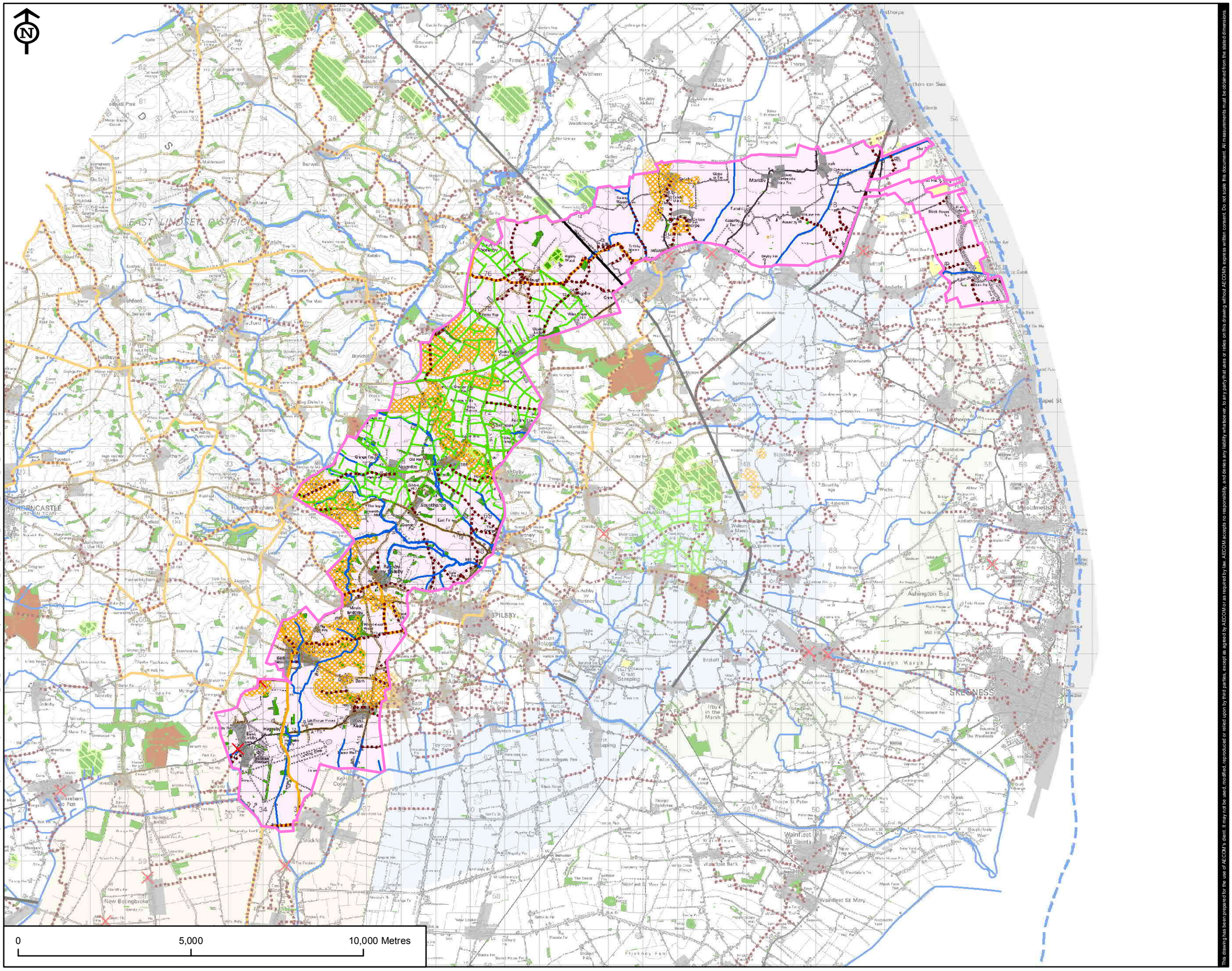

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VikingLink

LEGEND

Cable Route Corridor

- A
- Historic Windmill
- Public Rights of Way
- Proposed England Coast Path National Trail
- Long Distance Route
- Disused Railway Line
- AONB Hedgerow
- Main Rivers, Drains and Chalk Streams
- AONB/AGLV Roadside Verge
- Ancient Woodland
- Urban Region
- Caravan Park
- Ridges and High Points
- Woodland
- Registered Park and Garden
- Local Nature Reserve

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FIGURE NO.

VL_160810_RRA_A5

FIGURE TITLE

FIGURE A5
LANDSCAPE FEATURES AND INTERESTS

SHEET NUMBER

1 of 1

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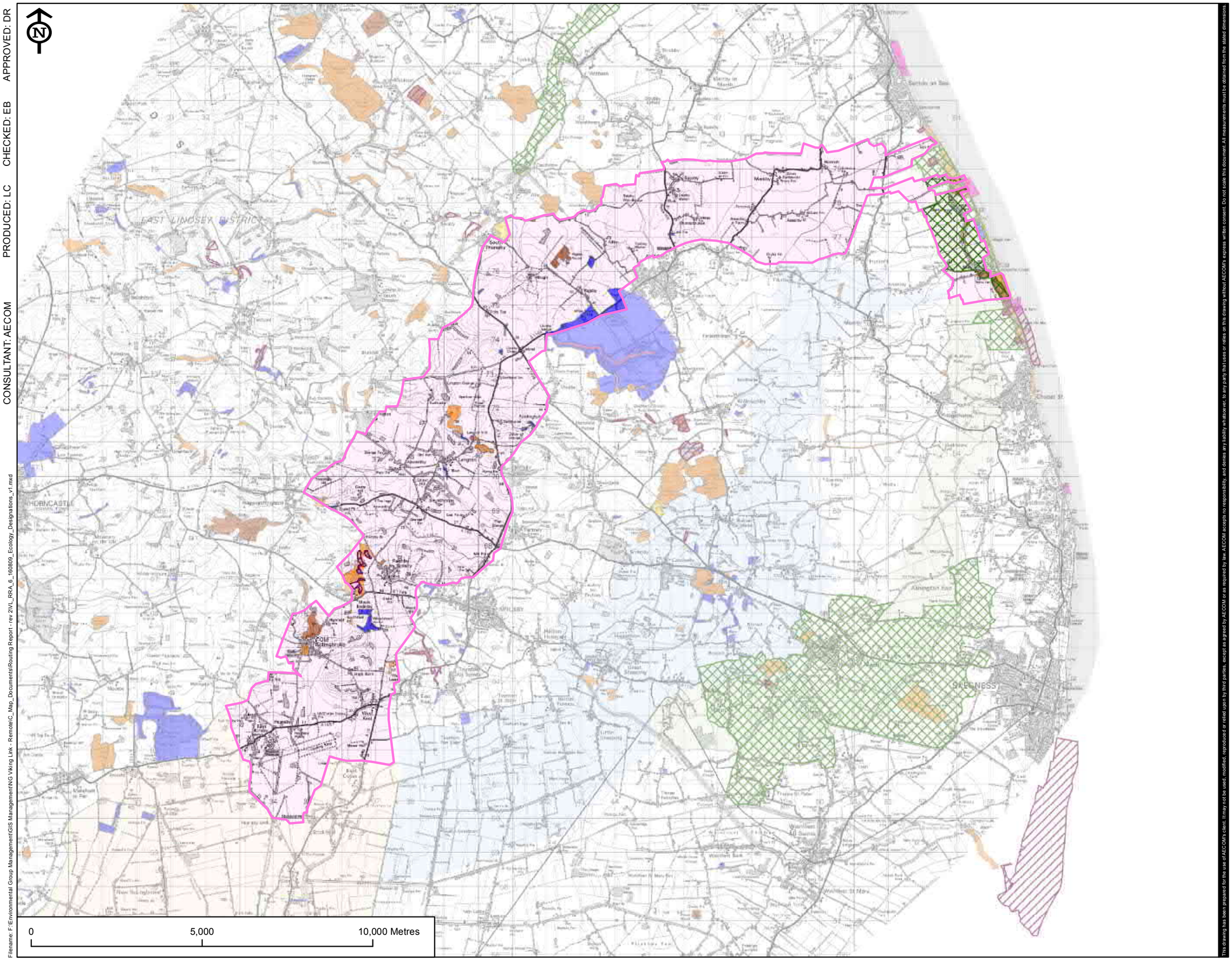

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VikingLink

LEGEND

Cable Route Corridor

- A
- Special Protection Area
- Special Area of Conservation
- Site of Special Scientific Interest
- Coastal Grazing Marsh
- Local Geological Site
- Local Wildlife Site
- Lincolnshire Wildlife Trust
- Regionally Important Geological/Geomorpholo... Site
- Roadside Nature Reserve
- Site of Nature Conservation Importance

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FIGURE NO.

VL_160809_RRA_A6

FIGURE TITLE

FIGURE A6
ECOLOGY
DESIGNATIONS

SHEET NUMBER

1 of 1

NOTES

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Scale at A3: 1:100,000

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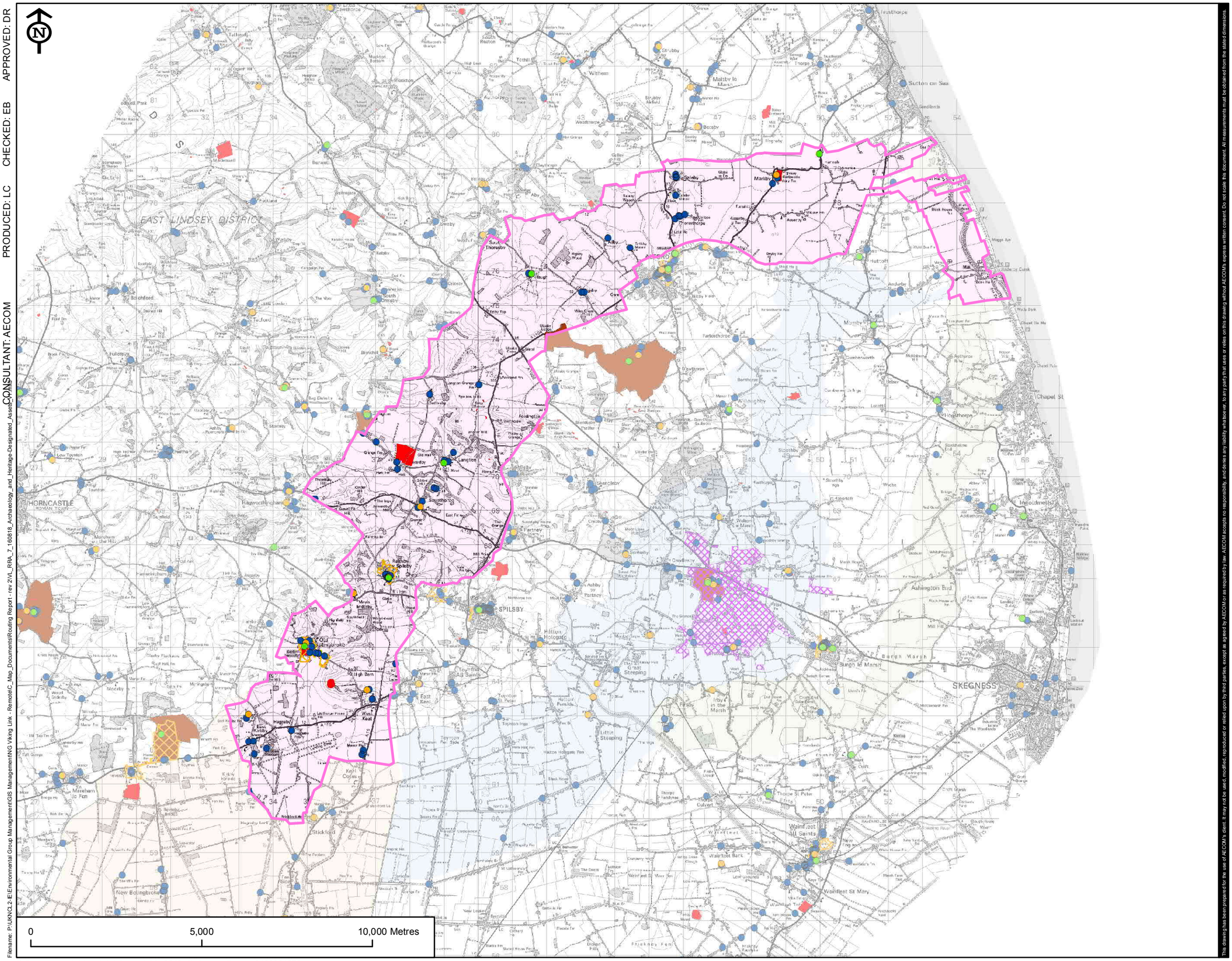
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HORNCASTLE
SPILSBY
SKEGNESS
Old Bolingbroke
Langton
Southorpe
Sutton on Sea
Burgh le Marsh
Ashington End
Wainfleet St Mary
Wainfleet All Saints
Thorpe St Peter
Little Steeping
Great Steeping
Firsby
Irby in the Marsh
Halton Holegate
Toynton All Saints
East Keal
West Keal
Hagnaby
Stickford
New Bolingbroke
Mareham le Fen
Ingoldmells
Chapel St
Hogsthorpe
Markby
Gunby
Orby
Withern
Strubby
Maltby le Marsh
Bilsby
Farlesthorpe
Thurlby
Hutoft
Anderby
Mumby
Sausthorpe
Wainfleet Bank
Low Grounds
Wainfleet St Mary Fen
Friskney Fen
Dickon Hill
Thorpe Culvert
Thorpe Fendyke
Burgh Marsh
Croft
Croft Marsh
Ashby cum Fenby
Partney
Ashby by Partney
Orby
Scremby
Sausthorpe
Bilsby
Farlesthorpe
Thurlby
Hutoft
Anderby
Mumby
Chapel St
Hogsthorpe
Ingoldmells
Addlethorpe
Wainfleet All Saints
Thorpe St Peter
Thorpe Culvert
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Wainfleet St Mary
Wainfleet St Mary Fen
Friskney Fen
Dickon Hill
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Stickford
New Bolingbroke
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Kirkby on Bain
Haugh
Thoresby
South Ormsby
Tetford
Belchford
Fulletby
Low Toynton
Cheatham
Marham le Hill
Tattershall
Coningsby
Mablethorpe
Sutton on Sea
Withern
Strubby
Maltby le Marsh

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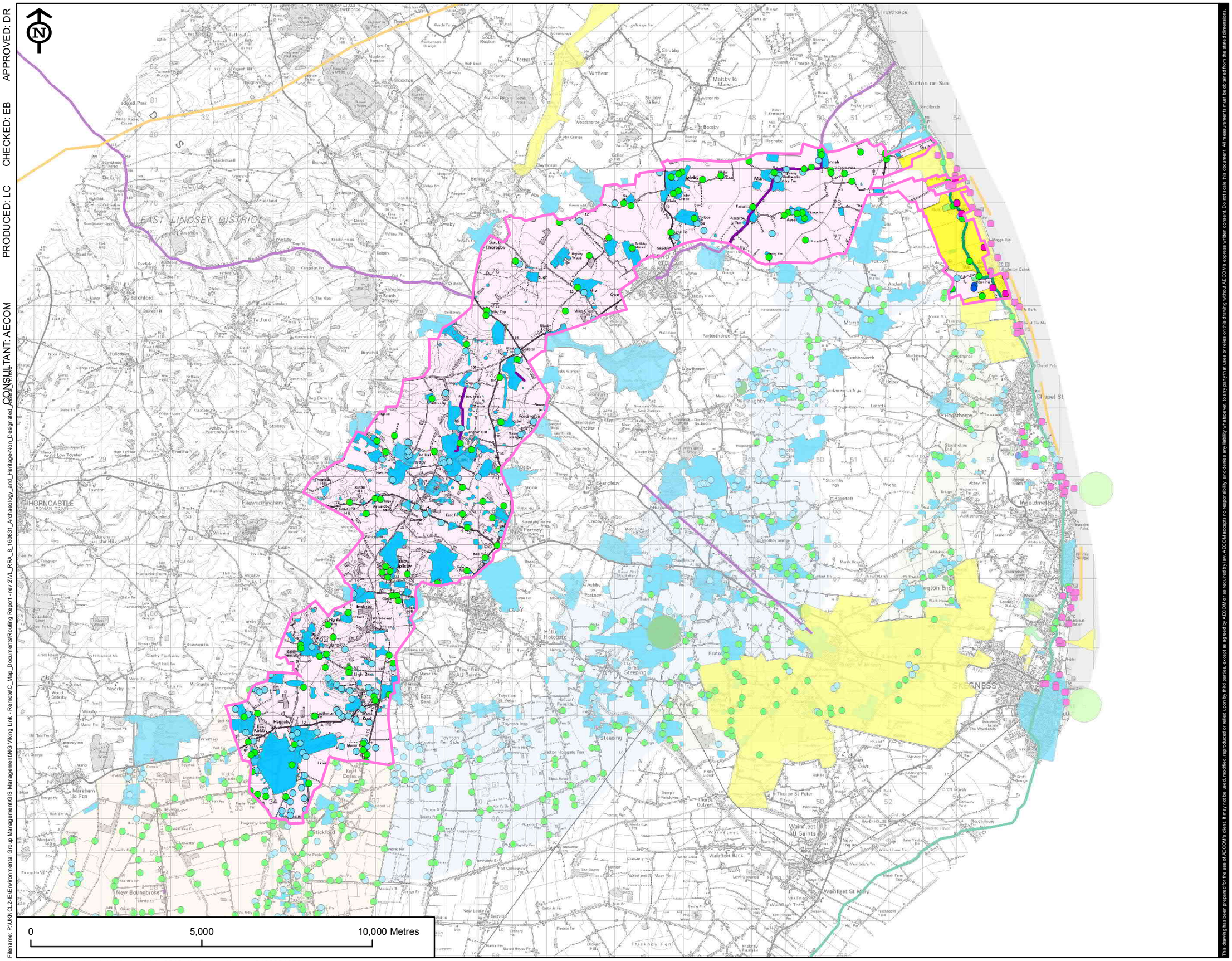

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VikingLink

LEGEND

Cable Route Corridor

- A
- Historic England Archive - Event Point
- Historic England Archive - Monument Point
- Historic England Archive - Monument Line
- Historic England Archive - Monument Polygon
- HER - Farms Point
- HER - Events Point
- HER - Events Line
- HER - Events Region
- HER - Monument Point
- HER - Monument Line
- HER - Monument Ellipse
- HER - Monument Region

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1	31/08/16	ORIGINAL ISSUE

FIGURE NO.

VL_160831_RRA_A8

FIGURE TITLE

FIGURE A8
ARCHAEOLOGY AND HERITAGE
NON-DESIGNATED ASSTES

SHEET NUMBER

1 of 1

NOTES

Date: 31/08/16

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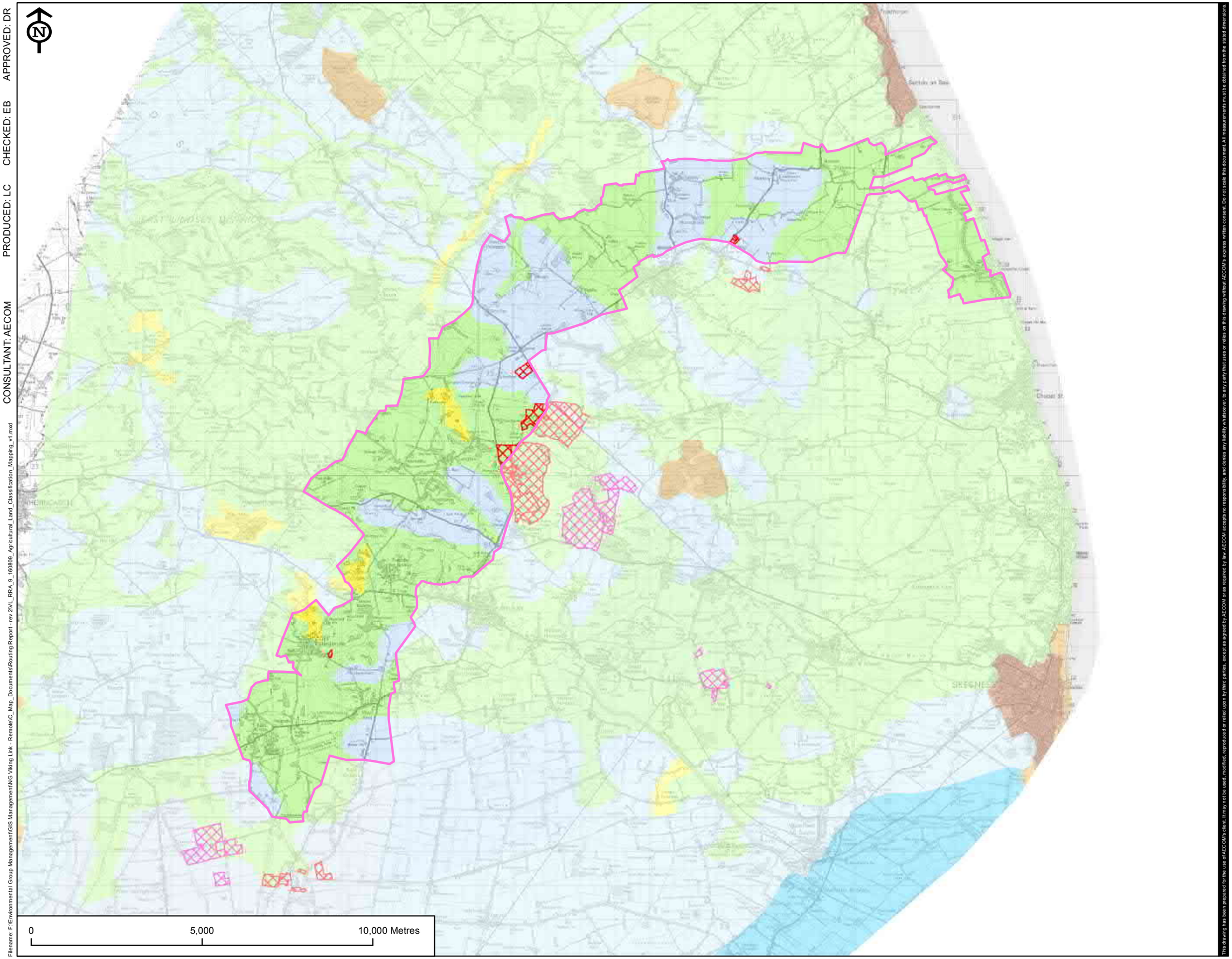

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VikingLink

LEGEND

Cable Route Corridor

- A
- Grade 1
- Grade 2
- Grade 3
- Grade 4
- Non Agricultural
- Urban
- Organic Entry Level Stewardship
- Organic Entry Level plus Higher Level Stewardship

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FIGURE NO.

VL_160809_RRA_A9

FIGURE TITLE

FIGURE A9
AGRICULTURAL LAND CLASSIFICATION MAPPING

SHEET NUMBER

1 of 1

NOTES

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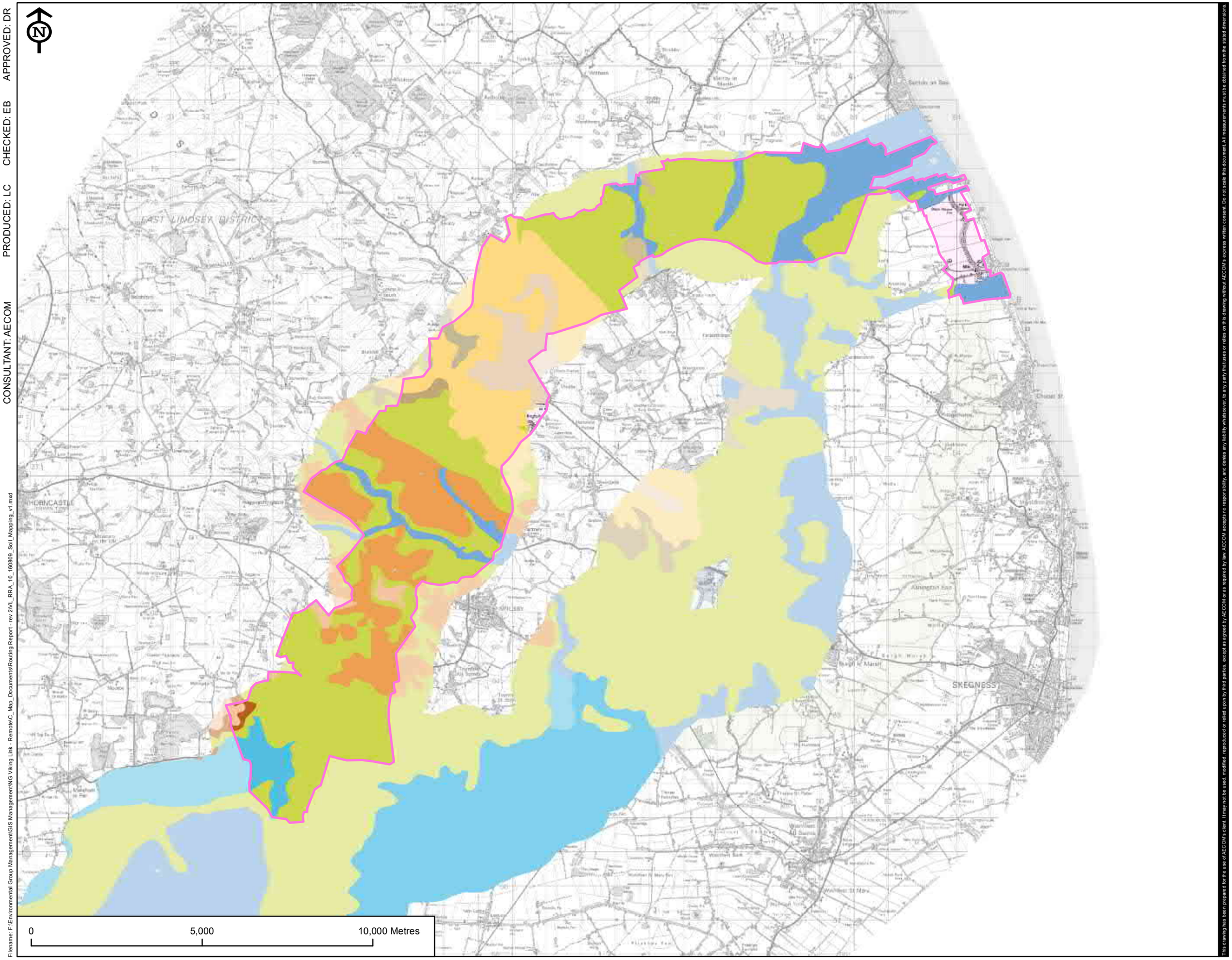

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VikingLink

LEGEND

Cable Route Corridor

- A
- 343h
- 511e
- 513
- 541r
- 543
- 544
- 551c
- 571n
- 711f
- 711m
- 711s
- 711u
- 812b
- 813c
- 813g
- 821b
- 851a
- 851b
- Lake

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FIGURE NO.

VL_160809_RRA_A10

FIGURE TITLE

FIGURE A10
SOIL MAPPING

SHEET NUMBER

1 of 1

NOTES

Date: 09/08/16

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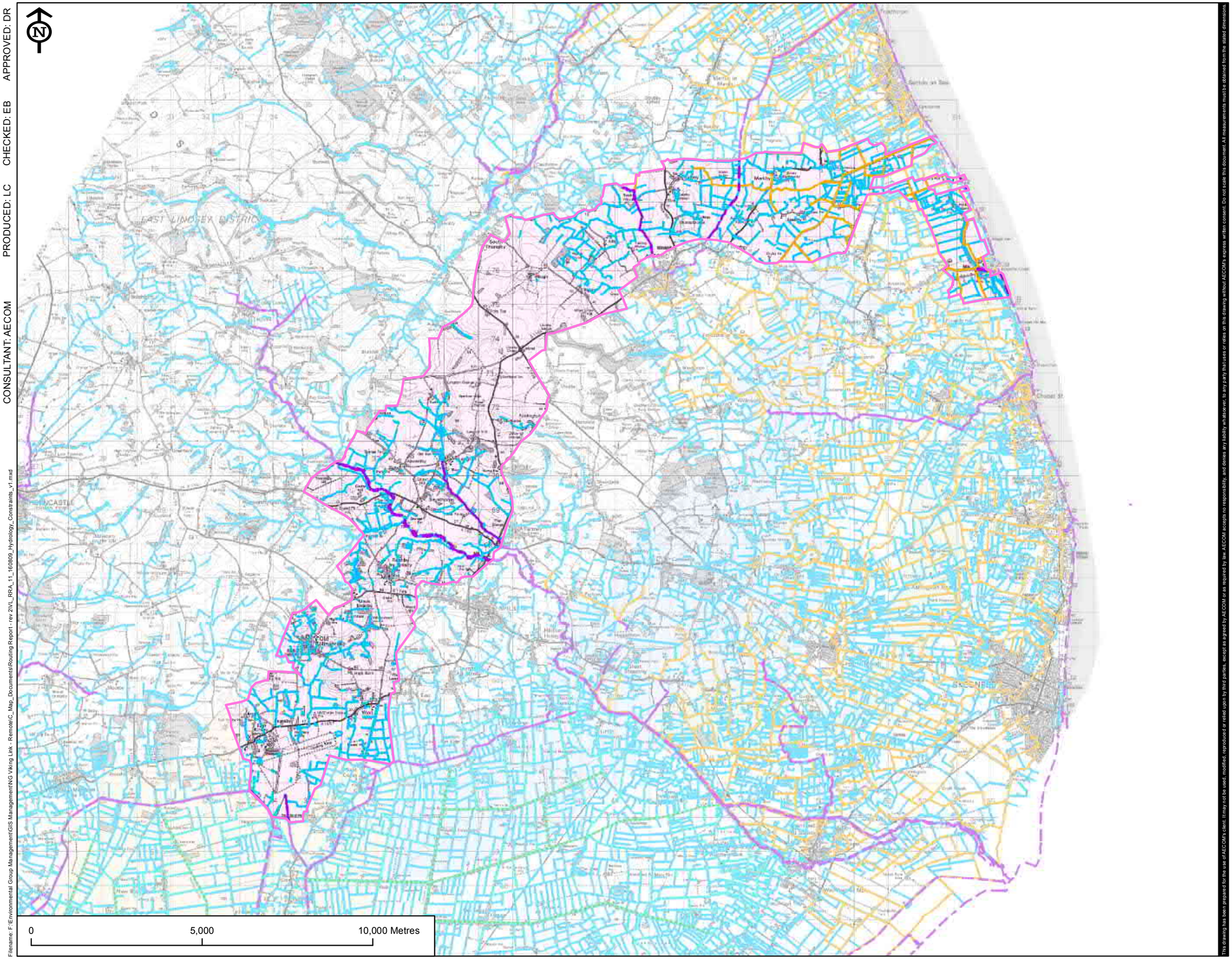

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VikingLink

LEGEND

Cable Route Corridor

- A
- Environment Agency Flood Defence
- Lindsey Marsh DB - Maintained Watercourse
- Witham Forth District IDB - Combined Sewer
- Witham Forth District IDB - Drain
- Watercourse / Water Feature

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FIGURE NO.

VL_160809_RRA_A11

FIGURE TITLE

FIGURE A11
HYDROLOGY
CONSTRAINTS

SHEET NUMBER

1 of 1

NOTES

Date: 09/08/16

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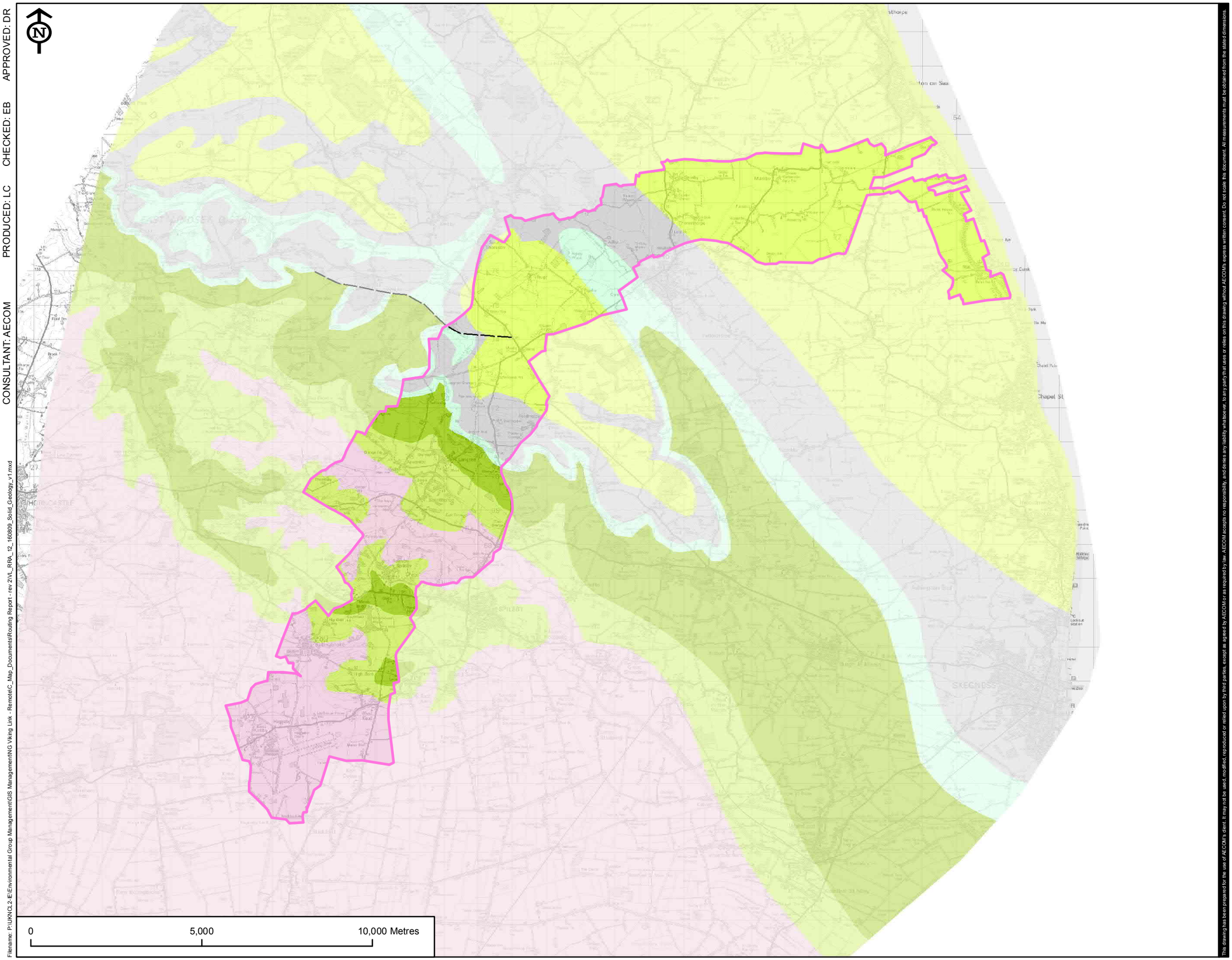

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VikingLink

LEGEND

Cable Route Corridor

- A
- Fault at rockhead
- Grey Chalk Subgroup - Chalk
- White Chalk Subgroup - Chalk
- Lower Greensand Group - Sandstone and Mudstone
- Wealden Group - Mudstone, Siltstone and Sandstone
- Wealden Group - Sandstone and Siltstone, Interbedded
- West Walton Formation, Ampthill Clay Formation and Kimmeridge Clay Formation (Undifferentiated) - Mudstone, Siltstone and Sandstone

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FIGURE NO.

VL_160809_RRA_A12

FIGURE TITLE

FIGURE A12
SOLID GEOLOGY

SHEET NUMBER

1 of 1

NOTES

Date: 09/08/16

Scale at A3: 1:100,000

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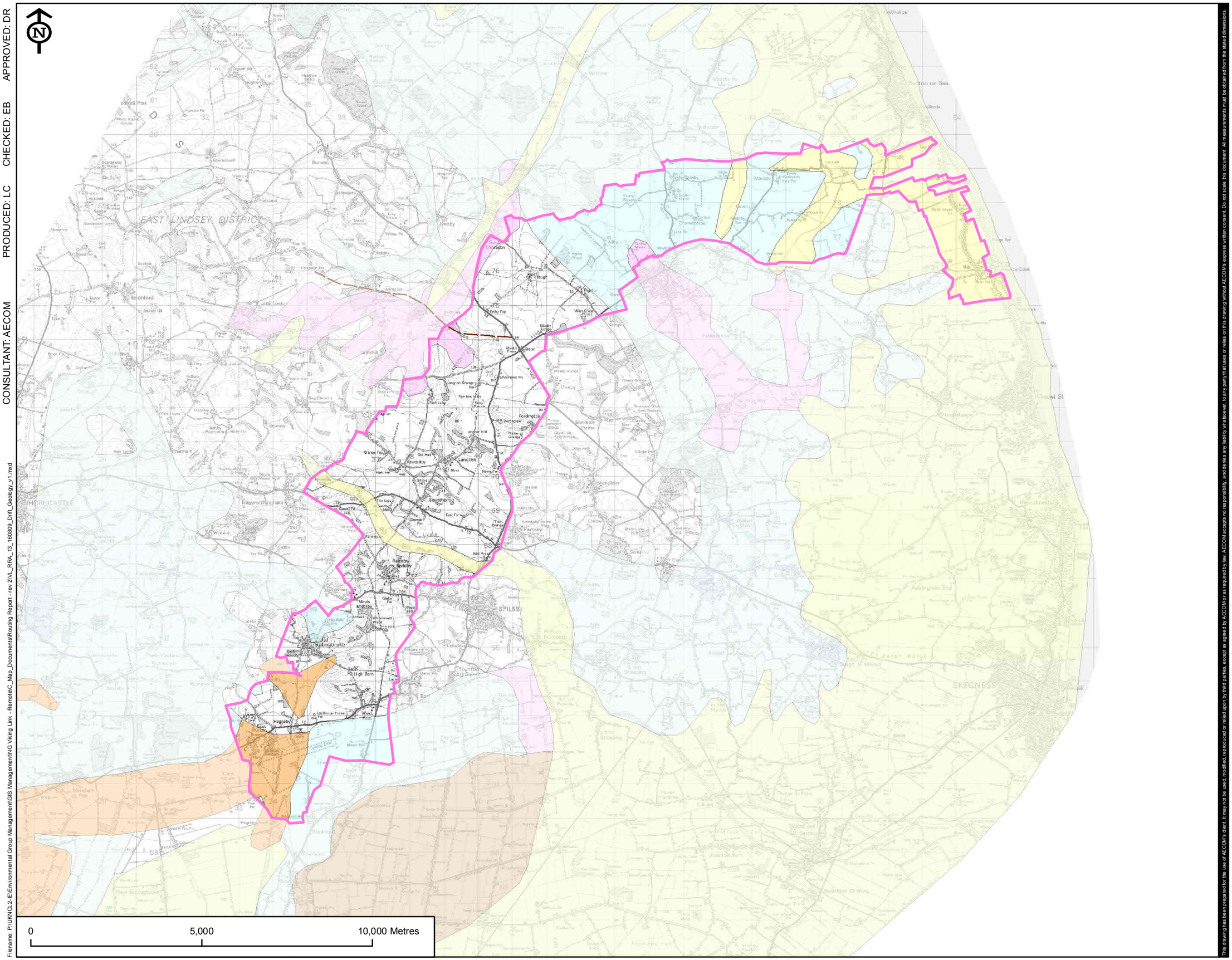

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VikingLink

LEGEND

Cable Route Corridor

- A
- Fault at rockhead
- Alluvium
- Glacial Sand and Gravel
- Peat
- River Terrace Deposits (Undifferentiated)
- Till

REVISION:

REV.	DATE	DESCRIPTION
1	09/08/16	ORIGINAL ISSUE

FIGURE NO.

