The Great Grid Upgrade

North Humber to High Marnham

Preliminary Environmental Information Report

Volume 1: Chapter 3 Project Need and Alternatives

February 2025

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3. Project Need and Alternatives

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3. Project Need and Alternatives

3.1 Need for the Project

3.1.1 The electricity industry in Great Britain is undergoing unprecedented change. Closure of fossil fuel burning generation and end of life nuclear power stations means significant additional investment in new generating and interconnection capacity will be needed to ensure existing minimum standards of security and supply are maintained.

3.1.2 With growing offshore wind and interconnectors[1], an anticipated tripling of wind generation connected across the Scottish networks by 2030 and Government's increased ambition to connect 50 gigawatts (GW) of offshore wind by 2030, north-south power flows are set to increase.

3.1.3 The existing electricity transmission network in the Humber and East Midlands region was initially developed in the 1960s and has historically, been able to meet demand. However, due to the changes noted above in terms of delivering net zero emissions, the existing network in the Humber and East Midlands region does not have the capability to reliably and securely transport all the energy that will be connected by 2030, whilst operating to the standards it is required to.

3.1.4 The Project will support the UK's net zero target by reinforcing the electricity transmission network between the north of England and the Midlands and facilitate the connection of planned offshore wind generation and interconnectors with other countries, allowing clean green energy to be carried on the network. The Project, together with other reinforcements along the East Coast, will help meet future energy requirements.

3.1.5 The reinforcements are necessary to support the connection of new generation projects in Scotland and the northeast of England in the next decade and beyond. National Grid identified that the existing transmission system would not be sufficient to meet connection demand going forward. Without additional network capability, offshore wind and interconnectors will be constrained off at times of high wind generation and high imports. The operation of the network would become sub-optimal in the long term, less efficient, and more carbon intensive sources of generation would potentially be used at those times, hindering progress towards net zero.

3.1.6 The network reinforcement would provide greater security to the network in the Humber and East Midlands region and reduce the risk of outages (periods of interruption to electricity supply) from limited network availability. If the network is not reinforced, outages could result in a greater risk of widespread supply interruptions. The transmission network needs to be able to maintain a minimum level of security of supply, as defined within the National Electricity Transmission System Security and Quality of Supply Standards (NETS SQSS) (Ref 3.2). Further detail on transmission boundaries and the need case for the Project can be found in the Strategic Options Report (SOR) Update (February 2025).

[1] Interconnectors are high voltage cables that are used to connect the electricity systems of neighbouring countries.

3.2 Consideration of Alternatives

3.2.1 Regulation 14(2)(d), in conjunction with Schedule 4, paragraph 2 of the EIA Regulations states that an Environmental Statement (ES) should include at least '*a description of the reasonable alternatives studied by the applicant, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment*',

3.2.2 The consideration of alternatives is an integral part of the ongoing development of the Project. Whilst there is no statutory requirement to include an assessment of alternatives in the Preliminary Environmental Information Report (PEIR), proportionate and relevant information is presented in this chapter to help consultees understand how the Project has evolved and what alternatives have been considered.

3.2.3 In agreeing the scope of the EIA with the Planning Inspectorate, the Scoping Report for the Proposed Overhead Line presented the main alternatives considered from the Corridor Preliminary Routeing and Substation Siting study (CPRSS) 2023. This focused on the information up to the date of seeking an opinion, and included the broad corridors as detailed in section 4 and section 5 of this chapter. Upon providing their scoping opinion, the Planning Inspectorate acknowledged the information presented and requested that the consultation responses from the Environment Agency in relation to flood risk and the Canal and River Trust on navigable waterways be considered in addition to '*other environmental constraints, has continued to inform subsequent design choices, such as siting of particular elements of the infrastructure or the use of particular construction technologies.*' The preliminary appraisal within this PEIR is the continuation of the iterative design process of the Proposed Overhead Line. Where this design has been influenced by environmental factors, this has been stated within **Chapter 6 to 21**.

3.2.4 National Grid undertakes options appraisal for their individual projects. There are often several different ways that a project can be developed, involving different locations, technologies, or designs. Each project requires professional judgement and decisions about the most appropriate way to achieve the required outcome. The options appraisal process provides information to help inform those professional judgements.

3.2.5 The options appraisal process has accordingly been followed by National Grid to identify a preferred option for the Project, as presented on Figure 4.1 - Proposed Project Design in Volume 2 of this PEIR.

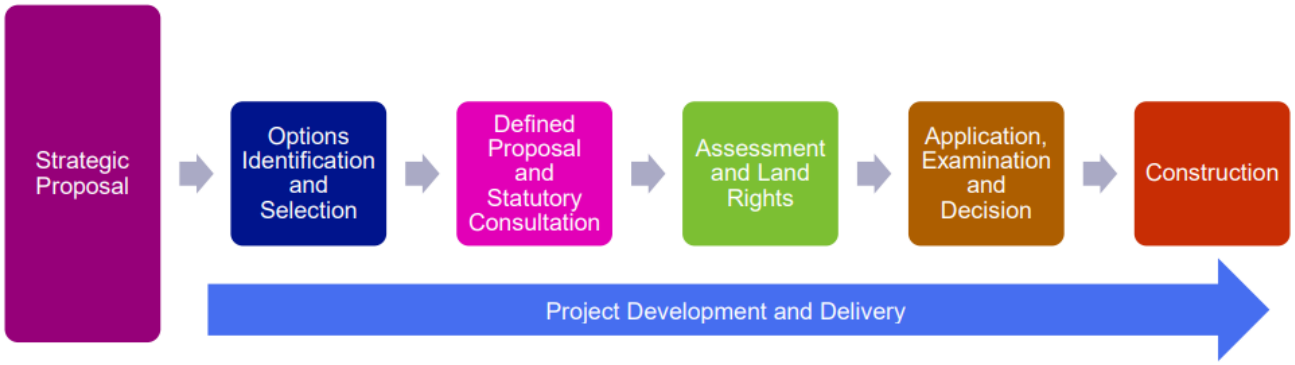
3.3 Project Development Process

3.3.1 National Grid's Approach to Consenting for major infrastructure projects outlines the Project development and delivery process. This is divided into six stages:

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

3.3.2 Figure 3.1 presents an overview of National Grid's Approach to Consenting.

Figure 3.1 - National Grid's Approach to Project Development and Delivery



3.3.3 The approach to the design and routeing of new electricity transmission lines, including the consideration of alternatives to the Project (such as alternative routes), has followed National Grid guidance (Ref 3.3) which sets out the key stages (1 to 4) in the process and the work to be undertaken ahead of a Development Consent Order (DCO) submission. These four stages are summarised below.

- **Stage 1 - Strategic proposal**: National Grid explores whether new infrastructure needs to be built. A project Need Case document is prepared, summarising the requirements at this early stage, and explaining the technical network modelling undertaken to determine the scope of the project and its underlying assumptions and parameters. Different technologies and geographical connection points are considered to identify strategic options which are appraised in relation to high-level environmental, socio-economic and technical issues, as well as capital and lifetime costs. This exercise concludes with the identification of a preferred strategic option. The identification of a preferred strategic option establishes the scope of the project which commences with Options identification and selection (Stage 2). The outcomes of the process are presented in a SOR (Ref 3.4).
- **Stage 2 - Options identification and selection**: The purpose of options identification and selection is to select a preferred corridor with a preliminary graduated swathe for the route which can be developed during the next project phase. Initial work will identify a broad study area within which a range of potential corridor options for the new infrastructure will be considered. These are identified by considering environmental and other constraints whilst using outline engineering design and assumptions. Consideration is given in the first instance to avoiding areas of greatest sensitivity, and where careful routeing cannot reduce impacts, other mitigation measures are incorporated. When corridor options have been identified, a review of these is undertaken to determine whether any could be discounted from consideration at an early stage. Options appraisal is carried out to determine a preferred option to consult on. Within the emerging preferred corridor taken forward, we identify a preliminary graduated swathe, which indicates a more likely location for the development within the preferred corridor. Stage 2 is intended to provide information on the approach to the identification and appraisal of route corridors and siting locations and demonstrate how National Grid's statutory duties, licence obligations, policy considerations, environmental, socio-economic, technical, cost and programme issues have been considered.

- **Stage 3 - Defined proposal and statutory consultation**: Following the adoption of the preferred corridor, the preliminary route and siting areas for non-linear infrastructure design are developed further using feedback from non-statutory consultation and environmental baseline information gathered during Stage 2 and Stage 3. The defined proposal together with the preliminary environmental information (as defined by Regulation 12(2) of the EIA Regulations) for the proposal is then subject to statutory consultation, in accordance with Sections 42, 47 and 48 of the Planning Act 2008.
- **Stage 4 - Assessment and land rights**: Feedback from statutory consultation informs further refinement of the project design. The Preliminary Route is developed further to form the detailed route alignment and/or site proposal, for which National Grid will submit an application for development consent including a draft DCO. The outcomes of the EIA process will be reported in the ES which will accompany the DCO application. Agreements to acquire land and rights in land through voluntary negotiation will also be sought with affected landowners.

3.3.4 The following sections provide a summary of the work undertaken to date within the above stages, with information relating to the development of the Project drawn from the following sources:

- The North Humber to High Marnham and Grimsby to Walpole Strategic Options Report (SOR), May 2023 (Ref 3.4).
- The North Humber to High Marnham Corridor Preliminary Routeing and Siting Study (CPRSS), June 2023 (Ref 3.5).
- The North Humber to High Marnham Supplementary Corridor Preliminary Routeing and Study, July 2024 (Ref 3.6).
- North Humber to High Marnham and Grimsby to Walpole - Updated Strategic Options Report, February 2025.

3.4 Strategic Proposal

3.4.1 National Grid undertook a Strategic Options Appraisal at the Strategic Proposal Stage (Stage 1) in 2021/22, which identified the most appropriate strategic solution to bring forward, considering a wide range of options for providing the necessary north-south power flows. The Strategic Options Appraisal is reported in the North Humber to High Marnham and Grimsby to Walpole - Updated Strategic Options Report (2025) which describes the future network requirements, and the options appraised to meet these requirements.

3.4.2 The consideration of strategic options was part of an iterative process in response to interactions with a range of emerging energy projects and customer requirements. As described in the need case, the connection of additional generation requires the transmission system to be reinforced. Transmission boundary B8 (See Figure 3.2) runs east to west separating the northern generation zones including Scotland, Northern England and North Wales from the Midlands and Southern demand centres. The B8 boundary will require two 400 kV Alternating Current (AC) double circuit or six high voltage direct current (HVDC) Connections of transmission capacity circuits to deliver >10 GW boundary capability.

