



**East Anglia Onshore & Offshore Cable Routing**  
Environmental & Community Appraisal

B2441H03

8<sup>th</sup> March 2024

Prepared for

**ESO**

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## Acronyms

AC	Alternating Current
AQMA	Air Quality Management Area
cSAC	Candidate Special Area of Conservation
HPMA	Highly Protected Marine Area
HRA	Habitats Regulation Assessment
HVDC	High voltage direct current link with offshore cables
IBA	Important Bird Area
MCZ	Marine Conservation Zone
NNR	National Nature Reserve
OHL	Overhead Lines
pSPA	Proposed Special Protection Area
RSPB	Royal Society for the Protection of Birds
RYA	Royal Yachting Association
SAC	Special Area of Conservation
SCI	Site of Community Importance
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest

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# 1. Introduction

The Transmission Network in Great Britain moves electricity from where it is generated to where it is consumed. As the country transitions away from electricity generated from fossil fuels to a net zero energy system, the demands on the transmission network are changing. As new generation connects to the Transmission Network, this may in turn drive the need for additional capacity on the network to move the electricity from where it is generated to where it is consumed. In the case of East Anglia, significant growth has already been experienced in offshore wind generation, and further significant growth in offshore wind generation and interconnection to Europe is expected in the next decade. The network in East Anglia also plays a pivotal role in the transfer of energy from further north in Great Britain, towards London and the South East - and again, in future years the volume of energy to be transferred is expected to grow significantly.

This report presents appraisals to determine the potential environmental and community constraints which may be encountered by the development and operation of new network infrastructure (known as reinforcements) in East Anglia and South-East England. Jacobs has been commissioned by ESO (the national electricity system operator) to undertake these appraisals. Jacobs is a company which provides a full spectrum of professional services including consulting, technical, scientific and project delivery for the government and private sector. National Grid Electricity Transmission (NGET) is the Transmission Owner, and would also be the developer of these reinforcement projects.

The appraisals of the onshore and offshore and landfall reinforcements have been undertaken at a high level on a environmental and community study area basis. The environmental and community context of the study areas are provided in Constraints Plans 1-15. These environmental study areas were provided by ESO. For onshore and offshore reinforcements these included the start point and end point of the proposed reinforcement works, defined as substations and a buffer zone around them. For landfall reinforcement, study areas are based on three landfall points. For each study area, ESO provided a brief scope of the works which included a physical description of the reinforcements and technology assumptions.

This appraisal report consists of three sections. Firstly, the appraisal assumptions and methodology (using a Black-Red-Amber-Green (BRAG) rating system) are outlined in this introductory section. Secondly, the study areas for each onshore and offshore reinforcement are appraised and BRAG rated (see Section 1.2), and key areas of environmental and community constraints are highlighted in the accompanying narrative. Following this, the study areas for each landfall reinforcement are appraised and BRAG rated, and key areas of environmental and community constraints are highlighted in the accompanying narrative

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## 1.1. Appraisal Assumptions

The appraisal has been undertaken in accordance with the Holistic Network Design (HND) Methodology<sup>1</sup>. The following assumptions underpin the appraisal:

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<sup>1</sup> National Grid ESO (2022) Holistic Network Design (HND) Methodology, February 2022. Available from: <https://www.nationalgrideso.com/document/239466/download>

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- The appraisal uses nationally available datasets of environmental and community receptors and focuses on the degree to which they present constraints requiring consideration in the further development of a reinforcement option.
  - At this stage in the optioneering process the assessment is strategic in nature and focuses on significant anticipated effects only. Where possible, the appraisal identifies where there are areas of key risk and whether avoidance or a reduced level of interaction with certain receptors may be possible. However, this will only be confirmed at later stages of the routing and design process when the mitigation hierarchy (a structured approach that prioritizes actions to first avoid, then minimize, and finally offset adverse environmental impacts) will be applied. For this reason, a more precautionary approach has also been adopted when assigning BRAG ratings owing to the strategic nature of the appraisal, the level of information available, and the further work that needs to be undertaken.
  - This appraisal has not considered impacts at a specific location or mitigation for a single receptor, such as an individual Listed Building or residential property. The appraisal relates to the entire study area for each reinforcement.
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## 1.2. Appraisal Methodology

The appraisal reported in this document has been completed with reference to the HND Methodology<sup>2</sup> and has following a two stage process (see Sections 1.2.1 and 1.2.2 ).

### 1.2.1 Stage 1: Environmental and Community Constraints

The HND methodology identifies potential constraints (eg. features, receptors or designations) to the development of different types of reinforcement (eg. offshore cabling, onshore overhead lines) which it classifies as either environmental or community constraints. Within the methodology, a BRAG (Black Red Amber Green) rating has been allocated to these constraints to identify the relative level of impedence that they may potentially impose on the development of a reinforcement. The level of impedence is a function of the relative importance or sensitivity of the constraint (generally defined by the extent of its legislative or policy underpinning) and the extent to which a reinforcement is likely to interact with the constraint. Each constraint is given a different rating depending on the nature of each type of reinforcement. For example, a constraint may be assigned a rating of amber in relation to development of an overhead line reinforcement and a rating of green in relation to development of an onshore cabling reinforcement.

The table below presents definitions of the BRAG ratings applied to environmental and community constraints.

Table 1.1: Environmental and Community Constraint BRAG Ratings

Rating	Environment	Community
<b>Black</b>	Features, receptors or designations which affect the likelihood of an Option being achievable to such a degree that they should not be considered as part of the design. This includes constraints which do not permit the proposed activities to be undertaken within them.	Features, receptors or designations which affect the likelihood of an Option being achievable to such a degree that they should not be considered as part of the design. This includes constraints which do not permit the proposed activities to be undertaken within them.
<b>Red</b>	Features, receptors or designations that are so significant, sensitive or pose such a high degree of risk to the design that they should be avoided, examples would include designated areas identified by statutory bodies to contain designated features sensitive to impacts of the proposed activities.	Features, receptors or designations that are so significant, sensitive or pose such a high degree of risk to the design that they should be avoided, examples would include designated areas identified by statutory bodies to contain designated features sensitive to impacts of the proposed activities.

<sup>2</sup> National Grid ESO (2022) Holistic Network Design (HND) Methodology, February 2022. Available from: <https://www.nationalgrideso.com/document/239466/download>

<b>Amber</b>	Most protected features, sensitive receptors and/or areas that are likely to require detailed assessment and potentially mitigation and should be avoided if possible.	Most protected features, sensitive receptors and/or areas that are likely to require detailed assessment and potentially mitigation and should be avoided if possible.
<b>Green</b>	Features, receptors or designations to be considered in constraint assessment/study but which are likely to be capable of resolution.	Features, receptors or designations to be considered in constraint assessment/study but which are likely to be capable of resolution.

The tables which follow (Table 1.2 and 1.3), list all the environmental and community constraints considered in the appraisal and provide a description regarding their importance / sensitivity and the reason for their inclusion. The constraints are set out by topic and where possible have generally been listed in order of importance / sensitivity.