VL_160809_RRA_A13

FIGURE TITLE

FIGURE A13
DRIFT GEOLOGY

SHEET NUMBER

1 of 1

NOTES

Date:	Scale at A3:
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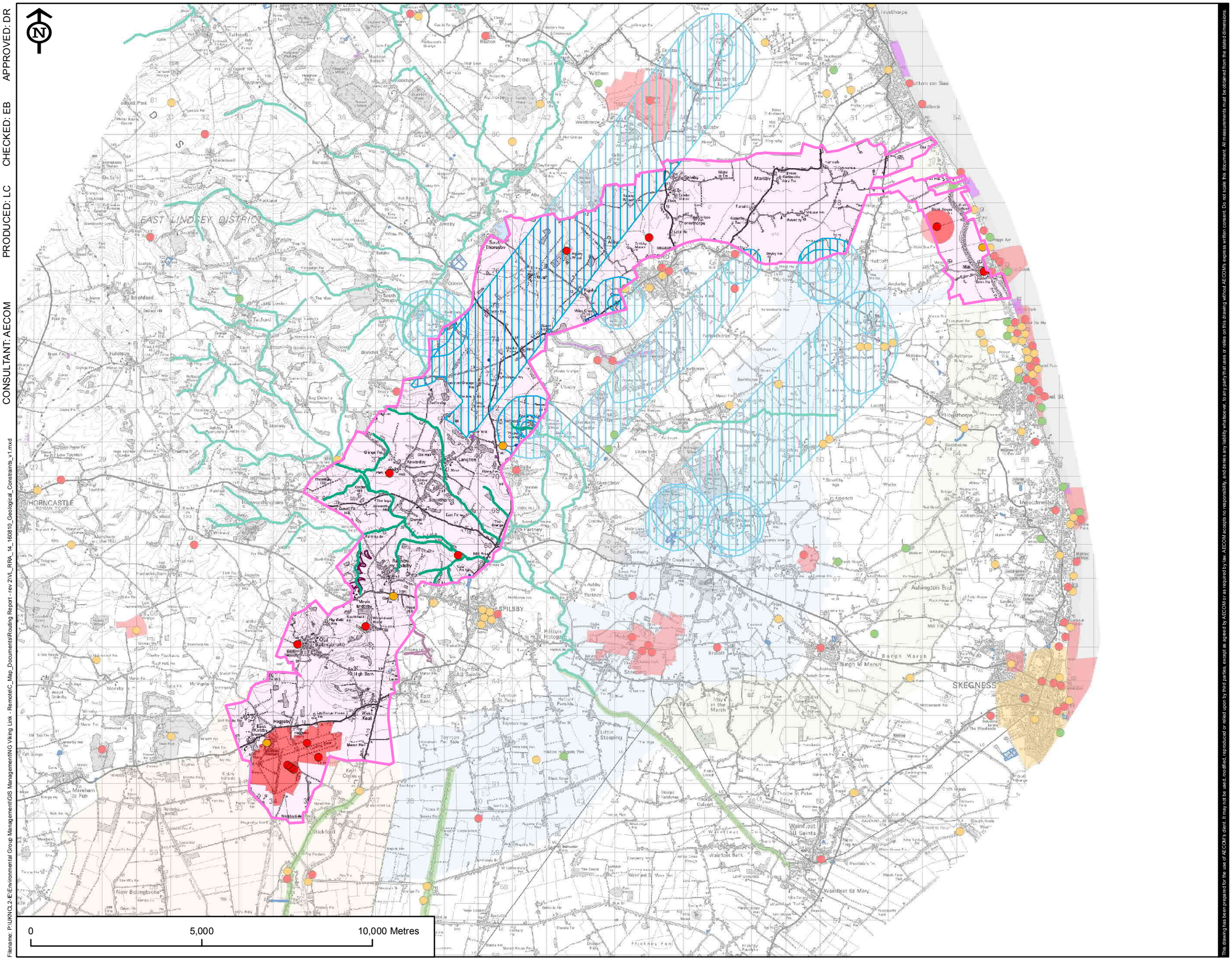
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Ingoldmells
Ashington End
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Wainfleet All Saints
Thorpe St Peter
Irby in the Marsh
Firsby
Little Steeping
Great Steeping
Bratoft
Toynton All Saints
East Keal
West Keal
Old Spilsby
Hagnaby
Langton
Southrepps
Partney
Ashby by Partney
Halton Holegate
Toynton St Peter
Toynton Side
Toynton Ings
Keal Cotes
Stickford
New Bolingbroke
Mareham le Fen
Mareham on the Hill
Low Toynton
Hareworthingham
Creetham
Bolingbroke
Farlesthorpe
Alford
Sutton on Sea
Trusthorpe
Withern
Sloothby
Hogsthorpe
Anderby
Hutoft
Markby
Orby
Sausthorpe
Thurlby
Sandy Wood
Wide Gate
Pigeon Hill
Tetney
Tetney Lock
Tetney Haven
Frieskney Fen
Thorpe Culvert
Thorpe Fendyke
Thorpe Gate
Wainfleet Bank
Wainfleet St Mary
Wainfleet All Saints
Ashby Puerorum
Ashby Cum Fenby
Stenigot
Gayton le Marsh
Ulceby
Withern
Weadnorpe
Hagnaby
Old Hall
Grange Fin
Thorpe Hill
Gibbet Hill
Sweet Fin Hill
Thorpe Grange
Grange Fin
East Fin
Mill Road
Rigsby
Ashby Puerorum
Ashby cum Fenby
Stenigot
Mavis Enderby
Sayfield
Woodhead Wood
Old Spilsby
Hagnaby
Hagnaby Lock
Lymbourne Fines
Manor Hse
Kirkby
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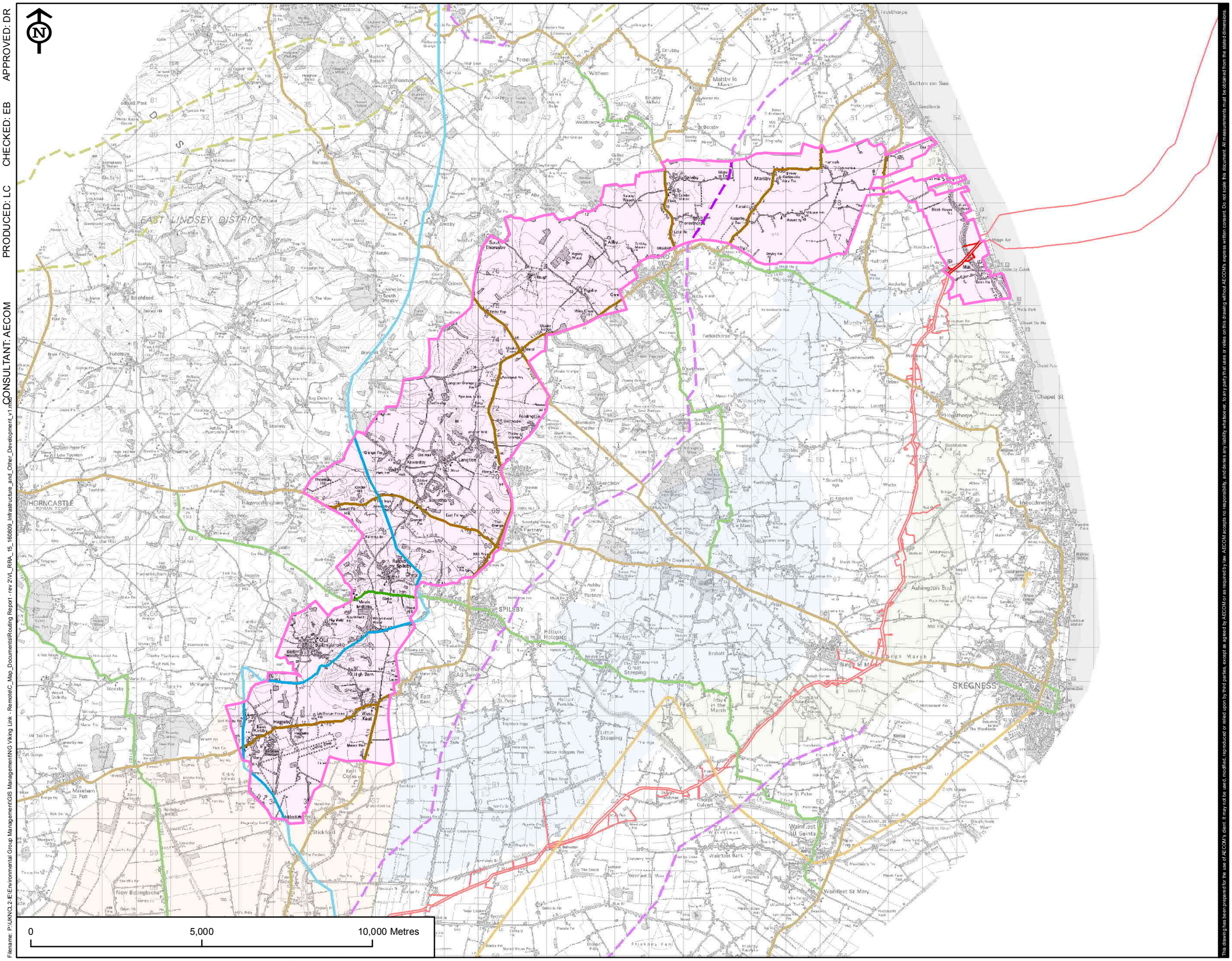

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VikingLink

LEGEND

Cable Route Corridor

- A
- A Road
- B Road
- Railway Line
- Anglian Water Proposed Pipeline Route
- Overhead Electricity Transmission Line
- Gas Pipeline
- Triton Knoll Order limits

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FIGURE NO.

VL_160810_RRA_A15

FIGURE TITLE

FIGURE A15
INFRASTRUCTURE AND OTHER DEVELOPMENT

SHEET NUMBER

1 of 1

NOTES

Date: 10/08/16

Scale at A3: 1:100,000

Route Corridor B – Thematic Constraints Plans

Table 2 Route Corridor B Thematic Constraints Plans	
Figure No.	**Figure Title**
B1	Topographic Map
B2	Settlement and Tourism Interests
B3	Landscape Designations
B4	Landscape Character
B5	Landscape Features and Interests
B6	Ecology Designations
B7	Archaeology and Heritage – Designated Assets
B8	Archaeology and Heritage – Non-designated Assets
B9	Agricultural Land Classification Mapping
B10	Soil Mapping
B11	Hydrology Constraints
B12	Solid Geology
B13	Drift Geology
B14	Geological Constraints
B15	Infrastructure and Other Development

APPROVED: DR

CHECKED: EB

PRODUCED: LC

CONSULTANT: AECOM

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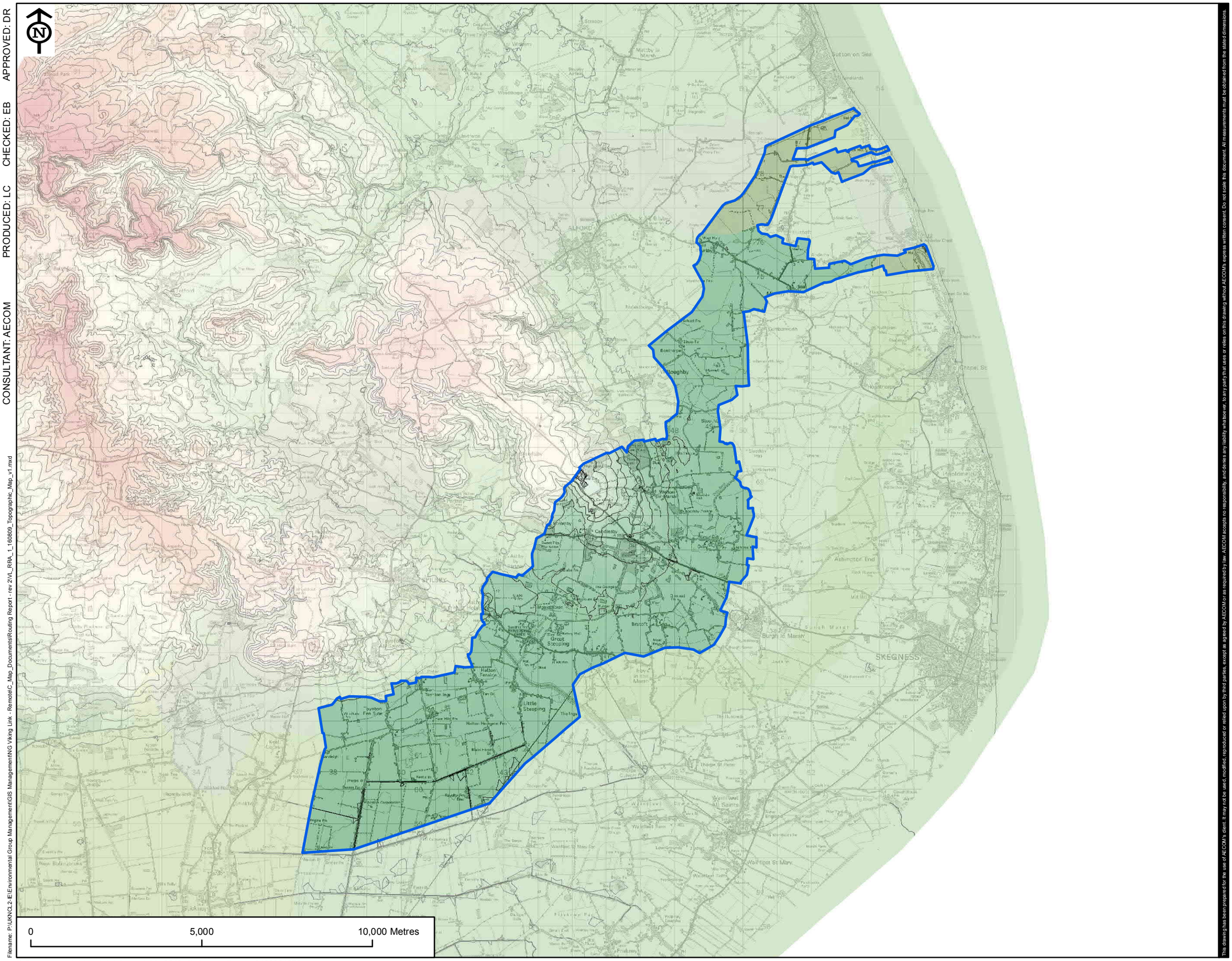
N
ALFORD
Sutton on Sea
Mablethorpe
Trusthorpe
Ingoldmells
Chapel St
Hogsthorpe
Ashington End
Burgh le Marsh
SKEGNESS
Boston
Sleaford
Great Steeping
Little Steeping
Halton Fenside
Toynton Fen Side
Toynton Fen Side
Toynton Inge
Halton Holegate Fen
Black Horse Dr
Kent's Dr
Ingoe Pit
Ingoe Pit
Sleaford Fen
Boston Corporation
Ingoe Pit
Sleaford Fen
Sleaford Fen
Sleaford Fen

APPROVED: DR

CHECKED: EB

PRODUCED: LC

CONSULTANT: AECOM

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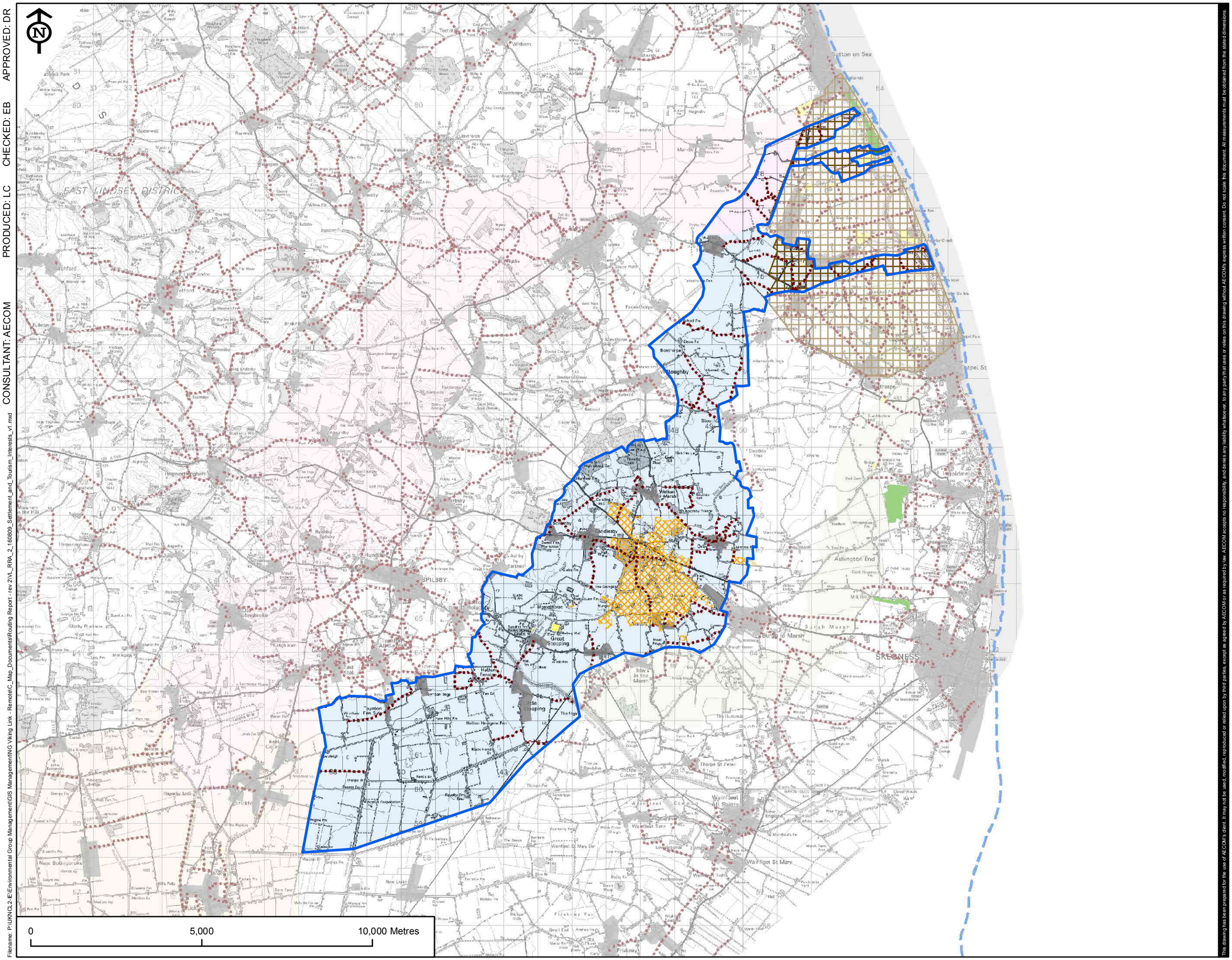
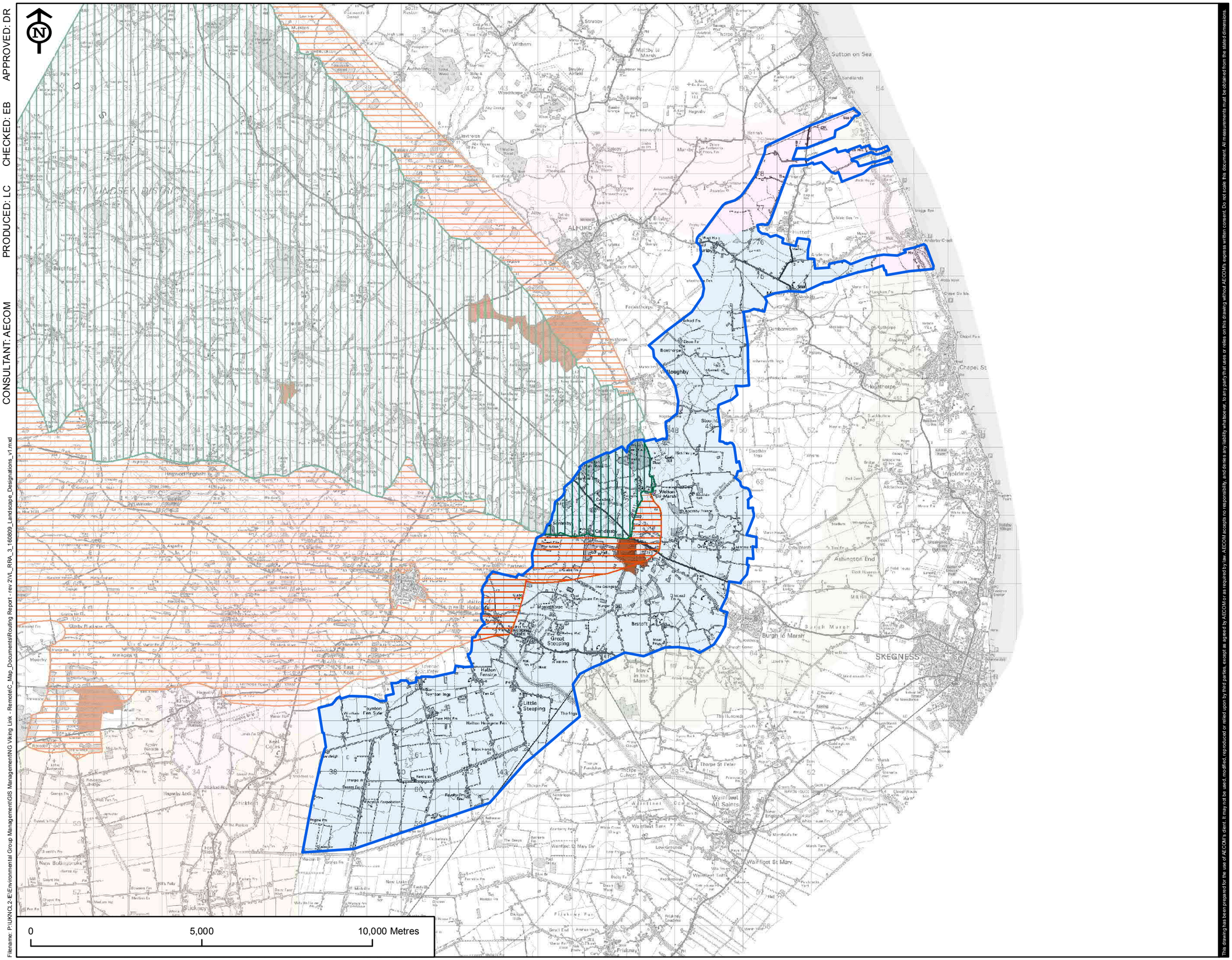

EAST LINDSEY DISTRICT
Sutton on Sea
Withern
Woodthorpe
Saleby
Marsh by
Hagnaby
Alford
Rigsby
Ferlesthorpe
Bonthorpe
Ploughby
Sloothby
Malthouse
Welton le Marsh
Scrivelsby
Sandilesby
Orby
Ashington End
Burgh le Marsh
Great Steeping
Little Steeping
Halton Fenside
Boynton Fen Side
Boynton Ings
Inby in the Marsh
SKEGNESS
Thorpe St Peter
Wainfleet All Saints
Wainfleet Sand
Wainfleet St Mary
Friskney
New Bolingbroke
Hagnaby Lock
Hogsthorpe
Hundleby
SPILSBY
Ashby by Partney
East Keal
Keal Cotes
Toynton All Saints
Toynton Ings
Hemingthorpe
Haugh
Ingoldmells
Chapel St Leonards
Anderby Creek
Mablethorpe
Trusthorpe
Sea Dyke
Gibraltar
Ingoldmells Point
Wainfleet Haven
Wainfleet Haven Outfall
Wainfleet Haven Sluice
Wainfleet Haven Sluice Outfall
Wainfleet Haven Sluice Inlet
Wainfleet Haven Sluice Outlet

APPROVED: DR

CHECKED: EB

PRODUCED: LC

CONSULTANT: AECOM



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VikingLink

LEGEND

Cable Route Corridor

- B
- Area of Outstanding Natural Beauty
- Area of Great Landscape Value
- Registered Park and Garden

REVISION:

REV.	DATE	DESCRIPTION
1	09/08/16	ORIGINAL ISSUE

FIGURE NO.

VL_160809_RRA_B3

FIGURE TITLE

FIGURE B3
LANDSCAPE
DESIGNATIONS

SHEET NUMBER

1 of 1

NOTES

Date: 09/08/16

Scale at A3: 1:100,000

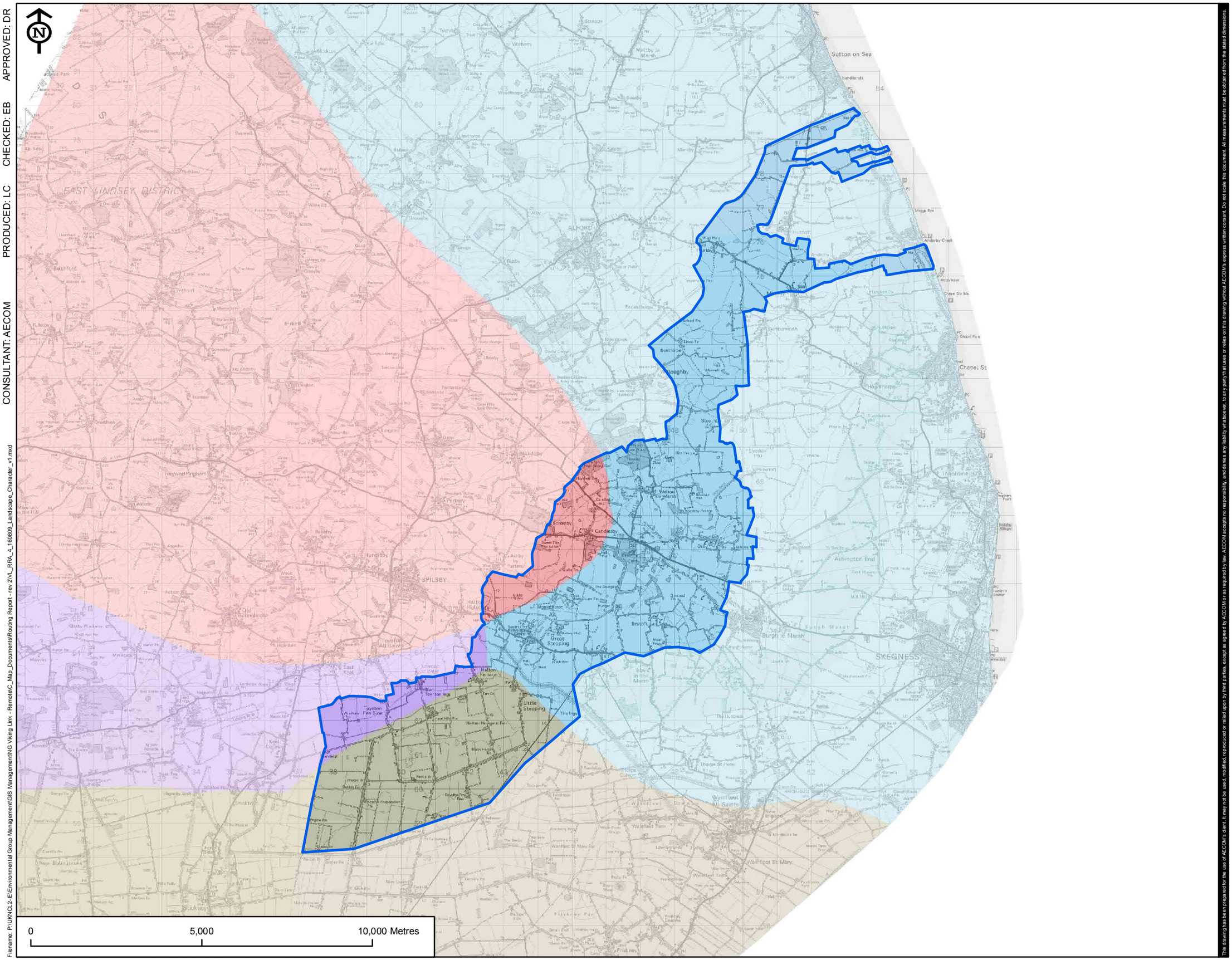
APPROVED: DR

CHECKED: EB

PRODUCED: LC

CONSULTANT: AECOM

Filename: P:\UKNCL2-E\Environmental Group Management\GIS Management\NG Viking Link - Remote\C_Map_Documents\Routing Report - rev 2\VL_RRA_4_160809_Landscape_Character_v1.mxd

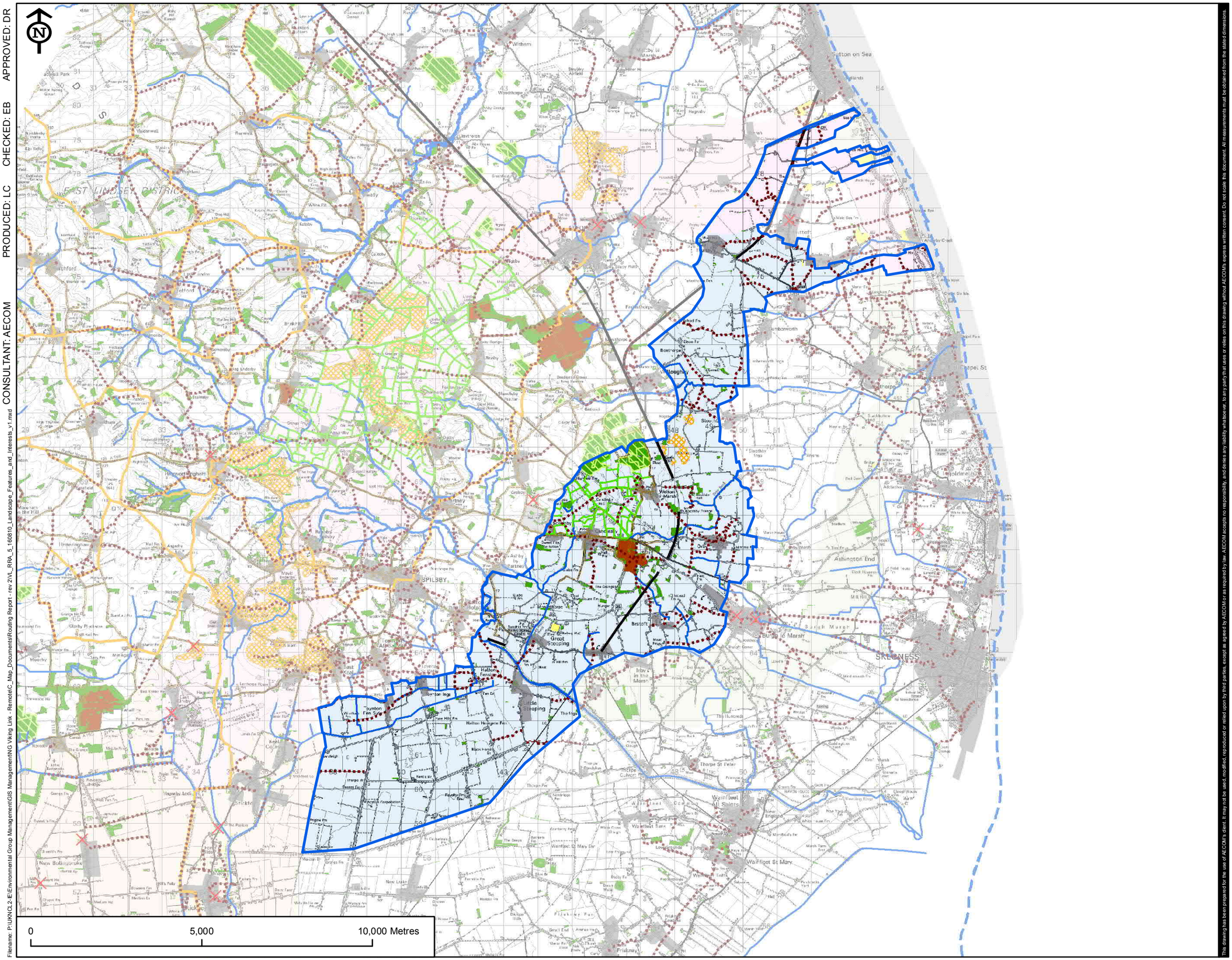

N
EAST LINDSEY DISTRICT
Sutton on Sea
ALFORD
Mablethorpe
Louth
Cumberworth
Ulceby
Ashby
Great Steeping
Little Steeping
Halton Fenside
Burgh le Marsh
SKEGNESS
Ingoldmells
Chapel St
Hogsthorpe
Wainfleet St Mary
Thorpe St Peter
Ashington End
Anderby Creek
Chapel Fen
Burgh Marsh
Bolingbroke
Spilsby
Hundleby
Ingworth Brigham
Wainfleet Tofts
Low Grounds
Flixborough
Fenton
Sturton by Stow
Stow
Willoughby
Sloothby
Alford
Bilsby
Marsh
Strubby
Withern
Mablethorpe
Theddlethorpe
Saltfleet
Skidbrooke
Tetford
Belchford
Hemingby
Langton
Fordington
Ferminsby
Sausthorpe
Stainsby
Ashby by Partney
Scrivelsby
Dalby
Maidenwell
Raithby
Mareham le Fen
Boston
Fishtoft
Frithville
Wainfleet Bank
Low Grounds
Thorpe Culvern
Hundleby
Old Bolingbroke
Toynton All Saints
Toynton Fen Side
Toynton Fen Side
Toynton Hogs
Hallow Hedge Fen
Bleak Hill
Fenton Corporation
Fenton Fen
Fenton Hill
Fenton Fen
Fenton Hill
Fenton Fen
Fenton Hill

APPROVED: DR

CHECKED: EB

PRODUCED: LC

CONSULTANT: AECOM



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VikingLink

LEGEND

Cable Route Corridor

- B
- Historic Windmill
- Public Rights of Way
- Proposed England Coast Path National Trail
- Long Distance Route
- Disused Railway Line
- AONB Hedgerow
- Main Rivers, Drains and Chalk Streams
- AONB/AGLV Roadside Verge
- Ancient Woodland
- Urban Region
- Caravan Park
- Ridges and High Points
- Woodland
- Registered Park and Garden
- Local Nature Reserve

REVISION:

REV.	DATE	DESCRIPTION
1	10/08/16	ORIGINAL ISSUE

FIGURE NO.

VL_160810_RRA_B5

FIGURE TITLE

FIGURE B5
LANDSCAPE FEATURES AND INTERESTS

SHEET NUMBER

1 of 1

NOTES

Date: 10/08/16

Scale at A3: 1:100,000

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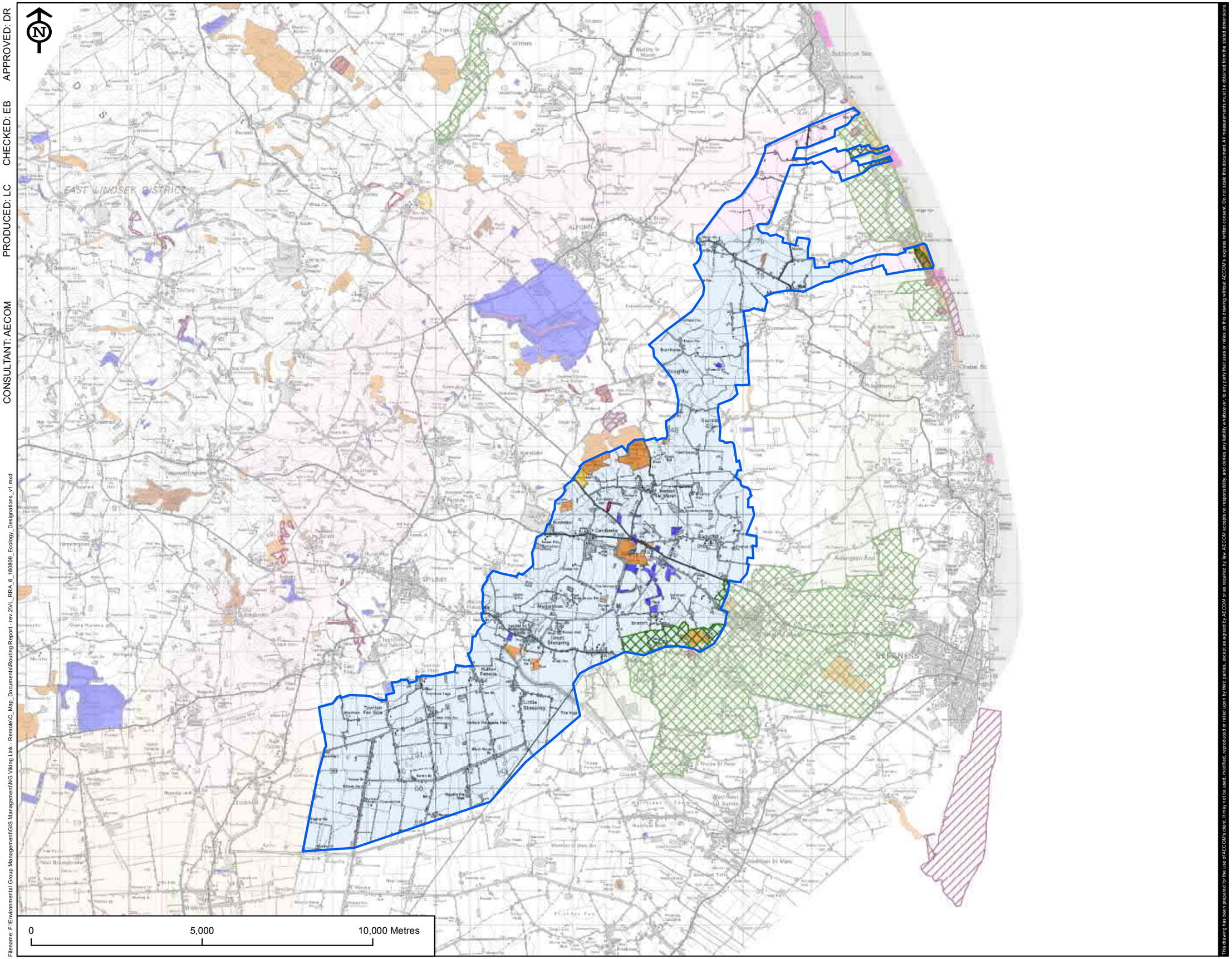

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VikingLink

LEGEND

Cable Route Corridor

- B
- Special Protection Area
- Special Area of Conservation
- Site of Special Scientific Interest
- Coastal Grazing Marsh
- Local Geological Site
- Local Wildlife Site
- Lincolnshire Wildlife Trust
- Regionally Important Geological/Geomorpholo... Site
- Roadside Nature Reserve
- Site of Nature Conservation Importance

REVISION:

REV.	DATE	DESCRIPTION
1	09/08/16	ORIGINAL ISSUE

FIGURE NO.

VL_160809_RRA_B6

FIGURE TITLE

FIGURE B6
ECOLOGY
DESIGNATIONS

SHEET NUMBER

1 of 1

NOTES

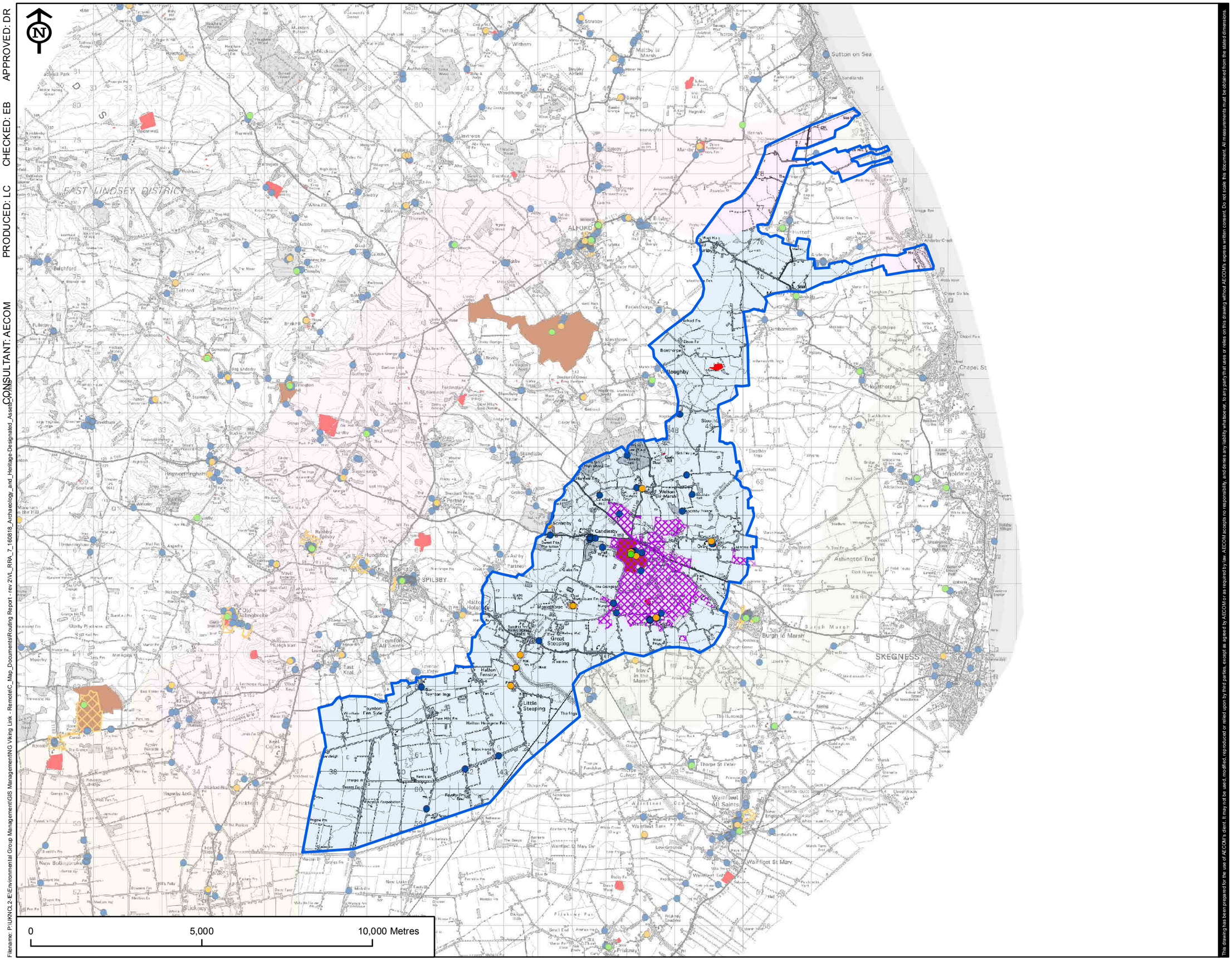
Date:	Scale at A3:
09/08/16	1:100,000

APPROVED: DR

CHECKED: EB

PRODUCED: LC

CONSULTANT: AECOM



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VikingLink

LEGEND

Cable Route Corridor

- B

Grade

- Grade I
- Grade II*
- Grade II
- Conservation Area
- National Trust Estate Land
- Scheduled Monument
- Registered Park and Garden

REVISION:

REV.	DATE	DESCRIPTION
1	18/08/16	ORIGINAL ISSUE

FIGURE NO.

VL_160818_RRA_B7

FIGURE TITLE

FIGURE B7
ARCHAEOLOGY AND HERITAGE DESIGNATED ASSTES

SHEET NUMBER

1 of 1

NOTES

Date: 18/08/16

Scale at A3: 1:100,000

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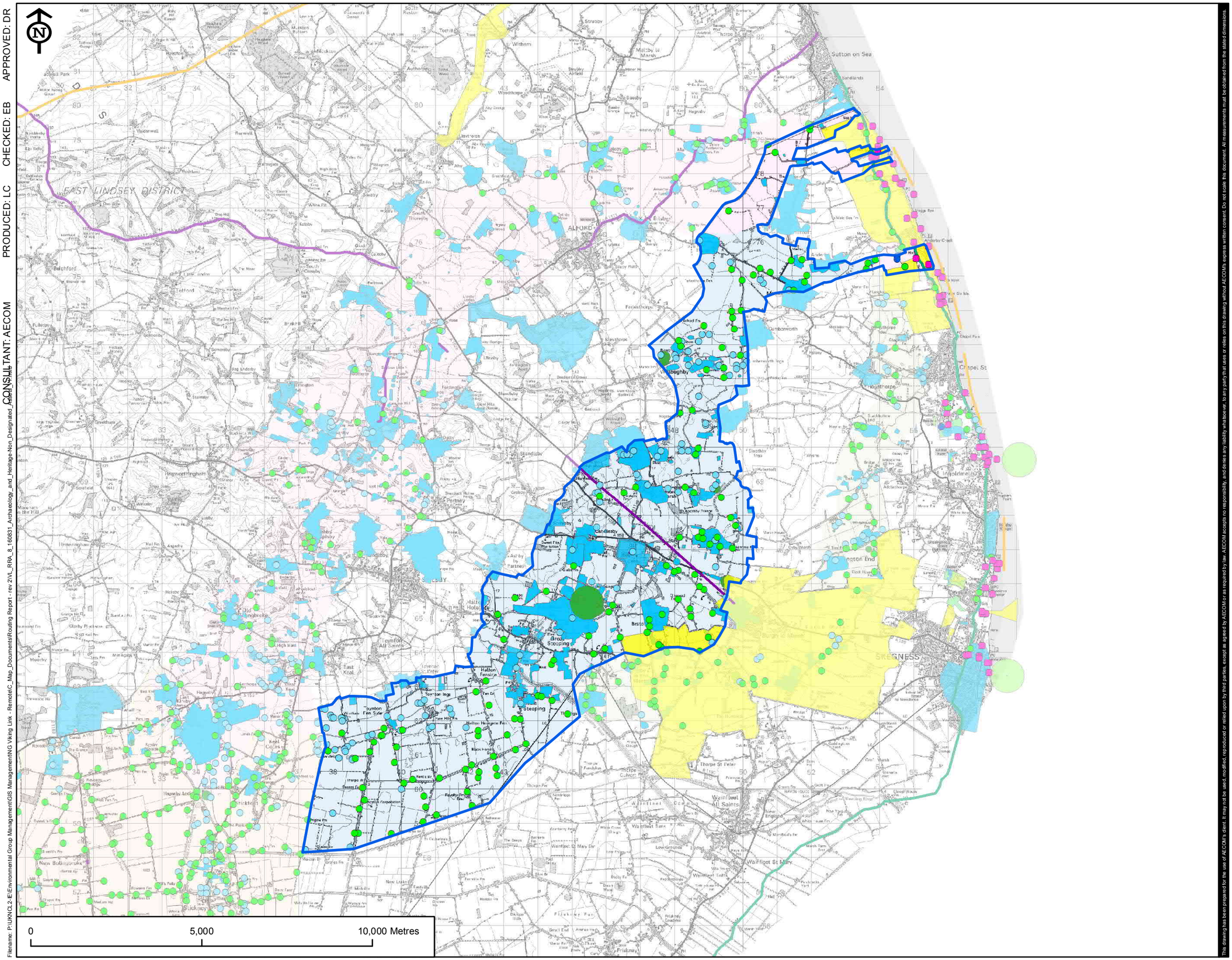
CONSULTANT: AECOM



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VikingLink

LEGEND

Cable Route Corridor

- B
- Historic England Archive - Event Point
- Historic England Archive - Monument Point
- Historic England Archive - Monument Line
- Historic England Archive - Monument Polygon
- HER - Farms Point
- HER - Events Point
- HER - Events Line
- HER - Events Region
- HER - Monument Point
- HER - Monument Line
- HER - Monument Ellipse
- HER - Monument Region

REVISION:

REV.	DATE	DESCRIPTION
1	31/08/16	ORIGINAL ISSUE

FIGURE NO.