3.4.3 Providing no infrastructure would mean the NETS in the area would not be compliant with the NETS SQSS, and NGET would not be complying with its transmission licence.

Therefore, the provision of infrastructure is a requirement and a key necessity for delivering government "Net Zero" targets.

3.4.4 The need above identifies a requirement for two AC 400 kV transmission circuits or multiple HVDC connections to resolve the NETS SQSS compliance and two distinct issues:

- Issue (a), a circuit is required to ensure compliance from the Creyke Beck generation group whilst also providing >6 GW of boundary capacity across the B8 boundary; and
- Issue (b), a circuit is required to provide capacity to the East Coast generation group whilst increasing the boundary capacity across B8 by an additional >6 GW (giving 12 GW capacity) and providing >6 GW of capacity across the B9 boundary.

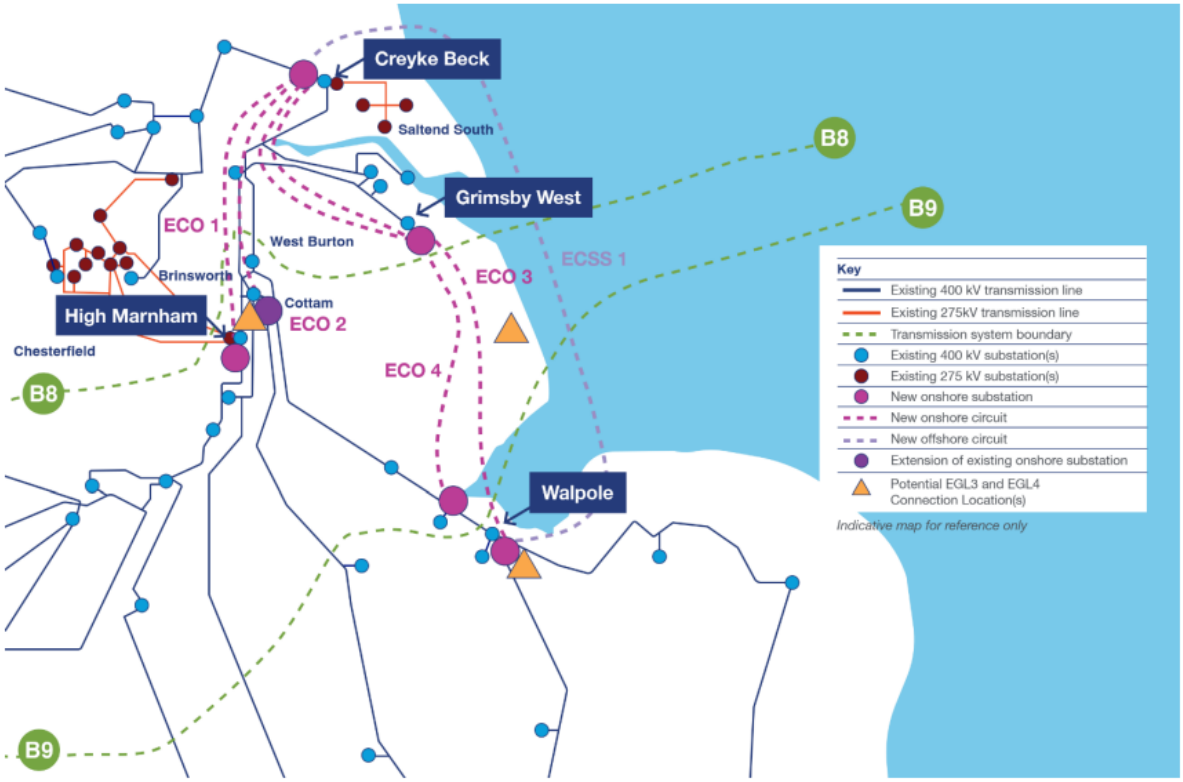
3.4.5 Strategic options were identified to resolve these distinct issues while complying with the NETS SQSS. Although strategic options were considered in parallel for the two issues identified above, both have progressed as separate development consent applications under NGET for reinforcement works. The Project represents the Preferred Strategic Proposal for Issue (a) only, and accordingly Issue (b) is not discussed further within this chapter or the wider PEIR. For further information refer to the North Humber to High Marnham and Grimsby to Walpole Strategic Options Report Update.

3.4.6 The strategic options considered to resolve Issue (a) - Creyke Beck generation group connections and >6 GW capacity across B8 were:

- ECO 1 - New Creyke Beck to new High Marnham 85 km.
- ECO 2 - New Creyke Beck to Cottam 75 km.
- ECO 3 - New Creyke Beck to new Grimsby West, new Grimsby West to new Walpole 225 km.
- ECO 4 - New Creyke Beck to new Grimsby West, new Grimsby West to new Weston Marsh 200 km.
- ECSS 1 - Subsea from new Creyke Beck - new Walpole 195 km.

3.4.7 Figure 3.2 illustrates the strategic options considered to resolve Issue (a) - Creyke Beck generation group connections and >6 GW capacity across B8.

Figure 3.2 - Indicative map of strategic options considered to resolve issue (a) - Creyke Beck generation group connections and >6 GW capacity across B8



3.4.8 For those onshore options with a connection at Creyke Beck (ECO 1, ECO 2, ECO 3 and ECO 4), both western and eastern sub-options were considered:

- The western sub-options (located to the west of Hull) assumed an overhead line crossing of the Humber Estuary Special Protection Area (SPA) and Special Area of Conservation (SAC). These options would also need to cross the Yorkshire Wolds, a locally important landscape.
- The eastern sub-options (located to the east of Hull) assumed a requirement for tunnelling for around 6 km beneath the Humber, due to the extent of the estuary in this area.

3.4.9 A full strategic options evaluation and comparative analysis of ECO 1 to ECO 4 and ECSS 1 (subsea option) was undertaken, with each strategic option appraised in accordance with National Grid's Approach to Consenting.

3.4.10 Each strategic option was appraised to establish its environmental and socio-economic impacts; this involved establishing a 20 km study area around the strategic option to identify its likely significant effects and enable comparison with other options, the objective being to identify an initial preferred option. The high-level options appraisal had particular regard for internationally or nationally important sites and other features that are of a sufficient scale and importance to inform decision-making at a regional level.

3.4.11 A technical appraisal was also undertaken to ensure each option would satisfy the NETS SQSS and resolve the requirements set out in the need case, along with a cost evaluation of the option transmission works.

3.4.12 For further information please see the North Humber to High Marnham and Grimsby to Walpole Updated Strategic Option Report, February 2025.

3.4.13 For ECSS1 (the offshore option), overall, technical, environmental and socio-economic factors were not considered to differentiate between ECSS1 and the onshore options for the purposes of option selection. However, ECSS 1 was substantially more expensive than any of the onshore options. This meant that onshore options were preferred and the ECSS option was discounted and not considered further.

3.4.14 ECO 1 performed better in terms of boundary capacity, while also being less constrained in terms of routeing due to the proposed connection to a new substation at High Marnham rather than Cottam. A comparison of the Cottam and High Marnham sites indicated that High Marnham offers substantial cost savings, as well as reduced constructability risks.

3.4.15 Overall, ECO 1 represented the most advantageous of the Creyke Beck generation group options when balancing cost, technical performance, and environmental and socio-economic effects.

3.4.16 Option ECO 1 would involve the construction of a new transmission circuit connection between a new Creyke Beck substation to new High Marnham substation, following a route to the west of the Humber estuary. From early calculations it would have had a route length of approximately 85 km.

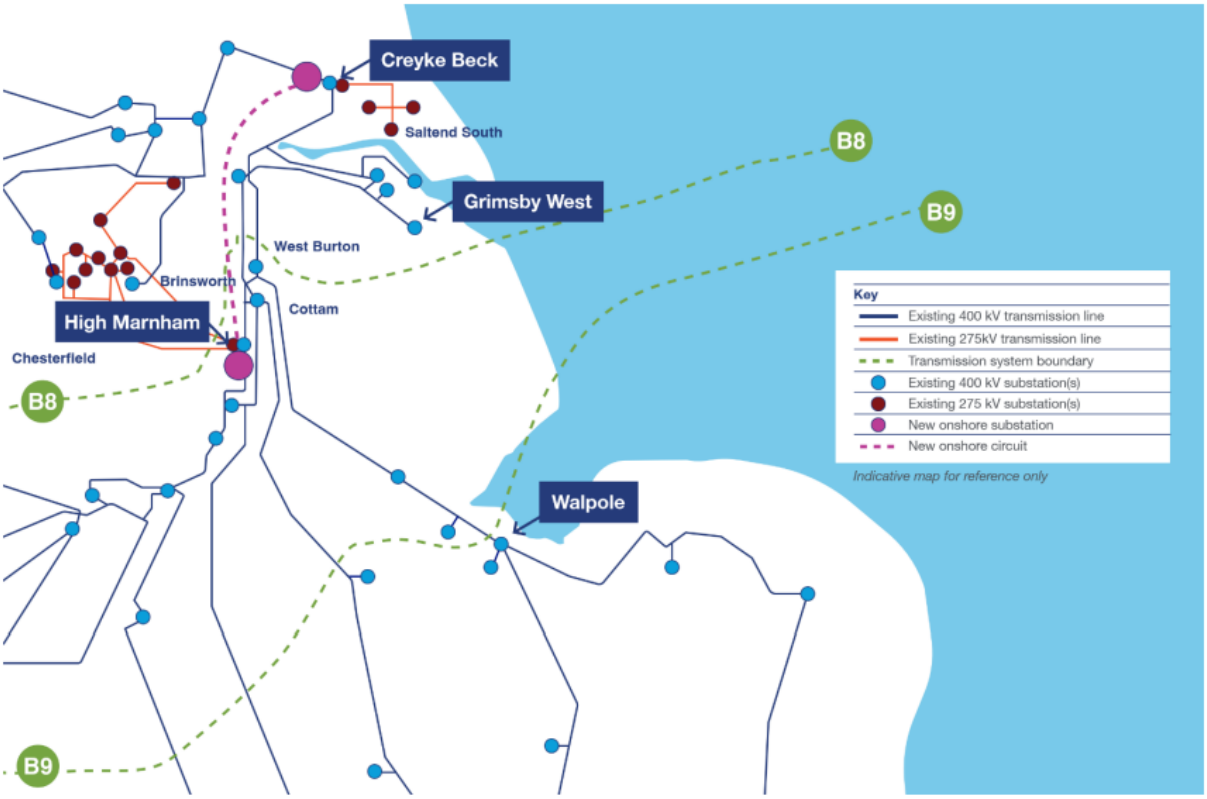
3.4.17 In summary, ECO 2, ECO 3 and ECO 4 were discounted at this stage for the following reasons:

- ECO 3 and ECO 4 would require a longer linear overhead route and would therefore be expected to have greater environmental and socio-economic effects, as well as higher capital and lifetime costs.
- ECO 2, ECO 3 and ECO 4 had lesser technical advantages when compared to ECO1. Where ECO 1 would perform better in terms of boundary capacity (i.e., the ability of the national network to transport power around regions, particularly the South Yorkshire conurbation), while also being less constrained in terms of routeing due to the proposed connection to a new substation at High Marnham, rather than Cottam.
- Both ECO 3 and ECO 4 would have likely resulted in long term adverse effects from within and into the Lincolnshire Wolds Area of Outstanding Natural Beauty (AONB)[2] and scattered properties and a higher number of settlement fringes;
- The Lincolnshire coast is a popular tourist destination with a number of coastal resorts and extensive areas of holiday accommodation, which both ECO 3 and ECO 4 would pass close to or within; and
- ECO 3 and ECO 4 would also result in likely adverse effects on The Wash SPA and The Wash and North Norfolk Coast SAC, in addition to the Humber Estuary SPA and SAC.