Table 1.2: Environmental Constraints

Environmental Constraints	Description and reason for inclusion in appraisal
<b>Ecology – International / European designations</b>	
Special Area of Conservation (SAC) / proposed Special Area of Conservation (pSAC)	Conservation sites that make a significant contribution to conserving the habitats and species identified in Annexes I and II, respectively, of the EC Habitats Directive (92/43/EEC). Afforded statutory status in the UK via the Conservation of Habitats and Species Regulations 2017 (as amended) and the Conservation of Offshore Marine Habitats and Species Regulations 2017.
Special Protection Area (SPA) / proposed Special Protection Area (pSPA)	Protected areas for specified bird species which qualify for consideration under the EC Birds Directive (79/409/EEC as amended). Afforded statutory status in the UK via the Conservation of Habitats and Species Regulations 2017 (as amended) and the Conservation of Offshore Marine Habitats and Species Regulations 2017.
Sites of Community Importance (SCI)	Sites that were adopted by the European Commission before the end of the Transition Period following the UK's exit from the EU, but not yet formally designated by the government of each country.
Ramsar sites / proposed Ramsar Sites	Wetlands of international importance designated under the UNESCO Ramsar Convention.
Important Bird Areas (IBA)	Areas identified by BirdLife International that have significance for the international conservation of bird populations. IBAs form a subset of Key Biodiversity Areas that have been embedded in various international agreements and safeguard mechanisms (eg. EC Birds Directive and the Ramsar Convention).
Biosphere Reserves	Non-statutory areas identified for testing interdisciplinary approaches to understanding and managing changes and interactions between social and ecological systems. The reserves are designated by UNESCO.
<b>Ecology – National designations</b>	
Site of Special Scientific Interest (SSSI)	Predominantly terrestrial and coastal areas designated due to their flora, fauna, geological, geomorphological or physiographical features. Afforded statutory status in the UK via the Wildlife and Countryside Act 1981 (as amended).
National Nature Reserve (NNR)	Predominantly terrestrial sites established to protect the most significant areas of habitat and of geological formations. They are designated via the National Parks and Access to the Countryside Act 1949 or Wildlife and Countryside Act 1981 (as amended).
Marine Conservation Zones	A type of marine protected area that protect a range of nationally important, rare or threatened habitats and species. They are designated under the Marine and Coastal Access Act 2009.
Highly Protected Marine Areas (HPMA)	Areas of the sea designated for the protection and recovery of marine ecosystems. They prohibit extractive, destructive, and depositional uses, allowing only non-damaging levels of other activities to the extent permitted by international law. They are designated under the Marine and Coastal Access Act 2009.
<b>Ecology – Local designations</b>	

Ancient Woodlands	An area that's been wooded continuously since at least 1600 AD. The habitat is considered to be irreplaceable. These areas are recognised in planning policy through the National Planning Policy Framework (NPPF).
Royal Society for the Protection of Birds (RSPB) Reserves	Non-statutory sites established as reserves by the RSPB.
<b>Ecology - Habitats</b>	
Annex 1 Reefs outside designated areas	Annex 1 habitats are those habitats listed in Annex 1 of the EC Habitats Directive (92/43/EEC).
Annex 1 Sandbanks outside designated areas	
Annex 1 Submarine Structures outside designated areas	
Annex 1 Saltmarsh outside designated areas	
<b>Ecology – Species</b>	
UK Grey Seals	Protected at the European level by the EC Habitats Directive (92/43/EEC) and afforded statutory status in the UK via the Conservation of Habitats and Species Regulations 2017 (as amended), the Conservation of Offshore Marine Habitats and Species Regulations 2017, the Wildlife and Countryside Act 1981, the Conservation of Seals Act 1970 and the Wild Mammals (Protection) Act 1996.
UK Harbour Seals	
SCANS 3 (marine mammal densities)	SCANS-III is a large scale ship and aerial survey to study the distribution and abundance of cetaceans (whales, dolphins and porpoises) in European Atlantic waters. Cetaceans are protected at the European level by the EC Habitats Directive (92/43/EEC) and are afforded statutory status in the UK via the Conservation of Habitats and Species Regulations 2017 (as amended) and the Conservation of Offshore Marine Habitats and Species Regulations 2017 and the Wildlife and Countryside Act 1981.
UK Seabirds at Sea	A dataset containing survey data covering much of the UK waters of interest, extending from 1978 to the present day. Seabirds and their eggs and nests are protected under the Wildlife and Countryside Act 1981. Some species are also protected via SPA designations (see above).
Fish Spawning Grounds	Areas more sensitive to human activity and disturbance. Some spawning and nursery grounds are subject to restriction by virtue of their location in marine protection areas.
Fish Nursery Grounds	
<b>Geology and soils</b>	
Geoparks	Non-statutory UNESCO designation of areas with internationally important rocks and landscapes, all of which are managed responsibly for conservation, education and sustainable development.

National Flood Zones	Areas defined nationally by the Environment Agency as being at risk from flooding from rivers or the sea. There is a presumption in planning policy and the NPPF against inappropriate development in areas at risk of flooding and avoiding areas at highest flood risk.
Historic Landfill Sites	Sites previously used as landfill sites and receiving a variety of different types of waste but which are now closed. Under the Town and Country Planning (General Development Procedure) Order 1995 Local Planning Authorities have to consult with the Environment Agency about all applications they receive to develop land within 250 metres of landfill sites (including historic landfill sites).
Peatland	Peat is organic material that has built up in waterlogged conditions over thousands of years, and represents a large store of carbon captured from the atmosphere. Carbon storage and greenhouse gas emissions from peatlands are of increasing relevance in the government's efforts to address climate change and therefore avoiding disturbance of peat is important.
<b>Socio-economics</b>	
Shellfish waters	Protected areas designated by the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 to protect the ecological health of the water body, and as a result, the shellfish growing within it.

Table 1.3: Community Constraints

Community Constraints	Description and reason for inclusion in appraisal
<b>Landscape and visual</b>	
National Parks	Areas of the UK established and receiving statutory protection via the National Parks and Access to the Countryside Act 1949. They are administered to conserve and enhance their natural beauty, wildlife and cultural heritage and to promote opportunities for the understanding and enjoyment of their special qualities by the public.
National Landscapes	National Landscapes (previously known as Areas of Outstanding Natural Beauty) are areas protected by the Countryside and Rights of Way Act 2000 to conserve and enhance their natural beauty.
National Trails	National Trails are long distance walking, cycling and horse riding routes through the best landscapes in England and Wales. They are designated through the National Parks and Access to the Countryside Act 1949.
Heritage Coasts	A non-statutory designation established to conserve the best stretches of undeveloped coast in England. Their protection from development is recognised through planning policy and the NPPF.
<b>Historic Environment</b>	
World Heritage Sites	UNESCO designation for sites of outstanding universal value – cultural and/or natural significance which are so exceptional as to transcend national boundaries and to be of common importance for present and future generations of all humanity. World Heritage Sites are recognised as material considerations in planning policy and the NPPF, as a designated heritage asset. Individual assets that form part of World Heritage Sites may also receive statutory protection as heritage assets (see below).
Scheduled Monuments	Nationally important archaeological sites and monuments afforded statutory protection through the Ancient Monuments and Archaeological Areas Act 1979.
Listed Buildings	Protection of a building's special architectural and historic interest. Afforded statutory protection through the Planning (Listed Buildings and Conservation Areas) Act 1990.
Protected wrecks	A restricted area around a wreck, designated to prevent uncontrolled interference. These protected areas are likely to contain the remains of a vessel, or its contents, which are of historical, artistic or archaeological importance. The areas are afforded statutory protection under the Protection of Wrecks Act 1973.
Registered Parks and Gardens	Designed landscapes that are considered to be of national importance and which are included on a register administered by Historic England. Registration does not give statutory protection to parks and gardens, but does make their status a material consideration in planning policy and the NPPF, as a designated heritage asset.
Registered Battlefields	Important battlefields that are considered to be of national significance and which are included on a register administered by Historic England. Registration does not give statutory protection to battlefields, but does make their status a material consideration in planning policy and the NPPF, as a designated heritage asset.