VL_160831_RRA_B8

FIGURE TITLE

FIGURE B8
ARCHAEOLOGY AND HERITAGE
NON-DESIGNATED ASSTES

SHEET NUMBER

1 of 1

NOTES

Date:	Scale at A3:
31/08/16	1:100,000

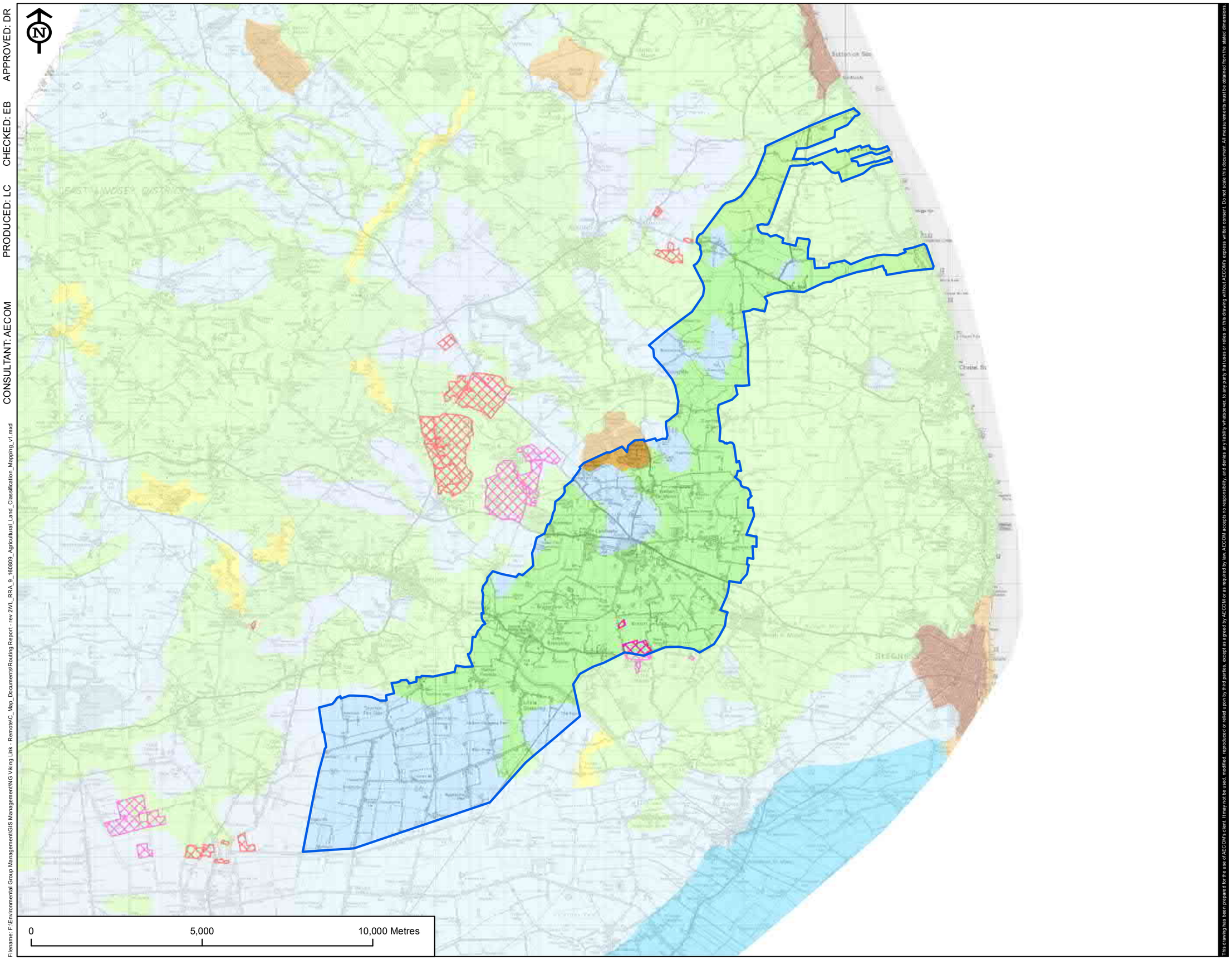
APPROVED: DR

CHECKED: EB

PRODUCED: LC

CONSULTANT: AECOM

Filename: F:\Environmental Group Management\GIS Management\NG Viking Link - Remote\C_Map_Documents\Routing Report - rev 2\VL_RRA_9_160809_Agricultural_Land_Classification_Mapping_v1.mxd



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VikingLink

LEGEND

Cable Route Corridor

- B
- Grade 1
- Grade 2
- Grade 3
- Grade 4
- Non Agricultural
- Urban
- Organic Entry Level Stewardship
- Organic Entry Level plus Higher Level Stewardship

REVISION:

REV.	DATE	DESCRIPTION
1	09/08/16	ORIGINAL ISSUE

FIGURE NO.

VL_160809_RRA_B9

FIGURE TITLE

FIGURE B9
AGRICULTURAL LAND CLASSIFICATION MAPPING

SHEET NUMBER

1 of 1

NOTES

Date: 09/08/16

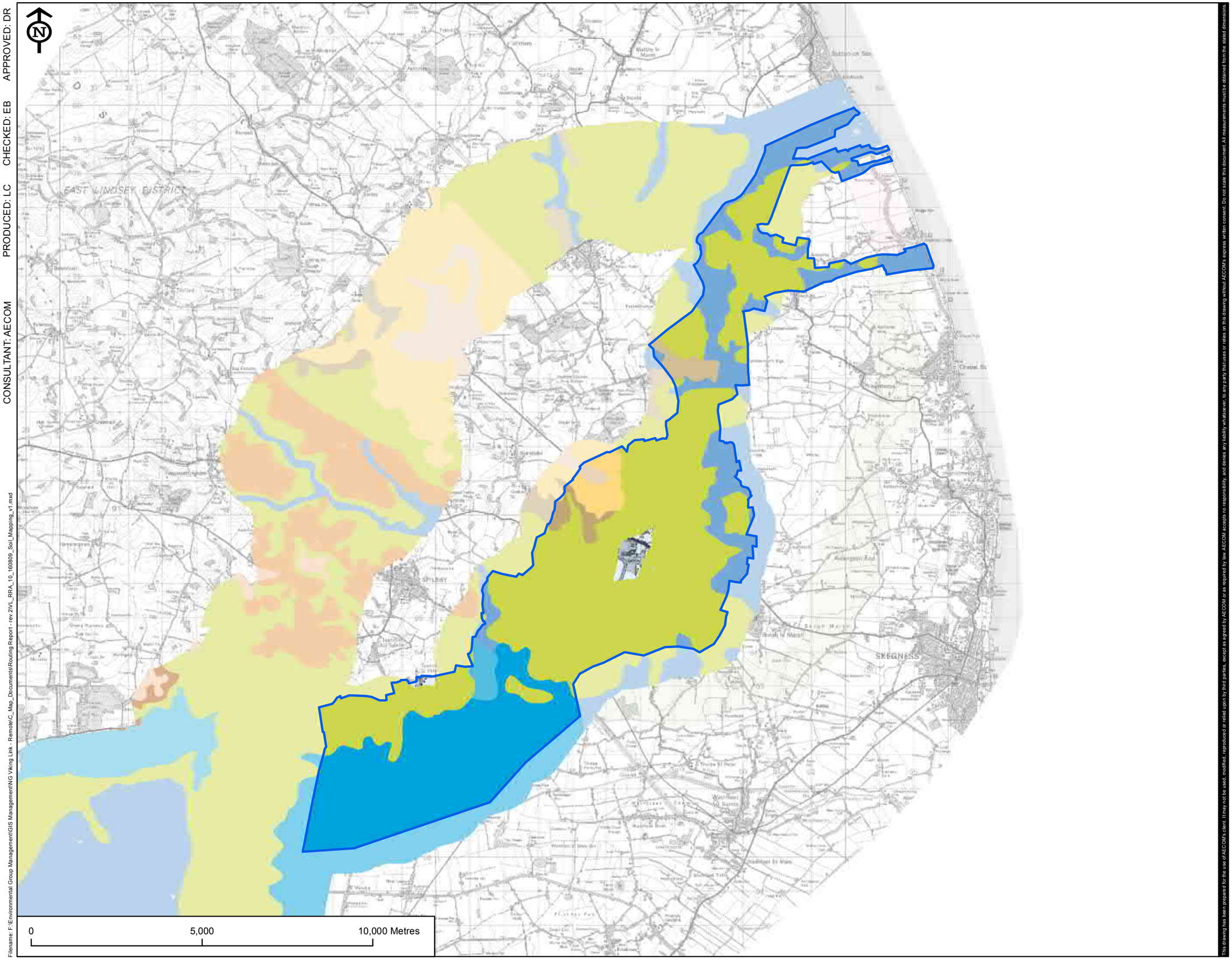
Scale at A3: 1:100,000

APPROVED: DR

CHECKED: EB

PRODUCED: LC

CONSULTANT: AECOM



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VikingLink

LEGEND

Cable Route Corridor

- B
- 343h
- 511e
- 513
- 541r
- 543
- 544
- 551c
- 571n
- 711f
- 711m
- 711s
- 711u
- 812b
- 813c
- 813g
- 821b
- 851a
- 851b
- Lake

REVISION:

REV.	DATE	DESCRIPTION
1	09/08/16	ORIGINAL ISSUE

FIGURE NO.

VL_160809_RRA_B10

FIGURE TITLE

FIGURE B10
SOIL MAPPING

SHEET NUMBER

1 of 1

NOTES

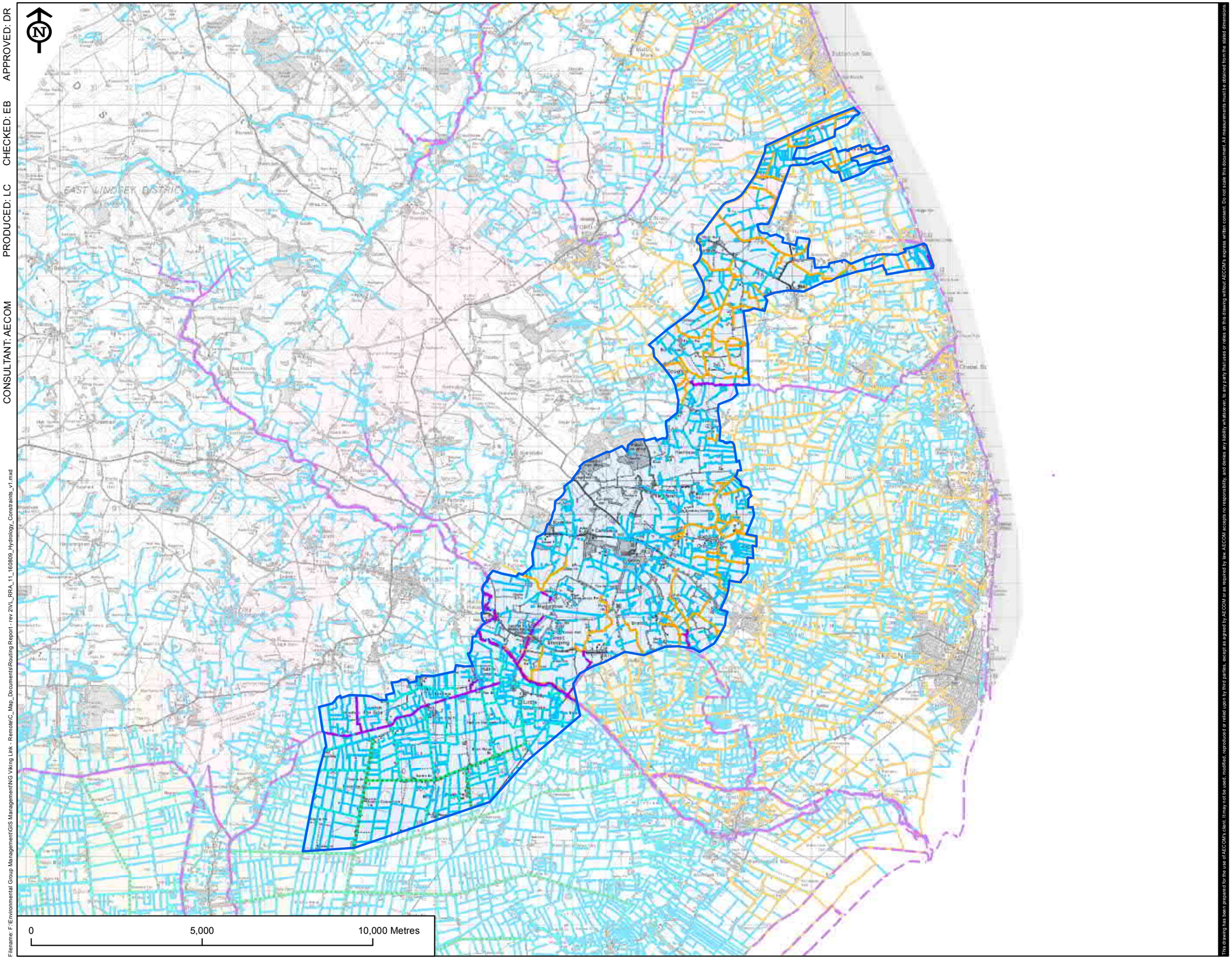
Date:	Scale at A3:
09/08/16	1:100,000

APPROVED: DR

CHECKED: EB

PRODUCED: LC

CONSULTANT: AECOM



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VikingLink

LEGEND

Cable Route Corridor

- B
- Environment Agency Flood Defence
- Lindsey Marsh DB - Maintained Watercourse
- Witham Forth District IDB - Combined Sewer
- Witham Forth District IDB - Drain
- Watercourse / Water Feature

REVISION:

REV.	DATE	DESCRIPTION
1	09/08/16	ORIGINAL ISSUE

FIGURE NO.

VL_160809_RRA_B11

FIGURE TITLE

FIGURE B11
HYDROLOGY
CONSTRAINTS

SHEET NUMBER

1 of 1

NOTES

Date: 09/08/16

Scale at A3: 1:100,000

APPROVED: DR

CHECKED: EB

PRODUCED: LC

CONSULTANT: AECOM

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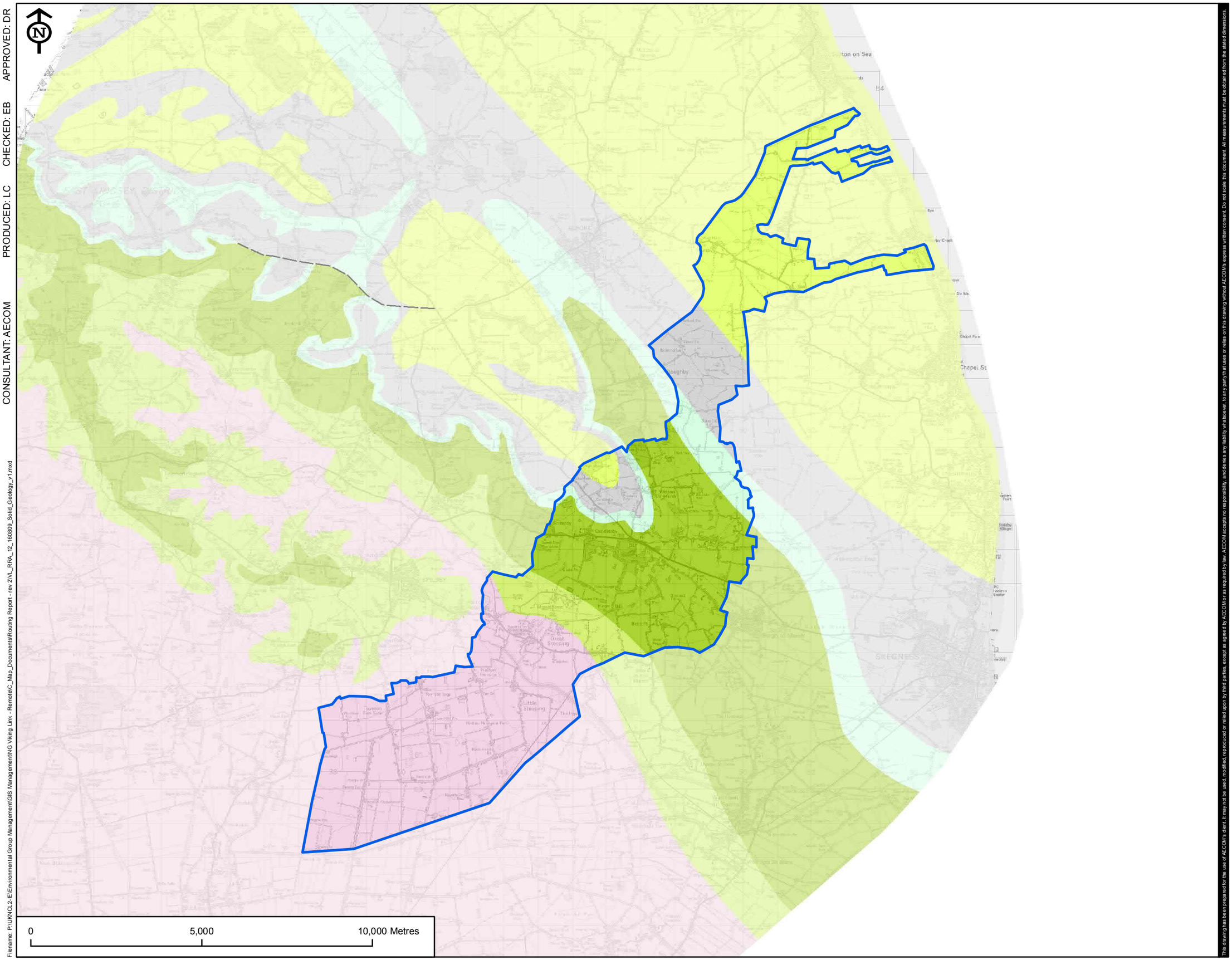

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VikingLink

LEGEND

Cable Route Corridor

- B
- Fault at rockhead
- Grey Chalk Subgroup - Chalk
- White Chalk Subgroup - Chalk
- Lower Greensand Group - Sandstone and Mudstone
- Wealden Group - Mudstone, Siltstone and Sandstone
- Wealden Group - Sandstone and Siltstone, Interbedded
- West Walton Formation, Ampthill Clay Formation and Kimmeridge Clay Formation (Undifferentiated) - Mudstone, Siltstone and Sandstone

REVISION:

REV.	DATE	DESCRIPTION
1	09/08/16	ORIGINAL ISSUE

FIGURE NO.

VL_160809_RRA_B12

FIGURE TITLE

FIGURE B12
SOLID GEOLOGY

SHEET NUMBER

1 of 1

NOTES

Date: 09/08/16

Scale at A3: 1:100,000

APPROVED: DR

CHECKED: EB

PRODUCED: LC

CONSULTANT: AECOM

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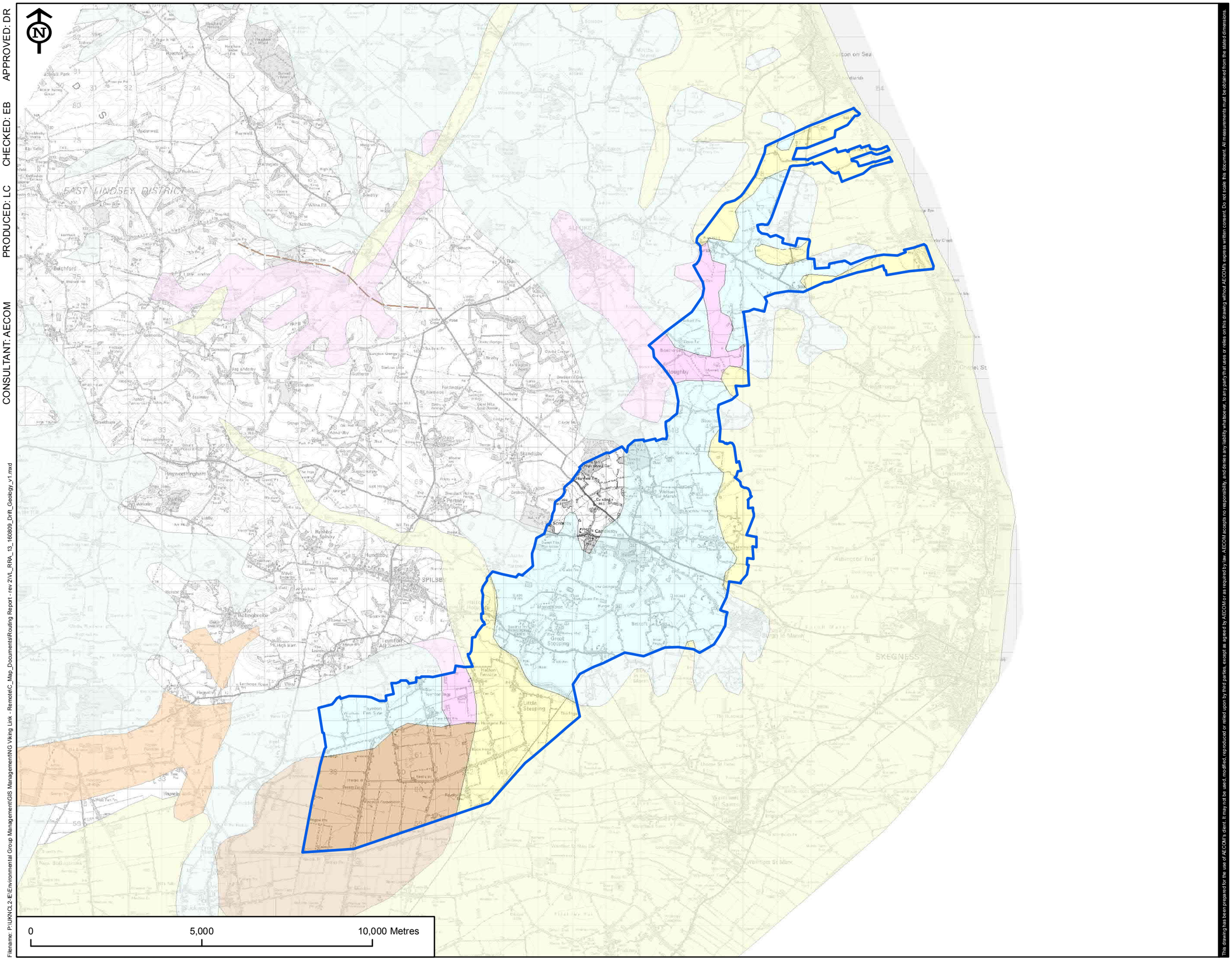

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VikingLink

LEGEND

Cable Route Corridor

- B
- Fault at rockhead
- Alluvium
- Glacial Sand and Gravel
- Peat
- River Terrace Deposits (Undifferentiated)
- Till

REVISION:

REV.	DATE	DESCRIPTION
1	09/08/16	ORIGINAL ISSUE

FIGURE NO.

VL_160809_RRA_B13

FIGURE TITLE

FIGURE B13
DRIFT GEOLOGY

SHEET NUMBER

1 of 1

NOTES

Date: 09/08/16

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APPROVED: DR

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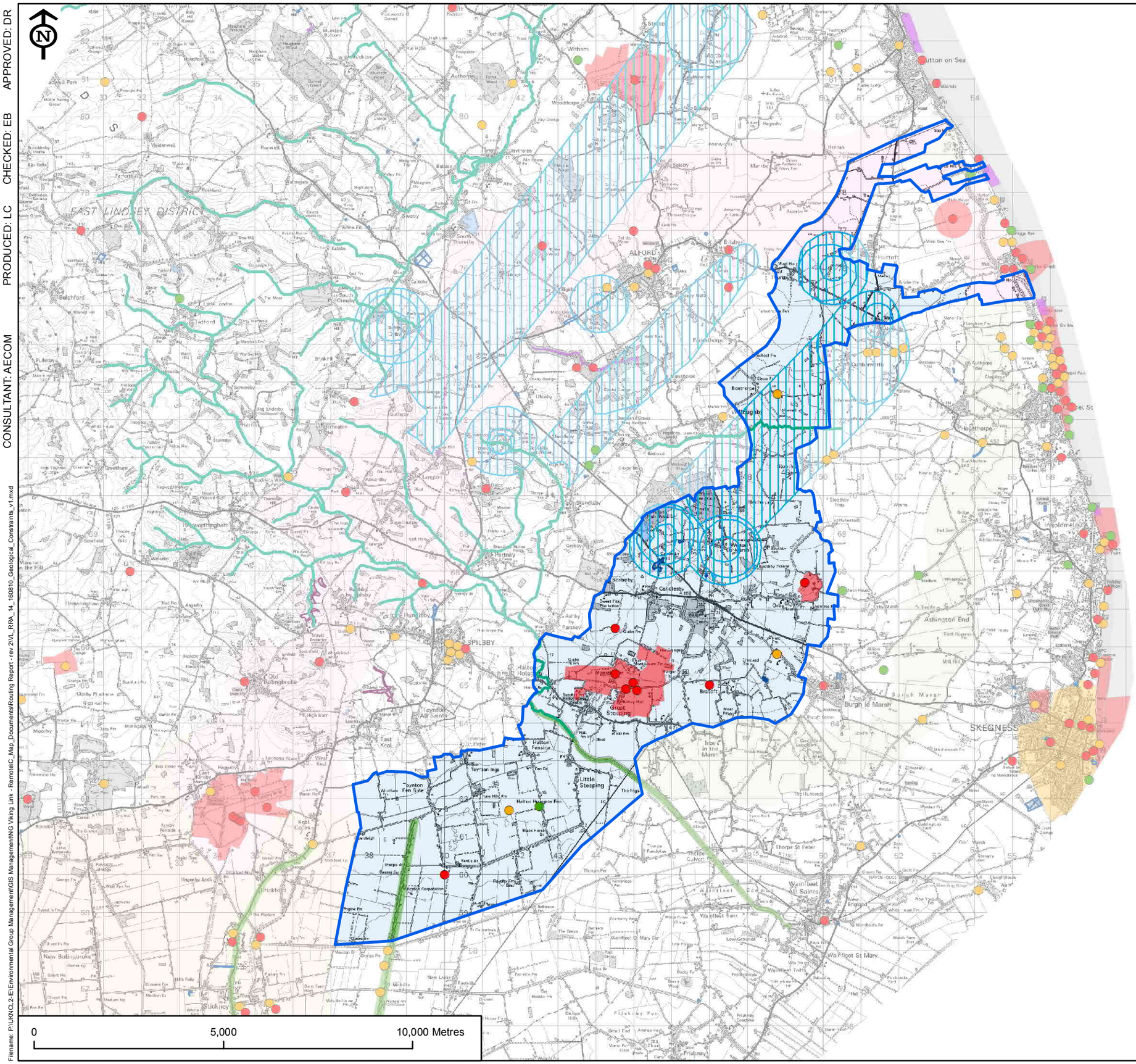
CONSULTANT: AECOM



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VikingLink

LEGEND

Cable Route Corridor

- B

UXO Hazards and Constraints

- High Risk
- Moderate Risk
- Low Risk
- High Risk
- Moderate Risk
- Low Risk
- Chalk River
- Landfill Site
- Geological Site of Special Scientific Interest
- Local Geological Site
- Regionally Important Geological/Geomorpholo... Site
- Groundwater Source Protection Zone

REVISION:

REV.	DATE	DESCRIPTION
1	10/08/16	ORIGINAL ISSUE

FIGURE NO.

VL_160810_RRA_B14

FIGURE TITLE

FIGURE B14
GEOLOGICAL
CONSTRAINTS

SHEET NUMBER

1 of 1

NOTES

Date: 10/08/16

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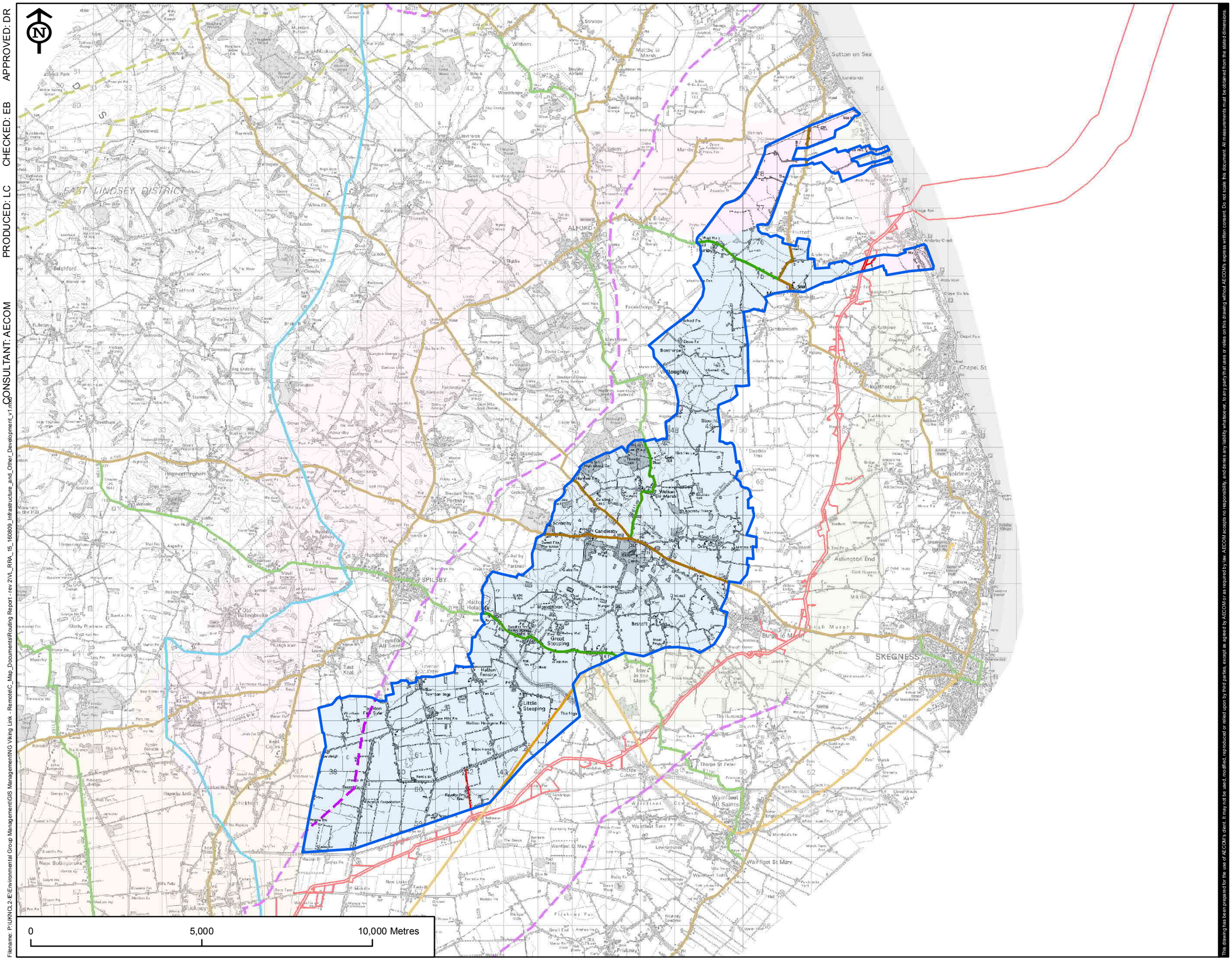

N
EAST LINDSEY DISTRICT
Sutton on Sea
Mablethorpe
Ingoldmells
Chapel St Leonards
Skegness
Burgh le Marsh
Ashington End
Anderby Creek
Alford
Ailby
Bilsby
Hildenborough
Cumberworth
Ferlesthorpe
Bonthorpe
Ploughby
Sloothby
Welton le Marsh
Scrivelsby
Candlesby
Orby
Bristoff
Great Steeping
Little Steeping
Halton Fenside
Toynton All Saints
Toynton Fen Side
Toynton Fen Side
Toynton Fen Side

Route Corridor C – Thematic Constraints Plans

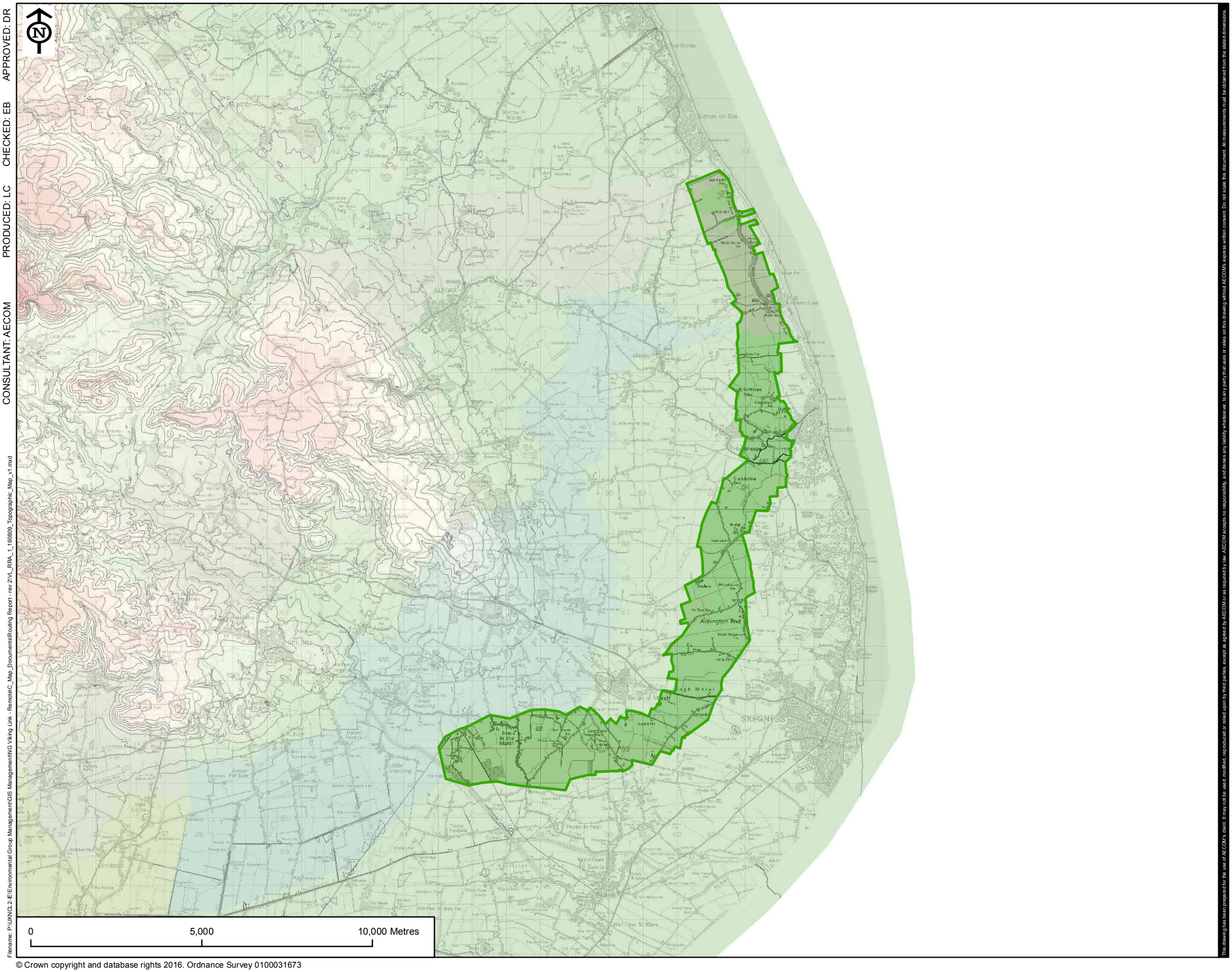
Table 3 Route Corridor C Thematic Constraints Plans	
Figure No.	**Figure Title**
C1	Topographic Map
C2	Settlement and Tourism Interests
C3	Landscape Designations
C4	Landscape Character
C5	Landscape Features and Interests
C6	Ecology Designations
C7	Archaeology and Heritage – Designated Assets
C8	Archaeology and Heritage – Non-designated Assets
C9	Agricultural Land Classification Mapping
C10	Soil Mapping
C11	Hydrology Constraints
C12	Solid Geology
C13	Drift Geology
C14	Geological Constraints
C15	Infrastructure and Other Development

APPROVED: DR

CHECKED: EB

PRODUCED: LC

CONSULTANT: AECOM



Filename: P:\UKNCL2-E\Environmental Group Management\GIS Management\NG Viking Link - Remote\C_Map_Documents\Routing Report - rev 2\VL_RRA_1_160809_Topographic_Map_v1.mxd

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VikingLink

LEGEND

Cable Route Corridor

C

10m Contour (OS Terrain 5)

Topography

High : 149.68m

Low : 0m

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1	09/08/16	ORIGINAL ISSUE

FIGURE NO.

VL_160809_RRA_C1

FIGURE TITLE

FIGURE C1
TOPOGRAPHIC MAP

SHEET NUMBER

1 of 1

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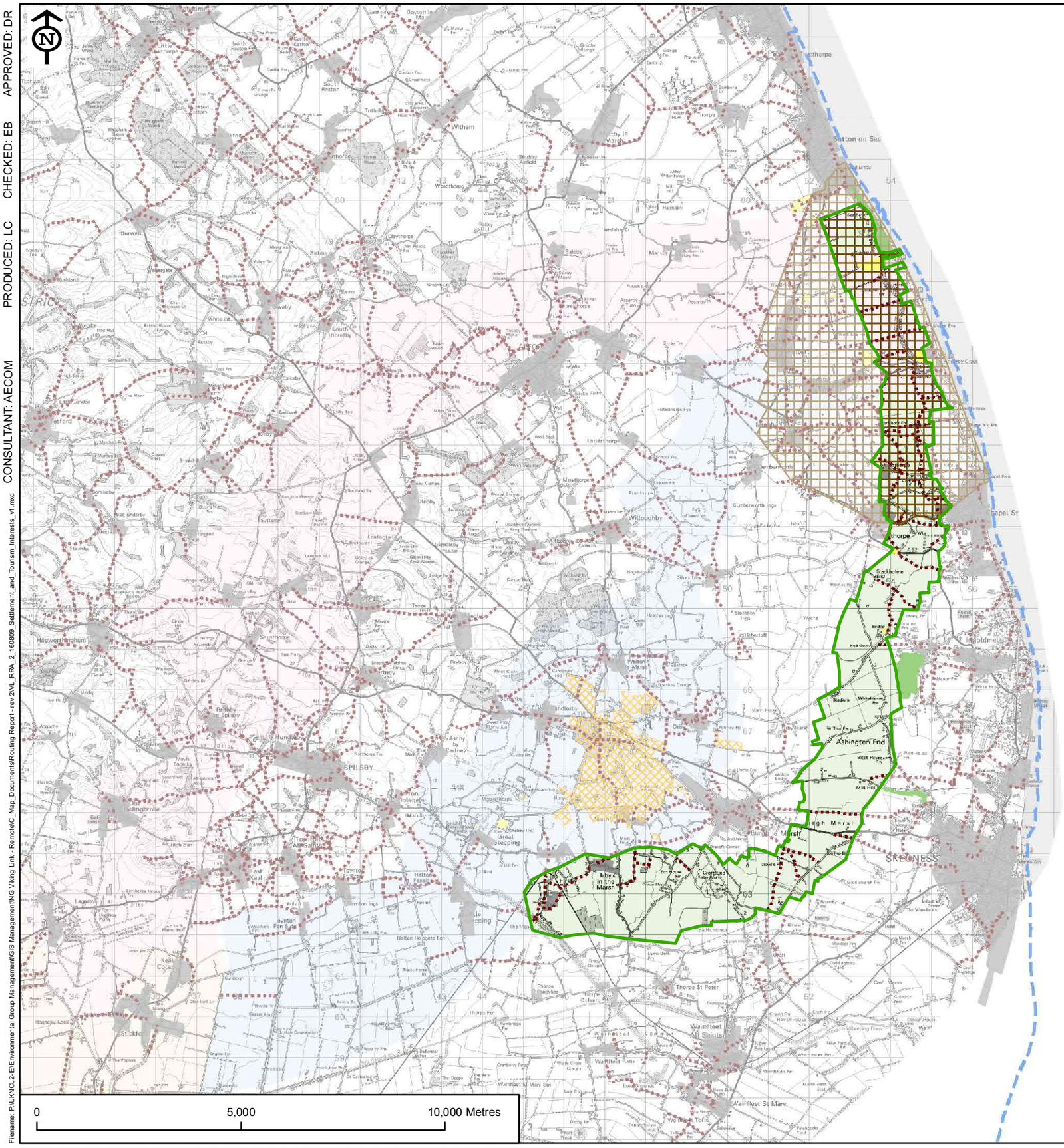

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VikingLink

LEGEND

Cable Route Corridor

- C
- Public Right of Way
- Sustrans National Cycle Route
- Proposed England Coast Path National Trail
- National Trust Land Ownership
- Lincolnshire Coastal Country Park
- Golf Course
- Caravan Park
- Urban Region

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FIGURE NO.

VL_160809_RRA_C2

FIGURE TITLE

FIGURE C2
SETTLEMENT AND TOURISM INTERESTS

SHEET NUMBER

1 of 1

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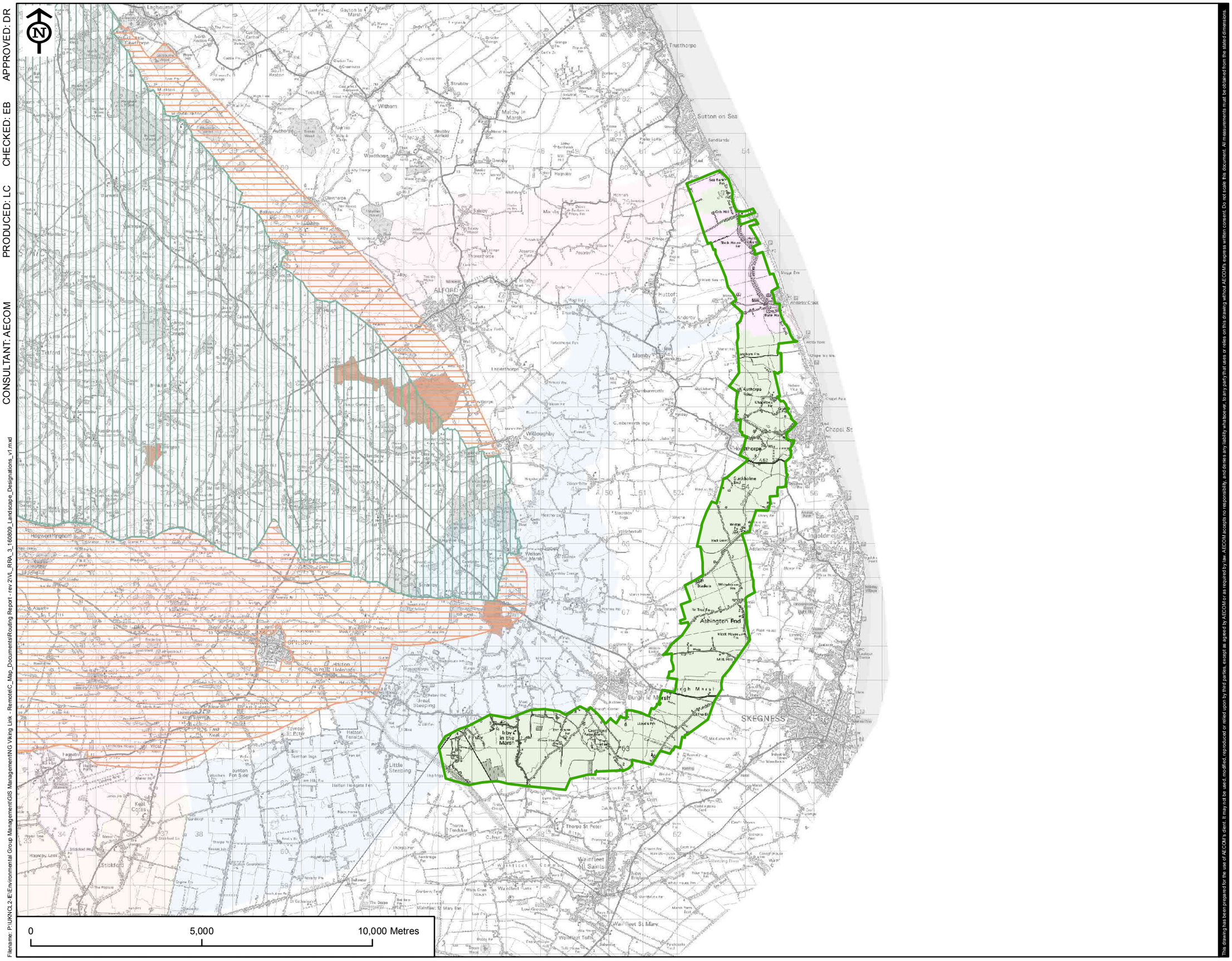

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VikingLink

LEGEND

Cable Route Corridor

- C
- Area of Outstanding Natural Beauty
- Area of Great Landscape Value
- Registered Park and Garden

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FIGURE NO.