3.4.18 The preferred strategic proposal (ECO 1) is illustrated in Figure 3.3.

[2] At the time of undertaking the Strategic Options Report (2021/21) these landscape designations were known as Areas of Outstanding Natural Beauty (AONBs). However, these were renamed in 2023 to National Landscapes, to highlight the importance of these natural sites and their role in conservation and public enjoyment.

Figure 3.3 - Preferred Strategic Proposal: ECO 1 - new Creyke Beck to new High Marnham



3.5 Options Identification and Selection

3.5.1 Following the selection of Option ECO 1, a Corridor and Preliminary Routeing and Siting Study ('the CPRSS 2023') was undertaken in 2023 to further define the location of the proposed Project infrastructure within a defined study area.

3.5.2 The CPRSS 2023 reported the process undertaken as part of the Options Identification and Selection stage to identify an emerging preferred corridor within which the required infrastructure for the Project may be located.

3.5.3 The CPRSS 2023 set out the routeing and siting activities undertaken as part of the identification, refinement and assessment of options for preliminary corridors between the proposed new substation in the Creyke Beck area, and the proposed new substation at High Marnham and explains the emerging preferred corridor National Grid consulted on in 2023 at non statutory consultation.

3.5.4 The CPRSS 2023 investigated the potential for undergrounding of the proposed cabling within broad geographical areas where known constraints were present. This was focused on the River Ouse crossing and the Yorkshire Wolds area.

3.5.5 The starting assumption (in accordance with National Grid's guidance and national planning policy) is that transmission connections are as overhead lines, except in nationally designated landscapes. Consideration was given to the use of underground cables throughout, including through the Yorkshire Wolds on the assumption that the area could be designated as an AONB. Underground cable options were considered across the Yorkshire Wolds because the initial 'Area of Search' for the AONB covered the entirety of the Wolds within the study area. When the provisional 'Candidate Area' for the proposed AONB was announced, indicating that designation within the study

area was unlikely, it was considered that a policy compliant overhead line could be developed within the study area through the Yorkshire Wolds and an underground cable option was not taken forward.

3.5.6 With regards the River Ouse crossing, undergrounding would have required the installation of long ducts or the construction of one or more tunnels to accommodate the eighteen transmission cables likely to be required, as these could not be laid securely on the riverbed. The use of underground cables would have also increased the amount of permanent loss of food zone and functionally linked land associated with the River Ouse Site of Special Scientific Interest, due to the operational need of cable sealing end compounds and tunnel head housing to allow for maintenance. These in addition to the significantly higher construction and programme costs, it was concluded that undergrounding for the Project in this location was not viable solution and not taken further.

Study Area

3.5.7 The study area defined the area within which the Project infrastructure could be located and represented the extents within which detailed environmental and socio-economic data was gathered to inform the CPRSS 2023.

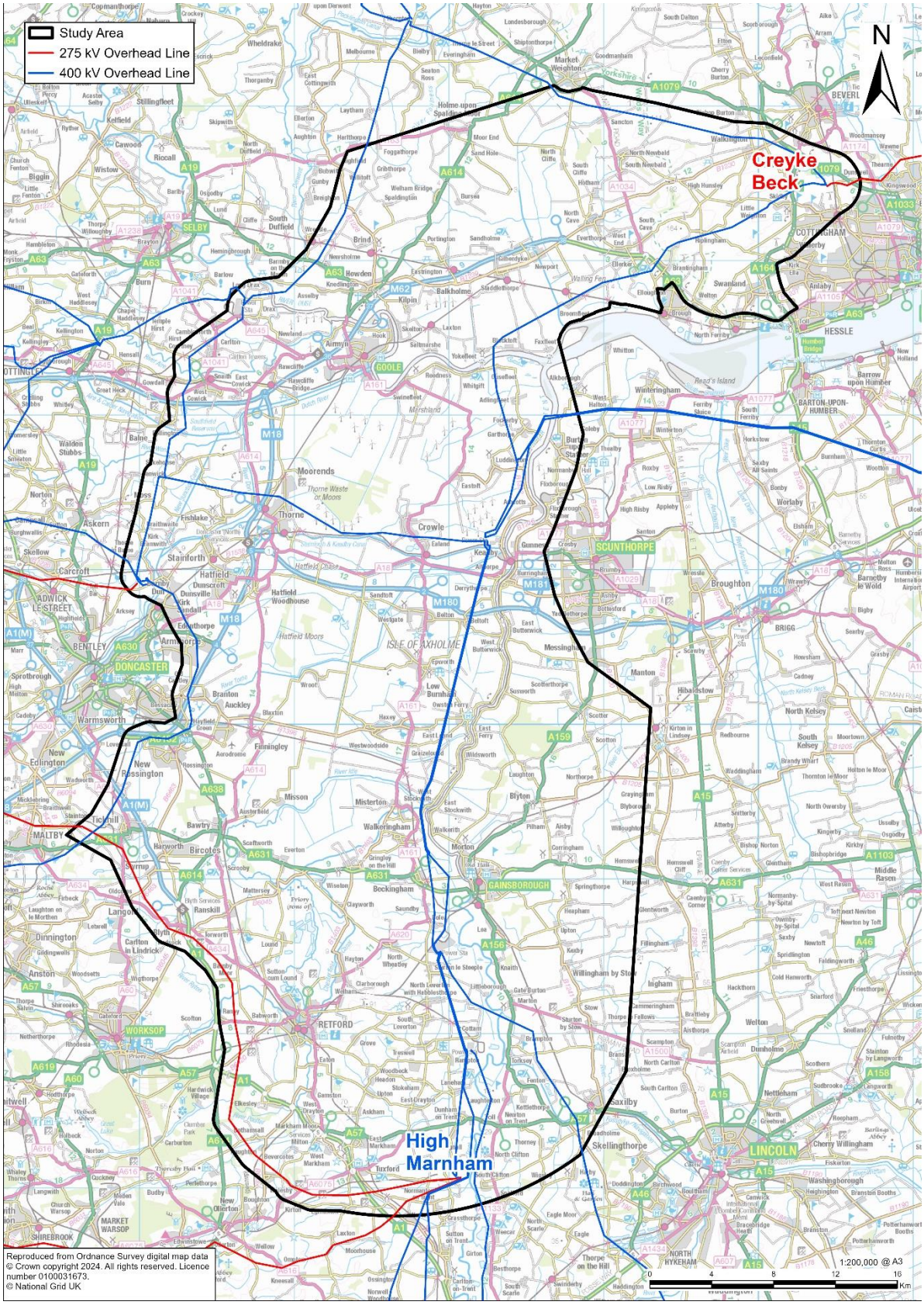
3.5.8 The study area developed for the Project was informed by:

- the connection points (start/end points) identified in the Strategic Proposal stage (Stage 1);
- the distribution of extensive areas of the highest amenity value or environmental constraint (for example, internationally designated sites);
- the nature of the physical and human geography. The presence of major geographical features such as estuaries or hills, or major settlements may represent a natural boundary to the study area or dictate a need for the area to extend to support routes around such features;
- consideration of the likely balance of environmental impacts between direct and indirect routes; and
- consideration of the Holford Rules (Ref 3.7) (for routeing of an overhead line) and the Horlock Rules (for siting of Sealing End Compounds (SECs) should any be required)).

3.5.9 The study area for the Project is shown in Figure 3.4. The study area encompasses the maximum extent within which a Project design that satisfies the statutory duties and obligations of National Grid and meets the Project objectives is likely to be located. Areas have been excluded which are considered unlikely to be feasible to accommodate the Project. The study area was defined by Holford Rule 1[3] and allows for the application of the principles of the Holford Rules and Horlock Rules.

[3] Holford Rule 1 is to “Avoid altogether, if possible, the major areas of highest amenity value, by so planning the general route of the first line in the first place, even if the total mileage is somewhat increased in consequence.”

Figure 3.4 - Study area for the Project



Identifying and Defining Corridors

3.5.10 The identification of preliminary routeing and siting options within the study area was led by landscape and environmental specialists, with due regard given to environmental

and socio-economic considerations alongside the Project's required technical parameters.

3.5.11 To start, heat maps were produced to undertake a Geographic Information System (GIS) 'corridor analysis'. This is a GIS tool that takes the weight applied to each cell (a 10 meter by 10 meter square based on the Ordnance Survey (OS) grid) and applies a weighted score of 1 (very low) to 5 (very high) against known features (such as listed buildings and priority habitats). This GIS tool then calculates the perceived 'cost' by adding up the weighted potential impacts/interactions with features from infrastructure passing through that 10m x 10m grid. This tool calculates the total cost of every possible path between the defined start and end points. From this it is possible to identify potential corridors that minimise the environmental 'cost', where the environmental 'cost' is determined by the combination of distance of a feature away from possible infrastructure and the sensitivity weighting applied by the heat map.

3.5.12 The GIS tool helps identify potential corridors with the least likely potential for adverse impacts on those aspects of the environment that can be mapped, by finding routes across the heat map surface to connect the start and end points of the Project which have the least environmental 'cost' - i.e., the least interaction with mapped environmental constraints.

3.5.13 The corridors generated through the GIS analysis then provided a starting point for the Project landscape and environmental specialists, working with the wider Project team as appropriate, and employing professional judgement and their understanding of routeing considerations to identify and generate technically feasible preliminary corridors based upon the start and end points and heat maps.