Wreck locations	Location of known wrecks around the UK.
Ship Hulk	Location of ship hulks (ie. old ships stripped of their fittings and permanently moored in intertidal areas, estuaries, canals, and rivers, often in a condition too dilapidated to return to sea).
<b>Air Quality</b>	
Air Quality Management Area (AQMA)	An area designated under the Environment Act 1995 by a local authority, where national air quality objectives are not likely to be achieved. Once designated, an Air Quality Action Plan is produced, describing the pollution reduction measures to be put in place.
<b>Noise</b>	
Major Settlements	Urban areas consisting of major urban agglomerations, cities and small towns.
Small Scale Settlements <sup>3</sup>	Any settlement smaller than a small town (eg. villages, hamlets).
<b>Socio-economic</b>	
Major Settlements	Urban areas consisting of major urban agglomerations, cities and small towns.
Small Scale Settlements	Any settlement smaller than a small town (eg. villages, hamlets).
National Trust Land	Land owned by the National Trust.
Royal Yachting Association (RYA) sailing and racing areas	Areas identified by the RYA as being used for sailing and racing by their members. Sailing areas are areas in extensive use for general day-sailing by all types of recreational craft but particularly smaller craft. Racing areas are areas in frequent use, particularly at weekends and holiday periods, by large numbers of racing craft normally under sail but also power.
Bathing waters	Surface waters designated as bathing water by the Bathing Water Regulations 2013. Bathing waters are monitored and water quality classified as Excellent, Good, Sufficient or Poor. If the water quality does not meet the standards set by the Regulations, remedial measures will be identified and put in place.
Fishing activity	Areas calculated as having high intensity fishing effort.
Marine Fish Farms	Locations of marine fish farms in the UK.

<sup>3</sup> Small scale settlements is not listed as a constraint in the HND Methodology. It has been added for consideration in this appraisal as the study areas being considered are predominantly rural in nature with many such settlements and relatively few major settlements.

The extent of each constraint in the study area and the nature of its impact on the reinforcement is then appraised, with potential mitigation considered. The ability of a reinforcement to avoid a constraint is prioritised, followed by minimising the interaction with the constraint. Where interaction with certain constraints is unavoidable, an assumption is made that suitable mitigation such as those associated with good/best construction practices will be implemented. It is acknowledged that the level of information available at this stage may not be sufficient to guarantee certain mitigations, as such mitigations put forward are those which are considered more standard practice in the development of the reinforcements. Finally, a second 'with mitigation' BRAG rating is applied to the constraint, which takes into account the nature of the impacts and the mitigation considered.

## 1.2.2 Stage 2: Study Area Environmental and Community Summary BRAG Ratings

Once the appraisal and rating of the individual constraints is completed, a qualitative appraisal has been made on how much these constraints constrain the development of the reinforcement within the study area as a whole. For each study area/reinforcement, one BRAG rating has been assigned for environment and one BRAG rating assigned for community. The BRAG rating definitions used at this stage are detailed in table below.

Table 1.4: Study Area / Reinforcement BRAG Rating Definitions

Rating	Environment	Community
<b>Black</b>	Significantly constrained Option. Unlikely to be viable due to significant environmental issues.	Significantly constrained Option. Unlikely to be viable due to significant social/community issues.
<b>Red</b>	Heavily constrained Option. Potentially viable however, will have to overcome many environmental issues.	Heavily constrained Option. Potentially viable however, will have to overcome many social/community issues.
<b>Amber</b>	Moderately constrained Option. Likely viable however, may have to overcome some environmental issues.	Moderately constrained Option. Likely viable however, may have to overcome some social/community issues.
<b>Green</b>	Lightly constrained Option. Likely viable without any major environmental issues.	Lightly constrained Option. Likely viable without any major social/community issues.

During the appraisal process, the following is considered in the assignment of the BRAG rating:

- Scope of works

The scope of works is considered in determining the BRAG rating. Reinforcements such as the upgrading of existing infrastructure through no physical changes will be less constrained than a reinforcement requiring new infrastructure and is therefore more likely to be given a more favourable BRAG rating.

- Number and area of constraints

Within the study area, a qualitative review is undertaken of the number and area of constraints. The greater the number/area of constraints within the study area, the more

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constrained the reinforcement is and therefore the increase in likelihood of a less favourable BRAG rating being assigned.

- BRAG ratings of constraints

The BRAG ratings of the constraints themselves is also considered. For example, a study area with predominantly red constraints will be more constrained than a study area with the same number of constraints but are predominantly green constraints.

## 2. Reinforcement Onshore and Offshore Appraisal

This section presents the environmental and community constraints for each of the individual study areas. This includes four onshore and two offshore study areas. Each appraisal contains the details of the reinforcement that is being considered within the study area, followed by environmental and community summaries of the appraisals that are detailed in the associated constraints table. These constraints tables detail the environmental and community constraints that are present in each study area. They also present a BRAG rating for each designation in line with the HND Methodology<sup>4</sup>. The constraints tables also suggest a range of mitigation measures to reduce risks to receptors in the study area, and assigns another BRAG rating based on the potential that each constraint has to constrain the development of the reinforcement, once these mitigation measures have been considered. The effectiveness of the mitigation measures and final assigned BRAG rating is based on the type, number and size of the constraints and professional judgement based on experience with similar projects. Further optioneering and appraisal will be needed to refine the impact assessment and mitigation measures.

### 2.1. Friston to Tilbury Study Area (OHL)

Start point	Via	End point	Applicable to shortlisted designs:
Friston	EACN (East Anglia Connection Node)	Tilbury	Yes

#### 2.1.1. Reinforcement Details

Reinforcement type (if known)	Reinforcement Length (if known)
AC OHL	N/A

#### Technology assumptions

This reinforcement includes the development of a 400kV AC OHL between Friston and Tilbury.

#### 2.1.2. Environmental Summary

BRAG rating with mitigation measures:

A

The study area includes multiple environmental constraints, including international and national designations.

There are several parts of the study area that are heavily constrained as seen in the constraints table below. The most significantly constrained areas area is within the offshore and eastern

<sup>4</sup> National Grid ESO (2022) Holistic Network Design (HND) Methodology, February 2022. Available from: <https://www.nationalgrideso.com/document/239466/download>



onshore sections of the study area, as there are several separate areas where multiple environmental designations overlap.

In these areas, there are:

- Special areas of conservation (SACs)
- Special protection areas (SPAs),
- Ramsar sites,
- Site of scientific interest (SSSIs),
- National nature reserves (NNRs).

Mitigation measures associated with these constraints should include:

- Consideration of buffer zones for bird migration routes,
- HRA Screening,
- Detailed route planning,
- Best practice construction measures.

There are also several Ancient Woodlands, Important bird areas (IBAs), Former Landfills, Peatlands, and RSPB reserves. These sites are small and distributed throughout the study area, as shown on the constraints plan. Taken together, it is considered that these sites moderately constrain the onshore areas of the study area.

There are also a number of National Flood Zones (Flood Zones 2 and 3) as well as main rivers distributed throughout the study area, which broadly follow the numerous surface water features in the area.

During construction it would be necessary to implement best practice construction measures with considerably planned access routes and buffer zones that are relevant to the constrained areas mentioned. However, the broad distribution of these constraints means that opportunities for avoidance through detailed route planning may be marginal, and therefore subsequent design stages should consider the mitigation hierarchy to further mitigate risk.

As explained in Section 1.2.2 (Study Area Environmental and Community Summary BRAG Ratings), the following factors have been considered in determining an overall Environmental BRAG rating for this Study Area.

Table 2.1.2: Overall Environmental BRAG rating for the Friston to Tilbury Study Area.