VL_160809_RRA_C3

FIGURE TITLE

FIGURE C3
LANDSCAPE
DESIGNATIONS

SHEET NUMBER

1 of 1

NOTES

Date: 09/08/16

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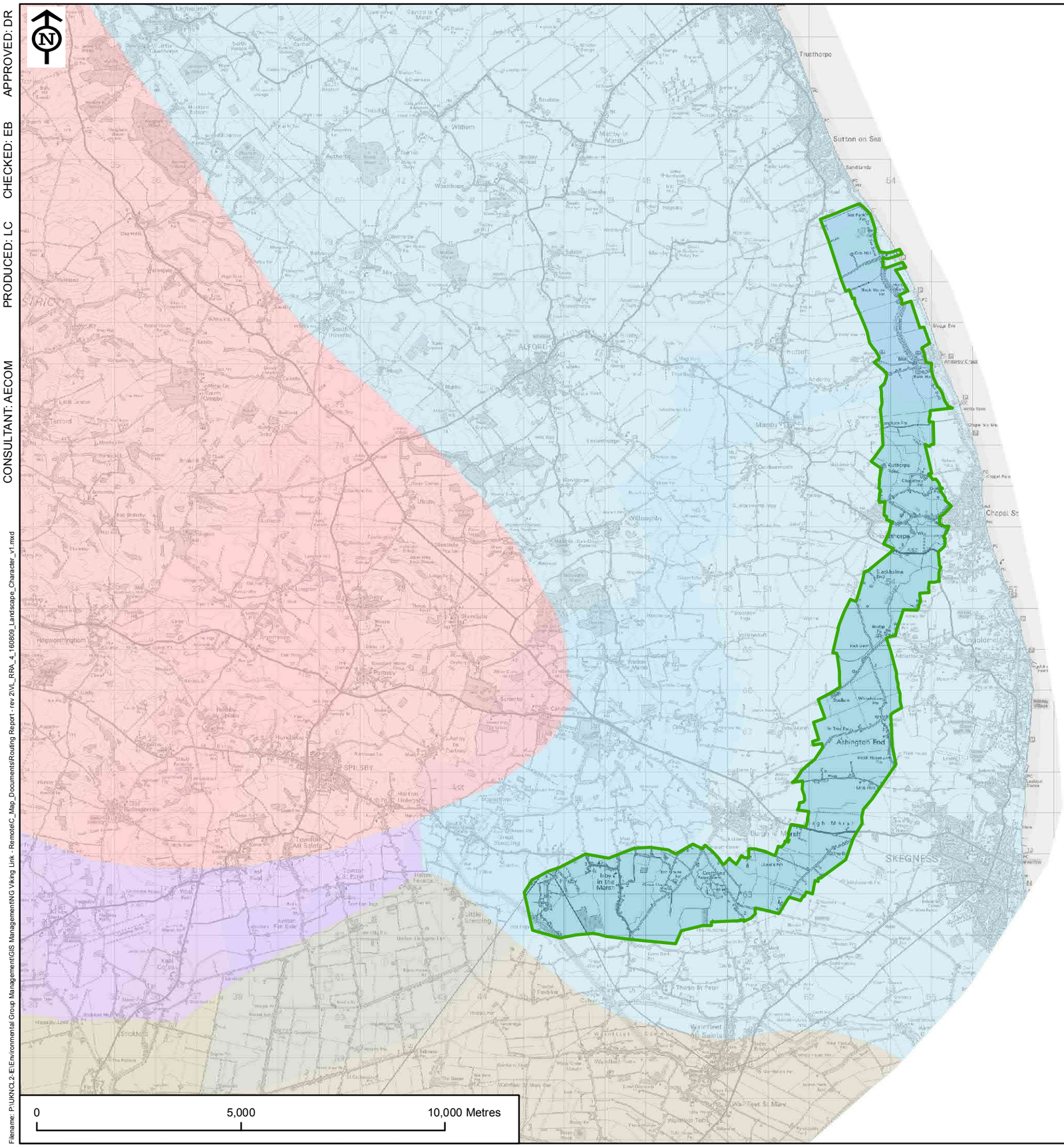

0 5,000 10,000 Metres

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VikingLink

LEGEND

Cable Route Corridor

- C

National Character Area

- Lincolnshire Coast and Marshes
- Lincolnshire Wolds
- Lincolnshire and Rutland Limestone
- North Lincolnshire Coversands and Clay Vales
- The Fens

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FIGURE NO.

VL_160809_RRA_C4

FIGURE TITLE

FIGURE C4
LANDSCAPE
CHARACTER

SHEET NUMBER

1 of 1

NOTES

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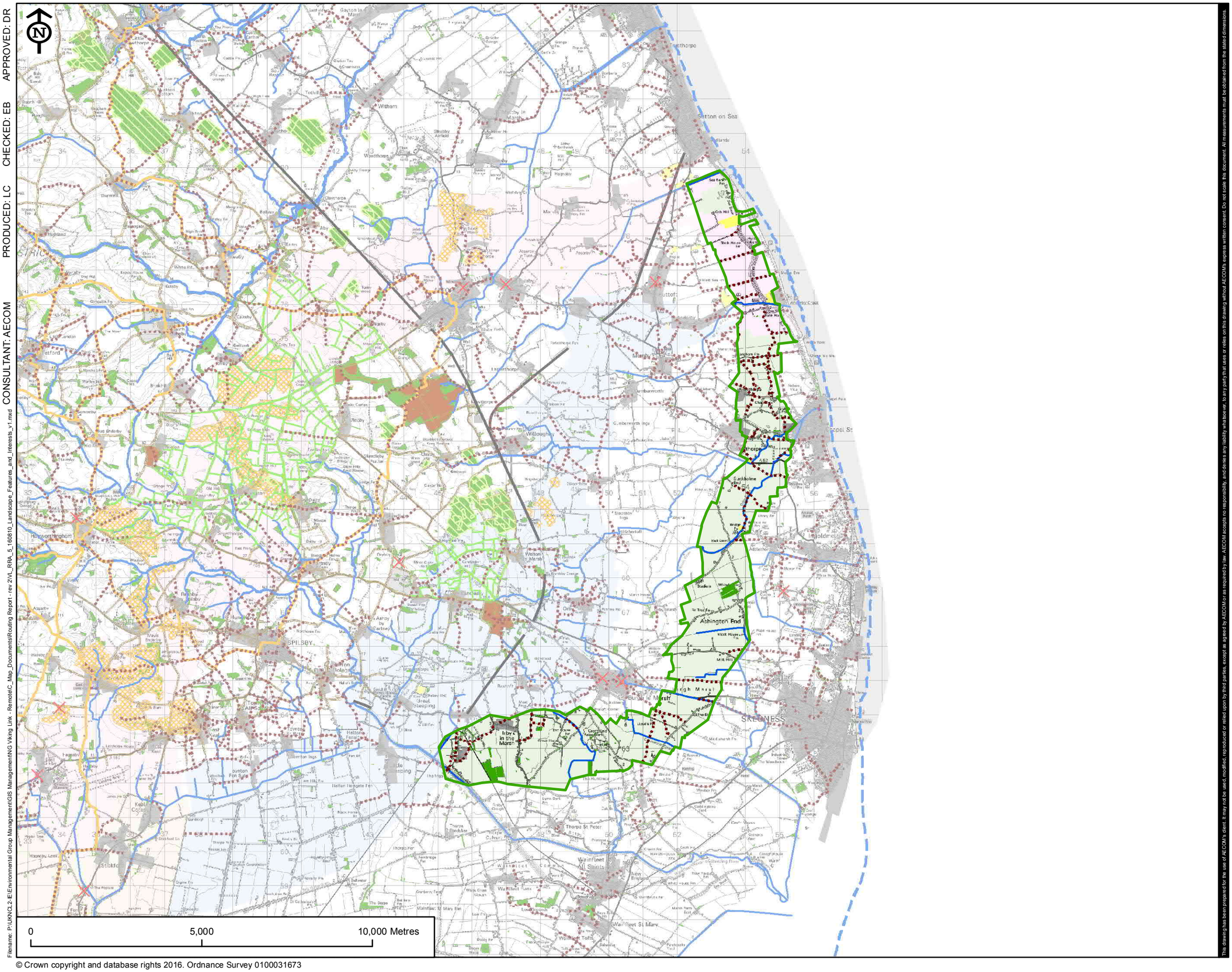

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VikingLink

LEGEND

Cable Route Corridor

- C
- Historic Windmill
- Public Rights of Way
- Proposed England Coast Path National Trail
- Long Distance Route
- Disused Railway Line
- AONB Hedgerow
- Main Rivers, Drains and Chalk Streams
- AONB/AGLV Roadside Verge
- Ancient Woodland
- Urban Region
- Caravan Park
- Ridges and High Points
- Woodland
- Registered Park and Garden
- Local Nature Reserve

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1	10/08/16	ORIGINAL ISSUE

FIGURE NO.

VL_160810_RRA_C5

FIGURE TITLE

FIGURE C5
LANDSCAPE FEATURES AND INTERESTS

SHEET NUMBER

1 of 1

NOTES

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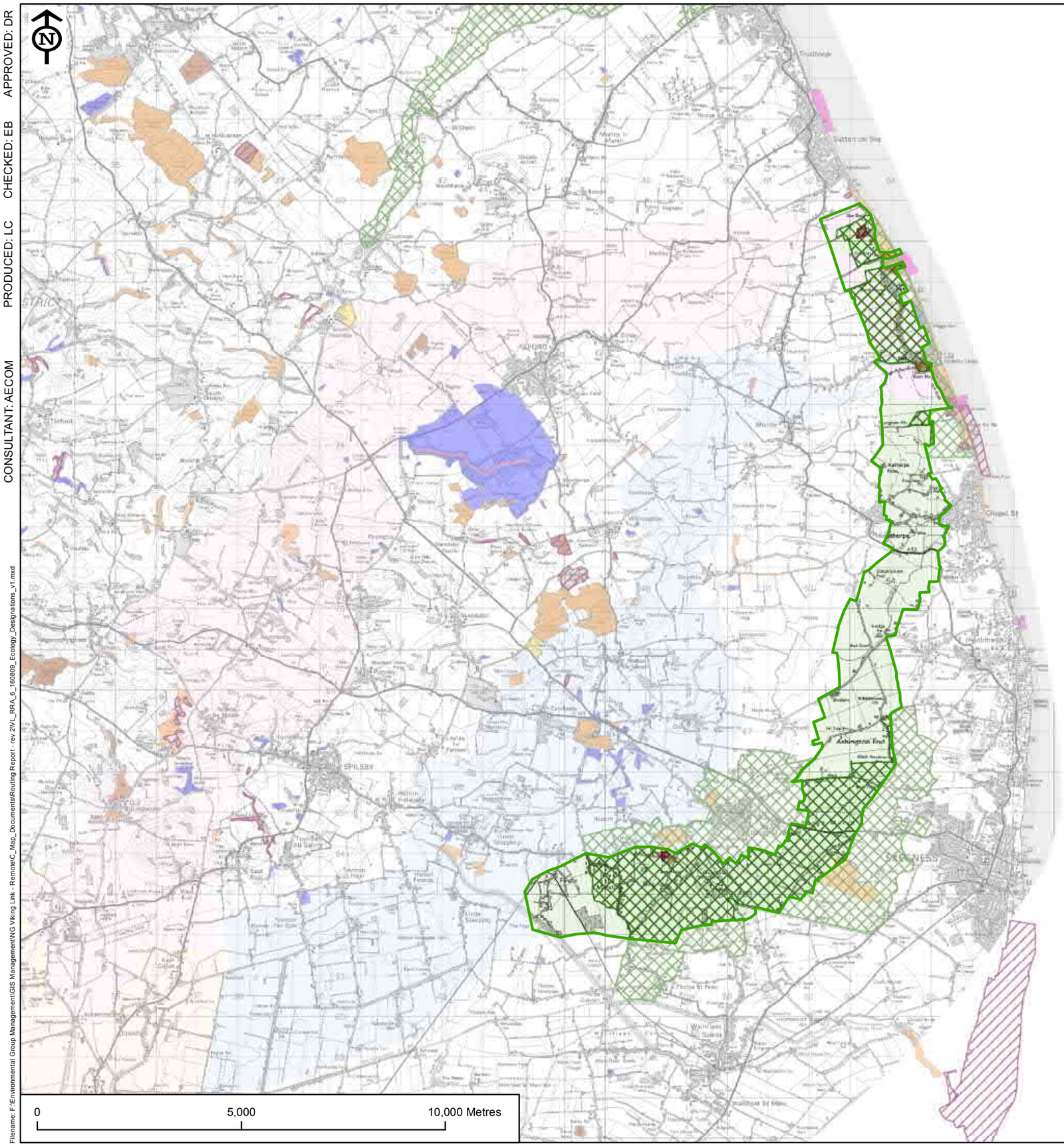

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VikingLink

LEGEND

Cable Route Corridor

- C
- Special Protection Area
- Special Area of Conservation
- Site of Special Scientific Interest
- Coastal Grazing Marsh
- Local Geological Site
- Local Wildlife Site
- Lincolnshire Wildlife Trust
- Regionally Important Geological/Geomorpholo... Site
- Roadside Nature Reserve
- Site of Nature Conservation Importance

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FIGURE NO.

VL_160809_RRA_C6

FIGURE TITLE

FIGURE C6
ECOLOGY
DESIGNATIONS

SHEET NUMBER

1 of 1

NOTES

Date: 09/08/16

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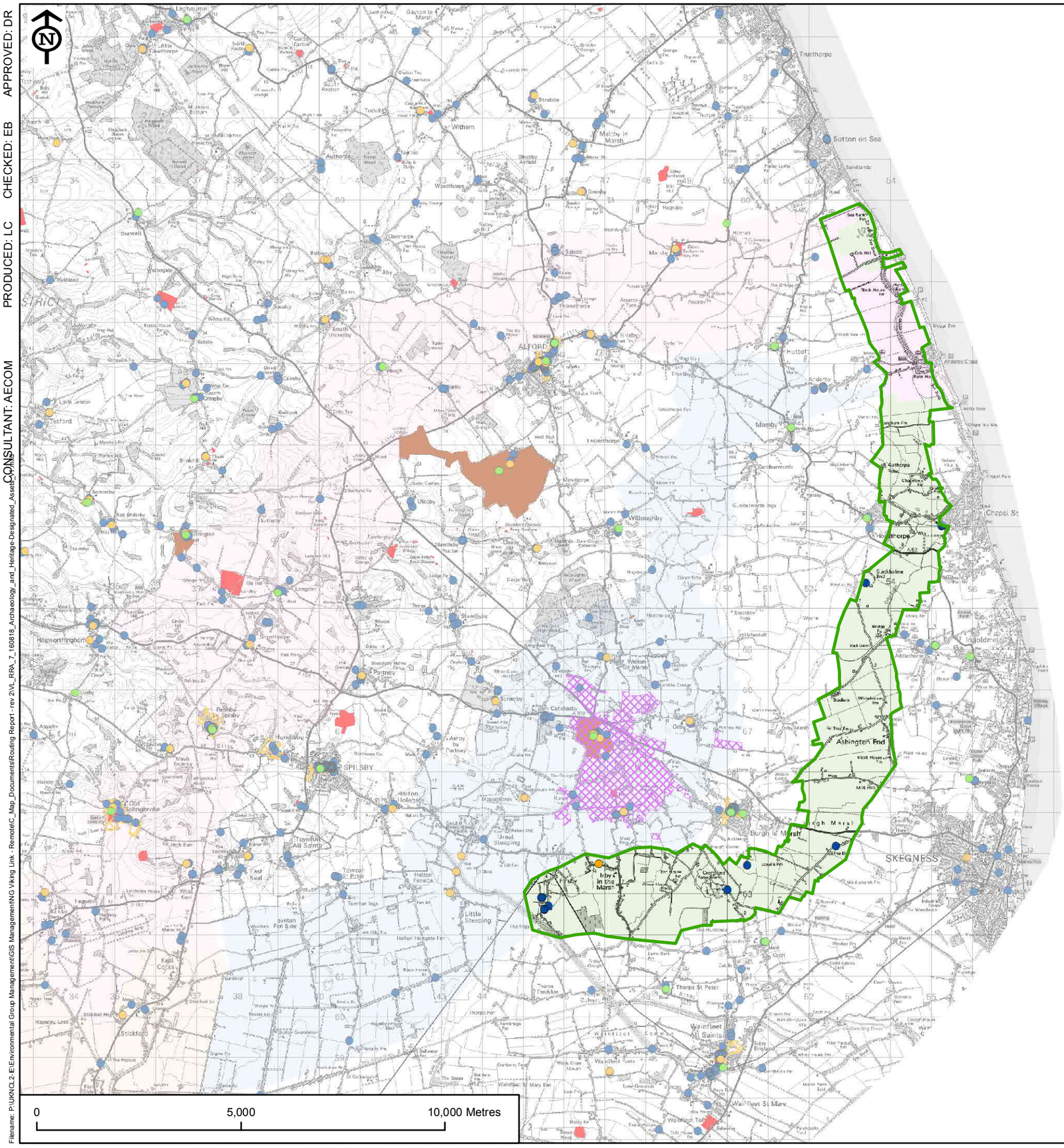
CHECKED: EB

PRODUCED: LC

CONSULTANT: AECOM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Mablethorpe
Trusthorpe
Alford
Huttoft
Anderby
Chapel St Leonards
Ingoldmells
Skegness
Ashington End
Burgh le Marsh
Orby
Croft
Thorpe St Peter
Wainfleet All Saints
Wainfleet St Mary
Spilsby
Halton Holegate
Toynton All Saints
Toynton St Peter
Little Steeping
Great Steeping
Hogsthorpe
Willoughby
Witham
Stickford
Keal Cotes
Old Bolingbroke
Hundleby
Partney
Scrivelsby
Langton
Tetford
Somersby
Bag Enderby
Tattershall
Coningsby
Mareham le Fen
Hagnaby
Maltby le Marsh
Strubby
Claxby
Thoresway
Saleby
Asgarby
Ulceby
Fordington
Alvingham
Cumberworth
Legbourne
Little Cawthorpe
Gayton le Marsh
Swaby
South Thoresby
Belleau
Aby
Authorpe
Woodthorpe
Driby
Raithby
Hareby
Farlesthorpe
Mumby
Chapel Fen
Sea Dyke Fen
Crab Hill
Sandilands
Mill Hill
Ashington Fen
Wainfleet Fen
Croft Fen
Thorpe Fen
Wainfleet Fen
Low Ground
Wainfleet Tofts
Wainfleet Fen
Wainfleet Fen
Wainfleet Fen

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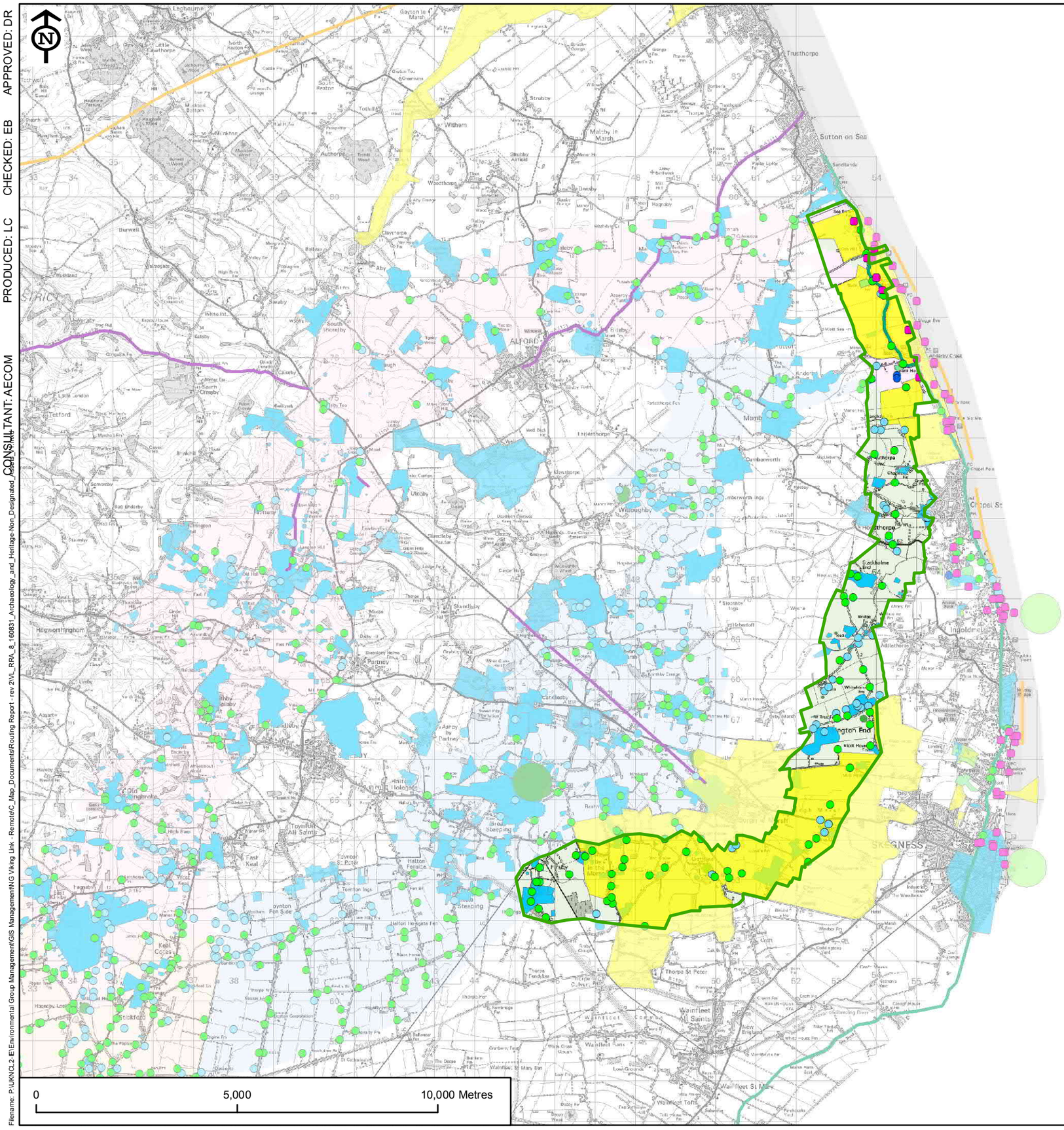
N
Sutton on Sea
Mablethorpe
Trusthorpe
Sandilands
Witham
Maltby le Marsh
Strubby
Authorpe
Woodthorpe
Hagnaby
Claythorpe
Alford
Hilsby
Mumby
Lanesthorpe
Cumberworth
Utoxeter
Willoughby
Chapel St
Ingoldmells
Hogsthorpe
Sandholme End
Wainfleet End
Adlethorpe
Hogsthorpe
Hogsthorpe
Hogsth

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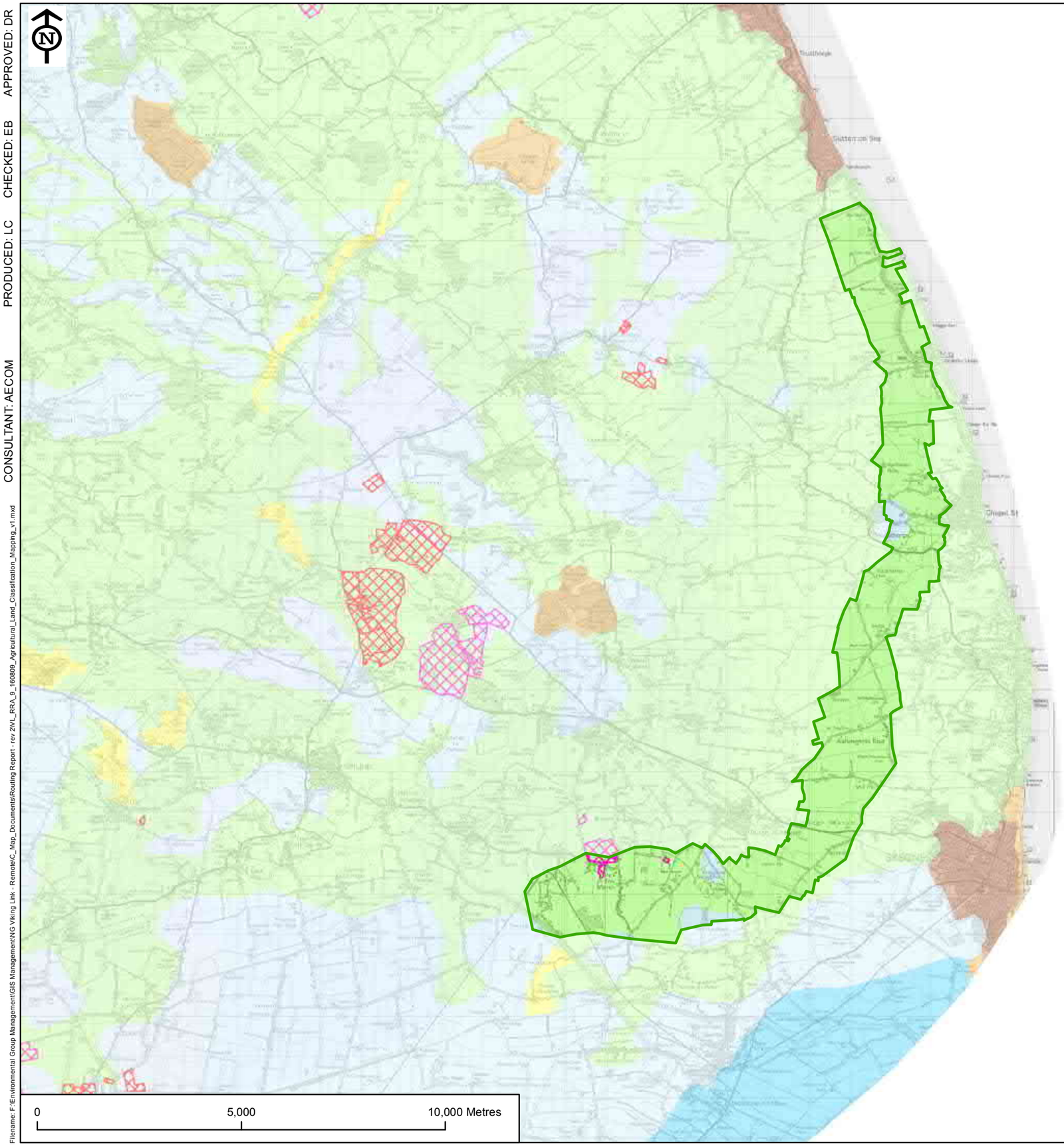

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VikingLink

LEGEND

Cable Route Corridor

- C
- Grade 1
- Grade 2
- Grade 3
- Grade 4
- Non Agricultural
- Urban
- Organic Entry Level Stewardship
- Organic Entry Level plus Higher Level Stewardship

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FIGURE NO.

VL_160809_RRA_C9

FIGURE TITLE

FIGURE C9
AGRICULTURAL LAND CLASSIFICATION MAPPING

SHEET NUMBER

1 of 1

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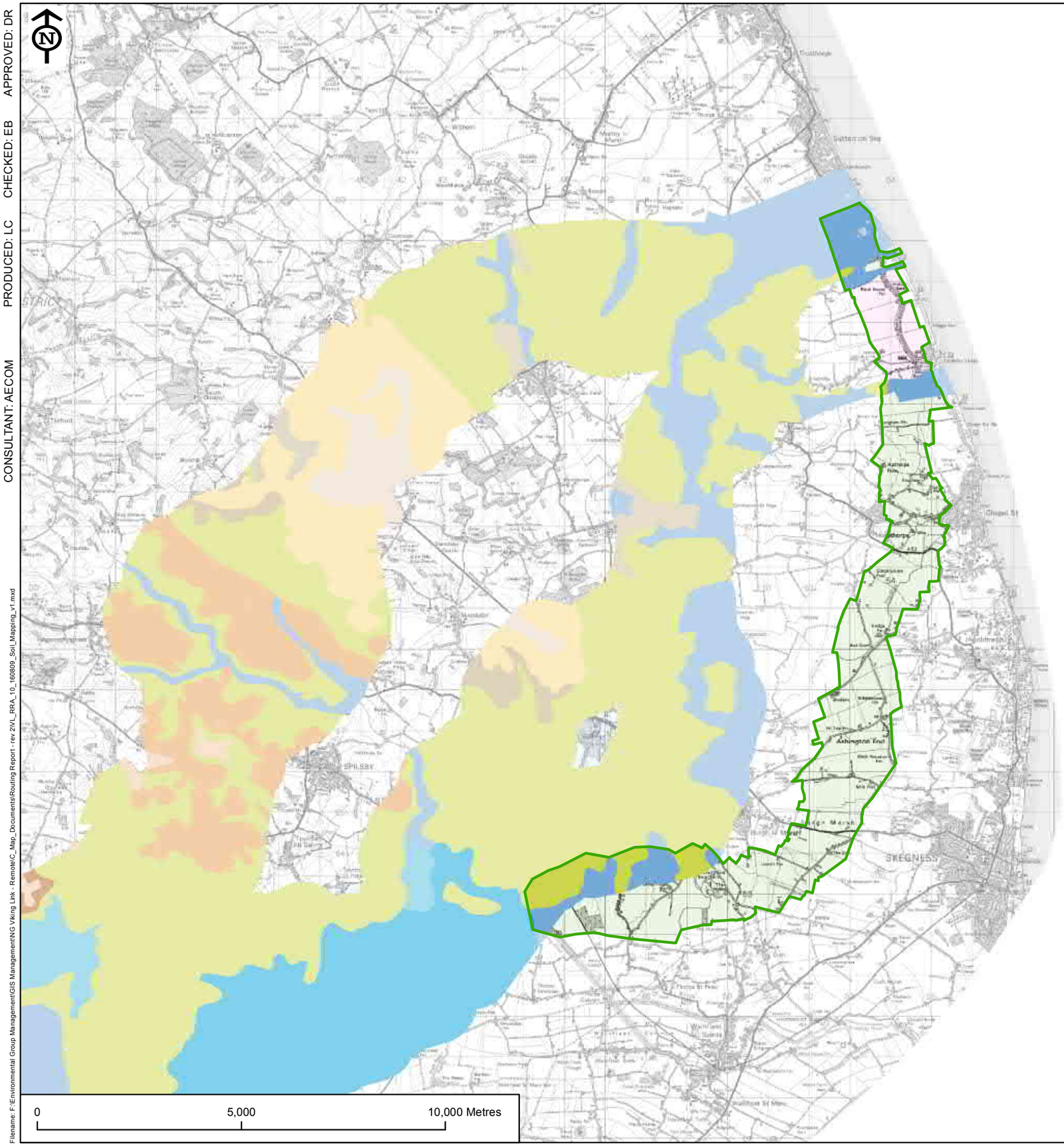

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VikingLink

LEGEND

Cable Route Corridor

- C
- 343h
- 511e
- 513
- 541r
- 543
- 544
- 551c
- 571n
- 711f
- 711m
- 711u
- 813c
- 813g
- 821b
- 851a
- 851b
- Lake

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FIGURE NO.

VL_160809_RRA_C10

FIGURE TITLE

FIGURE C10
SOIL MAPPING

SHEET NUMBER

1 of 1

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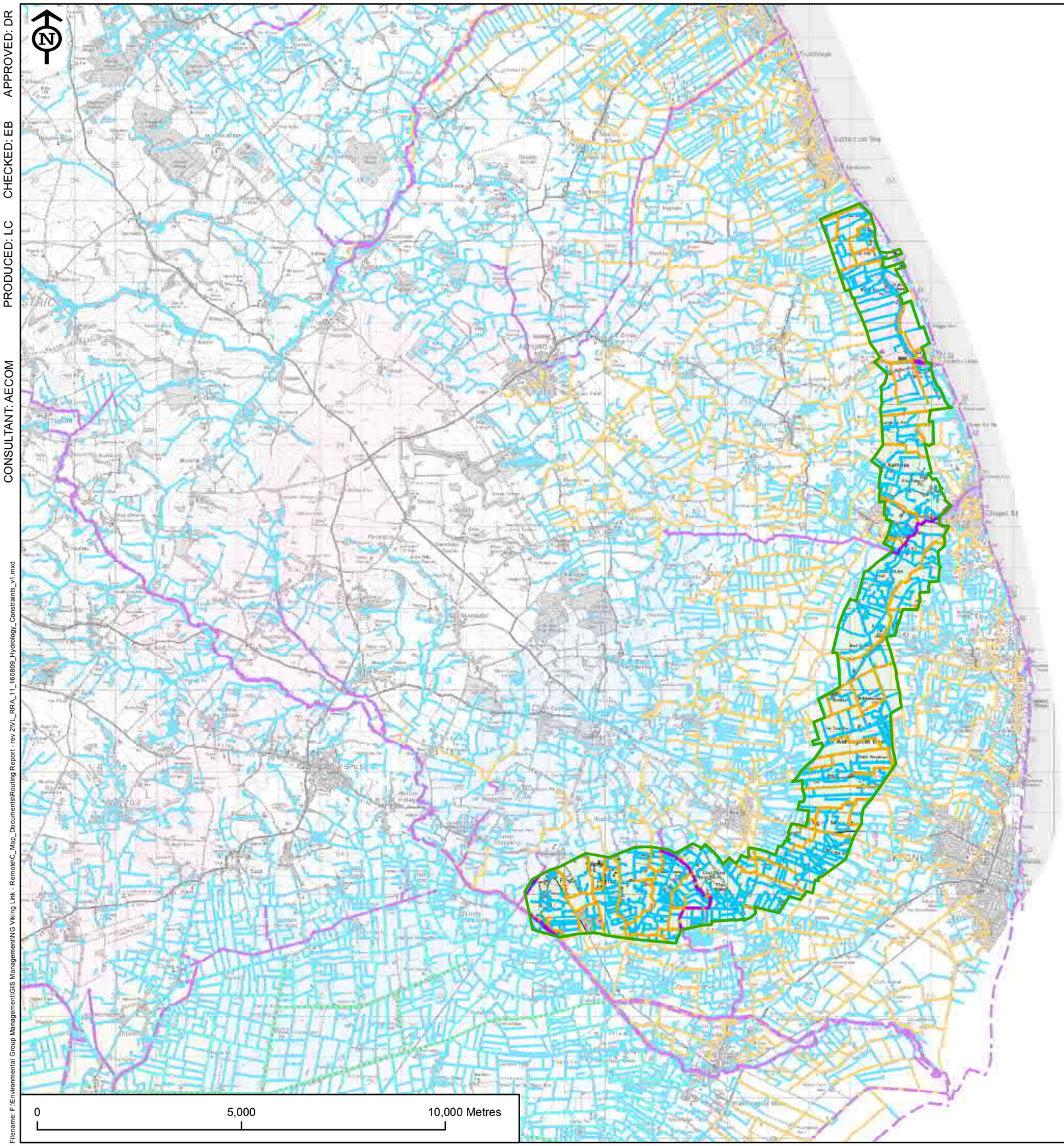

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VikingLink

LEGEND

Cable Route Corridor

- C
- Environment Agency Flood Defence
- Lindsey Marsh DB - Maintained Watercourse
- Witham Forth District IDB - Combined Sewer
- Witham Forth District IDB - Drain
- Watercourse / Water Feature

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FIGURE NO.

VL_160809_RRA_C11

FIGURE TITLE

FIGURE C11
HYDROLOGY
CONSTRAINTS

SHEET NUMBER

1 of 1

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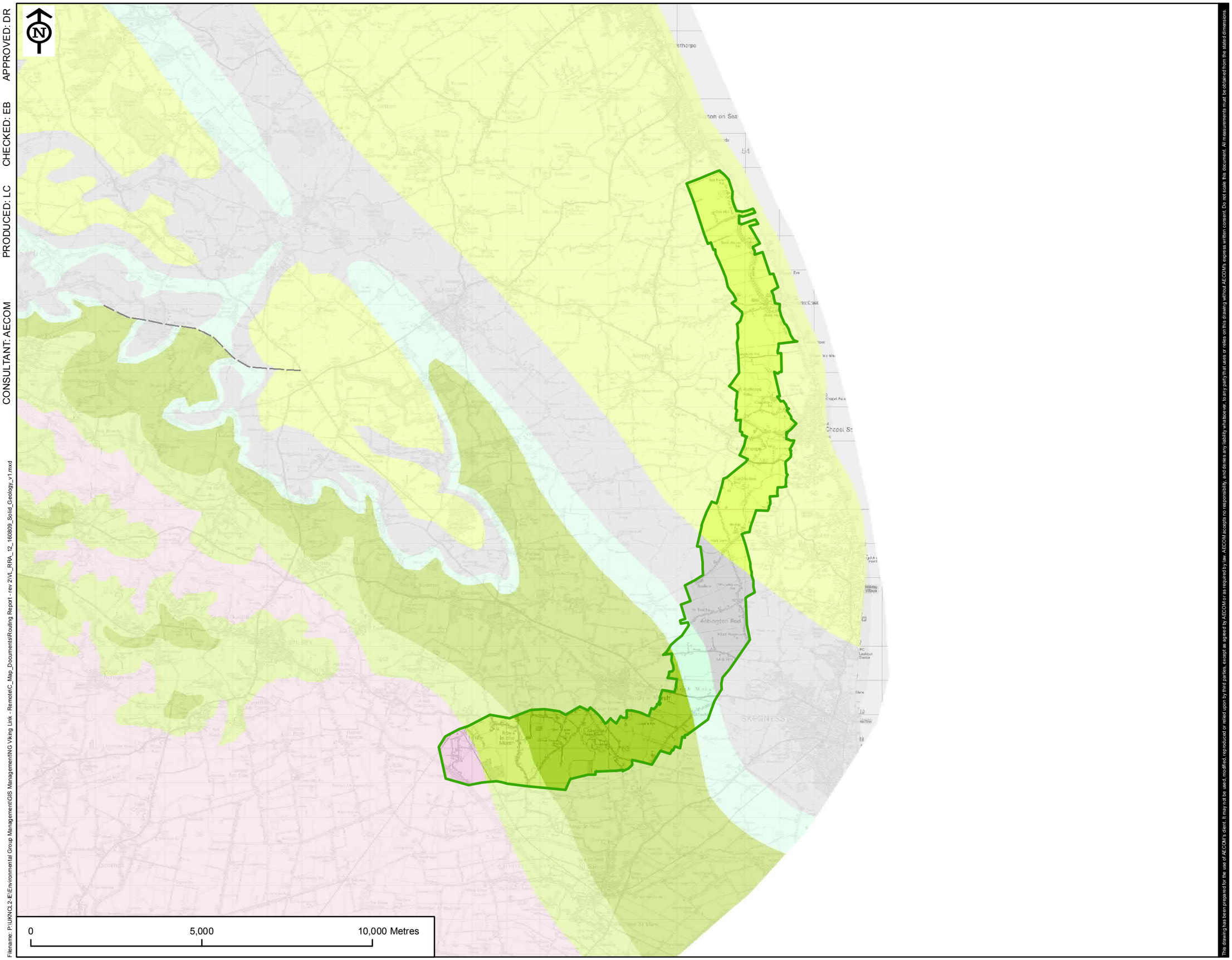

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VikingLink

LEGEND

Cable Route Corridor

- C
- Fault at rockhead
- Grey Chalk Subgroup - Chalk
- White Chalk Subgroup - Chalk
- Lower Greensand Group - Sandstone and Mudstone
- Wealden Group - Mudstone, Siltstone and Sandstone
- Wealden Group - Sandstone and Siltstone, Interbedded
- West Walton Formation, Ampthill Clay Formation and Kimmeridge Clay Formation (Undifferentiated) - Mudstone, Siltstone and Sandstone

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FIGURE NO.

VL_160809_RRA_C12

FIGURE TITLE

FIGURE C12
SOLID GEOLOGY

SHEET NUMBER

1 of 1

NOTES

Date:	Scale at A3:
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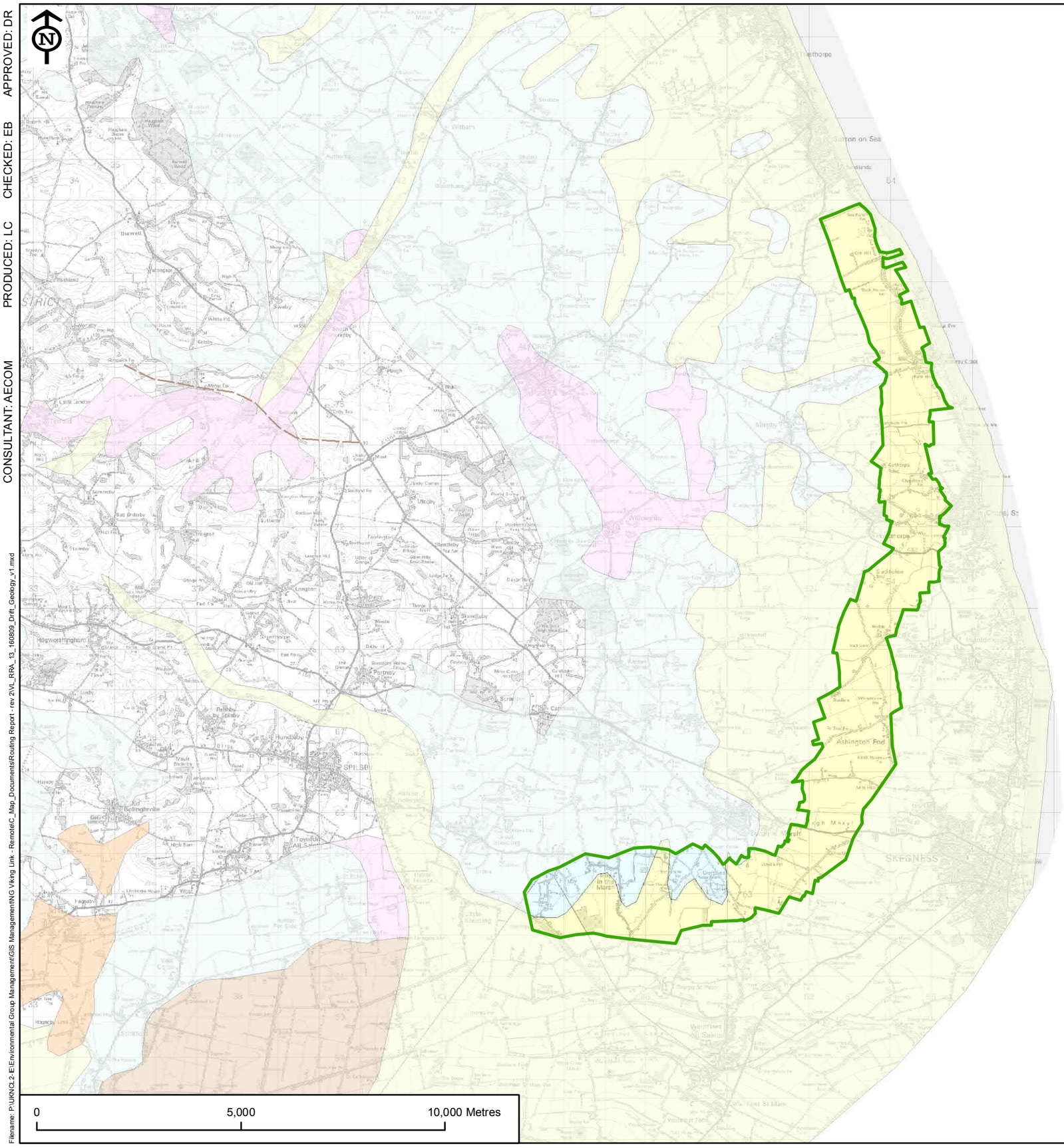

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VikingLink

LEGEND

Cable Route Corridor

- C
- Fault at rockhead
- Alluvium
- Glacial Sand and Gravel
- Peat
- River Terrace Deposits (Undifferentiated)
- Till

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1	09/08/16	ORIGINAL ISSUE

FIGURE NO.