3.5.14 The preliminary corridors identified were then subject to review by National Grid, to confirm technical feasibility and ensure that key issues and the interaction of constraints had been appropriately considered. Professional judgement applied during the review led to modifications being recommended to the corridors (i.e., to park, refine or expand the corridors). These recommendations were reviewed and implemented by the landscape and environmental specialists to ensure that changes were made in a manner consistent with landscape and environmental considerations.

3.5.15 Following identification of preliminary corridors, links and loops[4], site visits were undertaken by landscape, heritage and ecology specialists, along with the Front-End Engineering Design (FEED) Contractor and National Grid. Following these site visits, further refinements were made to the corridors, links and loops before progressing to Options Appraisal.

3.5.16 For the Project, four preliminary overhead line corridors were identified following the process described above, as illustrated in Figure 3.5 and summarised below.

Corridor 1

3.5.17 Corridor 1 began to the north of Cottingham in the area around the existing Creyke Beck Substation and then routed in a north westerly direction to the south of Market Weighton. From here, it routed in a southeasterly direction towards Barmby on the Marsh where it crossed the River Ouse. From the River Ouse, the corridor continued

[4] A link being a connection between two corridors and a loop being where a corridor splits into an eastern or western section to loop around a feature, like a settlement.

south passing the towns of Thorne, Bawtry and Retford before ending at the area around the existing High Marnham Power Station.

3.5.18 Corridor 1 is located furthest west and is the longest corridor of the options appraised. Constraints to note for this corridor included the Yorkshire Wolds Important Landscape Area (ILA); River Ouse crossing; Thorne and Hatfield Moors designated sites; Local Plan Allocations and proximity to Doncaster Sheffield Airport and Retford (Gamston) Airport.

3.5.19 The corridor was progressed primarily due to it providing an option to avoid crossing the sections of the River Ouse that are internationally designated for their bird interest (Humber Estuary designated sites). It was also recognised as potentially providing opportunities to close parallel[5] existing overhead lines. The corridor provided three close parallel opportunities. The first is between Creyke Beck and Market Weighton alongside the existing 4ZR 400 kV overhead line for approximately 17.5 km, the second is between Spaldington and Barmby on the Marsh alongside the existing 4VC 400 kV overhead line for approximately 8.5 km, and the third is between Blyth and Retford alongside the existing XE 275 kV overhead line for approximately 8 km.

Corridor 2

3.5.20 Corridor 2 began with a northern and southern option. The northern option began to the west of South Cliffe, using Corridor 1 to route between Creyke Beck and Link 1 and the southern option began to the west of South Cave, using Corridor 3 to route between Creyke Beck and South Cave. From Link 1, the corridor routed south and west around Gilberdyke and from Corridor 3, the corridor routed in a westerly direction to the north of Broomfleet. Both the northern and southern options merge at Bellasize and the corridor then routes southwest towards the River Ouse. Corridor 2 provides three separate crossing opportunities for the River Ouse to the east and west of Swinefleet and Saltmarshe. South of the River Ouse, Corridor 2 continued south passing settlements such as Crowle, Epworth and Sturton le Steeple before ending at the area around the existing High Marnham Power Station.

3.5.21 Key constraints associated with this corridor included the Yorkshire Wolds ILA; River Ouse crossing; River Ouse and Thorne and Hatfield Moors designated sites; Isle of Axholme Area of Special Historic Landscape Interest; and proximity to several wind farms.

Corridor 3

3.5.22 Corridor 3 began to the north of Cottingham in the area around the existing Creyke Beck Substation and then routes in a south westerly direction to Ellerker, passing to the north of Skidby and Brantingham. From Ellerker, the corridor continued in a south westerly direction to the north of Yokefleet and Blacktoft, crossing the River Ouse in between these settlements. From the River Ouse, the corridor continued south passing the settlements of Garthorpe, Althorpesta, Epworth, Misterton and Gainsborough before ending at the area around the existing High Marnham Power Station.

3.5.23 Key constraints associated with this corridor included the Yorkshire Wolds ILA; River use crossing and Humber Estuary designated sites and Blacktoft Sands RSPB Nature Reserve; Keadby Windfarm; and existing transmission infrastructure.

[5] Close Parallel - where two overhead lines run alongside each other at the closest distance achievable whilst maintaining a safe operating distance for maintenance between them. For close parallel lines this equates to 150m.

3.5.24 The corridor was identified primarily to close parallel existing electricity transmission infrastructure, including the existing 4ZQ 400 kV overhead line between Creyke Beck and Keadby, and several existing 400 kV routes south of Keadby to High Marnham.

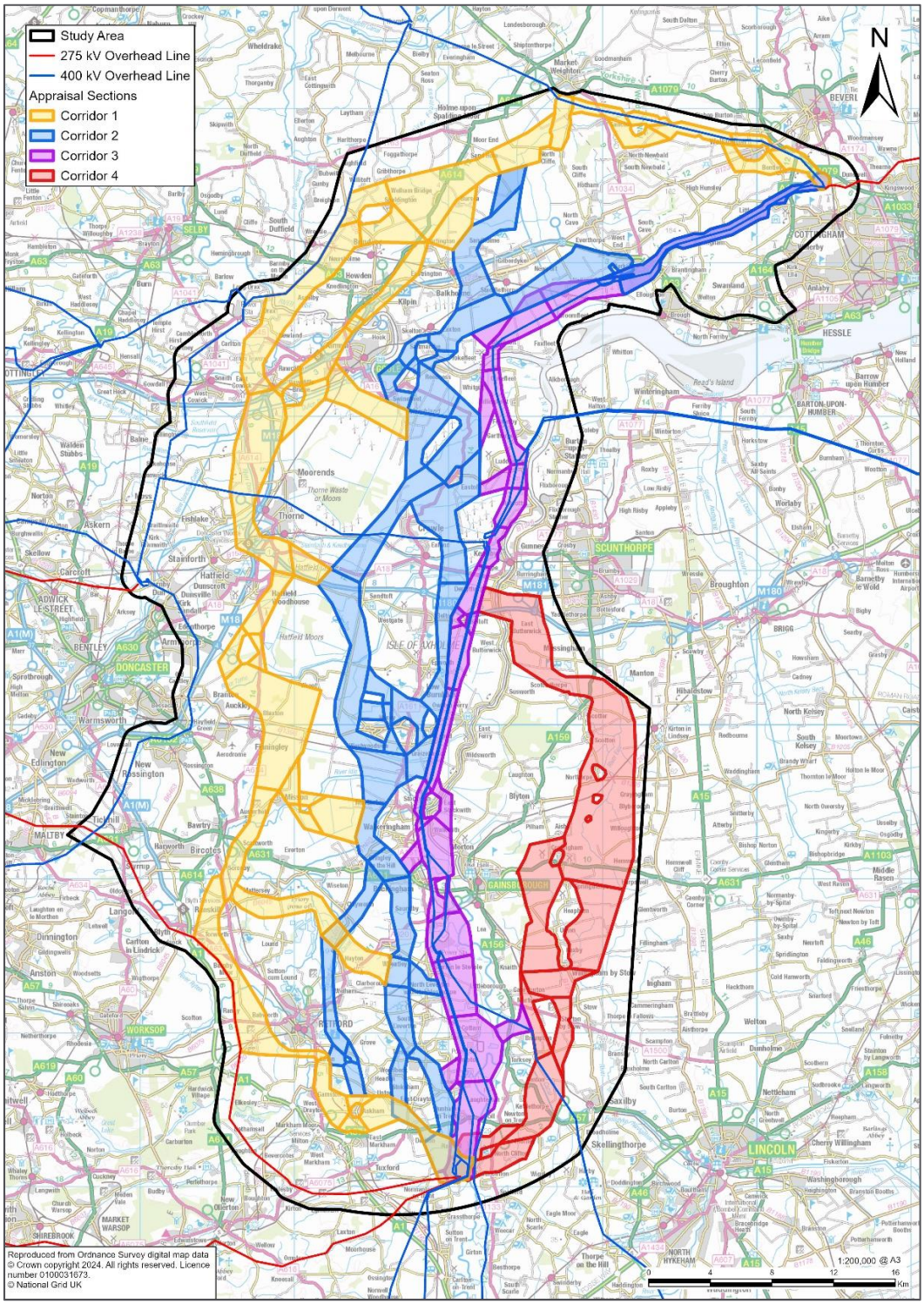
Corridor 4

3.5.25 Corridor 4 branched from Corridor 3 and began with a crossing of the River Trent to the southwest of Scunthorpe and south of Burringham. The corridor then routed southeast through agricultural fields crossing the M180, M181 and A159 to the west and south of Scunthorpe, before routeing southeast to avoid Scotter and Laughton Forest. From Scotter, the corridor continued south past Scotton, Kirton in Lindsey and Northorpe before crossing the A631 at Corringham, and continuing south passing settlements including Upton, Willingham by Stow, and Stow. The corridor then routed south crossing the A1500, A156, A57 and A1133 before routeing in a southwest direction ending at the area around the existing High Marnham Power Station.

3.5.26 Corridor 4 was the furthest east corridor option and was the shortest as it did not connect to Creyke Beck; instead, it connected to the northern section of Corridors 2 or 3 at a point southwest of Scunthorpe to complete the route. Key constraints associated with this corridor included five existing 400 kV overhead lines which would need to be crossed, the River Trent, and the road and rail network.

3.5.27 The corridor was progressed primarily to avoid the Trent Valley and route away from the existing electricity transmission infrastructure in this area through a relatively open and unconstrained landscape within west Lincolnshire. Corridor 4 was the only corridor to predominantly route to the east of the River Trent and is the only corridor to route into High Marnham from the northeast.

Figure 3.5 -Preliminary North Humber to High Marnham Project Location overhead corridor lines



Potential Route Corridor Links and Loops

3.5.28 As part of the CPRSS 2023, the four preliminary overhead line corridors were divided into sections, links and loops for appraisal (in isolation and end-to end solution) to inform identification and selection of an emerging preferred corridor. Due to the length of each corridor, the appraisals involved five steps: four steps covering geographical extents, and a fifth step comprising an end-to-end review.

3.5.29 This stepped approach was adopted as each preliminary corridor contained localised constraints which could be avoided through alternative routeing opportunities and could maximise routeing opportunities and wider corridor synergies (i.e., use of links and loops between sections of preliminary corridors). Therefore, it was likely that a combination of sections of preliminary corridors, links and loops, rather than a single corridor, would be used to route between Creyke Beck and High Marnham.