<p><b>Scope of works</b></p>	<p>The works include installing new overhead lines that will require some physical changes to the environment and as such, will therefore be affected by the constraints described in the constraints table in Section 2.1.4. This is reflected in the BRAG ratings.</p>
<p><b>Number and area of constraints</b></p>	<p>Within the study area there are 11 different environmental constraint types present. As noted above, the most constrained area is within the offshore and eastern onshore sections of the study area, as there are several separate constrained areas where multiple environmental designations overlap. However, it is worth noting that works include installing new overhead lines and as this is presumed onshore route, these offshore constraints would not be impacted.</p> <p>Further onshore, the constraints, though many, cover a smaller total area.</p>

<b>BRAG ratings of constraints</b>	<p>Within the study area there are 11 environmental constraint types present. Of these, zero have a rating of red under the HND methodology after mitigation, six have a rating of amber after mitigation and five, a rating of green after mitigation.</p> <p>The six amber rated constraints include:</p> <ul style="list-style-type: none"> <li>• SACs</li> <li>• SPAs</li> <li>• Ramsar sites</li> <li>• SSSIs</li> <li>• NNRs</li> <li>• National Flood Zones</li> </ul> <p>The five green rated constraints include:</p> <ul style="list-style-type: none"> <li>• Ancient woodlands</li> <li>• Important bird areas</li> <li>• RSPB reserves</li> <li>• Area of peatland</li> <li>• Historic landfill sites</li> </ul>
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As shown on the constraint plan, there are possible opportunities to avoid the above constraints through construction design and routing, except National Flood Zones located within the study area, as avoidance of all areas of river flood risk will not be possible. There are potential opportunities to avoid intersection with SACs, SPAs and Ramsar sites by considering the route west of the identified constrained areas. There might be possible opportunities by routing between the National Landscape's, SPA's and Ramsar sites or to the west of the study area.

Overall, an amber BRAG rating has been assigned to this study area after mitigation measures, which reflect the factors described above. This is a moderately constrained area which is likely to be viable, however, may have to overcome some environmental issues.

### 2.1.3. Community Summary

BRAG rating with mitigation measures

A

There are numerous community constraints in the study area, including national and international designations.

One of the most significant areas of constraint is the presence of Dedham Vale and Suffolk Coast & Heaths National Landscape sites, which span a significant part of the northern section of the study area. In line with National Policy and the Holford Rules<sup>5</sup>, National Landscape sites should be avoided altogether and where this is not possible and there would

<sup>5</sup> Guidelines on overhead line routing which were first formulated in 1959 by Sir William Later Lord, Holford. Available from <https://www.nationalgrid.com/sites/default/files/documents/13795-The%20Holford%20Rules.pdf>

be harm to landscape, visual amenity and natural beauty, there should be a strong presumption for undergrounding overhead lines.

Additionally, the presence of Scheduled Monuments across the study area, in particular surrounding Colchester and Kesgrave, creates a large constraint for this reinforcement due to the risk construction works may have upon the feature and/or associated archaeological features, as well as during operation via risk to the setting of the Scheduled Monuments.

There are also many small settlements distributed throughout the study area, which have been given a red BRAG rating after mitigation due to potential visual impacts.

Constraints that may be avoided with best practice construction management measures and selective routing include Heritage Coasts, Listed Buildings, Registered Parks and Gardens, Registered Battlefields, AQMA, Noise Important Areas, and National Trust Land.

As explained in Section 1.2.2 (Study Area Environmental and Community Summary BRAG Ratings), the following factors have been considered in determining an overall Community BRAG rating for this Study Area.

Table 2.1.3: Overall Community BRAG rating for the Friston to Tilbury Study Area.

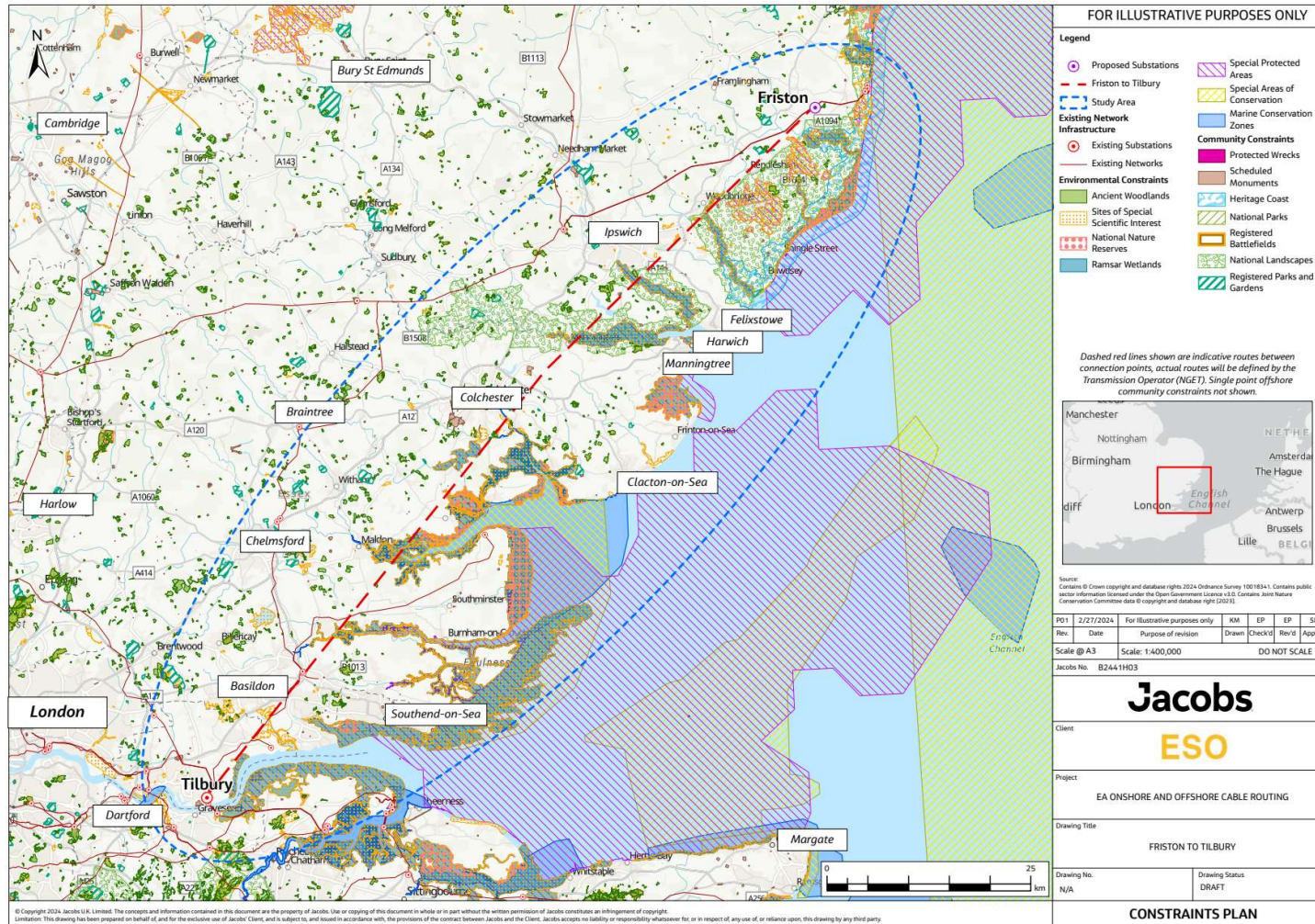
<b>Scope of works</b>	The works include installing new overhead lines that will require some physical changes to the environment and as such, will therefore be affected by the constraints described in the constraints table in Section 2.1.4. This is reflected in the BRAG ratings.
<b>Number and area of constraints</b>	Within the study area there are 12 different community constraint types present. As noted above, the most constrained area is within the north onshore section of the study area, as Dedham Vale and Suffolk Coast & Heaths National Landscape sites span across a significant part of this area. The number and location of scheduled monuments and small scale settlements also constrain much of the study area.
<b>BRAG ratings of constraints</b>	<p>Within the study area there are 12 community constraint types present. Of these, one has a rating of red under the HND methodology after mitigation, four have a rating of amber after mitigation and seven have rating of green after mitigation.</p> <p>The one red rated constraint includes:</p> <ul style="list-style-type: none"> <li>• Small Scale Settlements (Socio-Economics)</li> </ul> <p>The four amber rated constraints include:</p> <ul style="list-style-type: none"> <li>• National Landscapes</li> <li>• Scheduled Monuments</li> <li>• Small Scale Settlements (Noise)</li> <li>• Major Settlements (Socio-Economics)</li> </ul> <p>The seven green rated constraints include:</p> <ul style="list-style-type: none"> <li>• Heritage Coasts</li> <li>• Listed Buildings</li> <li>• Registered Parks and Gardens</li> <li>• Registered Battlefields</li> <li>• AQMA</li> <li>• Major Settlements (Noise)</li> </ul>