VL_160809_RRA_C13

FIGURE TITLE

FIGURE C13
DRIFT GEOLOGY

SHEET NUMBER

1 of 1

NOTES

Date: 09/08/16

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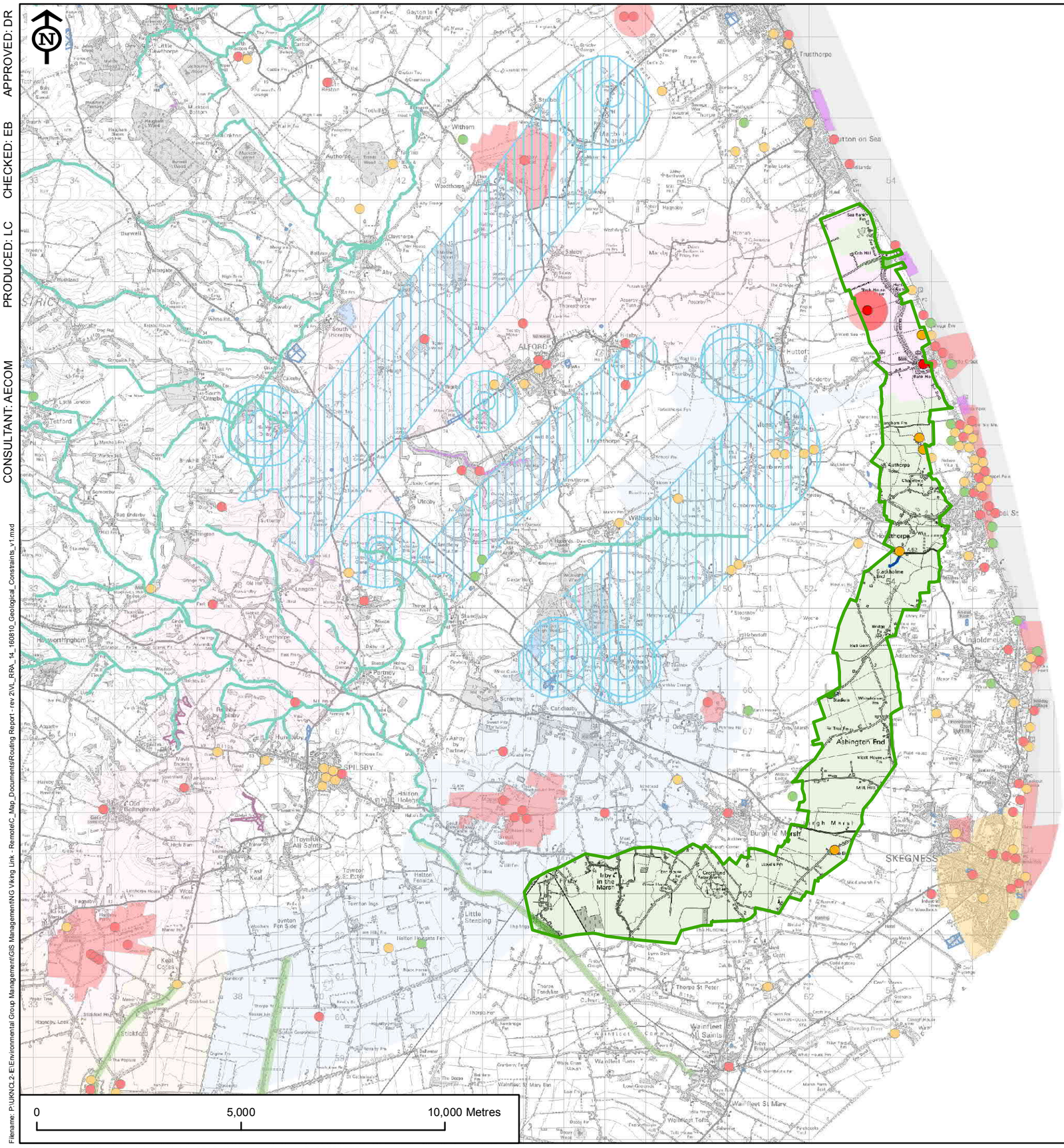

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VikingLink

LEGEND

Cable Route Corridor

- C

UXO Hazards and Constraints

- High Risk
- Moderate Risk
- Low Risk
- High Risk
- Moderate Risk
- Low Risk
- Chalk River
- Landfill Site
- Geological Site of Special Scientific Interest
- Local Geological Site
- Regionally Important Geological/Geomorpholo... Site
- Groundwater Source Protection Zone

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FIGURE NO.

VL_160810_RRA_C14

FIGURE TITLE

FIGURE C14
GEOLOGICAL
CONSTRAINTS

SHEET NUMBER

1 of 1

NOTES

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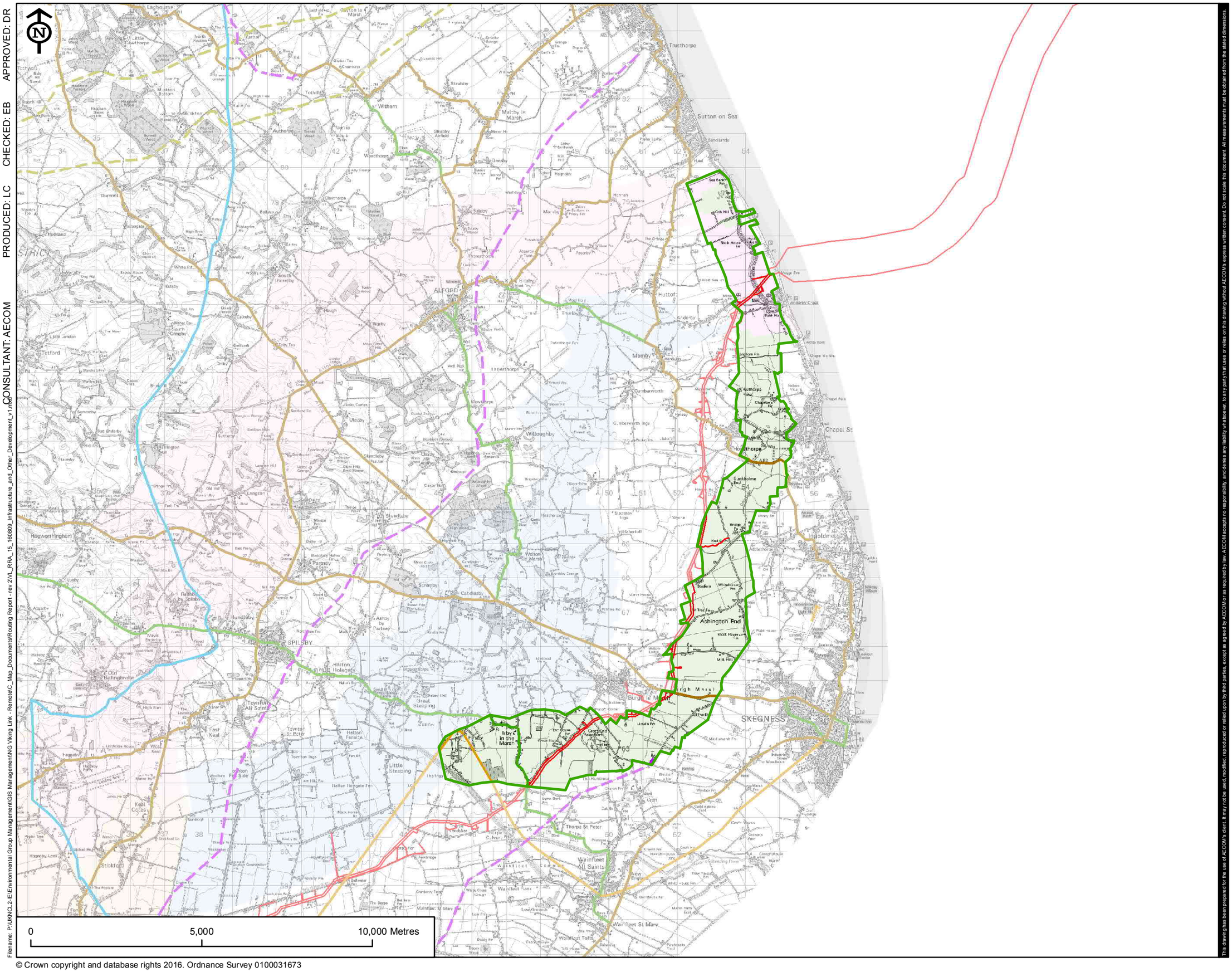
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Mill Hill
Ashington End
Sandilands
Mablethorpe Fm
Mablethorpe Bank
Mablethorpe Fm
Sea Dyke Fm
Mablethorpe Bank
Mablethorpe Fm
Sea Dyke Fm
Sea Dyke Fm
Sea Dyke

Route Corridor D – Thematic Constraints Plans

Table 4 Route Corridor DThematic Constraints Plans	
Figure No.	**Figure Title**
D1	Topographic Map
D2	Settlement and Tourism Interests
D3	Landscape Designations
D4	Landscape Character
D5	Landscape Features and Interests
D6	Ecology Designations
D7	Archaeology and Heritage – Designated Assets
D8	Archaeology and Heritage – Non-designated Assets
D9	Agricultural Land Classification Mapping
D10	Soil Mapping
D11	Hydrology Constraints
D12	Solid Geology
D13	Drift Geology
D14	Geological Constraints
D15	Infrastructure and Other Development

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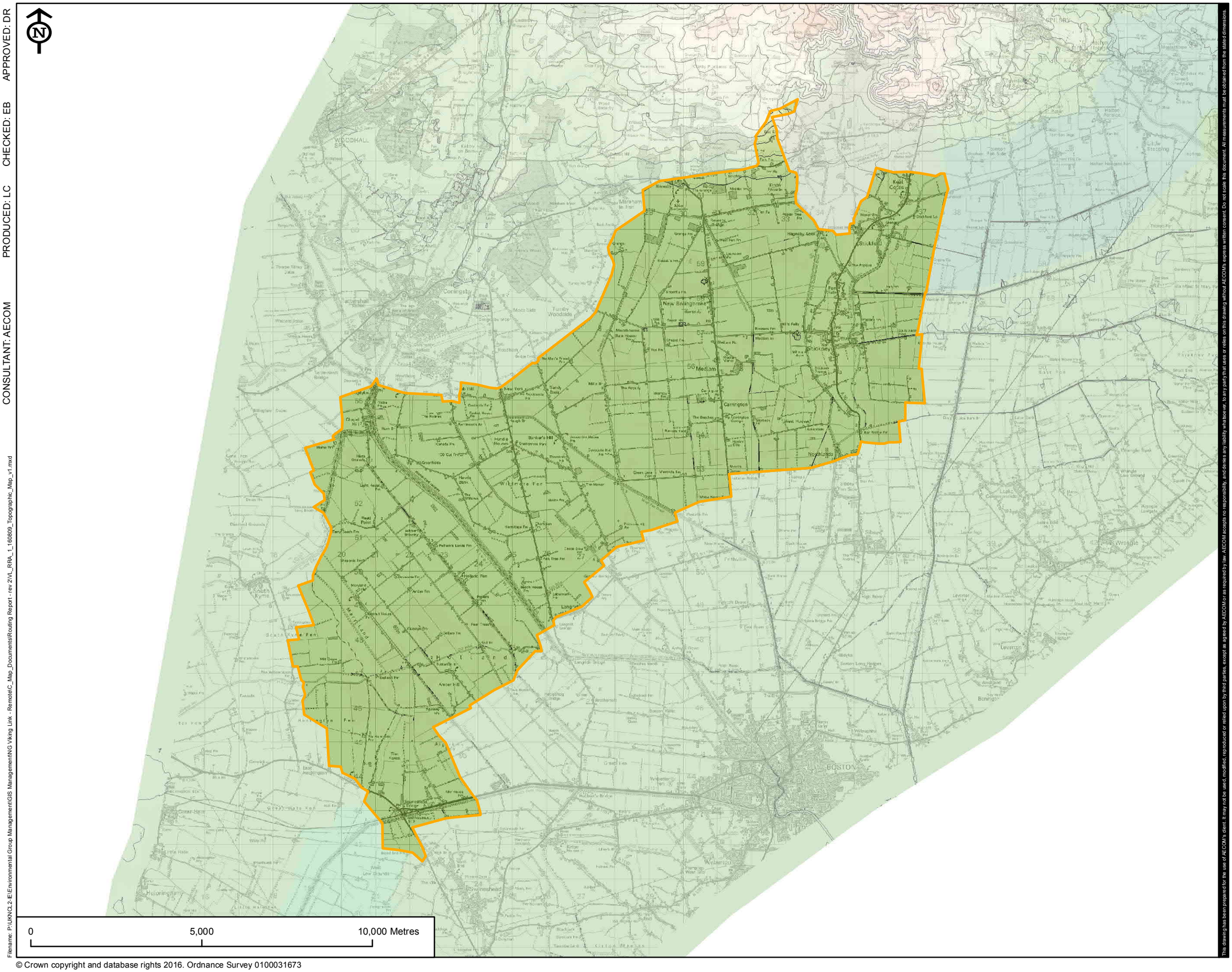

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VikingLink

LEGEND

Cable Route Corridor

D

10m Contour (OS Terrain 5)

Topography

High : 149.68m

Low : 0m

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1	09/08/16	ORIGINAL ISSUE

FIGURE NO.

VL_160809_RRA_D1

FIGURE TITLE

FIGURE D1
TOPOGRAPHIC MAP

SHEET NUMBER

1 of 1

NOTES

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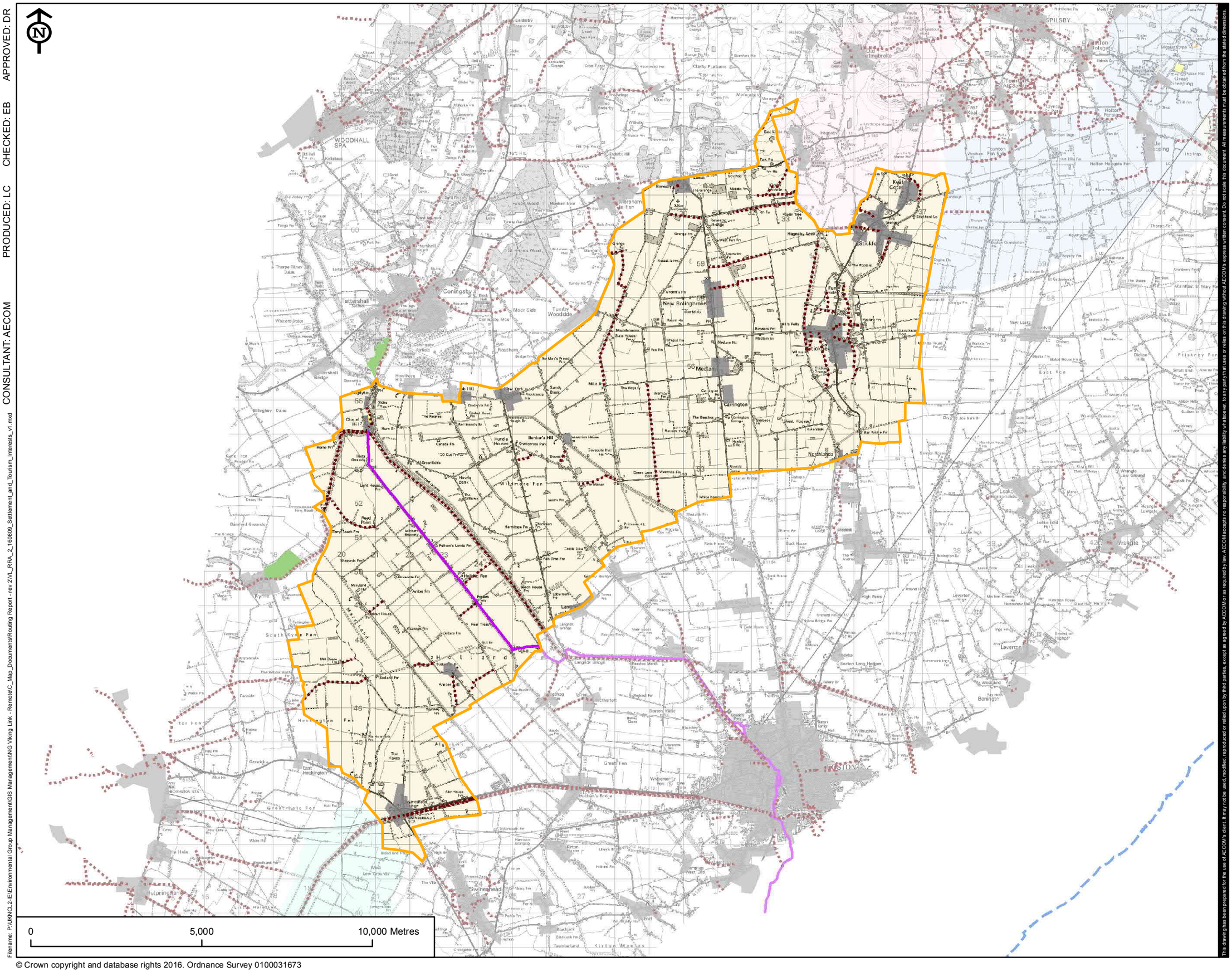

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VikingLink

LEGEND

Cable Route Corridor

- D
- Public Right of Way
- Sustrans National Cycle Route
- Proposed England Coast Path National Trail
- National Trust Land Ownership
- Lincolnshire Coastal Country Park
- Golf Course
- Caravan Park
- Urban Region

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FIGURE NO.

VL_160809_RRA_D2

FIGURE TITLE

FIGURE D2
SETTLEMENT AND TOURISM INTERESTS

SHEET NUMBER

1 of 1

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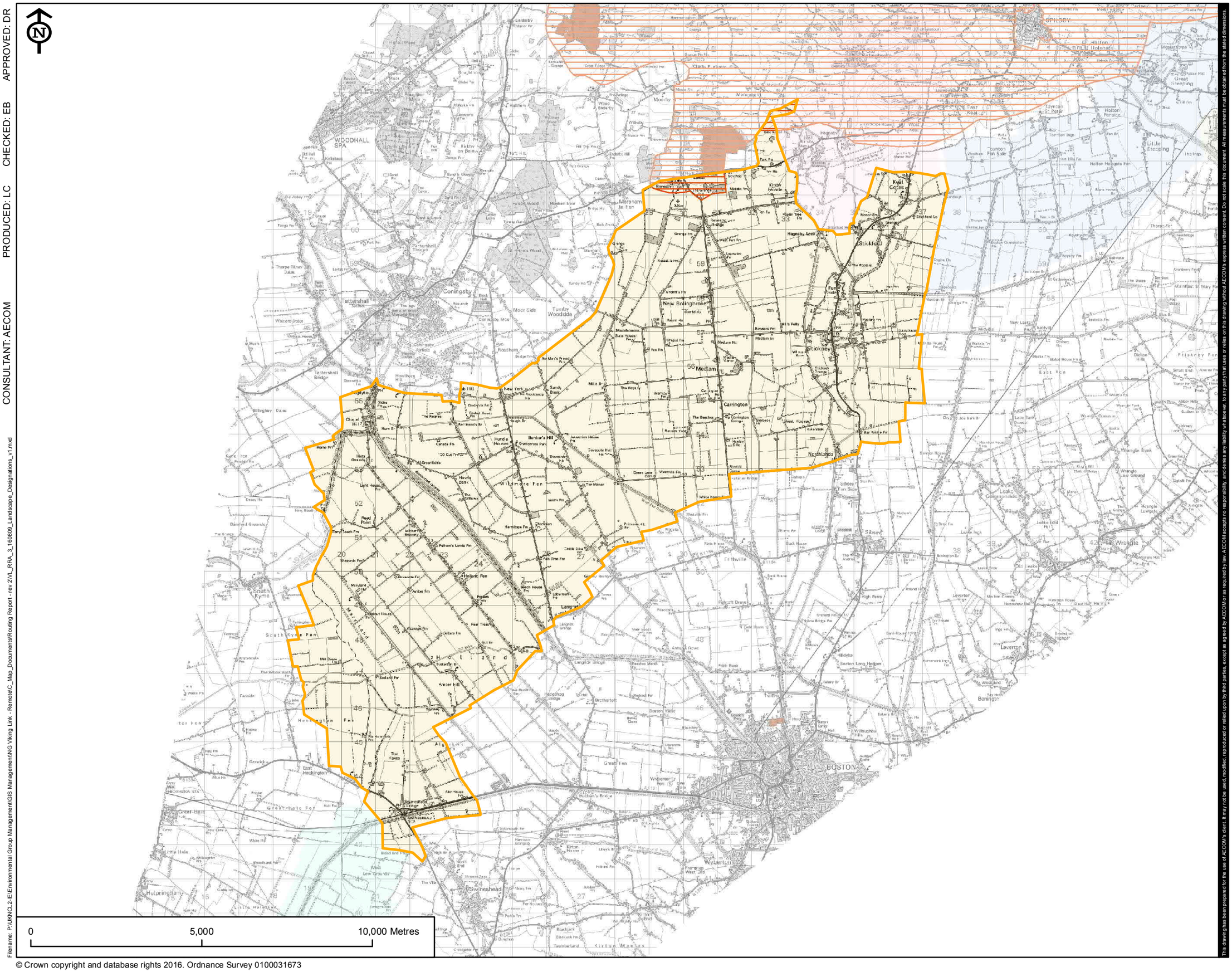
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Coningsby
Tattershall
Mareham le Fen
New Bolingbroke
Stickford
Stickney
Mediam
Carrington
Wildmore Fen
Holland Fen
Langriick
Frithville
Wrangle
Leverton
BOSTON
Wyberton
Swineshead
South Kyme
Hubberts Bridge
Kirton
Great Hale
Hulpringham
East Heckington
Boston Valley
Brotherton
Langrick Bridge
Hagnaby Lock
Sibsey
Leake Commonside
Old Leake
Boston Fen Side
Little Steeping
Great Steeping
Halton Holegate
Spilsby
Hagnaby
Wainfleet St Mary
Friskney
Orby
Skegness
Ingoldmells
Chapel St Leonards
Anderby
Burgh le Marsh
Croft
Thorpe St Peter
Wainfleet Bank
Wainfleet Tofts
Wainfleet All Saints
Tumby Woodside
Moor Side
Roughton
Bilsthorpe
Tattershall Thorpe
Tattershall Bridge
Billinghay
Dogdyke
Langriick Bridge
Hagnaby Lock
Stickford
Stickney
Mediam
Carrington
Northlands

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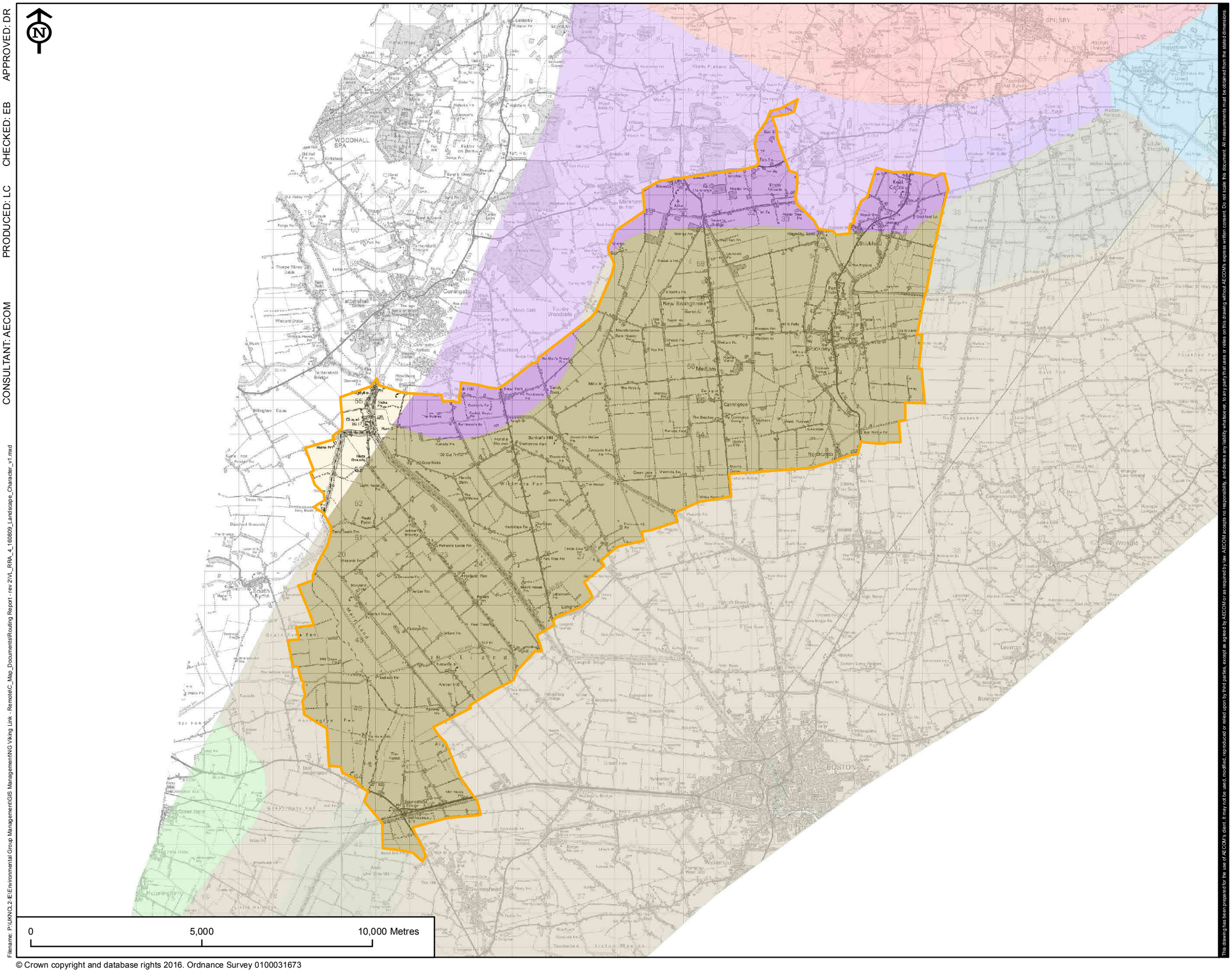

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VikingLink

LEGEND

Cable Route Corridor

- D

National Character Area

- Lincolnshire Coast and Marshes
- Lincolnshire Wolds
- Lincolnshire and Rutland Limestone
- North Lincolnshire Coversands and Clay Vales
- The Fens

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FIGURE NO.

VL_160809_RRA_D4

FIGURE TITLE

FIGURE D4
LANDSCAPE
CHARACTER

SHEET NUMBER

1 of 1

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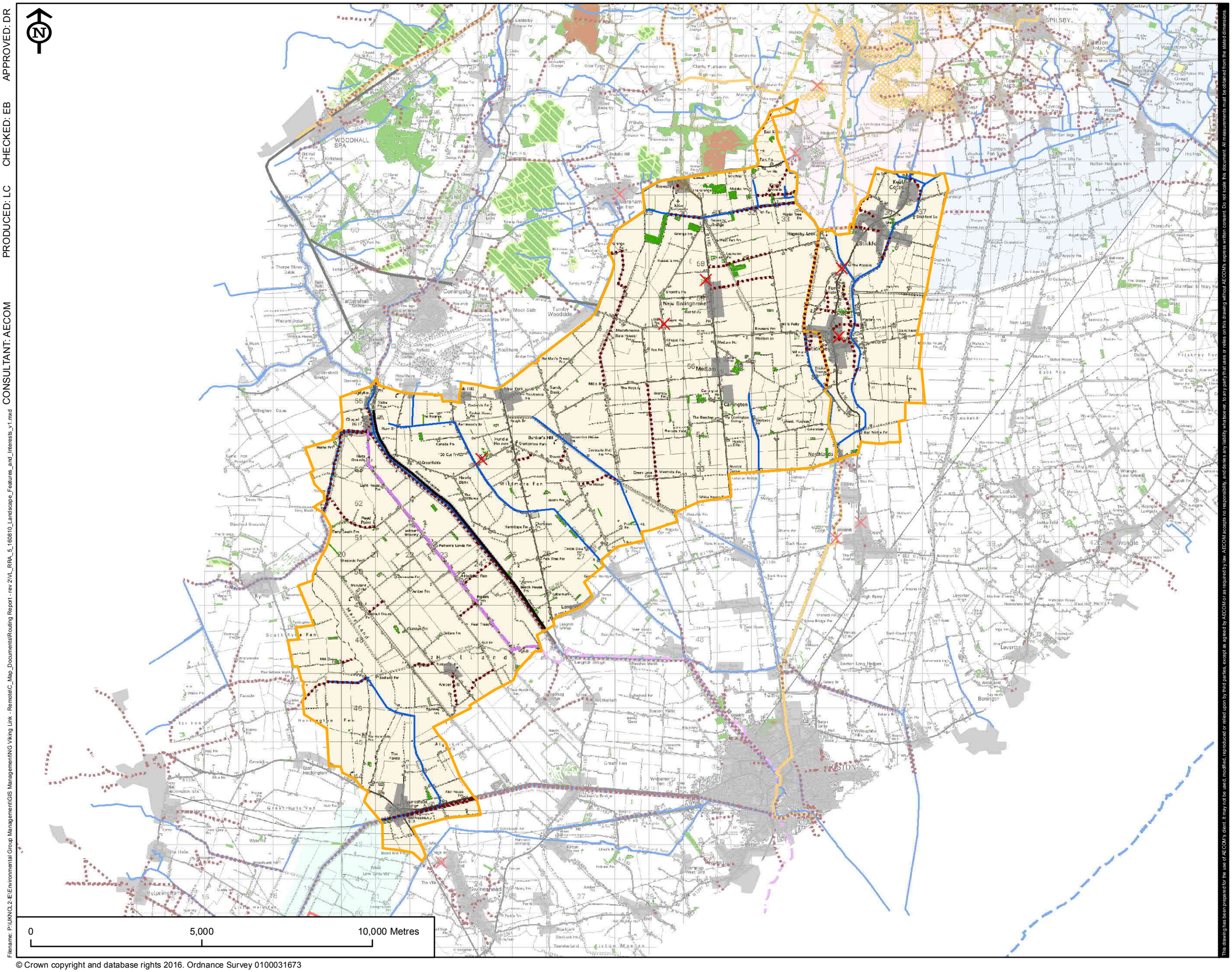

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VikingLink

LEGEND

Cable Route Corridor

- D
- Historic Windmill
- Public Rights of Way
- Sustrans National Cycle Route
- Proposed England Coast Path National Trail
- Long Distance Route
- Disused Railway Line
- Main Rivers, Drains and Chalk Streams
- Bicker Fen Wind Farm Boundary
- AONB/AGLV Roadside Verge
- Ancient Woodland
- Urban Region
- Caravan Park
- Ridges and High Points
- Woodland
- Registered Park and Garden

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FIGURE NO.

VL_160810_RRA_D5

FIGURE TITLE

FIGURE D5
LANDSCAPE FEATURES AND INTERESTS

SHEET NUMBER

1 of 1

NOTES

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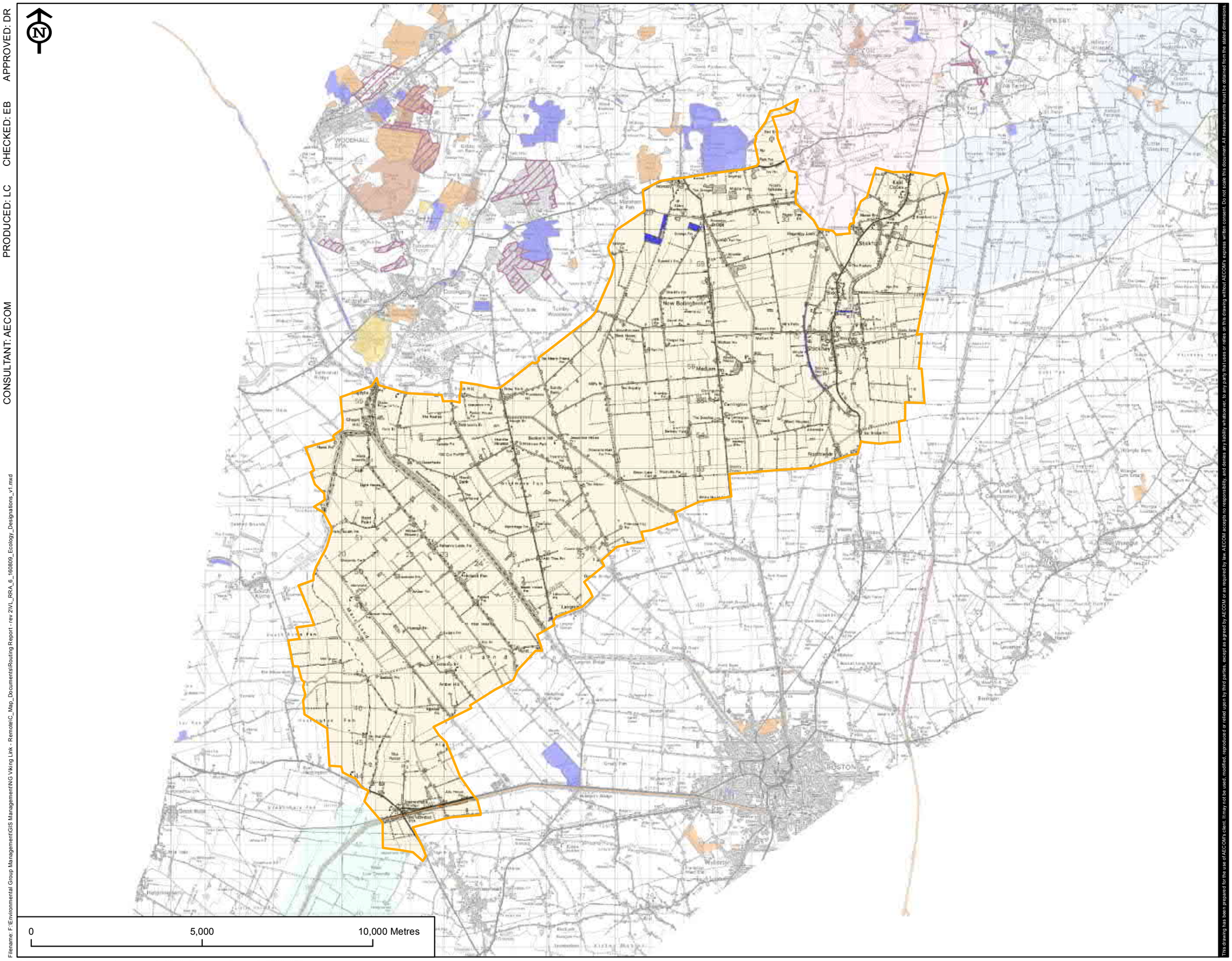

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VikingLink

LEGEND

Cable Route Corridor

- D
- Special Protection Area
- Special Area of Conservation
- Site of Special Scientific Interest
- Coastal Grazing Marsh
- Local Geological Site
- Local Wildlife Site
- Lincolnshire Wildlife Trust
- Regionally Important Geological/Geomorpholo... Site
- Roadside Nature Reserve
- Site of Nature Conservation Importance

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FIGURE NO.

VL_160809_RRA_D6

FIGURE TITLE

FIGURE D6
ECOLOGY
DESIGNATIONS

SHEET NUMBER

1 of 1

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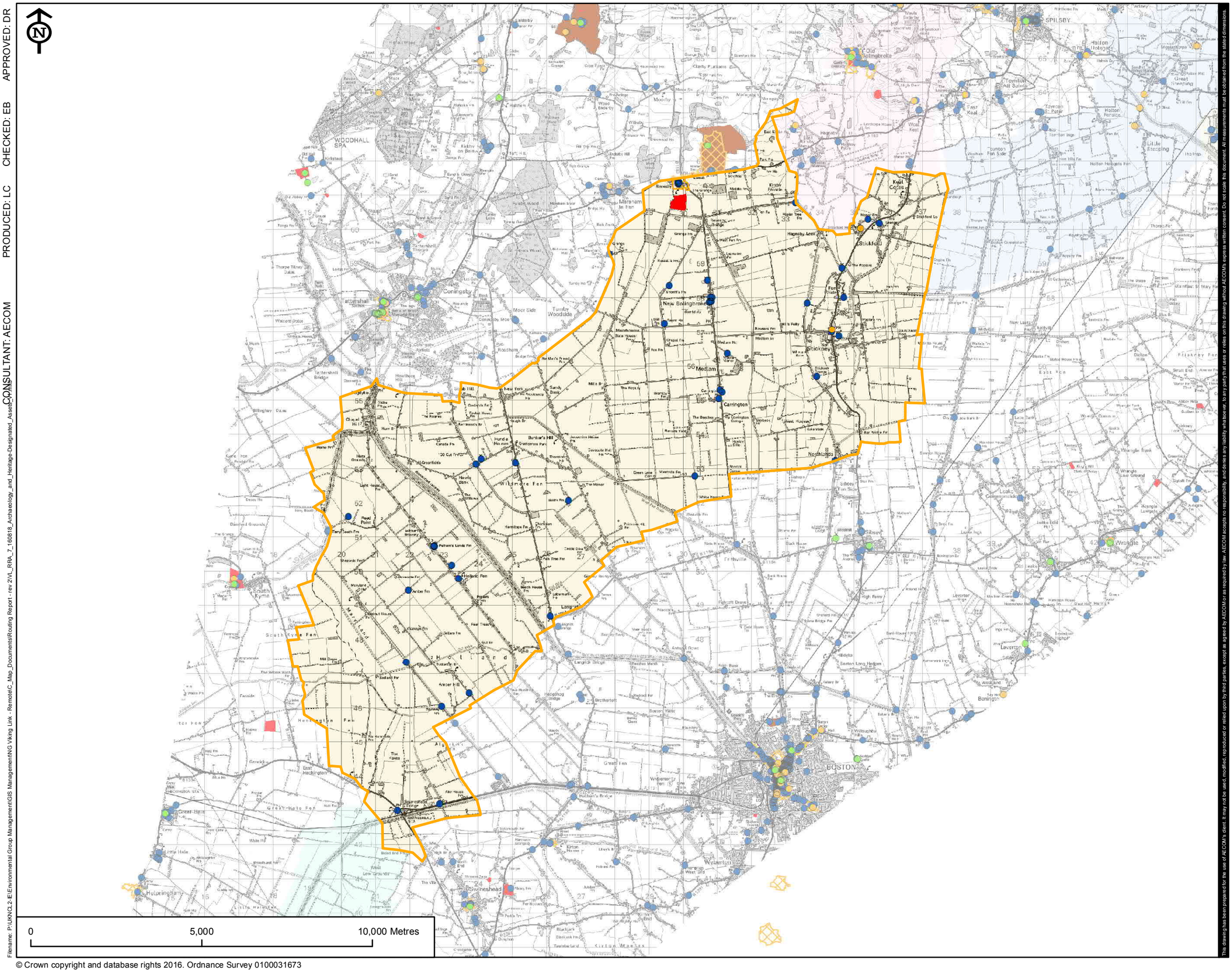
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Tattershall Thorpe
Tattershall Bridge
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Moor Side
Roughton
Marsham le Fen
Revesby
Kirkby on Bain
Haltham
Langriick
New Bolingbroke
Mareham
Carrington
Stickney
Stickford
Fen Side
Hagnaby Lock
Kyme Cotes
Old Bolingbroke
SPILSBY
Halton Holegate
Toynton All Saints
Toynton St Peter
Toynton Fen Side
Great Steeping
Little Steeping
East Keal
West Keal
Wainfleet
Frithville
Leverton
Wrangle
Leake Commonside
Old Leake
Sibsey
Boston
Wyberton
Swineshead
Kirton
Hubberts Bridge
Great Hale
Little Hale
Helpringham
South Kyme
South Kyme Fen
Holland Fen
Wildmore Fen
Hameringham
Bunkers Hill
Langrick Bridge
Brotherton
Boston Valley
Great Fen
Kirton Marsh
Wyberton West End
Wyberton Fen
Frithville
Fishtoft Drove
Anchor Corner
Hobhole Bridge
Hedgehog Bridge
Boston Bridge
Sibsey Fen Side
Black House
Bank House
Leverton Highgate
Westland
Boningtoo
Wrangle Low Ground
Wrangle Lowgate
Wrangle Bank
Leake Bank
Leake Field
Dickon Hills
Frisskney Fen
Small End
Mode House Fen
Walters Fen
Wainfleet St Mary Fen
Thorpe Fen
Hagnaby Fen
Stickford Fen
Stickford Lo
Kyme Cotes Fen
Hagnaby Lock
Fen Side
Mill's Folly
Medlam
Medlam Ho
Medlam St
Carrington
Northlands
Sibsey
Sibsey Fen Side
Black House
Bank House
Frithville
Fishtoft Drove
Anchor Corner
Hobhole Bridge
Hedgehog Bridge
Boston Bridge
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Kirton
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Hameringham
Bunkers Hill
Wildmore Fen
Holland Fen
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Langrick
Langrick

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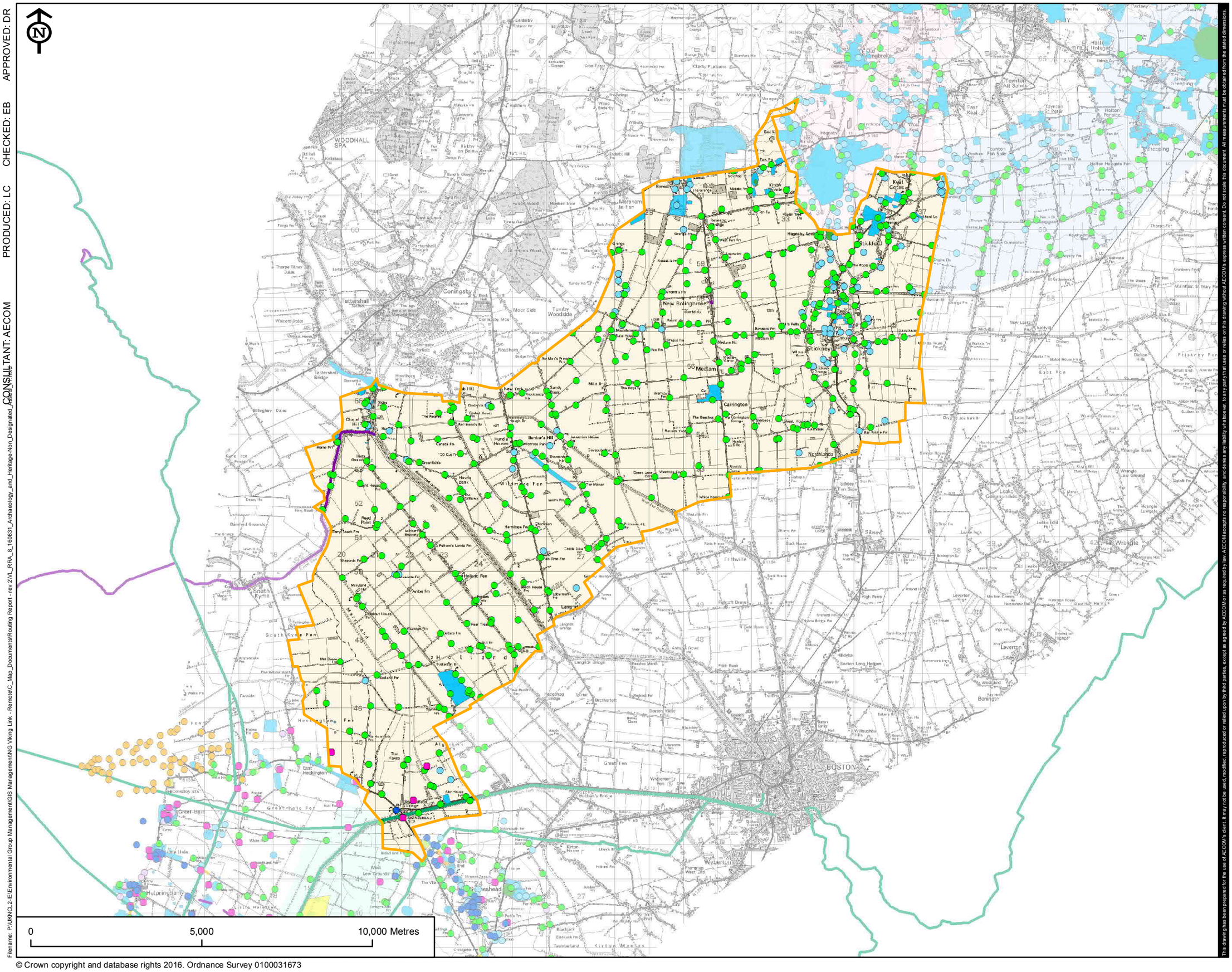
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Roughton
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Kirkby on Bain
Moulton
Toynton All Saints
Toynton St Peter
Halton Holegate
Sleaford
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Kyme Fen
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Stickford
Stickney
Mediam
Carrington
Northlands
Wildmore Fen
Holland Fen
Langriggs
Langrick Bridge
Frithville
Leverton
Wrangle
Boston
Wyberton
Kirton
Fishtoft
Great Fen
Great Hale Fen
Hubberts Bridge
Sibsey
Leake Commonside
Old Leake
Wrangle Low Ground
Wrangle Lowgate
Tim Pawes
Alt Bridge
Swineshead
Hulpringham
Great Hale
Little Hale
Kirton Marsh
Kirton Meres
Blackjack
Twentieth Land
Swineshead Bridge
Boston Wash
Brotherton
Hedgehog Bridge
Fishtoft Drove
Frith Bank
Anthony Bower
Bell House
Leverton Higher
Westland
Boningtown
Sibsey Fen Side
Black House
Bank House
Wyberton West End
Wyberton Fen
Hubberts Bridge
Kirton Meres
Kirton Marsh
Swineshead Bridge
Brotherton
Hedgehog Bridge
Langrick Bridge
Frithville

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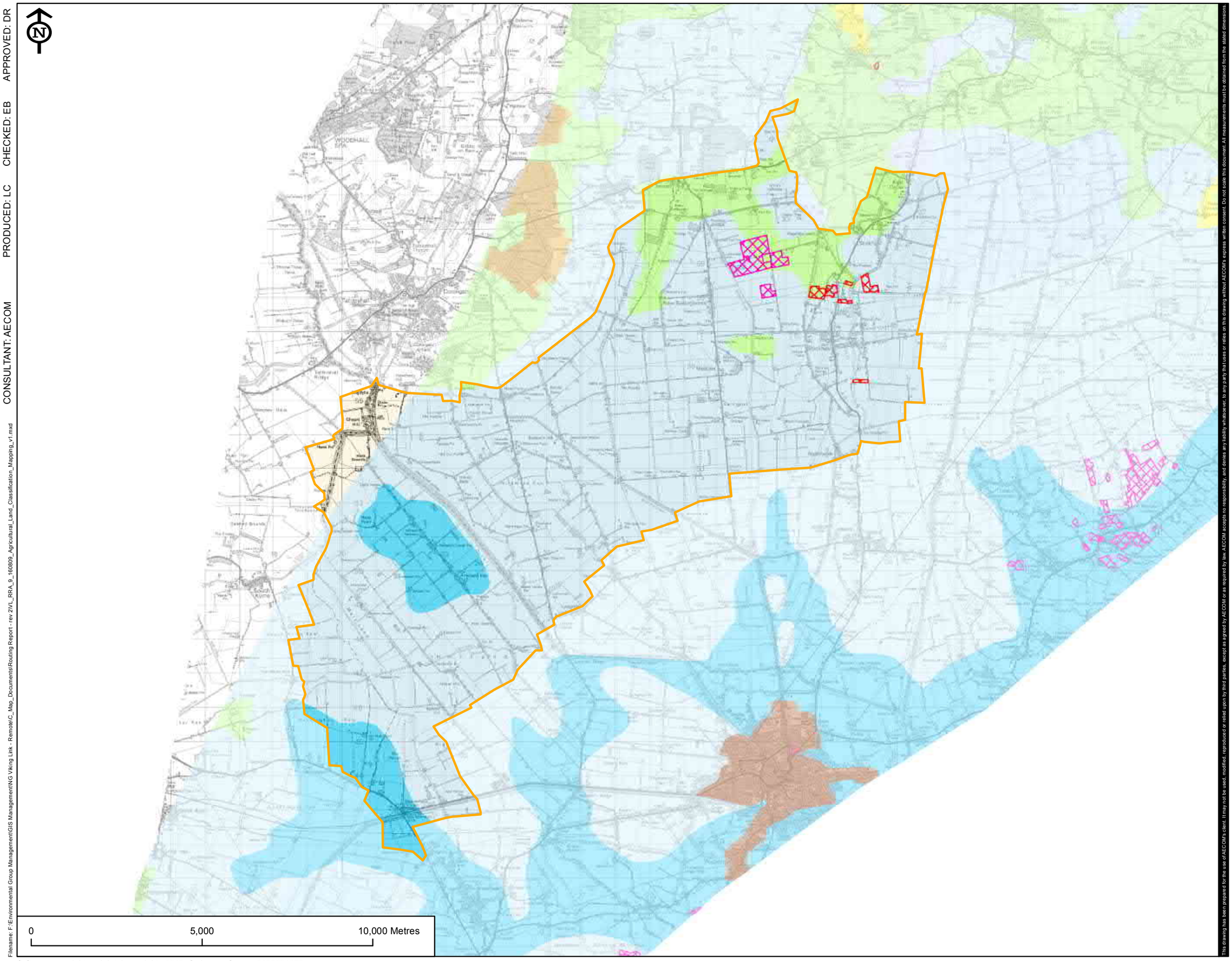

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VikingLink

LEGEND

Cable Route Corridor

- D
- Grade 1
- Grade 2
- Grade 3
- Grade 4
- Non Agricultural
- Urban
- Organic Entry Level Stewardship
- Organic Entry Level plus Higher Level Stewardship

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FIGURE NO.