3.5.30 The defined components considered under each step are summarised below from the CPRSS 2023 report. The defined components were considered in isolation and broadly approached in a sequential manner routeing north to south:

- **Step 1** - Consider the preliminary corridors across the Yorkshire Wolds;
- **Step 2** - Consider how to link the optimum preliminary corridor from Step 1 between the Yorkshire Wolds and the River Ouse;
- **Step 3** - Consider the best performing preliminary corridor across the River Ouse;
- **Step 4** - Consider options from the River Ouse crossing point to High Marnham. Step 4 comprises several sub-steps (Step 4a - 4e); and
- **Step 5** - Consider all evaluation components as end-to-end solutions to ensure that there were no circumstances where an accumulation of smaller constraints in a 'parked' option might justify reconsidering decisions in identification of the components.

3.5.31 The CPRSS 2023 considered each progressed section, link or loop of the preliminary corridor in the context of the wider end-to-end solution. This was done to ensure that the reasoning and justification for progressing one part of the emerging preferred corridor did not incorrectly impact on the decision made for the next section, link or loop of the corridor.

3.5.32 The emerging preferred corridor from the CPRSS 2023 consisted of:

- A new overhead line closely parallel to the existing 4ZQ 400 kV overhead line from the edge of the Yorkshire Wolds to near Luddington (Lincolnshire) including crossing the River Ouse alongside the existing overhead line river crossing;
- A new overhead line from Luddington to near Beltoft, looping west around Keadby Windfarm to pass east of Ealand and then parallel or close parallel to the two existing 400 kV overhead lines south to near the crossing of the Warping Drain, southeast of Haxey; and
- A new overhead line from there looping west to pass west of Misterton, then south, passing west of the line of villages along the edge of the Trent valley (Wallingham, Beckingham, Sturton le Steeple, North and South Leverton, Tresswell and Woodbeck) to pass west of East Drayton then approach High Marnham from the northeast.

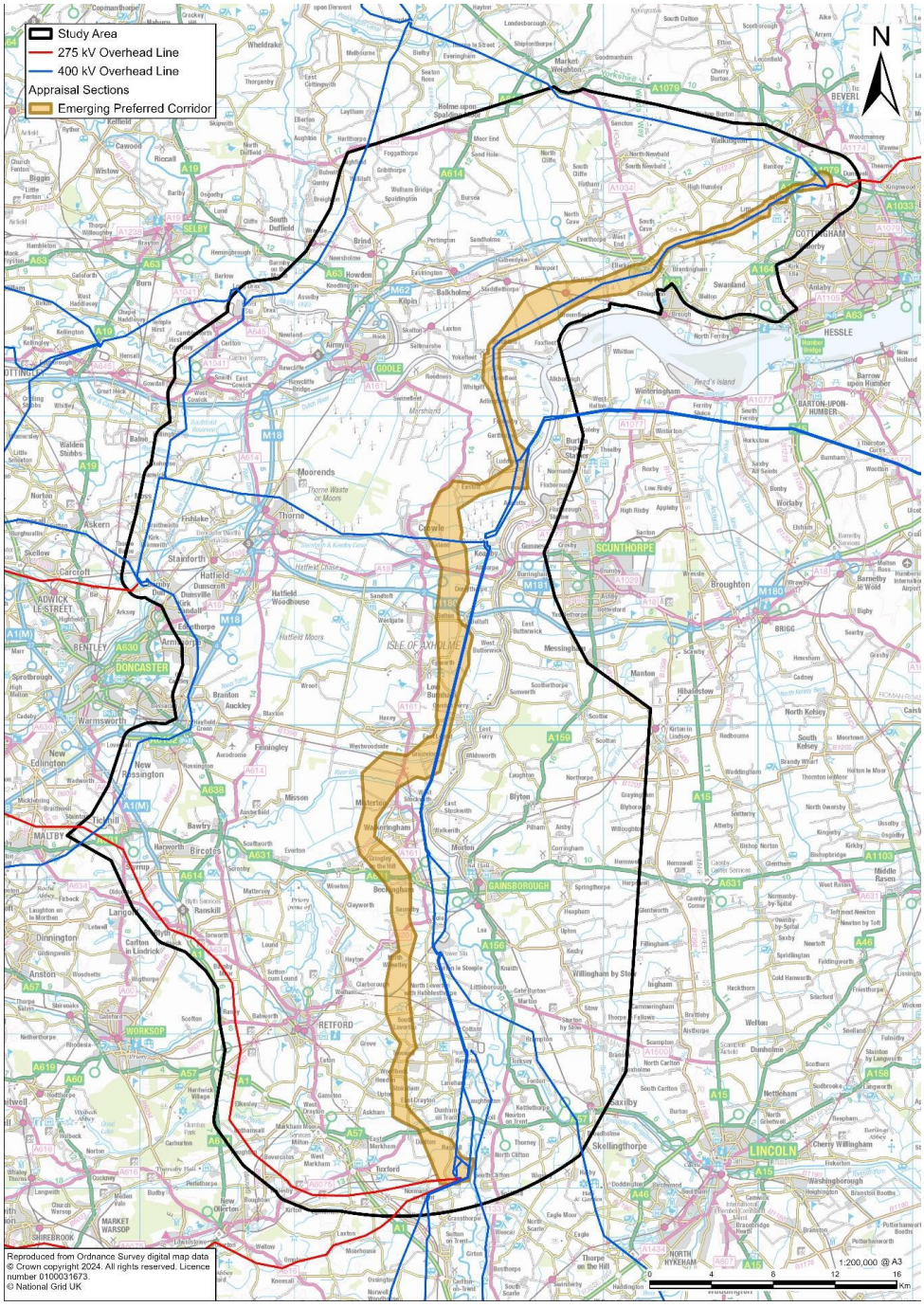
3.5.33 Overall, the conclusion was drawn that routeing the new overhead line closely parallel to existing 400 kV network would minimise the overall environmental impacts concentrating impacts in areas already impacted rather than spreading them more widely. Whereas the alternative corridors would introduce infrastructure in areas where it is currently not located and would result in likely adverse effects to the Yorkshire Wolds AONB and encircle a larger proportion of settlements.

3.5.34 The main exceptions to this are at Keadby with the technical constraints around Keadby Windfarm and south of Haxey. It was considered that south of Haxey, a new corridor

three to four kilometres west of the existing 400 kV overhead lines in the Trent Valley adhered to Holford Rule 6 by preventing a third close parallel to the existing overhead lines and avoiding further wirescape in the landscape.

3.5.35 The emerging preferred corridor is shown in Figure 3.6.

Figure 3.6 - Emerging Preferred Corridor – CPRSS 2023



The Graduated Swathe

3.5.36 A graduated swathe was then produced within the emerging preferred corridor that illustrated the geographical areas and extents where it might be more appropriate to route the new transmission line. This graduated swathe took into consideration designated ecological sites, heritage features, residential settlements and isolated properties, existing and consented infrastructure and professional judgement.

3.5.37 The emerging preferred corridor and graduated swathe within it were taken forward and consulted upon as part of the non-statutory consultation in 2023.

3.6 Defined Proposal and Non-Statutory Consultation

Non-Statutory Consultation 2023

3.6.1 The emerging preferred emerging preferred corridor option was presented at non-statutory consultation which took place between 1 June 2023 to 27 July 2023. The feedback has been compiled and presented within the Non-Statutory Consultation Feedback Report 2025. (February 2025).

3.6.2 A total of 585 feedback submissions were received during the non-statutory consultation period from local authorities, stakeholders and other consultees. The summaries below of the feedback received are not exhaustive but have been included so to present the range of themed feedback that was considered in further refining the emerging preferred corridor. To the north of the emerging preferred corridor option, feedback included but was not limited to:

- the request to underground and/ or move proposed overhead lines to the west of Brantingham/ Ellerker area;
- concerns around landscape, visual and ecological impacts in proximity to the River Ouse;
- Requests for undergrounding across the River Ouse;
- Landscape and visual impacts local footpaths, residents and North Leverton Windmill; and
- If a route went through the Isle of Axholme, it should be undergrounded.

3.6.3 To the south of the emerging preferred corridor option, feedback included:

- that the new overhead line should be routed further to the east, placing it closer to existing overhead power lines, and further from villages where infrastructure was not present;
- that the new overhead line should be routed in close parallel with the existing overhead lines wherever possible to reduce encirclement of residential areas by the new overhead line to the west, and the existing 400 kV overhead lines to the east; and
- concerns were raised around the potential negative impacts of routeing the overhead line in close proximity to the Treswell Woods Site of Special Scientific Interest and Nature Reserve, and on North Leverton Windmill, a local Grade II* Listed cultural heritage asset in the area.

3.6.4 The Non-Statutory Consultation Feedback Report (2025), provides the full detail on the consultation feedback responses provided during Non-statutory Consultation 2023