	<ul style="list-style-type: none"> <li>National Trust Land</li> </ul>
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An amber BRAG rating has been assigned after mitigation measures due to the number and spatial distribution of the red and amber constraints across the breadth of the study area. In particular, the potential requirement for undergrounding in line with the Holford Rules due to the National Landscapes sites, combined with the presence of Scheduled Monuments and the many small-scale settlements, creates a large constraint which may be difficult to avoid entirely. However, although avoidance may be challenging, there are opportunities for detailed route design and implementation of appropriate construction methodologies to reduce the overall impacts.

#### 2.1.4. Constraints Table

The following table details the environmental and community constraints for Friston to Tilbury Study Area for OHL reinforcement. It describes the constraints present within the study area, the potential mitigation measures to avoid or reduce risks, and a BRAG rating before and after mitigation measures have been applied.



**Constraints Plan 1: Study Area Friston to Tilbury showing Nationally and Internationally Designated Sites**

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
<b>Ecology (Environmental)</b>					
SACs	Onshore and offshore UK SACs	<p>There are six SACs within the proposed study area:</p> <ul style="list-style-type: none"> <li>- Essex Estuaries SAC,</li> <li>- Hamford Water SAC,</li> <li>- Orfordness-Shingle Street SAC,</li> <li>- Alde-Ore &amp; Butley Estuaries SAC,</li> <li>- Staverton Park &amp; The Thicks, Wantisden SAC,</li> <li>- Minsmere to Walberswick Heaths &amp; Marshes</li> </ul> <p>The Essex Estuaries SAC occupies the largest area among the above in the centre of study area.</p>	R	<p>Due to the limited areas of the study area constrained by these SACs, only eastern areas in the centre and eastern areas in the northern parts of this study area are heavily constrained. There are potential opportunities to avoid interaction with these heavily constrained areas by considering the route west of Essex Estuaries SAC, as well as for the rest of the identified SACs.</p> <p>Consideration should be given to the routing of the OHL to avoid negative impacts such as habitat loss and fragmentation, soil erosion and sedimentation. Planning of construction activities and access routes should be undertaken, including the implementation of buffer zones as appropriate to avoid associated impacts e.g., relating to access roads and construction waste stockpiles. A HRA Screening is likely to be required as the route could have a significant effect on these SACs.</p> <p>An amber BRAG rating has been assigned in view of the importance and size of the constraints requiring the need for routing to avoid sensitive areas and other mitigation measures for construction activities.</p>	A
cSACs	England cSACs	There are no cSACs located in the study area.	N/A	N/A	N/A

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
SPAs	Onshore and offshore UK SPAs	<p>There are 14 SPAs within the proposed study area:</p> <ul style="list-style-type: none"> <li>- Thames Estuary &amp; Marshes SPA</li> <li>- Benfleet and Marshes SPA</li> <li>- Crouch &amp; Roach Estuaries (Mid-Essex Coast Phase 3) SPA</li> <li>- Dengie (Mid-Essex Coast Phase 1) SPA</li> <li>- Foulness (Mid-Essex Coast Phase 5) SPA</li> <li>- Blackwater Estuary (Mid-Essex Coast Phase 4) SPA</li> <li>- Abberton Reservoir SPA</li> <li>- Colne Estuary (Mid-Essex Coast Phase 2) SPA</li> <li>- Hamford Water SPA</li> <li>- Stour and Orwell Estuaries SPA</li> </ul>	R	<p>Due to the size and distribution of SPAs, the central and eastern parts of this study area are heavily constrained. There are potential opportunities to avoid interaction with these heavily constrained areas by considering the route west of identified SPAs.</p> <p>Construction mitigation in terms of reducing noise and visual disturbance will be required if the route passes close to this constraint (up to 1 km, depending on designated bird species). Consideration should be given to wider impacts such as bird migratory routes and proximity to these. There will be opportunities to mitigate risks through various measures, such as using buffer zones, screening during construction and timing of works to avoid sensitive times such as nesting or overwintering birds.</p> <p>An amber BRAG has been assigned in view of the importance of the constraint and mobile/migratory features requiring the need for detailed routing and other mitigation measures.</p>	A

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		<ul style="list-style-type: none"> <li>- Deben Estuary SPA</li> <li>- Sandlings SPA</li> <li>- Alde-Ore Estuary SPA</li> <li>- Minsmere-Walberswick</li> </ul>			
pSPAs	England pSPAs	There are no pSPAs located in the study area.	N/A	N/A	N/A
SCIs	SCI	There are no SCIs located within the study area.	N/A	N/A	N/A
Ramsar sites	UK Ramsar sites	<p>There are 13 SPAs within the proposed study area, those being:</p> <ul style="list-style-type: none"> <li>- Thames Estuary &amp; Marshes,</li> <li>- Benfleet and Southend Marshes</li> <li>- Crouch &amp; Roach Estuaries (Mid-Essex Coast Phase 3)</li> <li>- Dengie (Mid-Essex Coast Phase 1)</li> </ul>	R	<p>These Ramsar sites are predominantly coastal and encroach only marginally onshore. Due to the size and distribution of Ramsar sites within the study area, central and eastern part of this study area are heavily constrained. There are potential opportunities to avoid interaction with these heavily constrained areas by considering the route west of identified Ramsar sites.</p> <p>Construction mitigation in terms of reducing noise and visual disturbance will be required if the route passes close to this constraint (up to 1 km, depending on designated bird species). Consideration would need to be given to wider impacts such as bird migratory routes and proximity to these. There will be opportunities to mitigate risks through various measures, such as using buffer zones, screening during construction and timing of works to avoid sensitive times such as nesting or overwintering birds.</p>	A



Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		<ul style="list-style-type: none"> <li>- Foulness (Mid-Essex Coast Phase 5)</li> <li>- Blackwater Estuary (Mid-Essex Coast Phase 4)</li> <li>- Abberton Reservoir</li> <li>- Colne Estuary (Mid-Essex Coast Phase 2)</li> <li>- Hamford Water</li> <li>- Stour and Orwell Estuaries</li> <li>- Deben Estuary</li> <li>- Alde-Ore Estuary</li> <li>- Minsmere-Walberwick</li> </ul>		An amber BRAG has been assigned in view of the importance of the constraint and mobile/migratory features requiring the need for detailed routing and other mitigation measures.	
Proposed Ramsar sites	UK Proposed Ramsar sites	There are no Proposed Ramsar sites located within the study area.	N/A	N/A	N/A
SSSIs	UK SSSIs	There are numerous SSSIs located within the study area, including, Crouch and Roach Estuaries SSSI, Blackwater Estuary SSSI, Colne Estuary	R	The most constrained part of the study area is the central and eastern part. There are multiple small SSSIs throughout the entire study area that can be avoided with selective routing and buffer zones to minimise disruption to sensitive areas. This will need detailed planning at the next stage, as well as the implementation of best practices during construction in order to avoid impacts on these constraints.	A