VL_160809_RRA_D9

FIGURE TITLE

FIGURE D9
AGRICULTURAL LAND
CLASSIFICATION MAPPING

SHEET NUMBER

1 of 1

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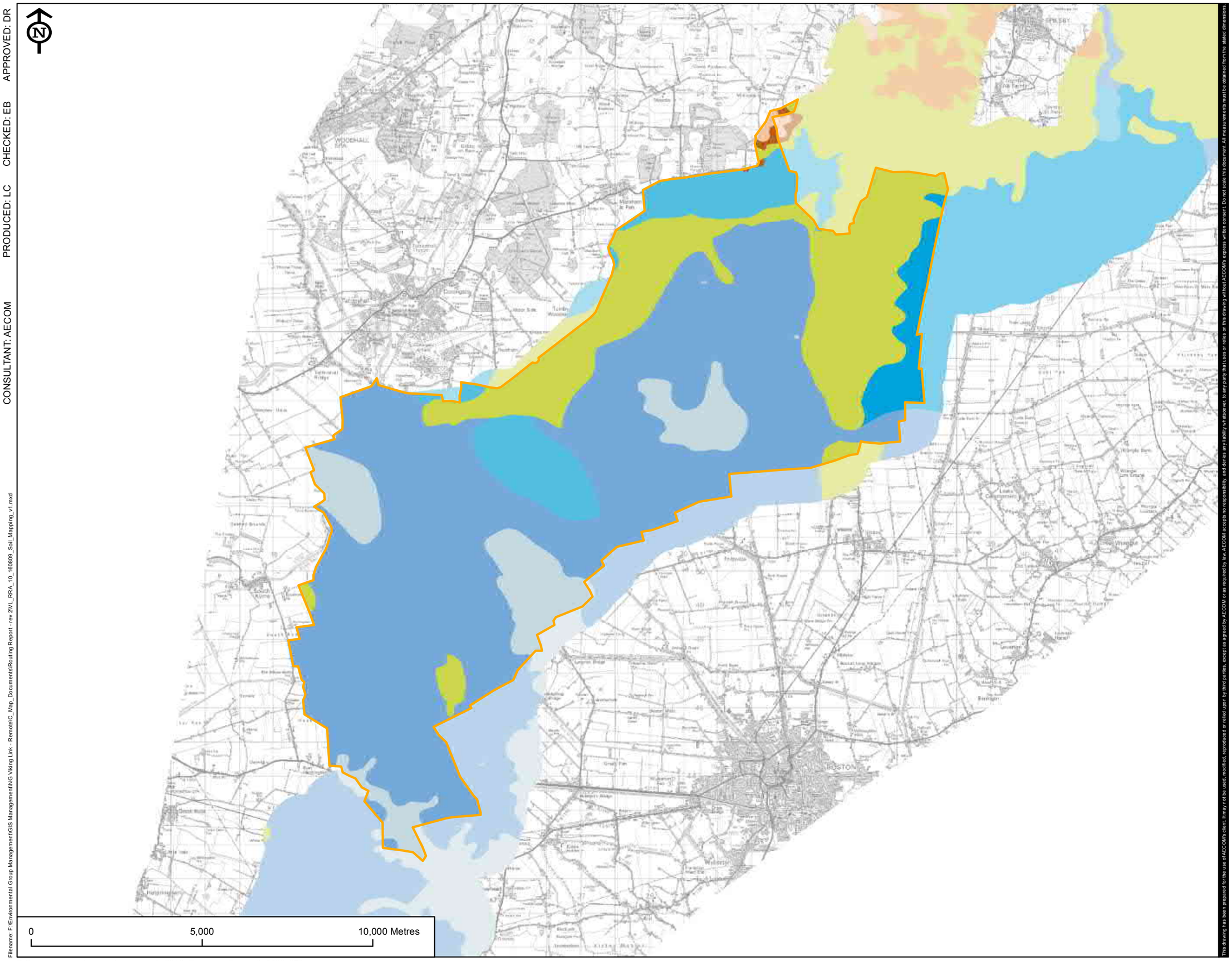

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VikingLink

LEGEND

Cable Route Corridor

- D
- 511e
- 513
- 551c
- 711f
- 711m
- 711r
- 711s
- 711t
- 711u
- 812b
- 812c
- 813c
- 813g
- 821b
- 851a
- 851b
- Lake

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FIGURE NO.

VL_160809_RRA_D10

FIGURE TITLE

FIGURE D10
SOIL MAPPING

SHEET NUMBER

1 of 1

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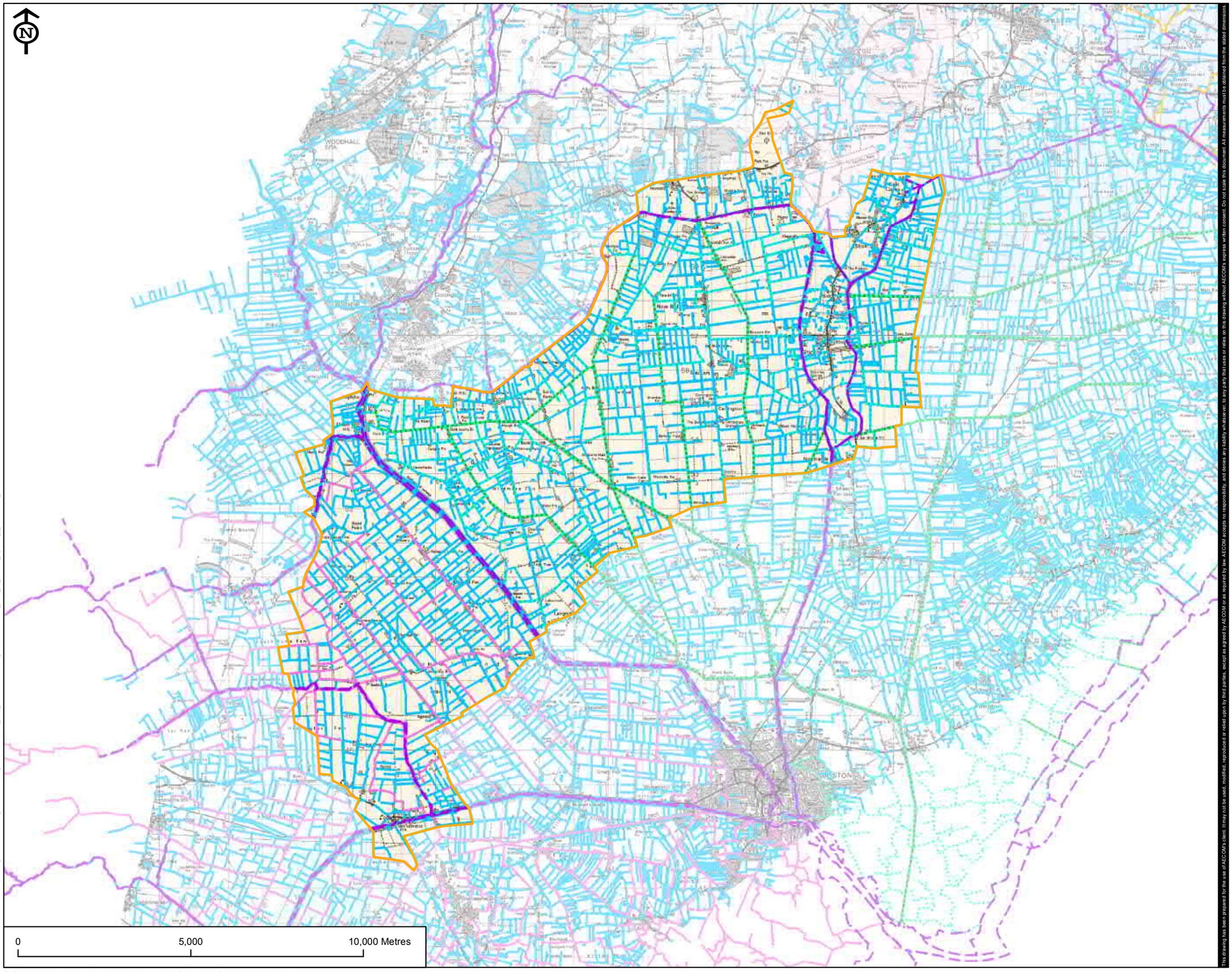

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VikingLink

LEGEND

Cable Route Corridor

- D
- Environment Agency Flood Defence
- Black Sluice IDB - Drains
- Lindsey Marsh DB - Maintained Watercourse
- Witham Forth District IDB - Combined Sewer
- Witham Forth District IDB - Drain
- Watercourse / Water Feature

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FIGURE NO.

VL_160809_RRA_D11

FIGURE TITLE

FIGURE D11
HYDROLOGY
CONSTRAINTS

SHEET NUMBER

1 of 1

NOTES

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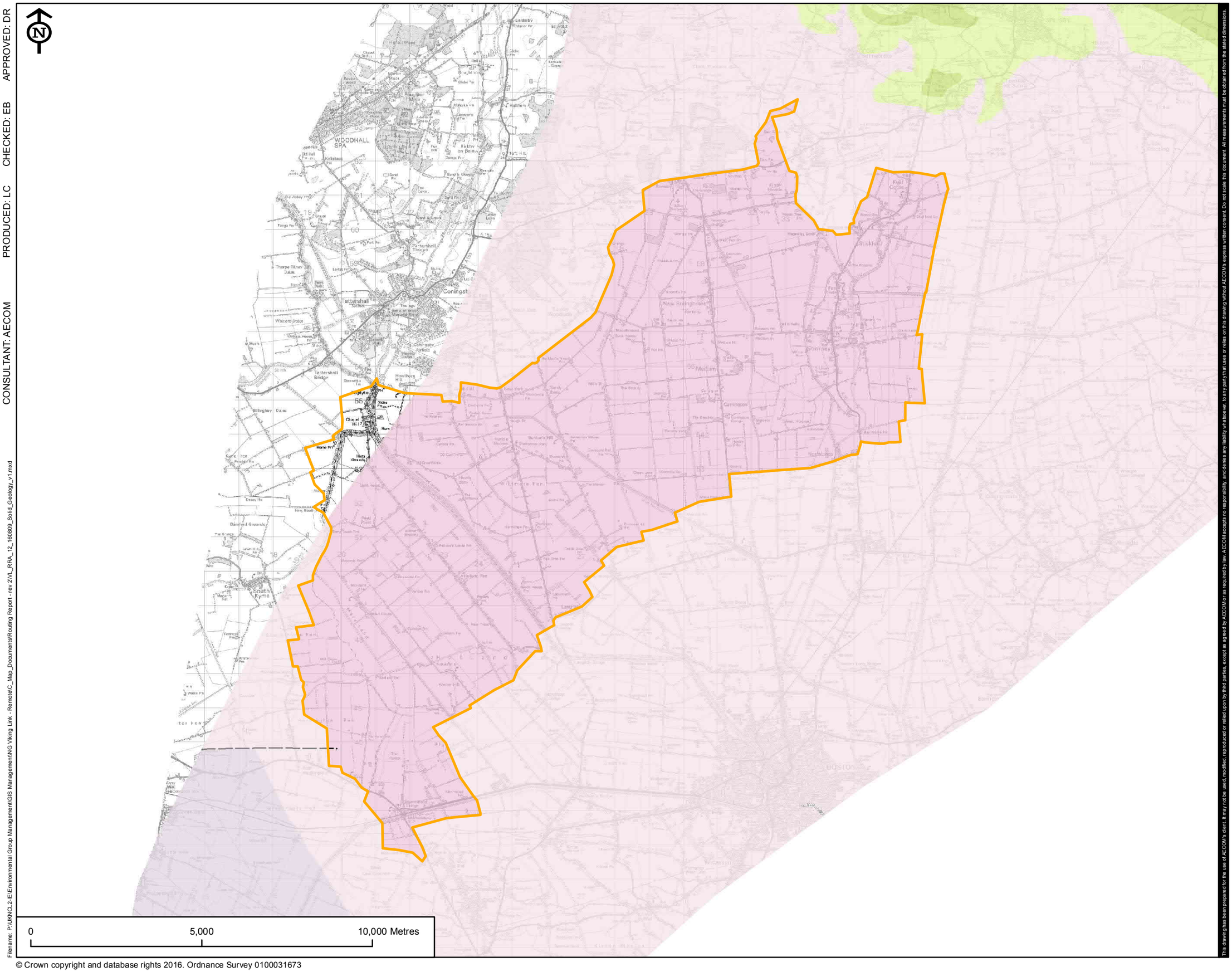

VikingLink

LEGEND

Cable Route Corridor

- D
- Fault at rockhead
- Wealden Group - Mudstone, Siltstone and Sandstone
- Wealden Group - Sandstone and Siltstone, Interbedded
- West Walton Formation, Ampthill Clay Formation and Kimmeridge Clay Formation (Undifferentiated) - Mudstone, Siltstone and Sandstone
- Kellaways Formation and Oxford Clay Formation (Undifferentiated) - Mudstone, Siltstone and Sandstone

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FIGURE NO.

VL_160809_RRA_D12

FIGURE TITLE

FIGURE D12
SOLID GEOLOGY

SHEET NUMBER

1 of 1

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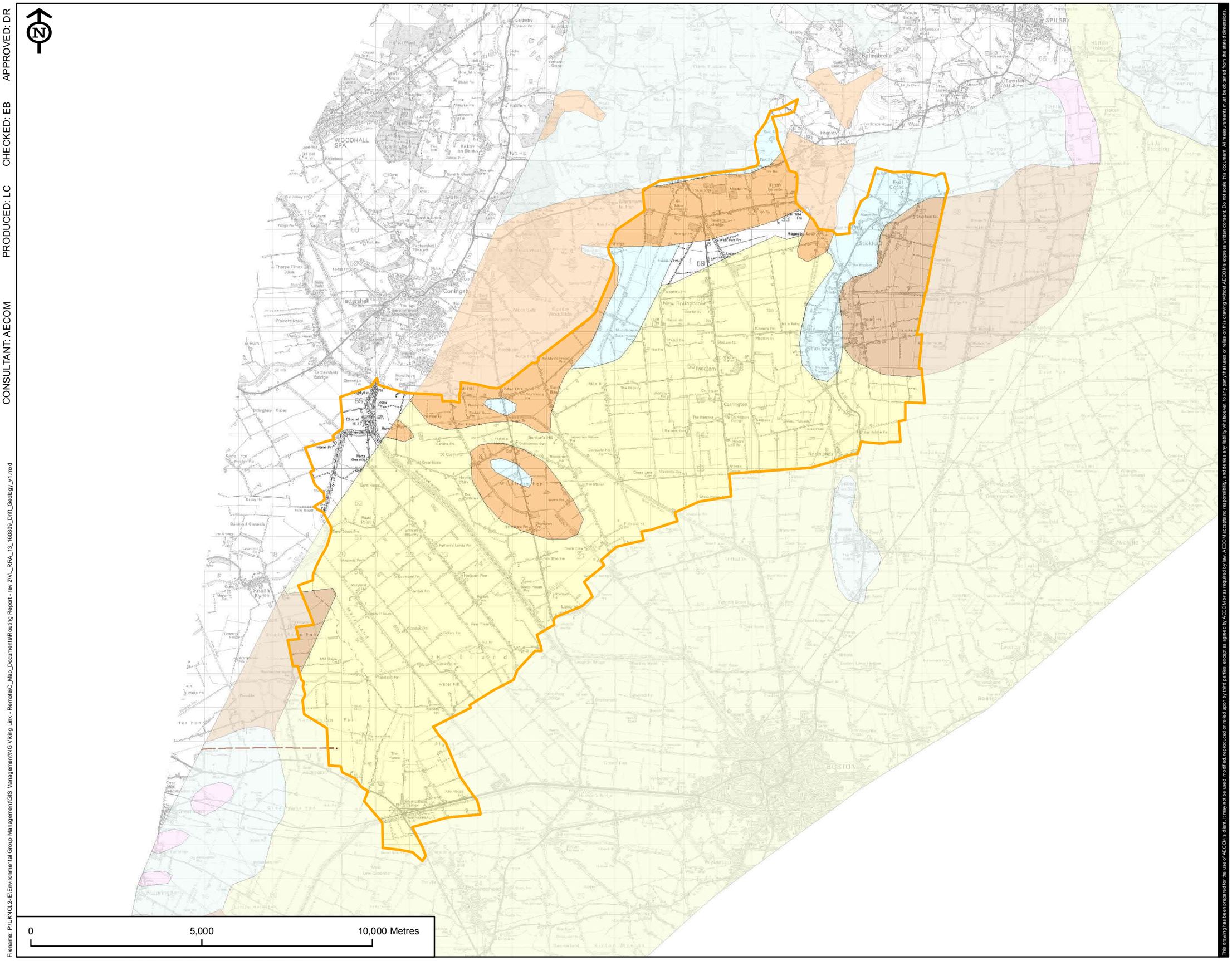

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VikingLink

LEGEND

Cable Route Corridor

- D
- Fault at rockhead
- Alluvium
- Glacial Sand and Gravel
- Peat
- River Terrace Deposits (Undifferentiated)
- Till

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FIGURE NO.

VL_160809_RRA_D13

FIGURE TITLE

FIGURE D13
DRIFT GEOLOGY

SHEET NUMBER

1 of 1

NOTES

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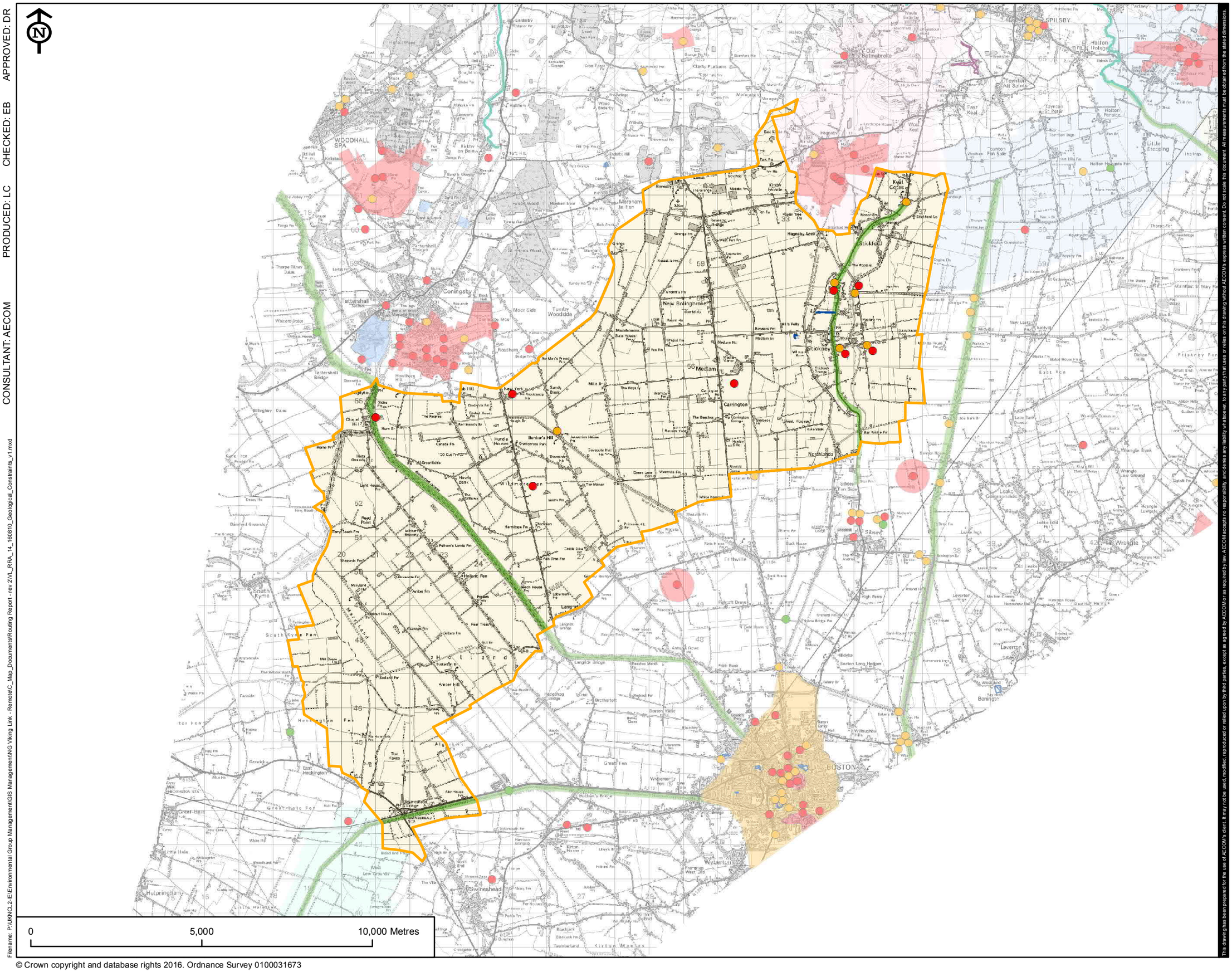

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VikingLink

LEGEND

Cable Route Corridor

- D

UXO Hazards and Constraints

- High Risk
- Moderate Risk
- Low Risk
- High Risk
- Moderate Risk
- Low Risk
- Chalk River
- Landfill Site
- Geological Site of Special Scientific Interest
- Local Geological Site
- Regionally Important Geological/Geomorpholo... Site

REVISION:

REV.	DATE	DESCRIPTION
1	10/08/16	ORIGINAL ISSUE

FIGURE NO.

VL_160810_RRA_D14

FIGURE TITLE

FIGURE D14
GEOLOGICAL
CONSTRAINTS

SHEET NUMBER

1 of 1

NOTES

Date: 10/08/16

Scale at A3: 1:100,000

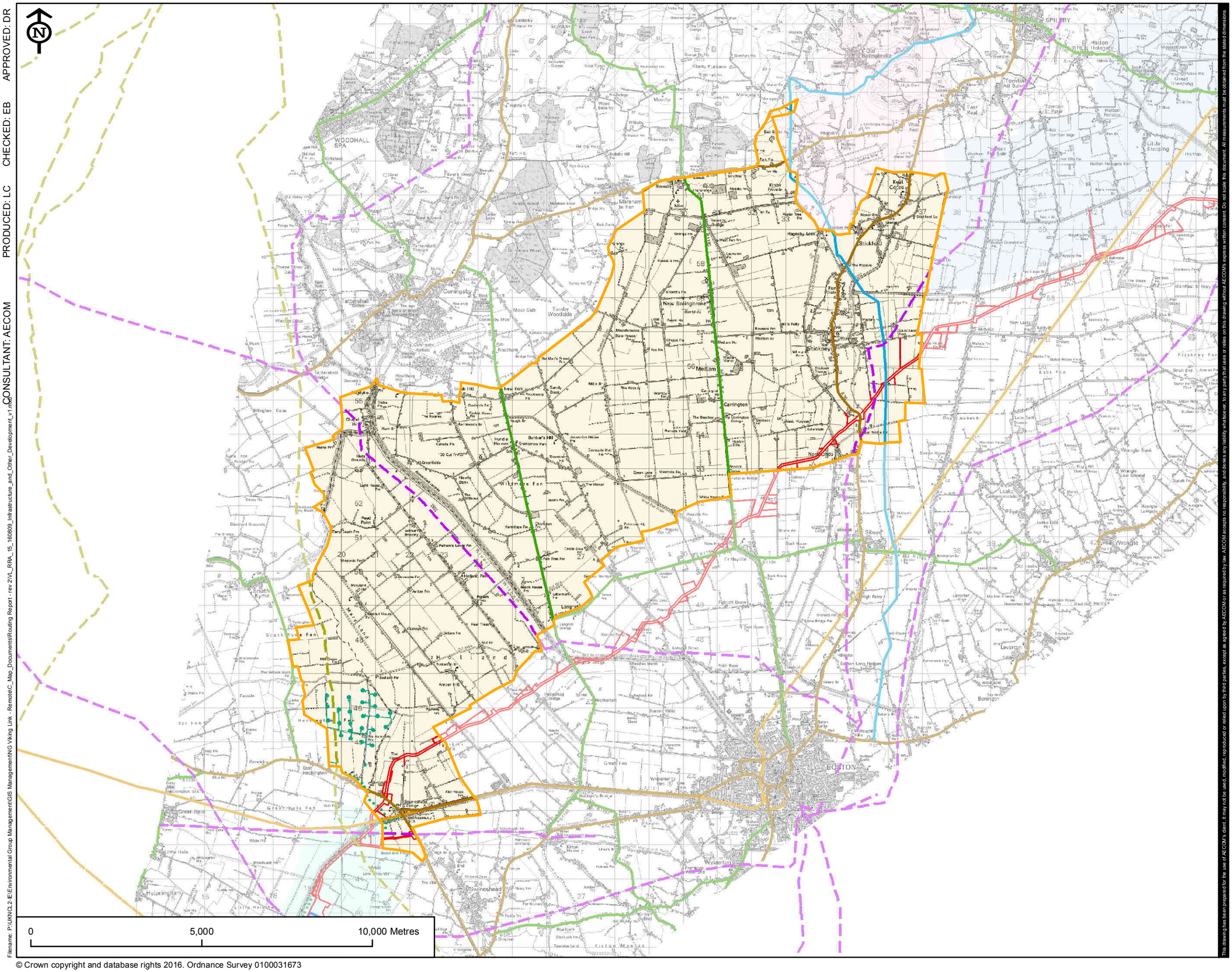
APPROVED: DR

CHECKED: EB

PRODUCED: LC

CONSULTANT: AECOM

Filename: P:\UKNQL2-E\Environmental Group Management\GIS Management\NG Viking Link - Remote\C_Map_Documents\Routing Report - rev 2\VL_RRA_15_160809_Infrastructure_and_Other_Development_v1.mxd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Mareham le Fen
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Haltham
Old Bolingbroke
New Bolingbroke
Hagnaby Lock
Stickford
Fen Side
Stickney
Mediam
Carrington
Northolmes
Wildmore Fen
Frithville
Langrick
Hollland
Hollland Fen
Hagnaby
West Keal
East Keal
Toynton All Saints
Toynton St Peter
Halton Holegate
Halton Fenside
Little Steeping
Great Steeping
SPILSBY
Old Leake
Leake Commonside
Wrangle
Wrangle Low Ground
Wrangle Lowgate
Leverton
Westland
Boston
Wyberton
Kirton
Swineshead
Kirton Marsh
Great Fen
Wyberton Fen
Hubberts Bridge
Sibsey
Sibsey Fen
Black House
Fishtoft Drove
Fishtoft
Frith Bank
Hobhole Bridge
Butterfield
Amber Hill
Sutterby
Sibsey Trader
Boston Valley
Great Hale Fen
Great Hale
Little Hale
Helpringham
South Kyme
South Kyme Fen
Heckington Fen
Heckington
East Heckington
Aswarby
Swarby
Ewerby
Ewerby Fen
Ewerby Thorpe
Aunsby
Dunsby
Haverholme Priory
Sleaford
Ruskington
Leasingham
Cranwell
Cranwell Village
Ashby de la Zouch
Ashby Fen
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Route Corridor E – Thematic Constraints Plans

Table 5 Route Corridor E Thematic Constraints Plans	
Figure No.	**Figure Title**
E1	Topographic Map
E2	Settlement and Tourism Interests
E3	Landscape Designations
E4	Landscape Character
E5	Landscape Features and Interests
E6	Ecology Designations
E7	Archaeology and Heritage – Designated Assets
E8	Archaeology and Heritage – Non-designated Assets
E9	Agricultural Land Classification Mapping
E10	Soil Mapping
E11	Hydrology Constraints
E12	Solid Geology
E13	Drift Geology
E14	Geological Constraints
E15	Infrastructure and Other Development

APPROVED: DR

CHECKED: EB

PRODUCED: LC

CONSULTANT: AECOM

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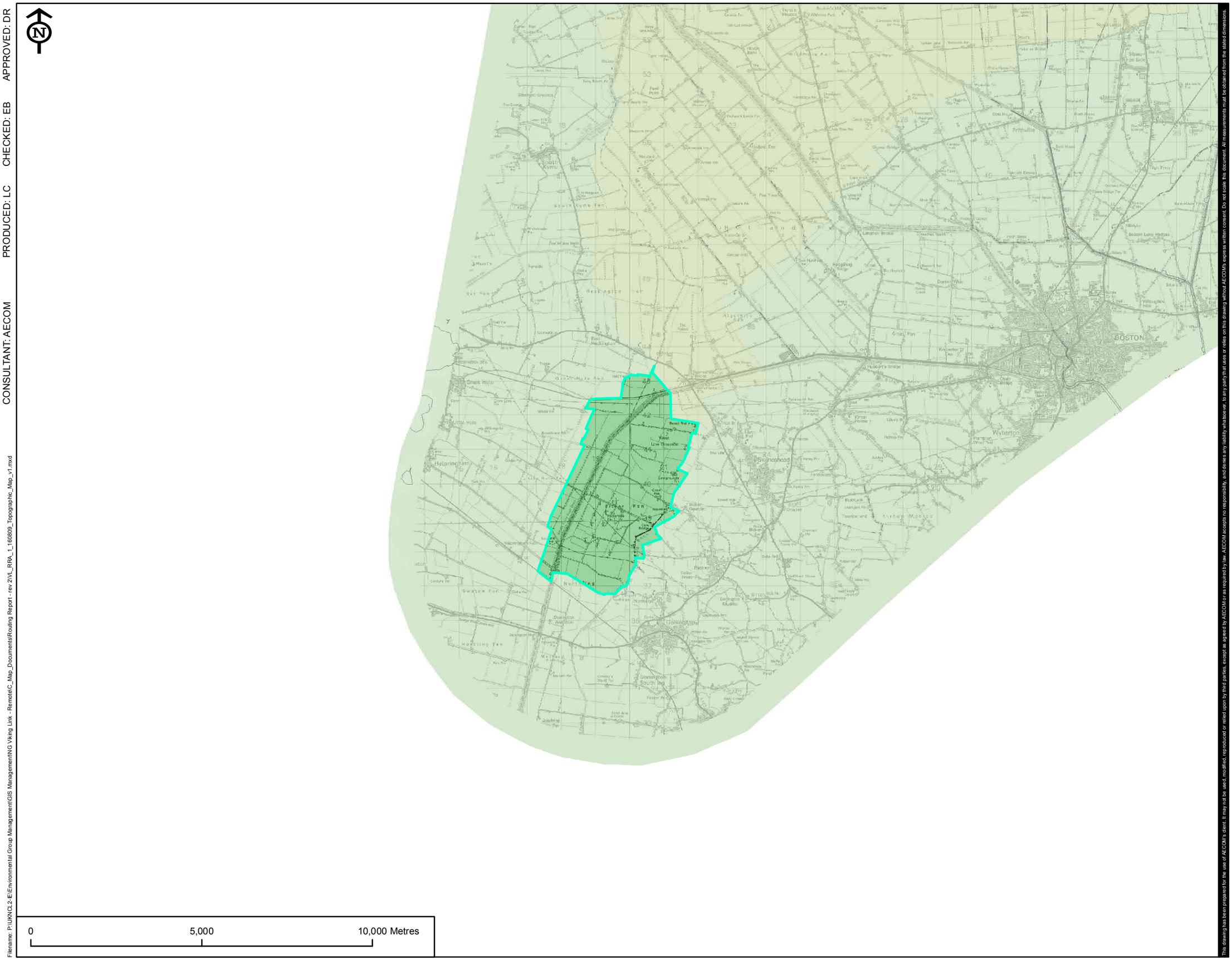
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Wyberton
Frithville
Heckington
Sibsey
Sibsey Trader Side
Boston West
Hubberts Bridge
Kirton
Dunsby
Bicker
Donington South Ing
Donington Eaudyke
Dorrington
Leverton
Leverton Sluice
Leverton Bridge
Butterwick
Benington
Benington Sluice
Sutterton
Fishtoft
Fishtoft Drove
Frithville Effen
Wrangle
Wrangle Bank End
Hubberts Bridge Fen
Bicker Fen
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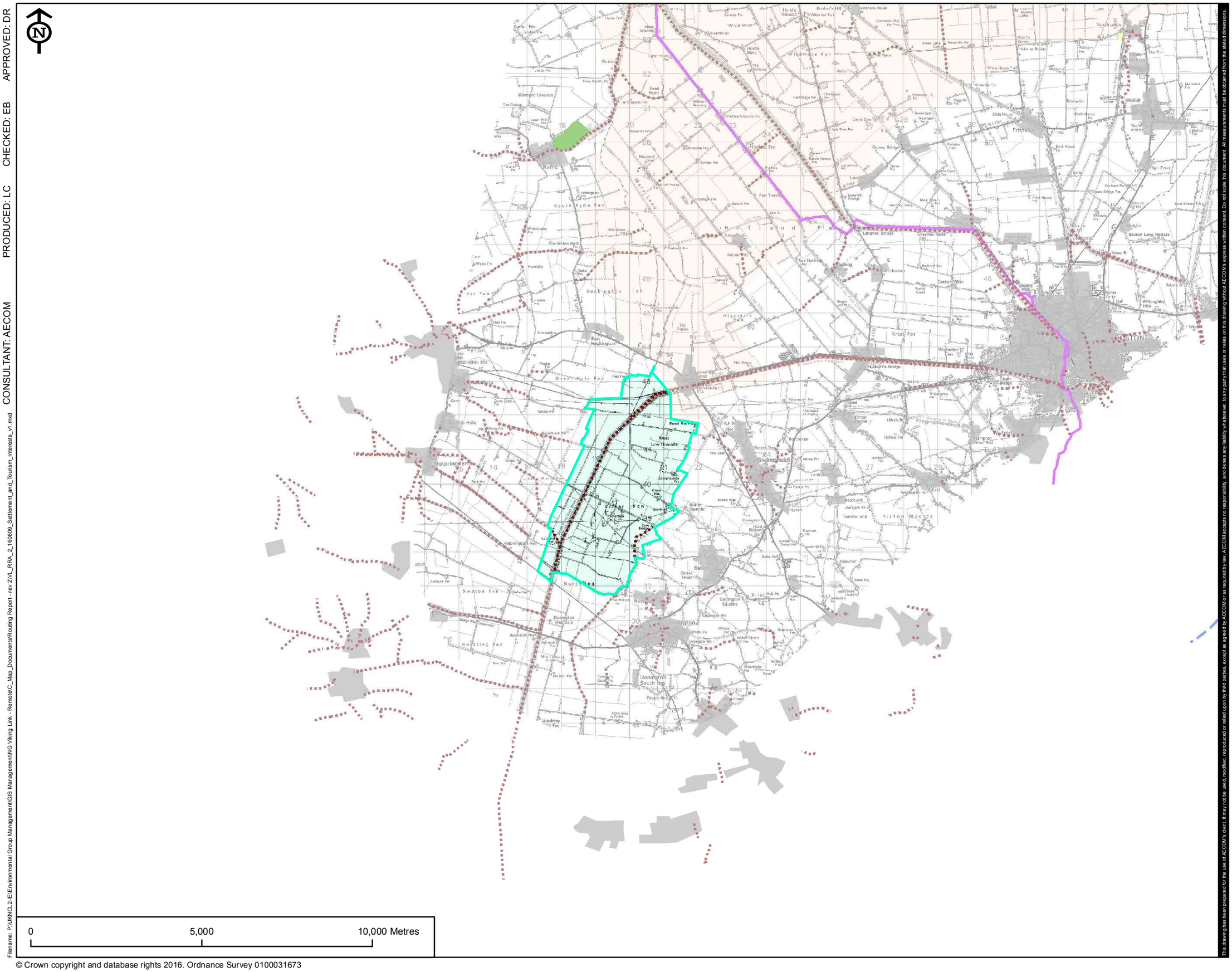

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VikingLink

LEGEND

Cable Route Corridor

- E
- Public Right of Way
- Sustrans National Cycle Route
- Proposed England Coast Path National Trail
- National Trust Land Ownership
- Lincolnshire Coastal Country Park
- Golf Course
- Caravan Park
- Urban Region

REVISION:

REV.	DATE	DESCRIPTION
1	09/08/16	ORIGINAL ISSUE

FIGURE NO.