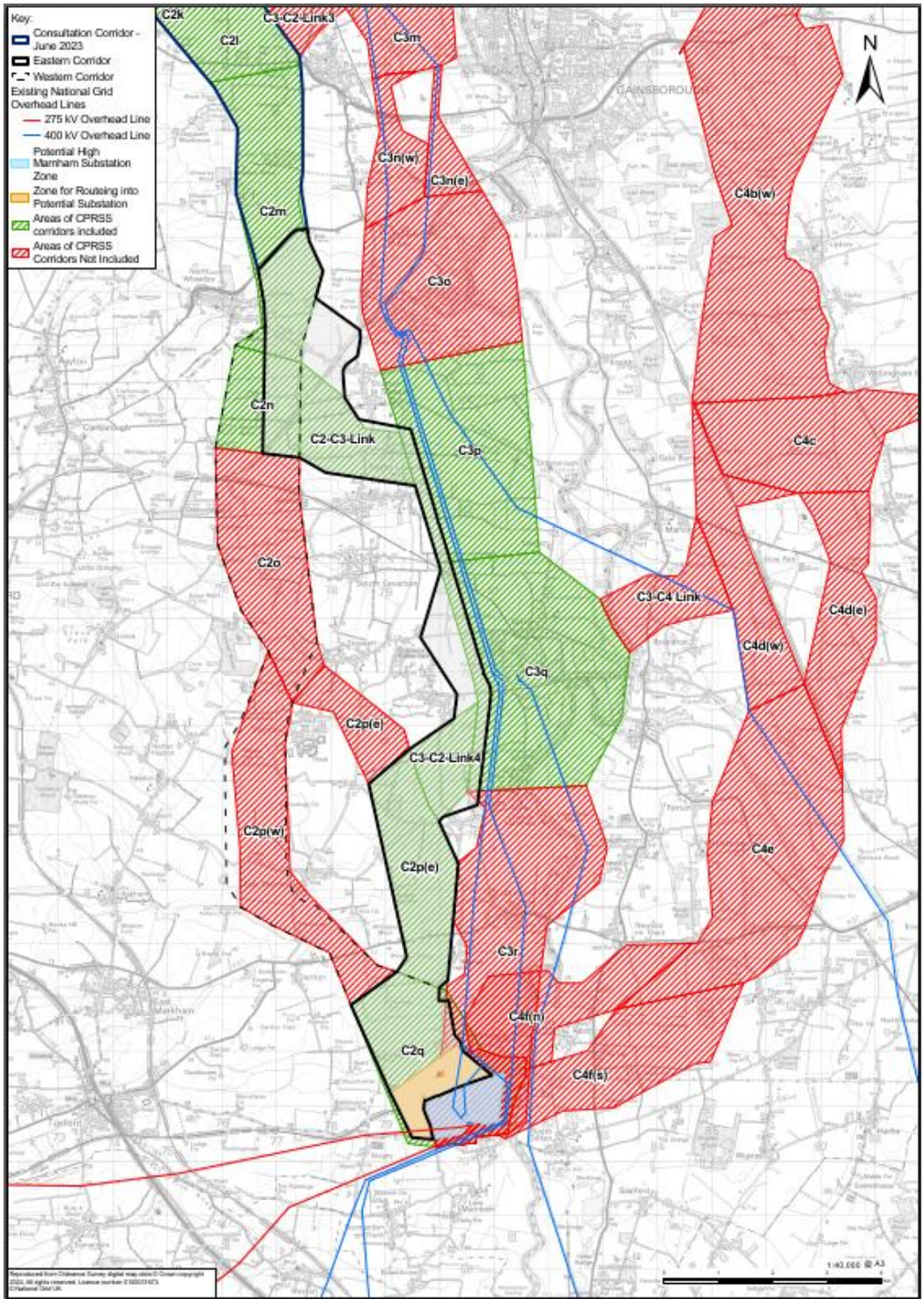
3.6.5 The consultation feedback received by National Grid during the 2023 non-statutory consultation played an important role in developing the Project as local knowledge and feedback helped shape the evolution of the Project design and routeing. Further information on evolution of the Project design, including identification of the preferred alignment, can be found in the Design Development Report (2025).

3.6.6 As a result of consultation feedback, review of new information and a review of the CPRSS 2023, a potential alternative corridor was considered, and a localised non-statutory consultation held in 2024. Further information on this is set out below.

Localised Non-Statutory Consultation 2024

3.6.7 Following a review of the CPRSS 2023 which took into account additional information received, and feedback gathered from the 2023 non-statutory consultation (as summarised above), National Grid undertook an exercise to consider a potential alternative corridor between South Wheatley and High Marnham. This potential alternative was referred to as the eastern corridor. National Grid undertook early engagement with stakeholders on this eastern corridor. Figure 3.7 shows which sections of Corridors 2 and 3, as defined within the CPRSS 2023 and described above in section 3.5, were used in defining the eastern corridor.

Figure 3.7 - Areas of the CPRSS Study corridors used in the Eastern Corridor



3.6.8 To support and inform the 2024 localised non-statutory consultation events, a potential impacts identification appraisal was undertaken on the eastern corridor which covered a range of criteria such as environmental, socio-economic, technical and cost factors. This options appraisal process is reported in the Supplementary Corridor Routeing Report 2024. Figure 3.8 presents the difference between the eastern and western corridors (and also shows for reference, the part of the consultation corridor immediately north of the two corridors) that was taken to non-statutory consultation in 2023.

3.6.9 The localised non-statutory consultation was undertaken between 9th July and 6th August 2024. This localised non-statutory consultation focused on the eastern corridor

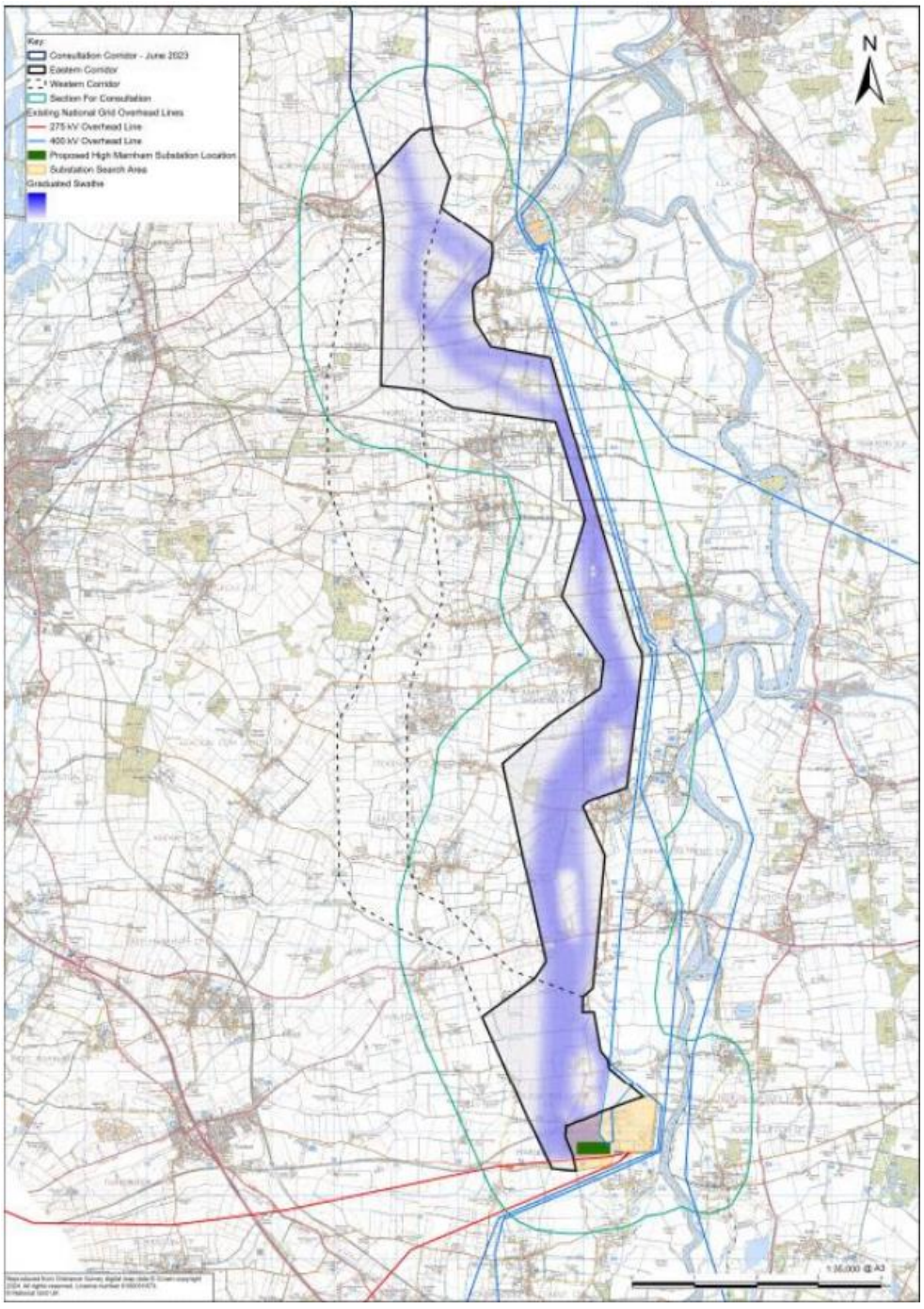
extents to allow stakeholders and consultees to provide feedback on the eastern corridor.

3.6.10 For the avoidance of doubt, National Grid had made no decision as to which of the two corridors (eastern or western) in this southern most section of the route should be taken forward at the time of the localised non-statutory consultation.

3.6.11 Following the closure of the localised non-statutory consultation 2024 feedback was collated and reviewed. In total 152 feedback submissions on the eastern corridor were received by National Grid during the localised non-statutory consultation.

3.6.12 The Non-Statutory Consultation Feedback Report summarises the consultation feedback responses received during localised non-statutory consultation 2024.

Figure 3.8 - Eastern Corridor (with graduated swathe) and Western Corridor



Selection of the end-to-end Preferred Corridor

3.6.13 Feedback from both the non-statutory consultation 2023, localised non-statutory consultation 2024 as well as further technical assessments including environmental surveys were considered when making a decision on the overall end to end preferred corridor and identification of the preferred alignment ahead of statutory consultation.

3.6.14 National Grid concluded that the western corridor was the preferred corridor for the southern section of wider overall end-to-end Preferred Corridor.

3.6.15 It was concluded that the western corridor between South Wheatley and High Marnham is preferred (subject to some amendments in the West Burton area) and the original findings of the CPRSS 2023 remain valid. Further details of the South Wheatley to High Marnham corridor decision are set out in **Chapter 5 of the Design Development Report** (National Grid, 2025), which explains the assessment undertaken from technical, cost, environmental, and socio-economic perspectives.

3.6.16 As set out above, the western corridor (emerging preferred corridor presented in 2023) has been subject to some change in the West Burton area. Details of this change which deviates outside the western corridor are set out in **Chapter 5.5 of the Design Development Report** (National Grid, 2025).

3.6.17 This end-to-end Preferred Corridor formed the geographic parameters for which the preliminary alignment for the Project is located. This preferred alignment is described within **Chapter 4 Project Description.**

3.6.18 This preferred alignment forms the basis for this PEIR to be consulted upon by National Grid as part of statutory consultation.

3.6.19 Within the end-to-end preferred corridor is the need to cross an existing 400 kV ZDA overhead line route between Ealand and the West of Keadby. At the time of non-statutory consultation in 2023 the working assumption was that the crossing of this overhead line would be done through undergrounding any new overhead line associated with the Project.

3.6.20 Further technical, cost and environmental and socio-economic assessments were undertaken as part of the iterative design process which identified that a solution known as a ‘diamond duck under’ would be a better solution. This solution would reduce overall land take, permanent construction works, disturbance to the environment and be less obtrusive to landowners and existing ground conditions. Further information can be found within the North Humber to High Marnham Design Development Report 2025. (National Grid, 2025).

3.6.21 National Grid continues to develop the preferred alignment design as it meets with Statutory Bodies, such as Natural England, local authorities, other stakeholders and interested parties, as it recognises the important part in developing the design and routeing of the Project through feedback given prior to and during statutory consultation.