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		SSSI, Stour Estuary SSSI, Orwell Estuary SSSI, Deben Estuary SSSI and Sandlings Forest SSSI.		An amber BRAG has been assigned on a precautionary basis in view of their concentrated distribution, the need for detailed routing, and the importance of this constraint.	
NNRs	UK NNRs	There are several NNRs within the study area: <ul style="list-style-type: none"> <li>- Swanscombe Skull Site</li> <li>- High Halstow</li> <li>- Leigh</li> <li>- Dengie</li> <li>- Blackwater Estuary</li> <li>- Colne Estuary</li> <li>- Hamford</li> <li>- Orfordness-Havergate</li> <li>- Westleton Heath</li> </ul>	R	The majority of this study area is not constrained by an NNR, but there are several small NNRs distributed mostly across the eastern part of the study area. There are potential opportunities to avoid interaction with these heavily constrained areas by selective routing. Therefore, it is necessary to mitigate risks through detailed routing and siting, as well as implementing buffer zones. Planning of construction activities and access routes should be undertaken, including the implementation of buffer zones as appropriate to avoid impacts relating to access roads and construction waste stockpiles. As a result of the distribution and potential opportunities for avoidance of this constraint through routing, an amber BRAG rating has been applied.	A
Biosphere Reserves	UK Biosphere Reserves	There are no Biosphere Reserves within the study area.	N/A	N/A	N/A
Ancient Woodlands	UK Ancient Woodlands	There are numerous areas of Ancient Woodland throughout the study area.	R	There are numerous, sparsely distributed, small areas of the study area that are constrained by Ancient Woodland. There are opportunities to mitigate risks through the routing process so that the pylons and OHLs do not cross areas of Ancient Woodland. Any risks during construction could be controlled through appropriate construction environmental management practices, for	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				<p>example in relation to the siting of access routes and implementing buffer zones around Ancient woodland areas.</p> <p>A green BRAG has been assigned due to the sparse distribution of Ancient Woodlands, and in view that there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	
IBAs	UK IBAs	<p>There are twelve IBAs within the study area, at Mid-Essex Coast (central Section), Abberton Reservoir, Alde-Ore Estuary, Benfleet and Southend Marshes, Deben Estuary, Hamford Water, Minsmere-Walberswick, Stour and Orwell Estuaries, Suffolk Sandlings, Thames Estuary and Marshes, Mid-Essex Coast (Southern and Northern Sections).</p>	G	<p>OHL development may be constrained by IBAs directly due to the risk of habitat loss, indirectly via disturbance during construction (i.e., noise/lighting) or via disturbance to flight paths once operational.</p> <p>The twelve contained IBAs within this study area will need to be avoided and therefore represent a constraint particularly to the centre and east of the study area. However, the majority of western of the study area is not constrained by IBAs.</p> <p>Connections between sites and bird flight paths would need to be considered including for construction and maintenance activities. OHLs can cause displacement and barrier effects as birds are deterred from using their normal routes to feeding or roosting grounds. There will be opportunities to mitigate risks through various measures, such as using buffer zones, screening during construction and timing of works to avoid sensitive times such as nesting or overwintering birds. Connections between sites and bird flight paths would need to be considered.</p> <p>If routed close by (up to 1 km, dependent on species), bird usage of the area would need to be considered where any disturbance risks are identified. Operational mitigation such as bird-friendly power line designs may be required for OHL. During construction, noise impacts and visual disturbance risks will need to be considered and mitigated accordingly (e.g., through screening). It is expected that with routing design, this could be avoided.</p>	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				As a result of the distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.	
RSPB Reserves	UK RSPB Reserves	There are 13 UK RSPB Reserves within the study area, at Northward Hill, Stour Estuary, Minsmere, North Warren, Old Hall Marshes, Havergate Island & Boyton Marshes, Snape, Shorne Marshes, Cliffe Pools, Rainham Marshes, Wallasea Island, South Essex Marshes and Wolves Wood Reserves.	A	<p>OHL development may be constrained by RSPB Reserves due to direct risks via habitat loss, indirect risks via disturbance during construction (i.e., noise/lighting) or via disturbance to flight paths once operational.</p> <p>There are significant sections of the study area that are not constrained by RSPB Reserves, and there are opportunities to reduce direct risks through the routing process. Connections between sites and bird flight paths would need to be considered. During construction, noise impacts and visual disturbance risks will need to be considered and mitigated accordingly (e.g., through screening).</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	G
<b>Geology and Soils (Environmental)</b>					
Peatland	UK Peatland	There are three areas of Peatland within the study area, located within north part of study area at Woodbridge related to River Deben and at Iken and Blaxhall related to River Alde.	A	<p>Areas of peatland have the potential to constrain the development of this reinforcement as a result of construction and operational risks. The loss and fragmentation of habitats is a key concern. However, there are significant sections of the study area that are not constrained by peatland. There are opportunities to reduce risks through the routing process. There may be temporary construction disturbance impacts that would need further consideration and mitigation.</p>	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				As a result of the small areas of peatland and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.	
Geoparks	UK Geoparks	There are no UNESCO Global Geoparks within the study area.	N/A	N/A	N/A
National Flood Zones/Areas Benefiting from Defences	National Flood Zones and Areas benefiting from defences	There are National Flood Zones (Flood Zone 2 and Flood Zone 3) distributed throughout the study area, associated with the numerous water body features. The most extensive Zone 3 areas (of a high probability of flooding) are surrounding related to River Thames, River Crouch, River Blackwater, River Stour, River Reach, River Deben and Long Reach.	A	<p>OHL development including construction works may be at risk from flooding. Owing to the distribution of this constraint throughout the study area, avoidance of all areas of river flood risk will not be possible and therefore there is residual risk for the development of this option.</p> <p>There will need to be detailed design of the installation and location of pylons within floodplains as well as planning of construction activities so that there are no increased flood levels arising from loss of floodplain storage e.g., during construction from working areas, temporary soil stockpiles, raised access tracks and watercourse crossings. Fluvial flow and surface water flow will also need to be considered in the planning of these activities so that culverts and crossings are of appropriate positioning and size and that water does not pool behind installations.</p> <p>As a result of the distribution and requirement for detailed planning to avoid this constraint through construction design and routing, an amber BRAG rating has been applied.</p>	A
Former landfill sites	Historic landfills	There are numerous small pockets of historic landfill sites located throughout the study area, most	A	OHL development, including construction works, may be at risk posed by sources of contamination from the former landfill sites. Due to the distribution and small size of historic landfills within the study area there are opportunities to avoid this constraint within considerate OHL routing. In addition, it is not considered that this is a	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		notably located to the south of area, surrounding Tilbury and Stanford-Hope.		<p>strategic level constraint that should influence decision-making at this stage.</p> <p>There is an opportunity at the next stage of the siting process to avoid this constraint for OHL routing. However, this will require detailed routing for areas of higher concentrations.</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	
<b>Landscape and Visual (Community)</b>					
National Parks	UK National Parks	There are no National Parks within this study area.	N/A	N/A	N/A
National Landscapes	England National Landscapes	Dedham Vale and Suffolk Coast & Heaths are National Landscape sites that spans a large portion of the study area located at the northern part or the study area.	R	<p>The northern section of this study area is heavily constrained by Dedham Vale and Suffolk Coast &amp; Heaths National Landscape sites, presenting a key constraint to the development of this option. There is a risk that new OHLs would directly and indirectly disrupt it. There might be possible opportunities for routing to avoid these National Landscapes, this constraint might be avoided by routing in small section between these National Landscapes or to the west of the study area.</p> <p>National Landscape sites are afforded the highest levels of protection in relation to landscape and natural beauty, having a specific statutory purpose to ensure their continued protection. The duty to have regard to the purposes of nationally designated areas also applies when considering applications for projects outside the boundaries. In line with National Policy and the Holford Rules, National Landscape sites should be avoided altogether and where this is not possible and there would be harm to landscape, visual</p>	A