VL_160809_RRA_E2

FIGURE TITLE

FIGURE E2
SETTLEMENT AND TOURISM INTERESTS

SHEET NUMBER

1 of 1

NOTES

Date: 09/08/16

Scale at A3: 1:100,000

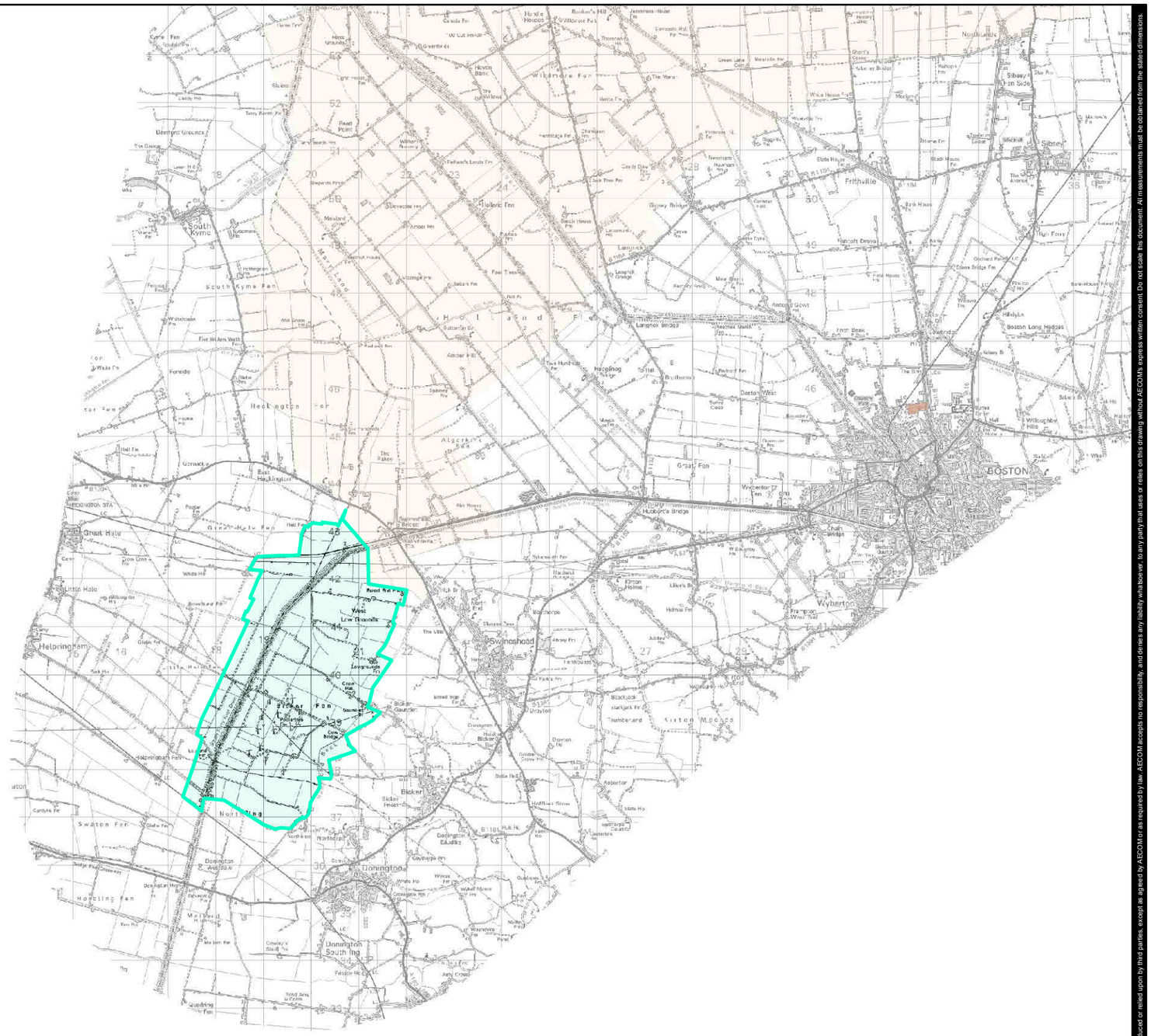
APPROVED: DR

CHECKED: EB

PRODUCED: LC

CONSULTANT: AECOM

Filename: P:\UKNGL2-E\Environmental Group Management\GIS Management\NG Viking Link - Remote\C_Map_Documents\Routing Report - rev 2\VL_RRA_3_160809_Landscape_Designations_v1.mxd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Frithville
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Donington
Donington South Ing
Bicker
Sibsey
Great Hale
Helpringham
South Kyme
Heckington
Holland Fen
Great Fen
Wildmore Fen
Hubberts Bridge
Langrick Bridge
Boston West
Swineshead Bridge
Kirton Marsh
Swaton Fen
Horsling Fen
Donington Bridge
Donington Eaudike
Bicker Fen
Bicker Bridge
Bicker Gauntlet
Sibsey Trader
Sibsey Fen Side
Northlands
Hill Foxy
Hobhole Bridge
Wyberton Fen
Frampton West End
Kyme Fen
Kyme Tower
Kyme Eaudike
Hodsock Priory
Hodsock Park
Hodsock Fen
Holbeck Fen
Holbeck Hall
Holbeck Bridge
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Holbeck Lodge
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Holbeck Farm
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Holbeck Hall Gate
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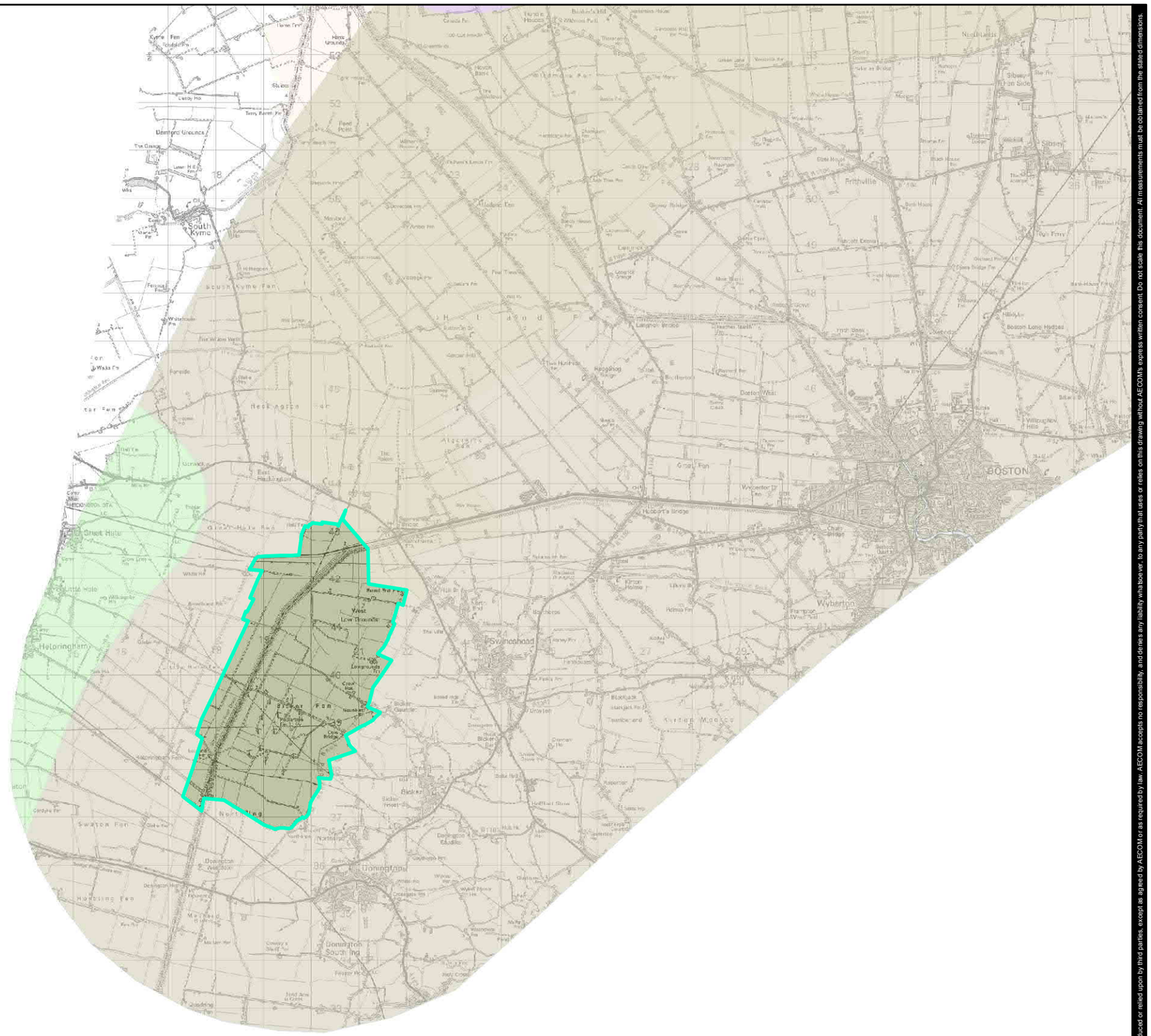

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VikingLink

LEGEND

Cable Route Corridor

- E

National Character Area

- Lincolnshire Coast and Marshes
- Lincolnshire Wolds
- Lincolnshire and Rutland Limestone
- North Lincolnshire Coversands and Clay Vales
- The Fens

REVISION:

REV.	DATE	DESCRIPTION
1	09/08/16	ORIGINAL ISSUE

FIGURE NO.

VL_160809_RRA_E4

FIGURE TITLE

FIGURE E4
LANDSCAPE
CHARACTER

SHEET NUMBER

1 of 1

NOTES

Date: 09/08/16

Scale at A3: 1:100,000

APPROVED: DR

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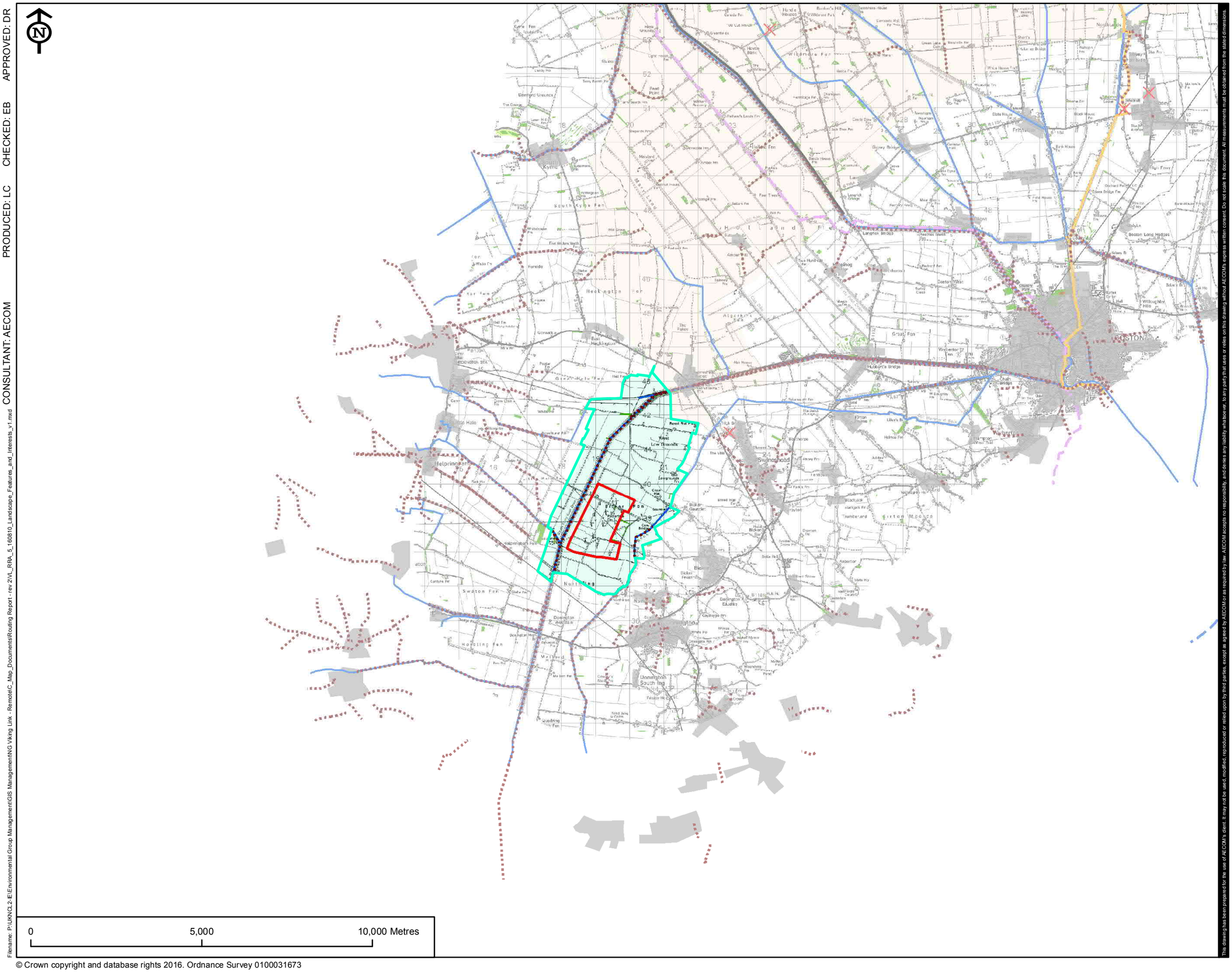
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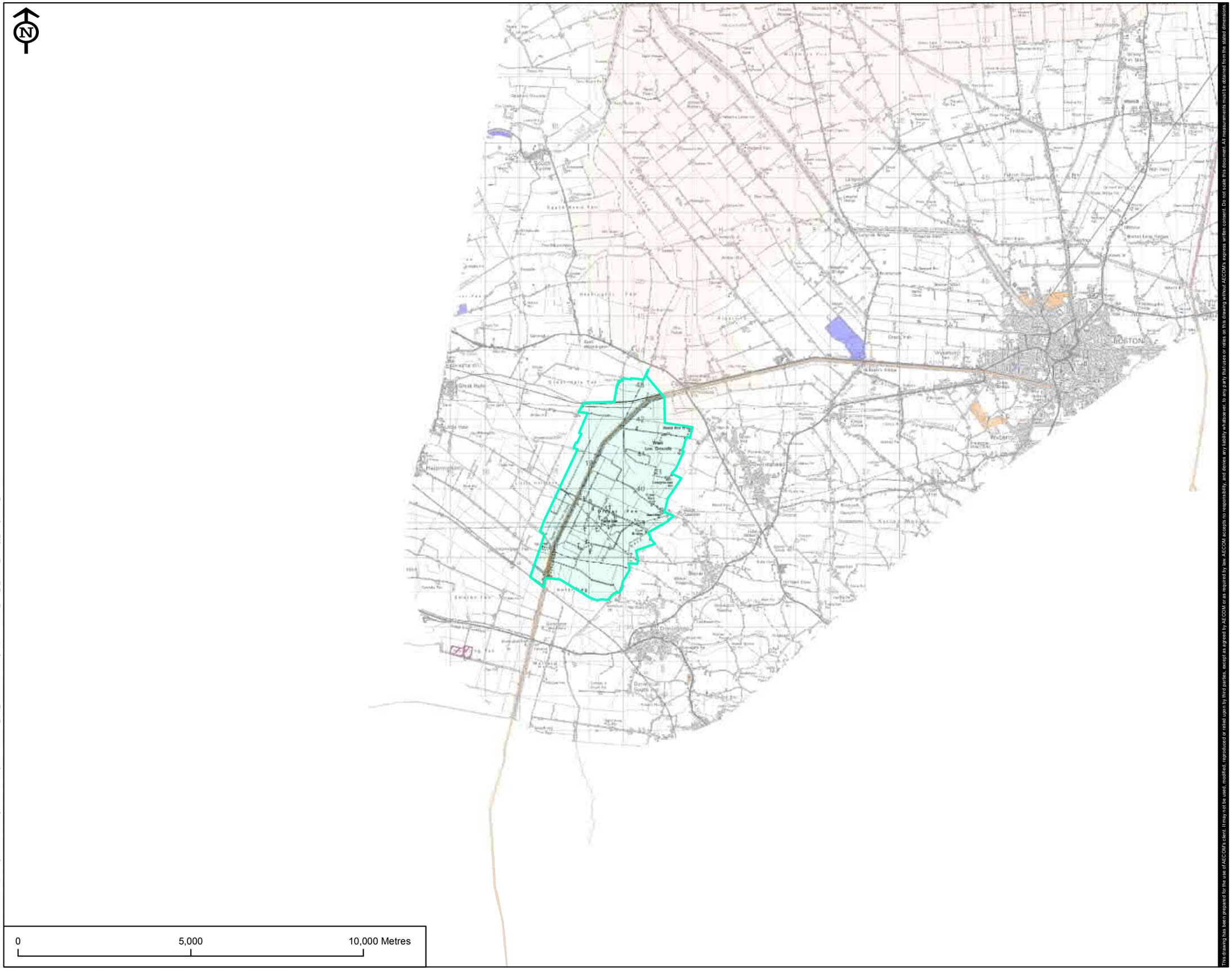

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VikingLink

LEGEND

Cable Route Corridor

- E
- Special Protection Area
- Special Area of Conservation
- Site of Special Scientific Interest
- Coastal Grazing Marsh
- Local Wildlife Site
- Lincolnshire Wildlife Trust
- Regionally Important Geological/Geomorpholo... Site
- Site of Nature Conservation Importance

REVISION:

REV.	DATE	DESCRIPTION
1	09/08/16	ORIGINAL ISSUE

FIGURE NO.

VL_160809_RRA_E6

FIGURE TITLE

FIGURE E6
ECOLOGY
DESIGNATIONS

SHEET NUMBER

1 of 1

NOTES

Date:	Scale at A3:
09/08/16	1:100,000

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CONSULTANT: AECOM

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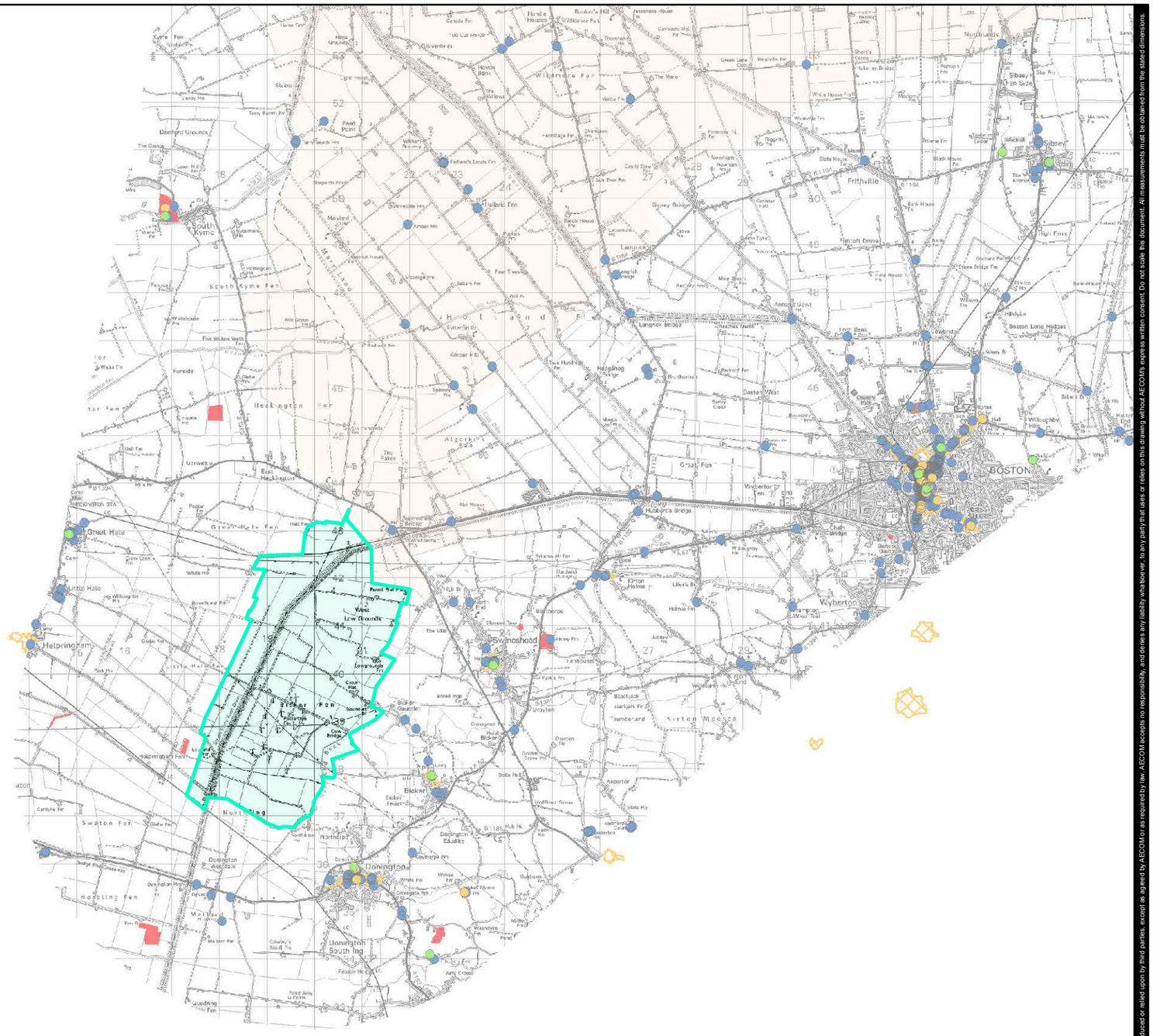
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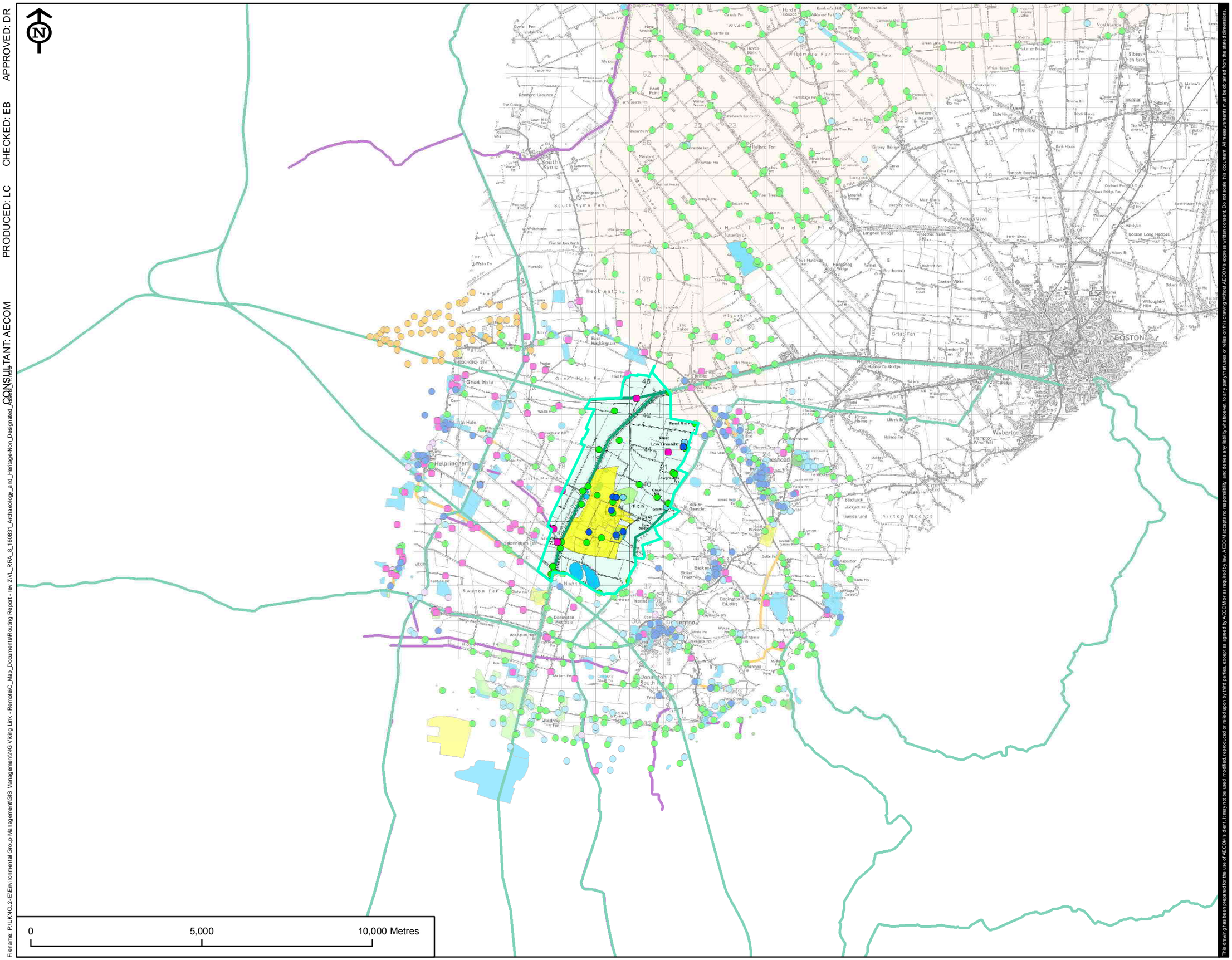

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VikingLink

LEGEND

Cable Route Corridor

- E
- Historic England Archive - Event Point
- Historic England Archive - Monument Point
- Historic England Archive - Monument Line
- Historic England Archive - Monument Polygon
- HER - Farms Point
- HER - Events Font Point
- HER - Events Point
- HER - Events Line
- HER - Events Ellipse
- HER - Events Region
- HER - Monument Point
- HER - Monument Line
- HER - Monument Ellipse
- HER - Monument Region

REVISION:

REV.	DATE	DESCRIPTION
1	31/08/16	ORIGINAL ISSUE

FIGURE NO.

VL_160831_RRA_E8

FIGURE TITLE

FIGURE E8
ARCHAEOLOGY AND HERITAGE
NON-DESIGNATED ASSTES

SHEET NUMBER

1 of 1

NOTES

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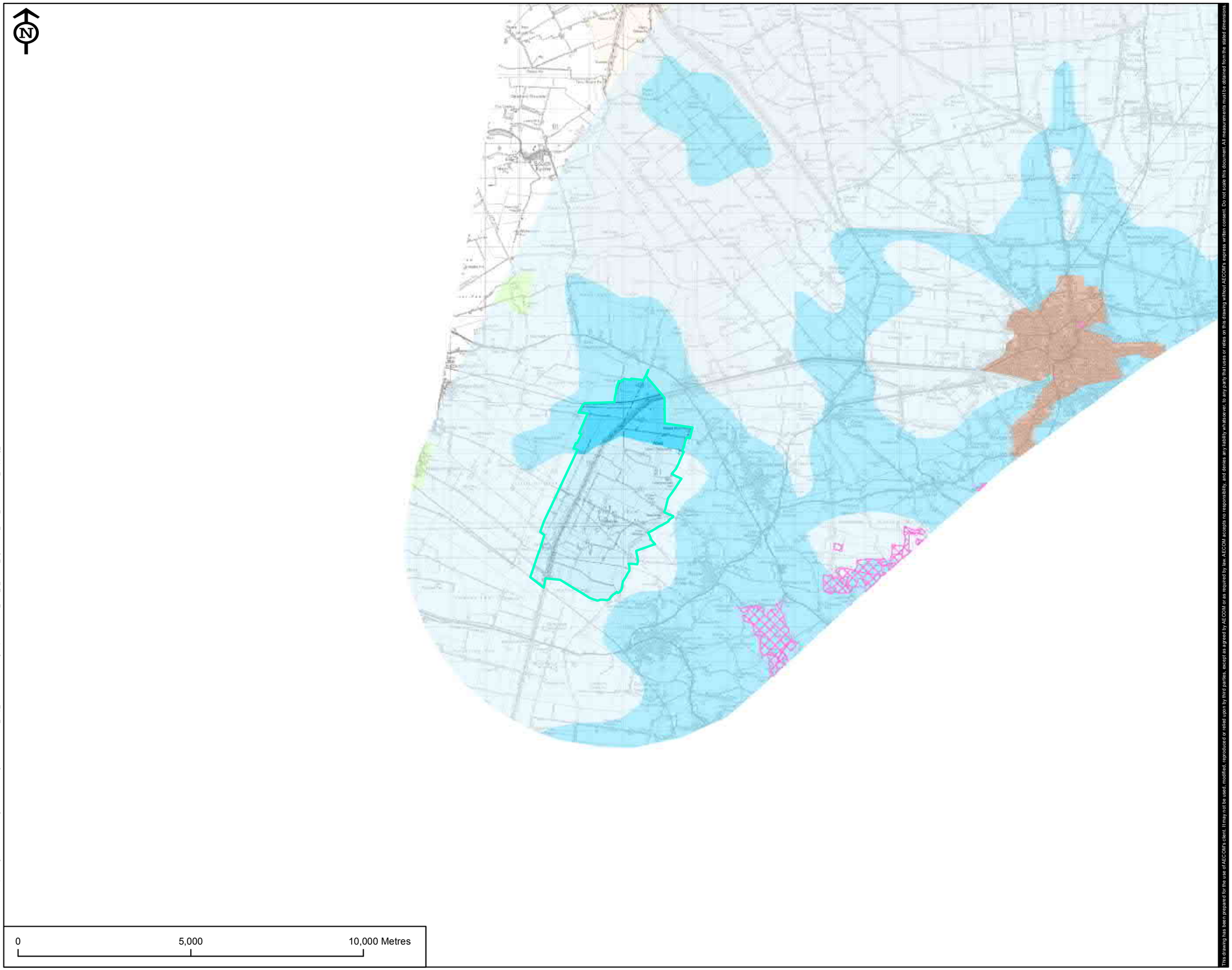

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LEGEND

Cable Route Corridor

- E
- Grade 1
- Grade 2
- Grade 3
- Urban
- Organic Entry Level plus Higher Level Stewardship

REVISION:

REV.	DATE	DESCRIPTION
1	09/08/16	ORIGINAL ISSUE

FIGURE NO.

VL_160809_RRA_E9

FIGURE TITLE

FIGURE E9
AGRICULTURAL LAND
CLASSIFICATION MAPPING

SHEET NUMBER

1 of 1

NOTES

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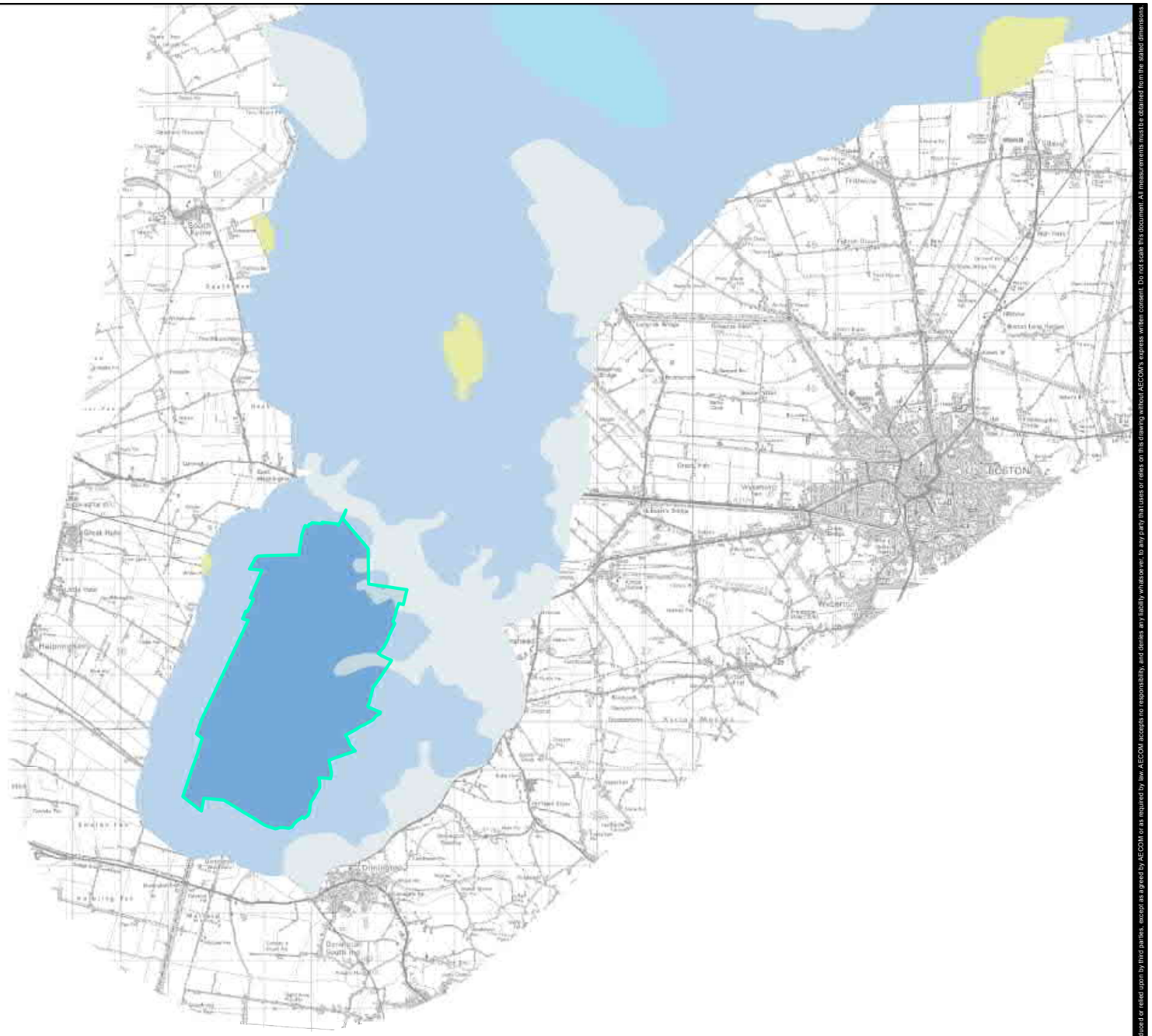

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LEGEND

Cable Route Corridor

- E
- 711m
- 711r
- 711s
- 711t
- 812b
- 812c
- 813g
- 821b
- Lake

REVISION:

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FIGURE NO.

VL_160809_RRA_E10

FIGURE TITLE

FIGURE E10
SOIL MAPPING

SHEET NUMBER

1 of 1

NOTES

Date: 09/08/16

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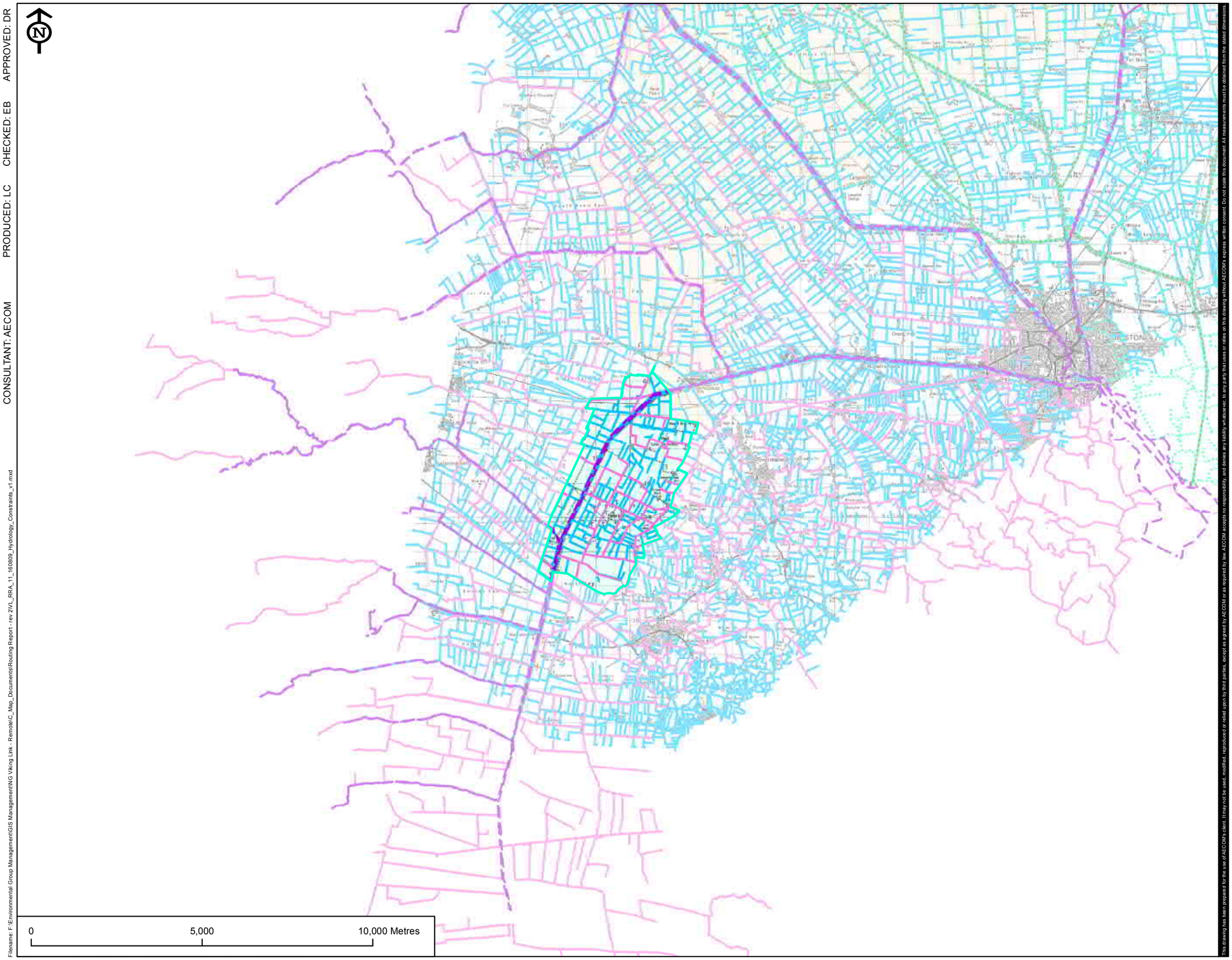

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LEGEND

Cable Route Corridor

- E
- Environment Agency Flood Defence
- Black Sluice IDB - Drains
- Witham Forth District IDB - Combined Sewer
- Witham Forth District IDB - Drain
- Watercourse / Water Feature

REVISION:

REV.	DATE	DESCRIPTION
1	09/08/16	ORIGINAL ISSUE

FIGURE NO.

VL_160809_RRA_E11

FIGURE TITLE

FIGURE E11
HYDROLOGY
CONSTRAINTS

SHEET NUMBER

1 of 1

NOTES

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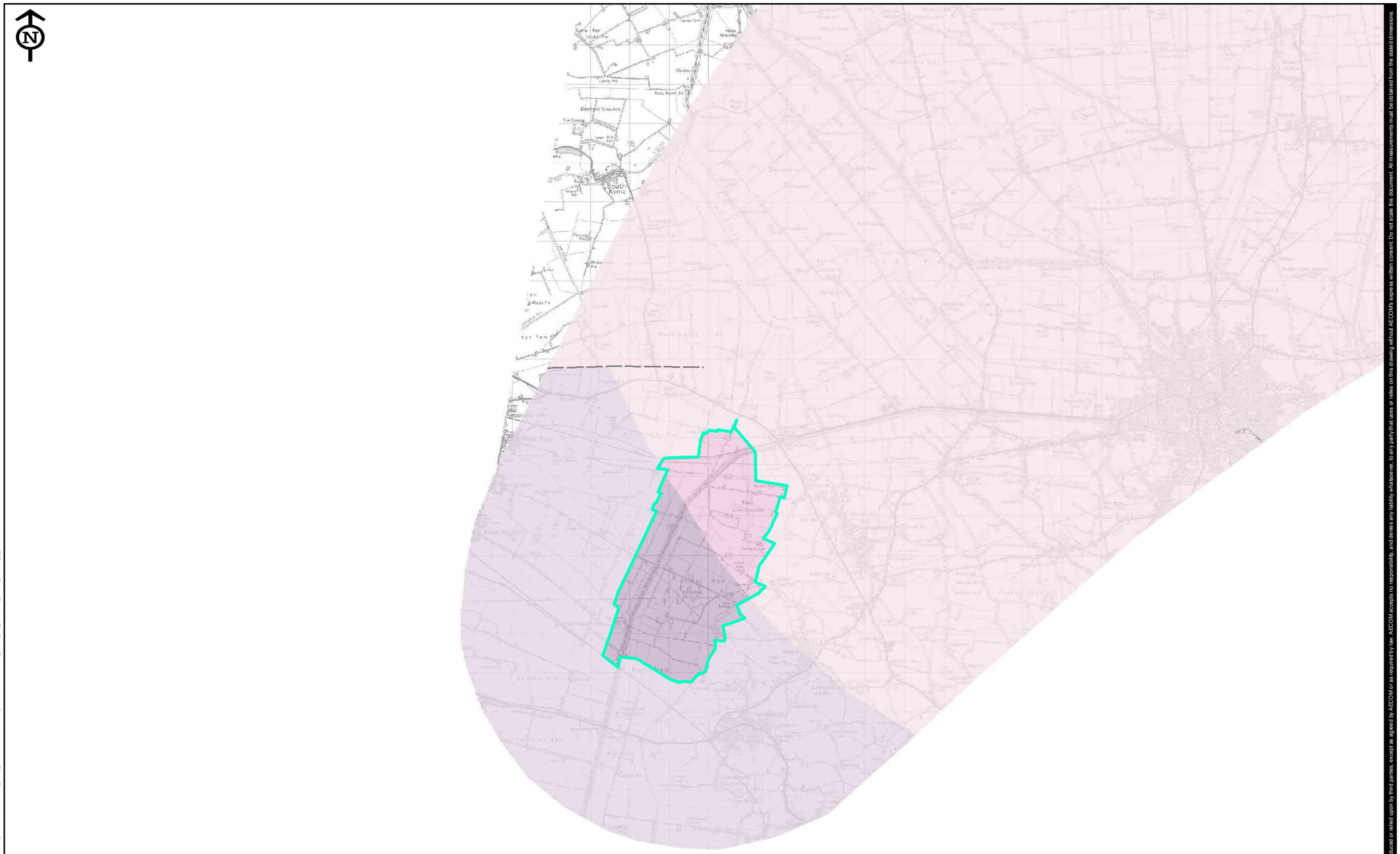

VikingLink

LEGEND

Cable Route Corridor

E

Fault at rockhead

West Walton Formation, Ampthill Clay Formation and Kimmeridge Clay Formation (Undifferentiated) - Mudstone, Siltstone and Sandstone

Kellaways Formation and Oxford Clay Formation (Undifferentiated) - Mudstone, Siltstone and Sandstone

REVISION:

REV.	DATE	DESCRIPTION
1	09/08/16	ORIGINAL ISSUE

FIGURE NO.