3.7 Substations

3.7.1 The Project would need to connect to two new substations, one at Creyke Beck, Cottingham, (known as Birkhill Wood Substation) in the East Riding of Yorkshire and a new substation at High Marnham in Nottinghamshire (part of a project called 'Brinsworth to High Marnham'). National Grid is, in 2025, proposing to apply for planning permissions for both of the two new 400kV substations from the relevant local planning authorities under the Town and Country Planning Act.

3.7.2 While the new substations did not form part of our proposals for the Project during non-statutory consultation, we have made the decision to include both substations within the stage 2 (statutory) consultation for the Project. This approach allows National Grid to demonstrate that the Project can be delivered and that it can connect to the national transmission network. National Grid, however, remain committed to, and fully intend to pursue and deliver, the substations pursuant to those consents under the Town and Country Planning Act.

3.7.3 The methodology for identifying and appraising potential siting options for the substations and the identification of the preferred option has followed a staged process involving:

- The identification of the study area for the new substation;
- Analysis of constraints and opportunities within the study area and identification and refinement of a long list of potential site options; and
- Appraisal of shortlisted substation site options and identification of the preferred site.

3.7.4 This section provides a description of these stages for the Birkhill Wood and High Marnham substations and the conclusion of the appraisal of the shortlisted sites.

Birkhill Wood Substation

Identifying the study area

3.7.5 A site close to the existing Creyke Beck 400 kV substation is required to meet both customer connection agreement obligations and to provide the connection point for the Project. To minimise the requirement for additional transmission infrastructure (such as pylons, conductors, cables) to connect the new substation to the existing 400 kV overhead line network, and associated environmental impacts and costs, the new substation should be located in close proximity to the existing 400 kV overhead line network. The study area was defined as 500 m either side of the existing 4ZR overhead line between existing pylon 4ZR001 at Creyke Beck substation and 4ZR008 to the north of the A1079 (avoiding locally designated landscape areas).

Potential siting options

3.7.6 An extensive site selection process was undertaken in order to identify the most appropriate site for the Birkhill Wood substation within the identified study area. Seven potential sites were identified through mapping potential environmental and land use factors that could constrain siting in the "study area". Following further desk top reviews of the potential sites, three sites were then shortlisted and subject to detailed Strategic Options Appraisals (a structured process by which the environmental, socio-economic, technical and cost implications of options are identified, reported and compared).

3.7.7 The initial identification and appraisal of a ‘long list’ of site options within the study area was undertaken using GIS mapping which identified areas of potential environmental and land use constraints within the siting study area.

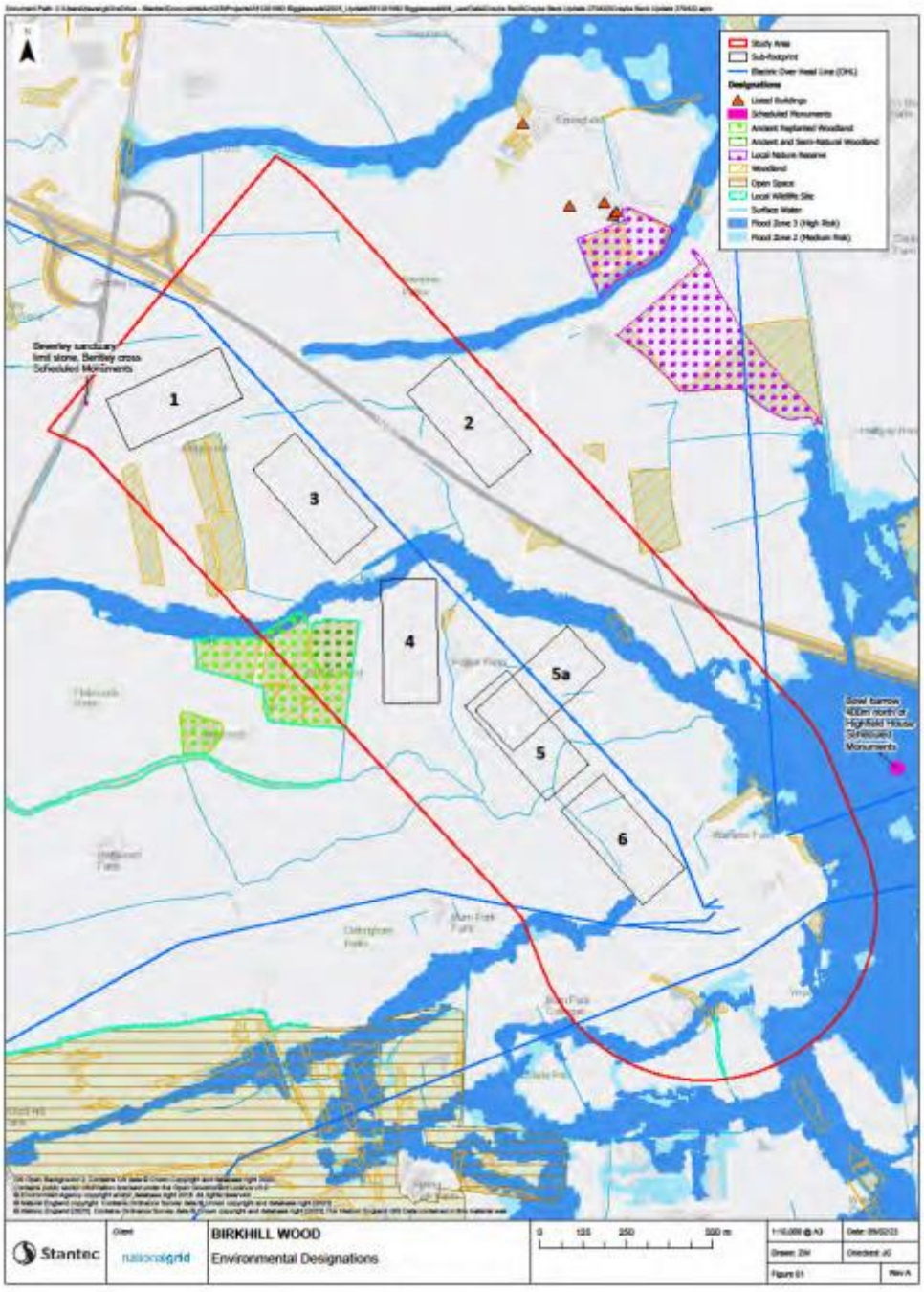
3.7.8 The following parameters were adopted to identify a ‘long list’ of sites for further consideration:

- A site of sufficient size to accommodate an Air Insulated Substation (AIS) substation.
- Proximity to the existing 400 kV 4ZR overhead line.
- Exclusion of Flood Zones 2 and 3 (areas at medium risk of flood risk, and high risk of flood risk from rivers respectively).
- Options which avoid or minimise as far as reasonably possible effects on environmental and socio-economic constraints including ecological constraints (for example designated Natura sites, presence of sensitive habitats, ancient woodland, presence of water bodies), historic environment (including World Heritage Sites, scheduled monuments, other known heritage assets or archaeological remains), landscape and visual (including designated landscape areas, existing infrastructure, locally designated Special Landscape Areas).
- The presence of any rights of way, access routes or other recreational receptors such as local caravan and holiday parks.
- The proximity to i) settlements and more rural isolated dwellings, and the degree to which existing features contribute to visual containment and ii) existing industrial and/or energy infrastructures and local landscapes which would have a lower sensitivity to the introduction of a substation.
- Ease of access and proximity of access routes to residential properties which have the potential to be affected by traffic-related impacts.

3.7.9 Following the initial review of the environmental and land use mapping exercise overlain onto the siting study area, a total of seven potential sites were considered for accommodating the Birkhill Wood substation.

3.7.10 The seven potential sites identified within the search area, are shown on Figure 3.9.

Figure 3.9 - Locations of the seven potential Birkhill Wood Sites



3.7.11 The seven potential sites identified were assessed against environmental, socio-economic, technical, and cost factors. Upon further examination of the seven sites initially considered for the long list, four were able to be ruled out primarily due to consenting, environmental and socio-economic factors. The sites which were discounted from the long list are as follows:

- Site 1: Conflicted with an existing high-pressure gas main. It was within the boundary of an existing extant planning permission for a highways improvement scheme to 'Jocks Lodge' roundabout on the junction of the A1079 and A164 in the northwest of the study area. Whilst the construction timings for this road scheme are unlikely to overlap with development of a new substation in this location, the overlapping site boundaries, combined with the relatively long distance from the existing Creyke Beck

substation (approximately 1.95 km) meant that Site 1 offered no technical, cost, or environmental advantage at this stage over the other sites considered.

- Site 2: Site 2 (and other areas of land to the north of the A1079) were discounted because connecting back to the existing overhead line and substation at Creyke Beck by cabling either over or under the A1079 presented a technical and cost disadvantage compared to other sites considered to the south of the study area.
- Site 4: Site 4 was within the boundary of a proposed planning application for a solar farm development. In addition, the alignment of field boundaries, drainage ditches and footpaths and the presence of a residential property in close proximity to Site 4 meant that a substation at this location would need to be developed at a 45° angle to the existing overhead line. The management of overhead line diversion and consideration of multiple incoming customer cable connections (in addition to the proposed Project) made this a non-viable Gas Insulated Substation (GIS) option.
- Site 6: Site 6 was situated within the boundary of an extant planning permission for a converter station and cable connections for an offshore windfarm connection. Route corridors/easements had been agreed with a connecting Windfarm customer that would constrain development in this area. In addition, the proximity to the existing substation and system design interactions would pose a number of construction and technical issues.

3.7.12 Site 3, Site 5 and Site 5A were taken forward to shortlist stage and were subject to further detailed desk based assessment and site visits undertaken to ‘ground truth’ the desk based assessment.

Appraisal of shortlisted sites and identification of the preferred Birkhill wood substation site

3.7.13 Each of the three short listed sites (Site 3, Site 5 and Site 5A) were taken forward and subject to a Strategic Options Appraisal.

3.7.14 All three short listed sites were physically constrained due to the presence of utilities and a bridleway / private road.

3.7.15 Site 3 was discounted due to the presence of an Ethylene pipe dissecting the site as it was considered to carry increased cost risk to manage and mitigate such a constraint.

3.7.16 The remaining two sites (5 and 5A) overlapped, however an AIS solution on 5A (which provides for a horizontality aligned site) would require building over a section of Park Lane, a designated bridleway and private road, which would trigger the need for a significant bridleway diversion and extinguishing multiple third-party private rights of access. The existing overhead line would also need to be permanently diverted around the substation; and an AIS solution on Site 5 (which provides for a vertically aligned site) would require a high-pressure gas main to be diverted. Both options would incur significant time, cost and complexity and an AIS solution was not considered feasible.