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				amenity and natural beauty, there should be a strong presumption for undergrounding the section of line. As a result of the distribution and requirement for detailed planning to avoid this constraint through construction design and routing, an amber BRAG rating has been applied.	
Heritage Coasts	England Heritage Coasts	There is Suffolk Coast Heritage site within the north-east part of study area.	R	The northern sector of this study area is heavily constrained by Suffolk Heritage Coast. However, there are significant sections of the northern study area that are not constrained by Heritage Coast, and there are opportunities to reduce direct risks through the routing process, by routing to the west of Suffolk Heritage Coast. A green BRAG has been assigned as there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.	G
National Trails	England National Trails	There are no National Trails within the study area.	N/A	N/A	N/A
<b>Historic Environment (Community)</b>					
World Heritage Sites	UK World Heritage Sites	There are no World Heritage Sites within the study area.	N/A	N/A	N/A
Scheduled Monuments	UK Scheduled Monuments	Within the study area there are multiple Scheduled Monuments, including a concentrated area within and surrounding Colchester and Kesgrave.	R	OHL development has the potential to be constrained by Scheduled Monuments due to the risk construction works may have upon the feature and/or associated archaeological features as well as during operation via risk to the setting of the Scheduled Monuments. Due to this, without mitigation the distribution of Scheduled Monuments across the study area is likely to constrain OHL route options and require consideration of the mitigation hierarchy.	A

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				<p>It is considered that there are opportunities to mitigate risks to the individual Scheduled Monuments in the study area through the routing and siting process. There may be opportunities for the type of reinforcement to be changed (e.g., undergrounding as opposed to OHL) to avoid effects on setting, considering the nature of the development and the location/extent of the constraint. However, there would need to be detailed considerations required for this type of construction. If undergrounding is implemented, there are opportunities during design development to avoid or mitigate risks via avoidance or considerate design (i.e., landscape screening).</p> <p>It may be possible to avoid direct risks to Scheduled Monuments due to the density of the sites in the study area, but indirect risks (ie. to the areas surrounding the Scheduled Monuments) may be more difficult to avoid.</p> <p>An amber BRAG rating has been applied as it is considered that there is a heavily constrained area where detailed route design and construction methodology is required.</p>	
Listed Buildings	UK listed buildings (Grade I, II* and II listed buildings)	There are a large number of Listed Buildings throughout the study area, including Grade I, Grade II*, and Grade II. There is a high concentration of Listed Buildings in Gravesend, Brentwood, Southend-on-Sea, Maldon, Chelmsford, Witham,	A	<p>OHL development may be constrained by Listed Buildings due to the risk of physical loss or damage to the listing, or indirectly via disturbance to the listed building's setting. There may also be risks to the curtilage (the area around, or any other building that is around and associated with a listed building).</p> <p>Whilst there is a large number of Listed Buildings within the study area, there are opportunities to reduce direct risks through the routing and siting process.</p> <p>In addition to potential accidental damage during construction if works or transport links are close by, there may be a risk on setting depending upon the location of the OHL route and any cable sealing end compounds.</p>	G



Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		Coggeshall, Colchester, Ipswich and Woodbridge.		Works and transport routes need to be considered in terms of their proximity to listed buildings near the highway (e.g., accidental damage risk from HGVs in narrow lanes or other restricted areas) or groundworks (i.e., if any vibration generating works are close enough to cause damage to buildings). As a result of the opportunities for avoidance of this constraint through detailed routing and construction best practices, a green BRAG rating has been applied.	
Registered Parks and Gardens	Registered Parks and Gardens	Within the study area there are several Registered Parks and Gardens. The north of the study area is more constrained than the south due to a higher concentration of Registered Parks and Gardens.	A	The Registered Parks and Gardens sites have the potential to constrain the development of this reinforcement as a result of construction risks and risks as a result of changes to setting during operation. However, there are significant sections of the study area that are not constrained by Registered Parks and Gardens. There are opportunities to reduce risks through avoidance within the routing process. As a result of the distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.	G
Registered Battlefields	England Registered Battlefields	There is one Registered Battlefield within the study area, at the site of the Battle of Maldon 991.	A	The Registered Battlefield constrains the development of this option due to the potential for direct harm during construction, or from changes to the setting of the sites during operation. However, there are significant sections of the study area that are not constrained by Registered Battlefields. There are opportunities to mitigate risks via avoidance through the routing process. As a result of the potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.	G
<b>Air Quality (Community)</b>					

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
AQMAs (AQMA)	UK AQMA	There are several AQMAs within the study area, those being Northfleet Industrial Area AQMA, Dartford AQMA No.2, Tilbury AQMA 24, Greys AQMA No. 1, Havering AQMA, Chelmsford Army and Navy AQMA, MDC Air Quality Management Area number 1, Rayleigh AQMA, Colchester Area 1 – Central Corridors AQMA, and Ipswich AQMA No.3	G	Given the small number and small spatial area constrained by the AQMAs, through careful design and construction planning, avoiding/mitigating direct and indirect adverse risks the sites are not considered to constrain the development of the option. As a result of the low density distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.	G
<b>Noise (Community)</b>					
Major Settlements	UK Major Urban Settlements	Within the study area, much of the environment is a natural/rural setting. There are five Major Urban Settlements located at Basildon, Southend-On-Sea, Chelmsford, Colchester and Ipswich.	A	There is potential for the construction of a new OHL to generate noise during construction and operation that would affect residents of settlements, including within several Noise Important Areas. Owing to the spatial separation between settlements over the majority of the study area, it is considered that any potential construction and noise impacts could be effectively controlled through appropriate routing and the use of best practice mitigation measures such as a Construction Environmental Management Plan (CEMP) during construction. Operational noise would also require further consideration at the next stage of the option development process.	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				As a result of the distribution and opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.	
Small Scale Settlements	UK Small Scale Urban Settlements	Within the study area, there are many small-scale settlements.	A	<p>There is potential for the construction of a new OHL to generate noise during construction and operation that would affect residents of settlements, including within several Noise Important Areas. Owing to the spatial separation between settlements over the majority of the study area, it is considered that any potential construction and noise impacts could be effectively controlled through appropriate routing and the use of best practice mitigation measures such as a CEMP during construction. Operational noise would also require further consideration at the next stage of the option development process.</p> <p>Although there are potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, this will not be possible for all of the smaller settlements, therefore, an amber BRAG rating has been applied.</p>	A
<b>Socio-Economics (Community)</b>					
Major Settlements	UK Major Urban Settlements (Socio-Economics)	Within the study area, much of the environment is a natural/rural setting. There are five Major Urban Settlements located at Basildon, Southend-On-Sea, Chelmsford,	R	<p>There is potential for the construction and operation of a new OHL to impact residents as a result of changes to visual amenity. Where the Major Urban Settlements are located, they occupy a large part of the study area at Basildon and Southend-On-Sea. However, mitigation of this constraint through routing is possible. There are opportunities to mitigate potential direct risks through vegetation screening and landscaping, and innovative tower designs.</p> <p>Potential positive impacts of this reinforcement may include employment generation during construction.</p>	A