VL_160809_RRA_E12

FIGURE TITLE

FIGURE E12
SOLID GEOLOGY

SHEET NUMBER

1 of 1

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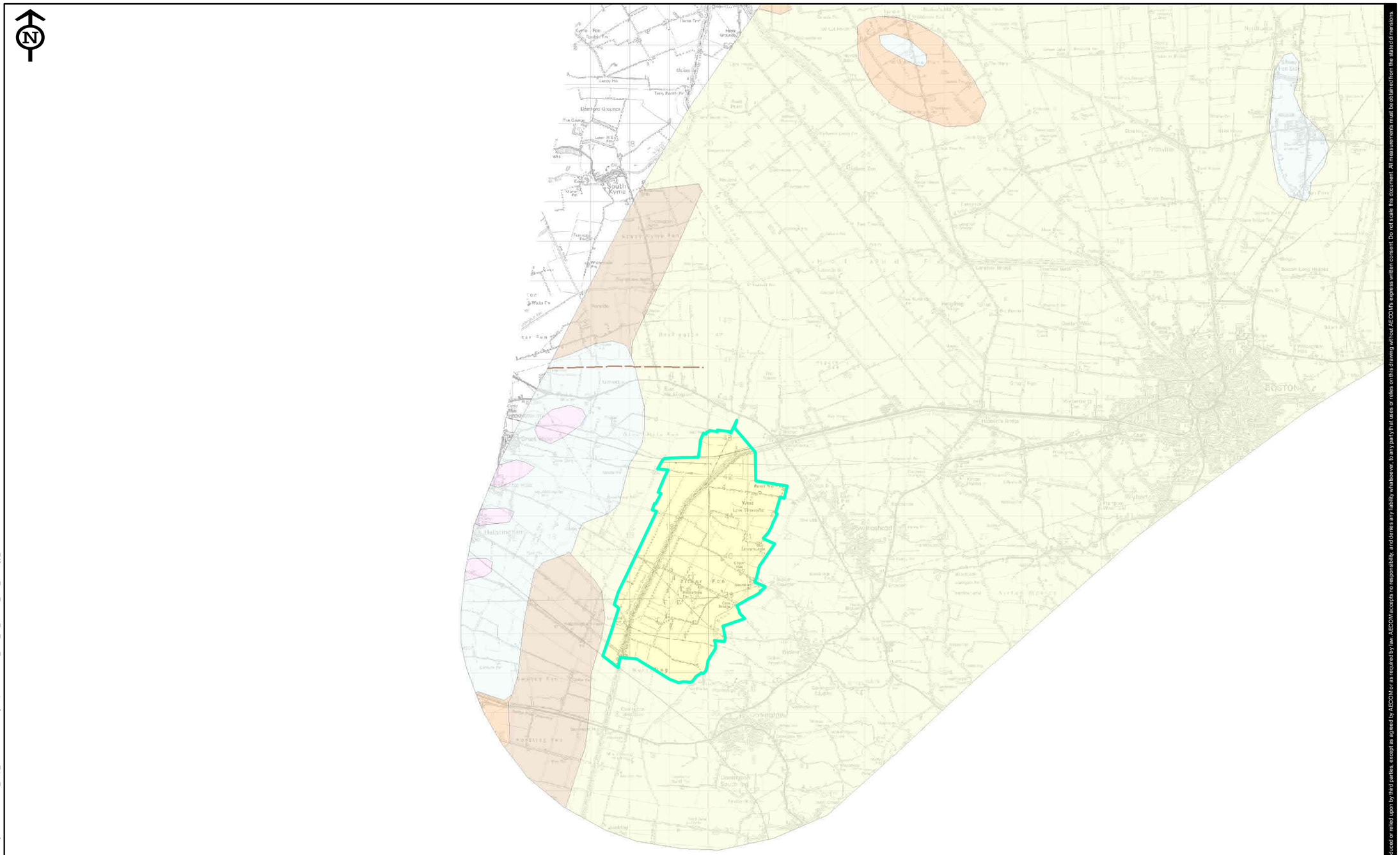
N
South Ferriby
Barton-upon-Humber
Goxhill
Swanland
Welton
Brough
Elloughton
Hessle
Cottingham
Kirk Ella
Anlaby
Willerby
Hutton Cranswick
Skipsea
Leven
Beeford
Frodingham
Burton Pidsea
Sproatley
Preston
Hedon
Paull
Aldbrough
Mappleton
Withernsea
Owthorne
Easington
Kilnsea
Spurn Head
Patrington
Holderness
Hornsea
Mappleton
Roos
Garton-on-the-Wolds
Lockington
Leconfield
Beverley
Cherry Burton
Bishop Burton
Walkington
Woodmansey
Dunswell
Cottingham
Hessle
Anlaby
Willerby
Kirk Ella
Swanland
Welton
Brough
Elloughton
Goxhill
Barton-upon-Humber
South Ferriby
Alkborough
Burnham
Winteringham
Thornton Curtis
Ulceby
Grayingham
Manton
Kirmington
Croxtonbury
Ludborough
Louth
Grimoldby
Manby
Strubby
Alford
Mablethorpe
Sutton-on-Sea
Theddlethorpe
Saltfleet
Tetney
Cleethorpes
Grimsby
Immingham
Habrough
Stallingborough
Healing
Waltham
Humberston
Scartho
Great Coates
Laceby
Ashby
Scunthorpe
Barrow-upon-Humber
Ulceby
Alkborough
Burnham
Winteringham
Thornton Curtis
Grayingham
Manton
Kirmington
Croxtonbury
Ludborough
Louth
Grimoldby
Manby
Strubby
Alford
Mablethorpe
Sutton-on-Sea
Theddlethorpe
Saltfleet
Tetney
Cleethorpes
Grimsby
Immingham
Habrough
Stallingborough
Healing
Waltham
Humberston
Scartho
Great Coates
Laceby
Ashby
Scunthorpe
Barrow-upon-Humber
Hutton Cranswick
Skipsea
Leven
Beeford
Frodingham
Burton Pidsea
Sproatley
Preston
Hedon
Paull
Aldbrough
Mappleton
Withernsea
Owthorne
Easington
Kilnsea
Spurn Head
Patrington
Holderness
Hornsea
Mappleton
Roos
Garton-on-the-Wolds
Lockington
Leconfield
Beverley
Cherry Burton
Bishop Burton
Walkington
Woodmansey
Dunswell
Cottingham
Hessle
Anlaby
Willerby
Kirk Ella
Swanland
Welton
Brough
Elloughton
Goxhill
Barton-upon-Humber
South Ferriby
Alkborough
Burnham
Winteringham
Thornton Curtis
Ulceby

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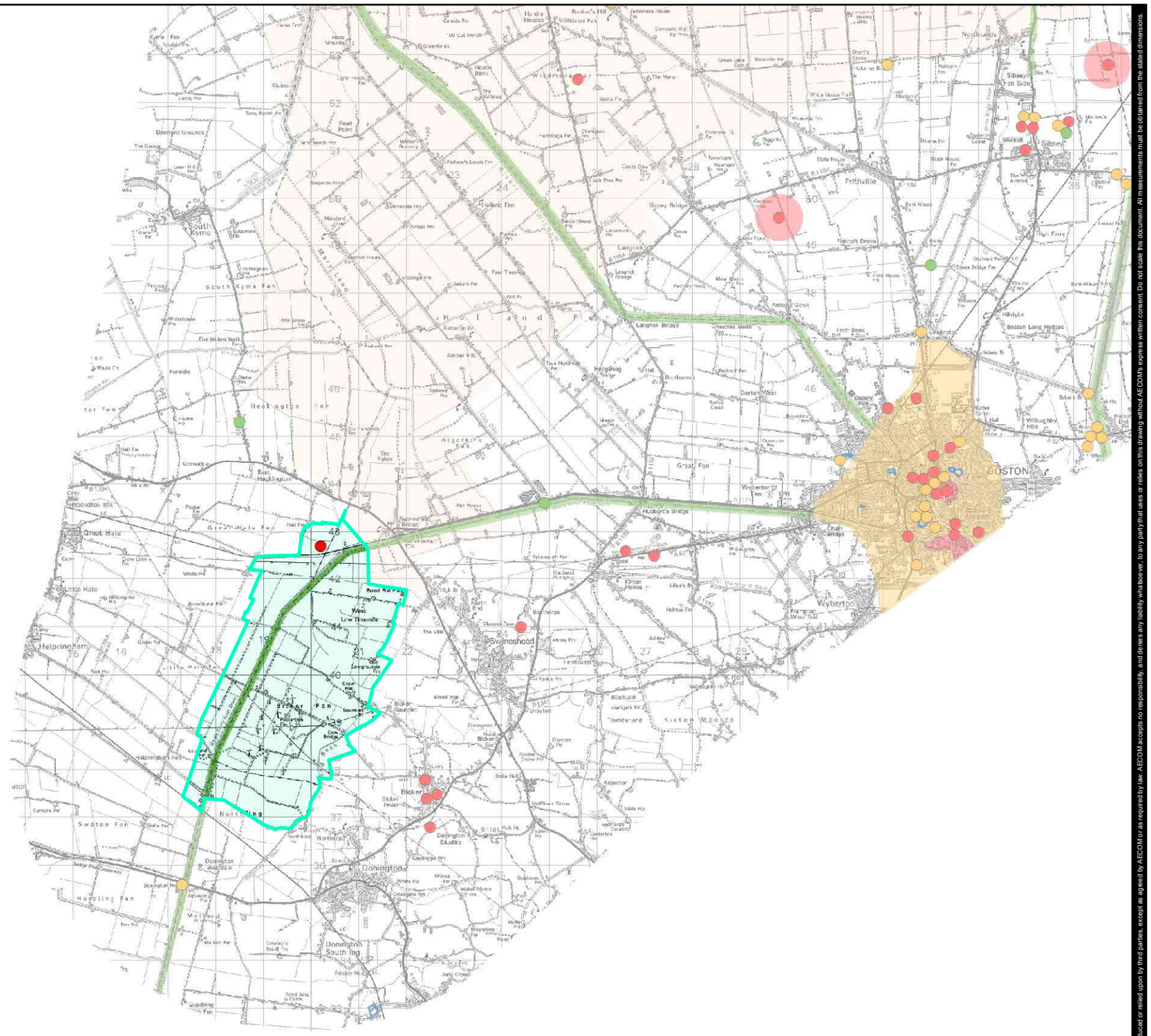

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VikingLink

LEGEND

Cable Route Corridor

- E

UXO Hazards and Constraints

- High Risk
- Moderate Risk
- Low Risk
- High Risk
- Moderate Risk
- Low Risk
- Landfill Site
- Regionally Important Geological/Geomorpholo... Site

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1	10/08/16	ORIGINAL ISSUE

FIGURE NO.

VL_160810_RRA_E14

FIGURE TITLE

FIGURE E14
GEOLOGICAL
CONSTRAINTS

SHEET NUMBER

1 of 1

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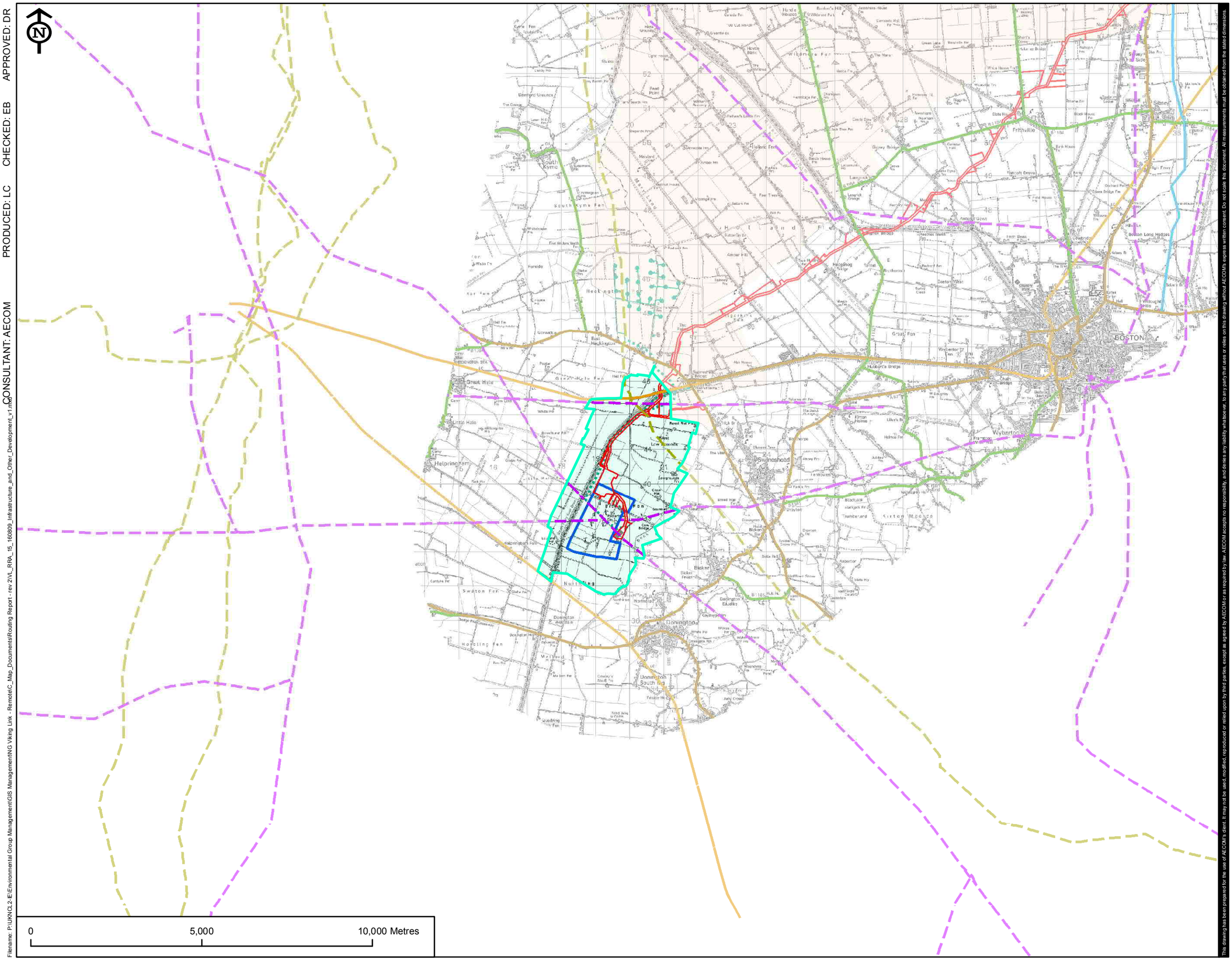
N
Frithville
Boston
Wyberton
Swineshead
Kirton
Donington
Bicker
Great Hale
Little Hale
Helpringham
South Kyme
Heckington
Holland Fen
Great Fen
Swineshead Bridge
Hubberts Bridge
Kirton Moors
Donington South
Donington Eaudike
Swaton Fen
Northing
Wyberton Fen
Boston West
Hagnaby
Thorpe
Drayton
Blackjack
Sibsey
Sibsey Trader
Hobhole Bridge
Cross Bridge
Cross Hall
Bicker Fen
Bicker Fen Station
Bicker Bridge
Bicker Gauntlet
Bicker Gate
Bicker Fen Station
Bicker Fen Station
Bicker Fen Station

Appendix D Geology Description

Route Corridor A

The underlying solid and superficial geology within Route Corridor A(RCA) comprises, at the coast, Blown Sand and Storm Beach Deposits over Salt Marsh and Tidal Creek deposits (clay and silt). These may locally overlie Till (Boulder Clay) in this area, which in turn overlies the solid geology of the Flamborough, Burnham, and Welton Chalk Formations (White Chalk Group).

Moving inland to the west, the Salt Marsh and Tidal Creek deposits gradually disappear with Till (Boulder Clay) becoming more prevalent with localised areas of overlying sand and gravel from near surface around Asserby. The Till continues as the dominant superficial geology up to an area northwest of Alford, and the eastern limits of the Lincolnshire Wolds. The solid geology between the conjectured sub-crop of the Welton Chalk and the Lincolnshire Wolds is primarily the Grey Chalk Group which includes sub-crops of Ferriby Chalk and Red Chalk. Carstone sandstone (Lower Greensand Group) also sub-crops just east of the Lincolnshire Wolds.

Superficial geology is generally absent throughout the Lincolnshire Wolds, except for occasional areas of Alluvium (associated with the River Lymn) and sand and gravel deposits. The superficial geology remains largely absent throughout the remainder of this route corridor except at the western limits where Till (Boulder Clay) is again indicated.

The Lincolnshire Wolds comprise a western scarp face with a gently sloping easterly incline. The solid geology is characterised by Welton Chalk across central areas, transitioning westwards where the Red Chalk and Ferriby Chalk of the Grey Chalk Group outcrop, followed by a sequence of siltstones, sandstones and mudstones of the Lower Greensand Group and the Wealden Group. The mudstones, sandstones and siltstones of the Ancholme Group (comprising a succession of the Kimmeridge Clay Formation, Ampthill Clay Formation, West Walton Formation, Oxford Clay Formation and Kellaways Formation) are then encountered. The Kimmeridge Clay is expected to sub-crop at the western end of this route corridor beneath the superficial geology.

Route Corridor B

The underlying superficial geology at the eastern limits of Route Corridor B (RCB) comprises predominantly of Till (Boulder Clay) with localised overlying Salt Marsh and Tidal Creek deposits (clay and silt). Moving south and southwest along the corridor alignment, the Till continues to be present from the surface until passing between the areas west of Fartlesthorpe and the areas west of Willoughby. At this point glaciofluvial sand and gravel deposits are indicated to be present over the Till. As the route corridor passes west of Willoughby, the glaciofluvial sand and gravels disappear and the Till is indicated again to be present from the surface, and this remains the dominant superficial geology until Great Steeping. There are localised areas of overlying Salt Marsh and Tidal Creek deposits at the eastern limits and also areas where superficial geology is absent altogether, notably in the western section of corridor, where the corridor splits into two options. Salt Marsh and Tidal Creek deposits are indicated again, west of Great Steeping around

Little Steeping, after which a broad area of overlying Peat is shown extending up to the western limits of the route corridor.

The underlying solid geology comprises a northwest to southeast trending succession of the Welton Chalk (White Chalk Group) in the east that extends from the start of the corridor to just east of Farlesthorpe. This is followed by the Red Chalk and Ferriby Chalk (Grey Chalk Group) that extends between the area east of Farlesthrope up to just west of Slouthby, and then the Carstone (Lower Greensand Group) that is present between the area west of Slouthby up to just south west of Hasthorpe. The Claxby Ironstone, Tealby Formation (clay and mudstone) and Spilsby Sandstone (Wealdon Group) extends to areas of the corridor just northwest of Great Steeping for the northern option of the corridor, and just southwest of Great Steeping for the southern option of the corridor. The remainder of the corridor is indicated to be underlain by the mudstones, sandstones and siltstones of the Ancholme Group (comprising a succession of the Kimmeridge Clay Formation, Ampthhill Clay Formation, West Walton Formation, Oxford Clay Formation and Kellaways Formation). The Kimmeridge Clay is anticipated to sub-crop, beneath any superficial cover, at the western end of this route corridor.

Route Corridor D

The underlying superficial geology at the north eastern limits of Route Corridor D (RCD) comprises initially Till (Boulder Clay) with overlying Peat indicated across the eastern half of this initial part of the corridor. The Peat continues to be present throughout the southern part of RCD, before transitioning to the locally peaty silts and clays of the Marine and Estuarine Deposits which overlie the Till. The Marine and Estuarine Deposits are the dominant superficial deposit from near surface, and they continue throughout the southern option becoming older moving west, where they transition to the Barroway Drove Beds (Silty Clay) from an approximate location just east of Westvale Road.

The superficial geology throughout the northern part of RCD comprises predominantly the locally peaty silts and clays of the Marine and Estuarine Deposits which overlie the Till, with localised areas of overlying River Terrace Deposits indicated extending into the corridor from the north.

The solid geology throughout RCD is indicated to be the mudstones, sandstones and siltstones of the Ancholme Group (comprising a succession of the Kimmeridge Clay Formation, Ampthhill Clay Formation, West Walton Formation, Oxford Clay Formation and Kellaways Formation). The Kimmeridge Clay sub-crops at the eastern end and the West Walton Formation at the western end beneath any superficial geology.

Route Corridor E

The underlying superficial geology within Route Corridor E (RCE) comprises the Barroway Drove Beds which are salt marsh deposits comprising of silty clay, which in turn overlie Till (Boulder Clay). The salt marsh deposits generally reduce in thickness moving west.

The solid geology throughout this corridor is indicated to be the mudstones, sandstones and siltstones of the Ancholme Group (comprising a succession of the West Walton Formation, Oxford Clay Formation and Kellaways Formation). The West Walton Formation sub-crops broadly across the northern half and the Oxford Clay, the southern half, beneath any superficial geology.

Appendix E Soils

Introduction

This Appendix sets out the details and methodology for the agriculture and soils topic for the Route Corridor report. It describes the soil associations present within the Cable Route Search Area of the UK Onshore Scheme; as well as principles of Agricultural Land Classification (ALC) and how they were applied to determine the quality of agricultural land within the Cable Route Search Area.

Agricultural Land Classification (ALC) Grading Methodology

A desk study was carried out using published data sources to determine the general soil characteristics of the Cable Route Search Area (Provisional 1:250,000 ALC Map for the East Midlands Region (Ref. 1) and the LandIS Dataset (Ref. 2)) and identify the ALC grading. Please refer to Section 4.1, of the UK Onshore Scheme Route Corridor Report, for a detailed description of the Cable Route Search Area.

ALC grade was determined using provisional 1:250,000 scale ALC mapping for the East Midlands Region (Ref. 1). The scale of the mapping cannot be used to identify the ALC grade of the land at the field level and does not provide division of Grade 3 into Subgrades 3a (BMV) and 3b (non-BMV) and therefore does not allow the identification of BMV land. However, it can be used to provide overall estimates of land quality over a larger area, such as a geographic subsection of the Cable Route Search Area.

Between 1989 and 1999, some areas of England and Wales were surveyed at the field level by MAFF (now Defra), allowing a detailed assessment of the ALC for these areas to be undertaken. These are collectively known as post-1988 ALC surveys and are considered to be the most detailed and up to date dataset. The post-1988 surveys were undertaken at varying scales and level of detail, ranging from 1:5,000 to 1:50,000 (typically 1:10,000), and provide division of Grade 3 allowing the identification of BMV land. Post-1988 ALC survey reports were not available for the Cable Route Search Area.

Soil surveys were not carried out to inform the Route Corridor Report. Therefore, 1:250,000 scale National Soil Map dataset for the Cable Route Search Area was obtained from the National Soil Resources Institute, Cranfield University. The dataset contains NATMAPvector data, which provides spatial distribution of soil associations. Associated datasets containing properties of soil associations, such as percentage of component soil series were also used. This data is collectively referred to as the LandIS NATMAP dataset. These data were also used to inform ALC as described below.

Agricultural Land Classification grading

ALC grading is assigned by investigating the physical properties of the soil resources and interrelated factors such as topography and climate; and assessing how they limit the site's suitability for agricultural use. The grade or subgrade is determined by the most limiting factor (limitation) present. For example, if wetness and droughtiness are the only factors limiting the quality of the land to Subgrade 3b and Grade 2, respectively, such land is classed as Subgrade 3b.

The limitations to ALC grading

The agroclimatic data of a site influences the ALC in respect of growing conditions and the soil reaction in terms of wetness and droughtiness. The Meteorological Office published agroclimatic data for England and Wales on a five kilometre grid basis from which site specific data can be estimated. The overall climatic limitation is assessed using the average annual rainfall and accumulated temperature at crop establishment (January to June). It reflects the direct effects of water supply and energy available for photosynthesis on plant growth.

Gradient has a significant effect on mechanised farm operations since most conventional agricultural machinery performs best on level ground. The safe and efficient use of machinery on sloping land depends very much on the type and design of the machine and on the nature of the slope being farmed. Microrelief involves complex changes in slope angle and direction over short distances, or the presence of boulders or rock outcrops; all of which can impact upon the use agricultural machinery.

Flooding can affect choice of crops to be grown, because it may have negative influence on the yield of some crops and restricts soil cultivation. The main factor determining the risk of flooding is topography. Local conditions can be assessed based on local knowledge and information from the water authorities. Floods which occur in summer are generally more damaging than winter floods because the growing roots of the crops are more sensitive to waterlogging. The flood limitation is therefore assessed separately for a 'winter' and a longer 'summer' periods (the latter including spring sowing and autumn cultivation).

Soil depth is important when determining available water capacity. Shallowness can affect cropping in a number of ways, such as restricting the range of cultivation methods available, restricting nutrient uptake and root growth.

Stones act as an impediment to cultivation, harvesting and crop growth. A high stone content reduces the potential for certain agricultural crop management, can cause wear and tear to agricultural implements and tyres, and can reduce the quality of crops (i.e. bruising potatoes during harvesting).

Physical limitations resulting from interactions between climate, site and soil characteristics are soil wetness and droughtiness. Soil wetness adversely affects plant growth and agricultural management (e.g. restricts grazing and operation of farm machinery). Droughtiness is most likely to be a significant limitation to crop growth in areas with low rainfall and high evapotranspiration, or where the soil profile holds only small reserves of moisture, for example if the soil is sandy.

For ALC purposes soil wetness assessment takes account of duration of the period of time when soil moisture is at field capacity, and soil susceptibility to waterlogging, based on the following soil profile characteristics: depth to slowly permeable layer, depth to gleying, and topsoil texture.

Droughtiness is assessed based on the average drought risk of two reference crops: winter wheat and potatoes. The method uses rooting depth and foliar characteristics of the reference crops to estimate soil moisture balance at a given location.

Deriving ALC from the National Soil Map

As described above, when used in isolation, the Provisional 1:250,000 ALC mapping cannot be used to identify the presence or absence of BMV land or the distribution of ALC grading at the field level (Ref. 1). However, it may be used in conjunction with published soils data; LandIS NATMAP data and "Soils and

their use in Eastern England" to identify the likely distribution of BMV land through the identification of areas of potential Subgrade 3a or 3b land.

The LandIS NATMAP dataset provides the area covered by each soil association and its component soil series within the Cable Route Search Area. The LandIS data also gives the percentage distribution of the dominant or key component soil series within each association; discounting any ancillary soil series which only make up a small proportion of the soils within the association. The percentage distribution of the dominant soil series is therefore adjusted so that their total equals 100%; this is because inclusion of the lesser ancillary series would unnecessarily complicate the assessment without increasing its accuracy. The area covered by each soil series, within areas identified as ALC Grade 3 land on the provisional 1:250,000 ALC mapping was then derived (See Table E2).

Published data from the Soil Survey of England and Wales (Ref. 3) was then used to identify the typical limitations to agricultural land quality (ALC) displayed by each of the soil series. Limitations included typical soil depth, soil texture, soil stone content and soil wetness. These limitations were then used to determine the subdivision of ALC Grade 3 into Subgrade 3a and 3b; using the methodology set out in here and described in MAFF (Ref. 4) (See Table E2).

The soil depth, stone content and soil wetness limitations were identified from the published soil profile descriptions (Ref. 3). If more than one soil wetness was listed in the description of soils series, their proportions were assumed to be equal.

The soil texture information was obtained from the published soil profile description (Ref. 4). Where a soil texture was identified as heavy or medium (i.e. silty clay loam and clay loam), it was assumed the distribution is a fifty-fifty split, resulting in a fifty-fifty split between ALC Subgrade 3a and 3b. Additionally, if more than one soil texture was listed in the description of soils series, their proportions were assumed to be equal.

If the calculation of the ALC grade from the published data resulted in a grade other than 3a or 3b, the grade was corrected. A calculated Grade 1 or 2 remained BMV land, but was re-assigned to Subgrade 3a, whilst a calculated Grade 4 or 5 remained non-BMV, but re-assigned to Subgrade 3b.

For some of the series it was not possible to determine one single grade, in such cases equal proportion was assumed.

The combination of the soil series areas within mapped ALC Grade 3 agricultural land, the proportion of Subgrade 3a and 3b of each series, and the mapped ALC Grades 1 and 2 land, can therefore provide the total potential area of BMV in the Cable Route Search Area.

The relative proportion of Subgrade 3a and 3b land within each soil association was calculated from the percentage of the soil series. The spatial arrangement of the ALC cannot be obtained from the NATMAP data, as only the proportion of each soil series within an association is provided, not their geographical location. Therefore, the relative proportions of Subgrade 3a and 3b within the Cable Route Search Area could only be presented in a tabular form and not represented in a mapped format.

Summary properties of the soil associations present in the Cable Route Search Area are provided in Table E1, whilst the results of the soil series classification are presented in Table E2.

Table E1 Geographical soil associations occurring within the Cable Route Search Area				
Code	**Soil association**	**Important soil properties**	**Typical range of crops**	**Erodibility***
3. Lithomorphic soils, 3.4 Rendzinas, 3.43 Brown rendzina				
343h	Andover 1	Shallow well drained calcareous silty soils over chalk on slopes and crests. Deep calcareous and non-calcareous fine silty soils in valley bottoms. Striped soil patterns locally	Winter cereals and short term grassland with dairying and stock rearing; cereals, sugar beet and potatoes in Lincolnshire	Moderate risk of water erosion +
5. Brown soils, 5.1 Brown calcareous earths, 5.11 Typical brown calcareous earths				
511e	Swaffham Prior	Well drained calcareous coarse and fine loamy soils over chalk rubble. Some similar shallow soils. Deep non-calcareous loamy soils in places. Striped and polygonal soil patterns locally	Cereals, sugar beet and potatoes	Moderate risk of water erosion
5. Brown soils, 5.1 Brown calcareous earths, 5.13 Stagnogleyic brown calcareous earths				
513	Cannamore	Deep calcareous and non-calcareous fine loamy and clayey soils with slowly permeable subsoils and slight seasonal waterlogging	Cereals, other arable crops and field vegetables	Moderate risk of water erosion
5. Brown soils, 5.4 Brown earths, 5.41 Typical brown earths				
541r	Wick 1	Deep well drained coarse loamy and sandy soils, locally over gravel. Some similar soils affected by groundwater. Moderate risk of water and wind erosion	Cereals and some horticultural crops in drier lowlands	Moderate risk of water and wind erosion
5. Brown soils, 5.4 Brown earths, 5.43 Gleyic brown earths				
543	Arrow	Deep permeable coarse loamy soils affected by groundwater	Cereals, some field vegetables and potatoes	Small risk of water erosion
5. Brown soils, 5.4 Brown earths, 5.44 Ferritic brown earths				
544	Banbury	Well drained brashy fine and coarse loamy ferruginous soils over ironstone. Some deep fine loamy over clayey soils with slowly permeable subsoils	Winter cereals with short term grassland, some potatoes; some sugar beet	Moderate risk of water erosion

Table E1 Geographical soil associations occurring within the Cable Route Search Area				
Code	Soil association	Important soil properties	Typical range of crops	Erodibility*
5. Brown soils, 5.5 Brown sands, 5.51 Typical brown sands				
551c	Cuckney 2	Well drained sandy and ferruginous fine loamy soils over soft sandstone	Cereals, sugar beet and potatoes; some field vegetables	High risk of water and wind erosion
5. Brown soils, 5.7 Argillic brown earths, 5.71 Typical argillic brown earths				
571n	Tathwell	Well drained reddish fine loamy over clayey soils and similar fine loamy soils with slowly permeable subsoils and slight seasonal waterlogging	Winter cereals with sugar beet and potatoes	Small risk of water erosion
7. Surface water gley soils, 7.1 Stagnogley soils, 7.11 Typical stagnogley soils				
711f	Wickham 3	Slowly permeable seasonally waterlogged fine loamy over clayey, fine silty over clayey and clayey soils	Cereals and grassland with dairying	Very small risk of water erosion
711m	Salop	Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils	Dairying on short term and permanent grassland, some cereals in drier districts	Very small risk of water erosion
711r	Beccles 1	Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils	Winter cereals, some potatoes and grassland	Very small risk of water erosion
711s	Beccles 2	Slowly permeable seasonally waterlogged fine and coarse loamy over clayey soils	Cereals and some sugar beet and potatoes; some grassland	Very small risk of water erosion
711u	Holderness	Slowly permeable seasonally waterlogged fine loamy soils and similar soils with only slight waterlogging. Narrow strips of clayey alluvial soils	Cereals and some short term grassland	Small risk of water erosion
8. Ground-water gley soils, 8.1 Alluvial gley soils, 8.12 Calcareous alluvial gley soils				
812b	Wisbech	Deep stoneless calcareous coarse silty soils. Groundwater usually controlled by ditches or pumps. Flat land with low ridges	Sugar beet, potatoes, field vegetables horticultural crops and cereals in the Fens	Very small risk of water and wind erosion +
812c	Agney	Deep stoneless calcareous fine and coarse silty soils.	Cereals, sugar beet, potatoes and	Very small risk of

Table E1 Geographical soil associations occurring within the Cable Route Search Area				
Code	Soil association	Important soil properties	Typical range of crops	Erodibility*
		Groundwater usually controlled by ditches and pumps. Flat land.	field vegetables	water erosion
8. Ground-water gley soils, 8.1 Alluvial gley soils, 8.13 Pelo-alluvial gley soils				
813c	Fladbury 2	Stoneless clayey soils variably affected by groundwater some with sandy subsoils. Some similar fine loamy soils. Flat land. Risk of flooding	Stock rearing on permanent grassland; cereals where flood risk low	Very small risk of water erosion +
813g	Wallasea 2	Deep stoneless clayey soils. Calcareous in places. Some deep calcareous silty soils. Flat land often with low ridges giving a complex soil pattern	Winter cereals and some sugar beet, potatoes, cereals and field vegetables	Very small risk of water erosion
8. Ground-water gley soils, 8.2 Sandy gley soils, 8.51 Typical sandy gley soils				
821b	Blackwood	Deep sandy and coarse loamy soils. Slightly stony	Cereals; potatoes and sugar beet; some grassland and coniferous woodland	Small risk of wind erosion +
8. Ground-water gley soils, 8.5 Humic-alluvial gley soils, 8.51 Typical humic-alluvial gley soils				
851a	Downholland 1	Deep stoneless humose clayey soils, calcareous in places. Some peat soils and deep humose calcareous silty soils. Flat land. Groundwater usually controlled by ditches and pumps	Cereals, sugar beet, potatoes and field vegetables in the Fens	Moderate risk of wind erosion -
851b	Downholland 2	Deep stoneless clayey or calcareous silty soils, mainly with humus surface horizon. Flat land. Groundwater controlled by ditches and pumps.	Grassland and arable in lowlands.	Small risk of wind erosion +
Sources: Soil Survey of England and Wales (1984) * Knox et al. (2015). 'Research to develop the evidence base on soil erosion and water use in agriculture: Final Technical Report. pp147'., where +: Locally risk of erosion is greater and -: Locally risk of erosion is less				

Table A2: Summary ALC for component soil series in each association used to estimate proportion of Subgrades 3a and 3b within Grade 3 areas

Series Name	%	Geology	Soil association properties and corresponding ALC limitations							Wetness limitation for possible textures				Main limitation	Grade 3 subdivision	
			Depth	Depth limit.	Texture	Texture limit.	Stoniness	Stoni-ness limit.	Wetness Class	A	B	C	D		% 3a	% 3b
Agney (812c)																
Agney	65	medium silty marine alluvium	100	1	ZCL	no	stoneless	1	I	1	**2**	-	-	wetness	na	na
Wisbech	35	light silty marine alluvium	100	1	ZL[c]	no	stoneless	1	I	1	**-**	-	-	none		
Andover 1 (343h)																
Andover	55	silty lithoskeletal chalk	40	**3a**	ZCL	no	slightly	**3a**	I	1	2	-	-	depth & stoniness	65	35
Panholes	15	medium silty material over lithoskeletal chalk	65	1	ZCL	no	moderately	**3b**	I	1	2	-	-	stoniness		
Coombe	10	medium silty chalky drift	90	1	ZCL	no	slightly	**3a**	I	1	2	-	-	stoniness		
Upton	10	loamy lithoskeletal chalk	40	3a	ZCL	no	moderately	**3b**	I	1	2	-	-	stoniness		
Charity	10	medium silty drift with siliceous stones	100	1	ZCL	no	moderately	**3b**	I	1	2	-	-	stoniness		
Arrow (543)																
Arrow	75	light loamy drift with siliceous stones	100	1	SL	no	slightly	**3a**	I	1	**-**	-	-	stoniness	100	0
Quorndon	25	light loamy drift with siliceous stones	100	1	SL	no	slightly	**3a**	I	1	**-**	-	-	stoniness		
Banbury (544)																

Table A2: Summary ALC for component soil series in each association used to estimate proportion of Subgrades 3a and 3b within Grade 3 areas

Series Name	%	Geology	Soil association properties and corresponding ALC limitations							Wetness limitation for possible textures				Main limitation	Grade 3 subdivision	
			Depth	Depth limit.	Texture	Texture limit.	Stoniness	Stoni-ness limit.	Wetness Class	A	B	C	D		% 3a	% 3b
Banbury	55	ferruginous medium loamy material over lithoskeletal ironstone	100	**1**	CL / SCL	**no**	slightly	**3a**	I	**1**	**1**	**2**	**-**	stoniness	91.5	8.5
Tadmarton	28	ferruginous light loamy material over lithoskeletal ironstone	100	**1**	SL	**no**	slightly	**3a**	I	**1**	**-**	-	-	stoniness		
Irondown	17	ferruginous medium loamy or medium silty drift over clayey material passing to clay or soft mudstone	100	**1**	CL	**no**	slightly	**3a**	III	**3a**	**3b**	**-**	**-**	stoniness and wetness		
Beccles 1 (711r)																
Beccles	65	medium loamy over clayey chalky drift	100	1	SCL / CL	no	slightly	**3a**	III	**3a**	**3a**	**3a**	**3b**	wetness & stoniness	48.8	51.3
Ragdale	35	clayey chalky drift	100	1	C / CL	no	moderately	**3b**	III	**3a**	**3b**			wetness & stoniness		
Beccles 2 (711s)																
Beccles	63	medium loamy over clayey chalky drift	100	1	SCL / CL	no	slightly	**3a**	III	**3a**	**3a**	**3a**	**3b**	wetness & stoniness	80.1	19.9
Aldeby	21	light loamy over clayey chalky drift	100	1	SL	no	stoneless	1	III	**2**	**-**	-	-	wetness		
Blackwood	16	sandy drift with siliceous stones	100	1	LS	2	slightly	**3a**	II	2	**-**	-	-	stoniness		
Blackwood (821b)																

Table A2: Summary ALC for component soil series in each association used to estimate proportion of Subgrades 3a and 3b within Grade 3 areas

Series Name	%	Geology	Soil association properties and corresponding ALC limitations							Wetness limitation for possible textures				Main limitation	Grade 3 subdivision	
			Depth	Depth limit.	Texture	Texture limit.	Stoniness	Stoni-ness limit.	Wetness Class	A	B	C	D		% 3a	% 3b
Blackwood	52	sandy drift with siliceous stones	100	1	LS	2	slightly	**3a**	II	2	**-**	-	-	stoniness	100	0
Quorndon	29	light loamy drift with siliceous stones	100	1	SL	no	slightly	**3a**	II	1	**-**	-	-	stoniness		
Formby	10	coarse or medium sandy stoneless drift	120	1	LS	**2**	stoneless	1	II	**2**	**-**	-	-	texture & wetness		
Ollerton	9	sandy drift with siliceous stones	90	1	SL/LS	2/no	slightly	**3a**	II	1	2	-	-	stoniness		
Cannamore (513)																
Cannamore	50	medium loamy chalky drift	100	1	SCL / CL	no	slightly	**3a**	II	2	**-**	-	-	stoniness	96.25	3.75
Hanslope	10	clayey chalky drift	100	1	C / CL	no	slightly	**3a**	III	2	3a	-	-	stoniness		
Beccles	15	medium loamy over clayey chalky drift	100	1	SCL / CL	no	slightly	**3a**	III	3a	3b	-	-	wetness & stoniness		
Ashley	10	medium loamy over clayey chalky drift	120	1	CL / SCL	no	slightly	**3a**	II	2	3a	-	-	wetness & stoniness		
Stretham	15	clayey chalky drift	100	1	C / CL	no	slightly	**3a**	I	1	2	-	-	stoniness		
Cuckney 2 (551c)																
Cuckney	62	medium or coarse sandy material passing to sand or soft sandstone	100	1	LS	**2**	very slightly	**2**	I	**2**	**-**	-	-	texture, stoniness & wetness		

Table A2: Summary ALC for component soil series in each association used to estimate proportion of Subgrades 3a and 3b within Grade 3 areas

Series Name	%	Geology	Soil association properties and corresponding ALC limitations							Wetness limitation for possible textures				Main limitation	Grade 3 subdivision	
			Depth	Depth limit.	Texture	Texture limit.	Stoniness	Stoni-ness limit.	Wetness Class	A	B	C	D		% 3a	% 3b
Curdridge	19	light loamy material passing to sand or soft sandstone	100	1	SL / SZL	no	stoneless	1	II	1	-	-	-	none	100	0
Spilsby	19	ferruginous medium loamy over clayey material passing to clay and sand	100	1	SCL	no	slightly	**3a**	I	1	-	-	-	stoniness		
Downholland 1 (851a)																
Downholland	41	clayey marine alluvium	110	1	humose ZC	no	stoneless	1	II	**3a**	-	-	-	wetness	100	0
Eastville	23	clayey marine alluvium	100	1	humose ZC	no	stoneless	1	II	**3a**	-	-	-	wetness		
Chatteris	18	silty marine alluvium	110	1	humose ZCL	no	stoneless	1	II	1	**2**	-	-	wetness		
Advertures'	18	humified peat	120	1	humified or loamy peat	no	stoneless	1	I	1	-	-	-	none		
Downholland 2 (851b)																
Downholland	57	clayey marine alluvium	110	1	humose ZC	no	stoneless	1	II	**3a**	-	-	-	wetness	100	0
Chatteris	29	silty marine alluvium	110	1	humose ZCL[c]	no	stoneless	1	II	1	**2**	-	-	wetness		
Wisbech	14	light silty marine alluvium	100	**1**	ZL (calcareous)	no	stoneless	**1**	I	1	-	-	-	none		

Table A2: Summary ALC for component soil series in each association used to estimate proportion of Subgrades 3a and 3b within Grade 3 areas

Series Name	%	Geology	Soil association properties and corresponding ALC limitations							Wetness limitation for possible textures				Main limitation	Grade 3 subdivision	
			Depth	Depth limit.	Texture	Texture limit.	Stoniness	Stoni-ness limit.	Wetness Class	A	B	C	D		% 3a	% 3b
Fladbury 2 (813c)																
Fladbury	47	clayey river alluvium	100	1	C	no	stoneless	1	IV	**3b**	**-**	-	-	wetness	12	88
Stixwould	29	clayey over light loamy or sandy river alluvium	100	1	C	no	stoneless	1	IV	**3b**	**-**	-	-	wetness		
Trent	24	medium loamy river alluvium	100	1	CL	no	stoneless	1	III	**3a**	**3b**	-	-	wetness		
Holderness (711u)																
Holderness	67	medium loamy chalky drift	120	1	CL	no	stoneless	1	III	**3a**	**3b**	-	-	wetness	58.3	41.8
Burlingham	33	medium loamy chalky drift	120	1	CL / SCL	no	very slightly	2	III	**3a**	**3a**	**3a**	**3b**	wetness		
Salop (711m)																
Salop	44	reddish medium loamy over clayey drift with siliceous stones	120	1	CL	no	slightly	3a	III	**3a**	**3b**	-	-	wetness	53.3	46.8
Clifton	25	reddish medium loamy drift with siliceous stones	100	1	CL / SCL	no	slightly	3a	III	**3a**	**3a**	**3a**	**3b**	wetness		
Flint	19	reddish medium loamy over clayey drift with siliceous stones	100	1	CL	no	slightly	3a	III	**3a**	**3b**	-	-	wetness		
Crewe	12	reddish clayey stoneless drift	100	1	CL / C	no	stoneless	1	III	**3a**	**3b**	**3b**	**3b**	wetness		
Swaffham Prior (511e)																

Table A2: Summary ALC for component soil series in each association used to estimate proportion of Subgrades 3a and 3b within Grade 3 areas

Series Name	%	Geology	Soil association properties and corresponding ALC limitations							Wetness limitation for possible textures				Main limitation	Grade 3 subdivision	
			Depth	Depth limit.	Texture	Texture limit.	Stoniness	Stoni-ness limit.	Wetness Class	A	B	C	D		% 3a	% 3b
Swaffham Prior	35	light loamy material over lithoskeletal chalk	100	1	SL	no	slightly	**3a**	I	1	-	-	-	stoniness	82	18
Soham	29	medium loamy material over lithoskeletal chalk	55	2	SCL	no	slightly	**3a**	I	1	-	-	-	stoniness		
Moulton	12	light loamy chalky drift	100	1	SL	no	slightly	**3a**	I	1	-	-	-	stoniness		
Newmarket	6	light loamy lithoskeletal chalk	50	2	SL	no	slightly	**3a**	I	1	-	-	-	stoniness		
Rudham	18	medium loamy lithoskeletal chalk	30	3a	SCL / CL	no	moderately	**3b**	I	1	2	-	-	stoniness		
Tathwell (571n)																
Tathwell	79	reddish medium loamy over clayey material over lithoskeletal chalk	80	1	SCL	no	stoneless	1	I	1	-	-	-	none	100	0
Andover	11	silty lithoskeletal chalk	40	**3a**	ZCL	no	slightly	**3a**	I	1	2	-	-	depth & stoniness		
Burlingham	10	medium loamy chalky drift	120	1	CL / SCL	no	very slightly	2	II	2	**3a**	-	-	wetness		
Wallasea 2 (813g)																
Wallasea	58	clayey marine alluvium	100	1	ZC	no	stoneless	1	II	**3b**	-	-	-	wetness	0	100
Newchurch	16	clayey marine alluvium	100	1	ZC	no	stoneless	1	II	**3b**	-	-	-	wetness		
Blacktoft	13	medium silty marine alluvium	120	1	ZCL	no	stoneless	1	I	1	**2**	-	-	wetness		

Table A2: Summary ALC for component soil series in each association used to estimate proportion of Subgrades 3a and 3b within Grade 3 areas

Series Name	%	Geology	Soil association properties and corresponding ALC limitations							Wetness limitation for possible textures				Main limitation	Grade 3 subdivision	
			Depth	Depth limit.	Texture	Texture limit.	Stoniness	Stoni-ness limit.	Wetness Class	A	B	C	D		% 3a	% 3b
Wisbech	13	light silty marine alluvium	100	1	ZL [c]	no	stoneless	1	I	1	-	-	-	none		
Wick 1 (541r)																
Wick	56	light loamy drift with siliceous stones	120	1	SL/SZL	no	slight	**3a**	I	1	-	-	-	stoniness	100	0
Arrow	25	light loamy drift with siliceous stones	100	1	SL	no	slight	**3a**	II/III	1	2	-	-	stoniness		
Newport	19	sandy drift with siliceous stones	120	1	SL/LS	no/2	slight	**3a**	I	1	-	-	-	stoniness		
Wickham 2 (711f)																
Wickham	55	medium loamy or medium silty drift over clayey material passing to clay or soft mudstone	100	1	ZCL / CL	no	slightly	3a	III	**3a**	**3b**	-	-	wetness	40.3	59.8
Denchworth	17	swelling clayey material passing to clay or soft mudstone	100	1	CL / C	no	slightly	3a	III	**3a**	**3b**	**3b**	-	wetness		
Oxpasture	17	medium loamy or medium silty drift over clayey material passing to clay or soft mudstone	100	1	CL / ZCL	no	slightly	3a	III	**3a**	**3b**	-	-	wetness		
Evesham	11	swelling clayey material passing to clay or soft mudstone	120	1	C	no	stoneless	1	III	**3b**	-	-	-	wetness		

Table A2: Summary ALC for component soil series in each association used to estimate proportion of Subgrades 3a and 3b within Grade 3 areas

Series Name	%	Geology	Soil association properties and corresponding ALC limitations							Wetness limitation for possible textures				Main limitation	Grade 3 subdivision	
			Depth	Depth limit.	Texture	Texture limit.	Stoniness	Stoni-ness limit.	Wetness Class	A	B	C	D		% 3a	% 3b
Wisbech (812b)																
Wishbech	69	light silty marine alluvium	100	1	ZL[c]	no	stoneless	1	I	1	-	-	-	none	na	na
Romney	31	light silty marine alluvium	120	1	ZL	no	stoneless	1	I	1	-	-	-	none		
Where [C]: calcareous																

References

Ref. 1: Ministry for Agriculture, Food and Fisheries (MAFF) now DEFRA, 1993. Agricultural Land Classification Map East Midlands Region (ALC005). Available at http://publications.naturalengland.org.uk/publication/143027?category=23033 (accessed 11 July 2016)

Ref. 2: LandIS NATMAP, National Soil Resources Institute, Cranfield University.

Ref. 3: Soil Survey of England and Wales, 1984 “Soils and their Use in Eastern England” and accompanying 1:250,000 map: “Sheet 4 Eastern England”.

Ref. 4: MAFF, 1998. Agricultural Land Classification of England and Wales: Revised guidelines and criteria for grading the quality of agricultural land.

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