3.7.17 The decision was therefore taken to change the substation design from an AIS solution to a GIS solution; a GIS substation would require a smaller operational footprint and so enable both the Park Lane bridleway / private road and the high-pressure gas main to be avoided.

3.7.18 The preferred site is the section of Site 5 and 5A that overlapped as this site provided sufficient space to accommodate a vertically aligned GIS substation while also avoiding the physical constraints. The selection of a vertically aligned GIS substation within Site

5 as the overall preferred site would also benefit from increasing the space available for the GIS hall and would simplify the configuration of overhead line turn-ins when compared to a horizontally aligned GIS substation on the overlapping areas of Site 5 and 5A, which would have presented technical challenges to turn in the existing overhead lines to the new substation.

3.7.19 In summary, the selected Birkhill Wood substation site (Site 5) was supported following detailed environmental, socio-economic, technical and cost appraisals, and it was considered that any residual environmental impacts could be suitably mitigated through detailed design choices.

High Marnham Substation

Identifying the study area

3.7.20 A study area of 5 km was defined for the substation site search. Whilst a distance of 2 km from the existing substation would be preferable, to reduce the number of underground cables, pylons and length of overhead lines that may need to be reconfigured in the area, a wider search area was adopted to identify additional sites in the event that no suitable sites within the 2 km radius were identified.

Potential siting options

3.7.21 An extensive site selection process was undertaken in order to identify the most appropriate site for the High Marnham substation within the identified study area. Nineteen potential sites were identified through mapping potential environmental and land use factors that could constrain siting in the “study area”. Following further analysis of the potential sites, four sites were then shortlisted and subject to detailed Strategic Options Appraisals.

3.7.22 An initial identification and appraisal of a ‘long list’ of site options within the study area was undertaken using GIS mapping which identified areas of potential environmental and land use constraints within the siting study area.

3.7.23 The following parameters has been adopted to identify a ‘long list’ of sites for further consideration:

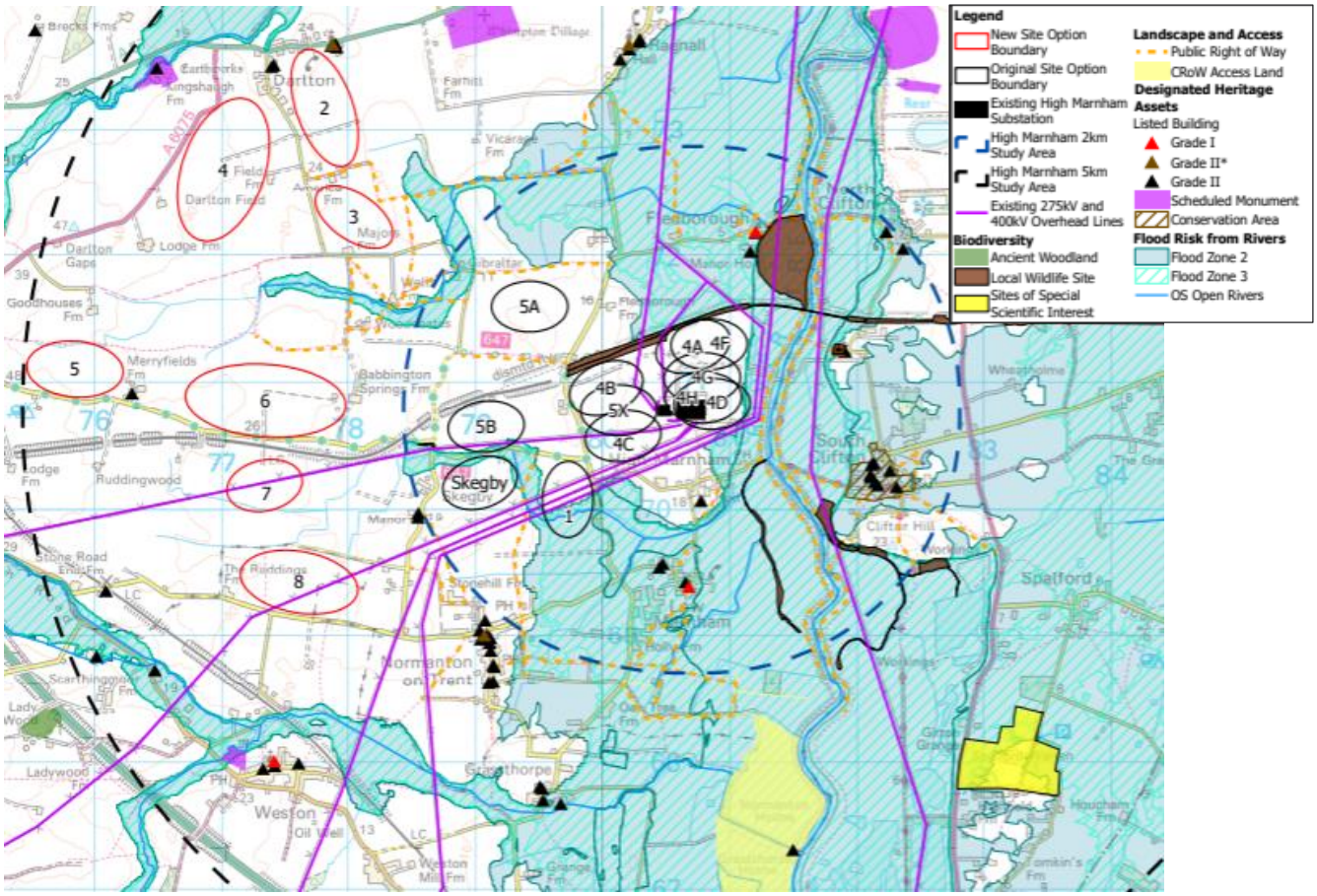
- A site of sufficient size to accommodate an AIS substation.
- Within close proximity to the local road network to avoid the need to construct new long access roads.
- Exclusion of Flood Zones 2 and 3 (areas at medium risk of flood risk, and high risk of flood risk from rivers respectively).
- Options which avoid or minimise as far as reasonably possible effects on environmental and socio-economic constraints, including environmental designated statutory and non-statutory sites (e.g., scheduled monuments, SSSIs), strategic allocated land in local planning documents (including Green Belt and other land where a substation would not be in accordance with the allocated land use), land identified in planning applications, commons and recreational areas, Crown land, National Trust land, and CRoW land.
- Options that minimise landowner disturbance as far as practicable when considered alongside other constraints.

- Options that follow the principles of the Horlock Rules and that are in accordance with the National Policy Planning Framework (NPPF), and local policy / allocations were preferable.

3.7.24 A total of nineteen sites were identified which could accommodate an AIS substation.

3.7.25 The geographical location of the nineteen longlisted sites (numbered 1 to 8 with sub options for 3 and 5 and an additional options known as 'Skegby' is shown at Figure 3.10.

Figure 3.10 - Locations of the 19 potential High Marnham Sites



3.7.26 The long list of options was refined, and some options discounted (including all sites outside the 2 km radius given potentially suitable sites were present within that radius) to provide a short list of sites to be considered and assessed in Stage 3, namely:

- Site 4F: located in the northeastern section of the former High Marnham Power Station site which could have been accessed from the access road for the existing substation. The site option was approximately 18 ha and included space for both permanent and temporary works.
- Site 5A: located to the northwest of the existing substation within agricultural land. The option could have been accessed from Far Road to the west of the option or the road that lies along the eastern boundary of the option. The site option was approximately 18 ha and included space for both permanent and temporary works.
- Site 5B: located to the west of the existing substation within agricultural land. The site option was approximately 18 ha and includes space for both permanent and temporary works. The option could have been accessed from Crabtree Lane which

lies along the western boundary of the option or from Polly Taylor's Road which lies along the southern boundary of the option.

- Site 5X: located to the southwest of the existing substation within agricultural land which could have been accessed from the road that lies along the western boundary of the option or Hollowgate Lane to the south of the option. The site option was approximately 18 ha and included space for both permanent and temporary works.

Appraisal of shortlisted sites and identification of the preferred High Marnham substation site

3.7.27 Each of the short-listed sites was subject to a Strategic Options Appraisal which considered the environmental, socio-economic, technical and cost implications of options are identified, reported and compared.

3.7.28 The output of this assessment was to identify Option 5X as the preferred location. Site Option 5X is equivalent or preferable to the other shortlisted sites on all technical aspects, optimising and minimising overhead line and cable lengths and providing opportunities to utilise existing infrastructure at the existing substation, balancing technical benefits and capital cost requirements for new developments against the consequential environmental effects.

3.7.29 Site Option 5X is located in close proximity to the existing substation, with the shortest new line entry reconfigurations and associated lengths of all site options (1 km). This reduces potential impacts on areas of local amenity value, important existing habitats and landscape features), avoid a confusing appearance and may minimise changes to the existing views from main viewpoints.

3.7.30 Site Option 5A and Site Option 5B were located at a further distance from the existing substation and would, therefore, required more infrastructure for the additional pylons and overhead lines connections. This would have likely resulted in greater residual adverse visual effects upon landscape and visual receptors than Site Option 5X and to a lesser extent Site Option 4F.

3.7.31 All site options had the potential to impact LWSs due to the possible need to reconfigure existing overhead lines within the LWSs. Options may be able to avoid the need for new overhead lines and pylons through the LWSs, or utilise the existing overhead line pylons within the LWSs. This would minimise disturbance to the habitats and species within the designation during construction. Site Option 4F may require multiple new overhead lines entering the substation from the north of the option due to the overlap with the LWSs along the northern boundary of the option, which has the potential to disturb habitats and species.

3.7.32 The engineering requirements are anticipated to be the least complex for Site Option 5X, likely resulting in a shorter construction programme and reduced construction cost for delivery.

3.7.33 On balance, based on the options appraisal, Site 5X is therefore the preferred substation location.

3.8 References

Ref 3.1 Department for Business, Energy and Industrial Strategy (2022). Policy paper British energy security strategy. [Online]. Available at: British energy security strategy - GOV.UK (www.gov.uk) [Accessed: October 2024].

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Ref 3.6 National Grid (2024). North Humber to High Marnham – Supplementary Corridor and Routeing Report. [Online]. Available at: https://www.nationalgrid.com/electricity-transmission/network-and-infrastructure/infrastructure-projects/north-humber-to-high-marnham/document-library [Accessed: October 2024].

Ref 3.7 National Grid (1959). The Holford Rules. [Online]. Available at: https://www.nationalgrid.com/sites/default/files/documents/13795-The%20Holford%20Rules.pdf [Accessed: October 2024].

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