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		Colchester, and Ipswich.		<p>Mitigation measures should also carefully consider the tourism and recreation socio-economic sensitivities of the study area and seek to mitigate risks to key receptors associated with the settlements. This will be applicable in the construction and operational stages.</p> <p>As a result of the distribution and nature of effects, avoidance of this constraint will require careful planning, design iterations and assessment in the following stages, therefore an amber BRAG rating has been applied.</p>	
Small Scale Settlements	UK Small Scale Urban Settlements	Within the study area, there are many small-scale settlements.	R	<p>There is potential for the construction and operation of a new OHL to impact residents as a result of changes to visual amenity. Small-Scale Urban Settlements are located throughout the study area and therefore mitigation of this constraint through routing is likely to only be partially successful. There are opportunities to mitigate potential direct risks through vegetation screening and landscaping, and innovative tower designs, however again, fully mitigating impacts will not be possible.</p> <p>Potential positive impacts of this reinforcement may include employment generation during construction.</p> <p>Mitigation measures should also carefully consider the tourism and recreation socio-economic sensitivities of the study area and seek to mitigate risks to key receptors associated with the settlements. This will be applicable in the construction and operational stages.</p> <p>As a result of the distribution and nature of effects, avoidance of this constraint will require considerable planning, design iterations and assessment in the following stages; nevertheless, some small-scale settlements will still be affected, therefore a red BRAG rating has been applied.</p>	R

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
National Trust Land	National Trust Open Land and Limited Access Land	There is dozen small areas of National Trust Land within this study area, most notably surrounding Dedham, but there are also small areas near to Maldon, Danbury, Great Wigborough, Colchester, Dedham and Woodbridge.	A	<p>There is potential for these sites to constrain development of this option due to the potential for direct and indirect risks, such as loss of land or disturbance to views.</p> <p>There are opportunities to mitigate risks through the routing process and therefore the presence of National Trust Land is not considered a constraint to the option. There may be a risk on setting and temporary construction disturbance depending upon the location of the route, which should be carefully considered.</p> <p>As a result of the low-density distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	G

## 2.2. Friston to EACN to Tilbury Study Area (OHL)

Start point	Via	End point	Applicable to shortlisted designs:
Friston	EACN (East Anglia Connection Node)	Tilbury	Yes

### 2.2.1. Reinforcement Details

Reinforcement type (if known)	Reinforcement Length (if known)
AC OHL	N/A

#### Technology assumptions

This reinforcement includes the development of a 400kV AC OHL between Friston and Tilbury via EACN, with construction of a new substation between these points, near Colchester.

### 2.2.2. Environmental Summary

BRAG rating with mitigation measures:

A

The study area includes multiple environmental constraints, including international and national designations.

There are several parts of the study area that are heavily constrained as seen in the constraints table below. The most significantly constrained area is within the offshore and eastern onshore sections of the study area, as there are several separate areas where multiple environmental designations overlap.

In these areas, there are:

- SACs,
- SPAs,
- Ramsar sites,
- SSSIs,
- NNRs.

Mitigation measures associated with these constraints should include:

- Consideration of buffer zones for bird migration routes,
- HRA Screening,
- Detailed route planning,
- Best practice construction measures.

There are also several Ancient Woodlands, Important bird areas (IBAs), Former Landfills, Peatlands, and RSPB reserves. These sites are small and distributed throughout the study area, as shown on the constraints plan. Taken together, it is considered that these sites moderately constrain the onshore areas of the study area.

There are also a number of National Flood Zones (Flood Zones 2 and 3) as well as main rivers distributed throughout the study area, which broadly follow the numerous surface water features in the area.

During construction it would be necessary to implement best practice construction measures with considerably planned access routes and buffer zones that are relevant to the constrained areas mentioned. However, the broad distribution of these constraints means that opportunities for avoidance through detailed route planning may be marginal, and therefore subsequent design stages should consider the mitigation hierarchy to further mitigate risk.

Within 2km of the EACN substation constraints include a SSSI, Flood Zone 3 and a former landfill site. These constraints can be avoided within the detailed design phase, and the mitigation hierarchy should be utilised to reduce any negative impacts.

As explained in Section 1.2.2 (Study Area Environmental and Community Summary BRAG Ratings), the following factors have been considered in determining an overall Environmental BRAG rating for this Study Area.

Table 2.2.2: Overall Environmental BRAG rating for the Friston to Tilbury Study Area.

<b>Scope of works</b>	The works include installing new overhead lines and the construction of a new substation that will require some physical changes to the environment and as such, will therefore be affected by the constraints described in the constraints table in Section 2.2.4. This is reflected in the BRAG ratings.
<b>Number and area of constraints</b>	Within the study area there are 11 different environmental constraint types present. As noted above, the most constrained area is within the offshore and eastern onshore sections of the study area, as there are several separate constrained areas where multiple environmental designations overlap. Further onshore, the constraints, though many, cover a smaller total area.
<b>BRAG ratings of constraints</b>	<p>Within the study area there are 11 environmental constraint types present. Of these, zero have a rating of red under the HND methodology after mitigation, six have a rating of amber after mitigation and five, a rating of green after mitigation.</p> <p>The six amber rated constraints include:</p> <ul style="list-style-type: none"> <li>• SACs</li> <li>• SPAs</li> <li>• Ramsar sites</li> <li>• SSSIs</li> <li>• NNRs</li> <li>• National Flood Zones</li> </ul> <p>The five green rated constraints include:</p> <ul style="list-style-type: none"> <li>• Ancient woodlands</li> <li>• Important bird areas</li> <li>• RSPB reserves</li> <li>• Area of peatland</li> <li>• Historic landfill sites</li> </ul>

As shown on the constraint plan, there are possible opportunities to avoid the above constraints through construction design and routing, except National Flood Zones located within the study area, as avoidance of all areas of river flood risk will not be possible. There are potential opportunities to avoid intersection with SACs, SPAs and Ramsar sites by considering the route west of the identified constrained areas.. There might be possible opportunities by routing between the National Landscape's, SPA's and Ramsar sites or to the west of the study area.

Overall, an amber BRAG rating has been assigned to this study area after mitigation measures, which reflect the factors described above. This is a moderately constrained area which is likely to be viable, however, may have to overcome some environmental issues.

### 2.2.3. Community Summary

BRAG rating with mitigation measures

A

There are numerous community constraints in the study area, including national and international designations.

One of the most significant areas of constraint is the presence of Dedham Vale and Suffolk Coast & Heaths National Landscape sites, which span a significant part of the northern section of the study area. In line with National Policy and the Holford Rules<sup>6</sup>, National Landscape sites should be avoided altogether and where this is not possible and there would be harm to landscape, visual amenity and natural beauty, there should be a strong presumption for undergrounding overhead lines.

Additionally, the presence of Scheduled Monuments across the study area, in particular surrounding Colchester and Kesgrave, creates a large constraint for this reinforcement due to the risk construction works may have upon the feature and/or associated archaeological features, as well as during operation via risk to the setting of the Scheduled Monuments.

There are also many small settlements distributed throughout the study area, which have been given a red BRAG rating after mitigation due to potential visual impacts.

Constraints that may be avoided with best practice construction management measures and selective routing include Heritage Coasts, Listed Buildings, Registered Parks and Gardens, Registered Battlefields, AQMAs, Noise Important Areas, and National Trust Land.

Within 2km of the EACN substation constraints include, national landscapes, scheduled monuments, listed buildings and small-scale settlements (noise and community).

As explained in Section 1.2.2 (Study Area Environmental and Community Summary BRAG Ratings), the following factors have been considered in determining an overall Community BRAG rating for this Study Area.

Table 2.2.3: Overall Community BRAG rating for the Friston to EACN to Tilbury Study Area.

<sup>6</sup> Guidelines on overhead line routing which were first formulated in 1959 by Sir William Later Lord, Holford. Available from <https://www.nationalgrid.com/sites/default/files/documents/13795-The%20Holford%20Rules.pdf>



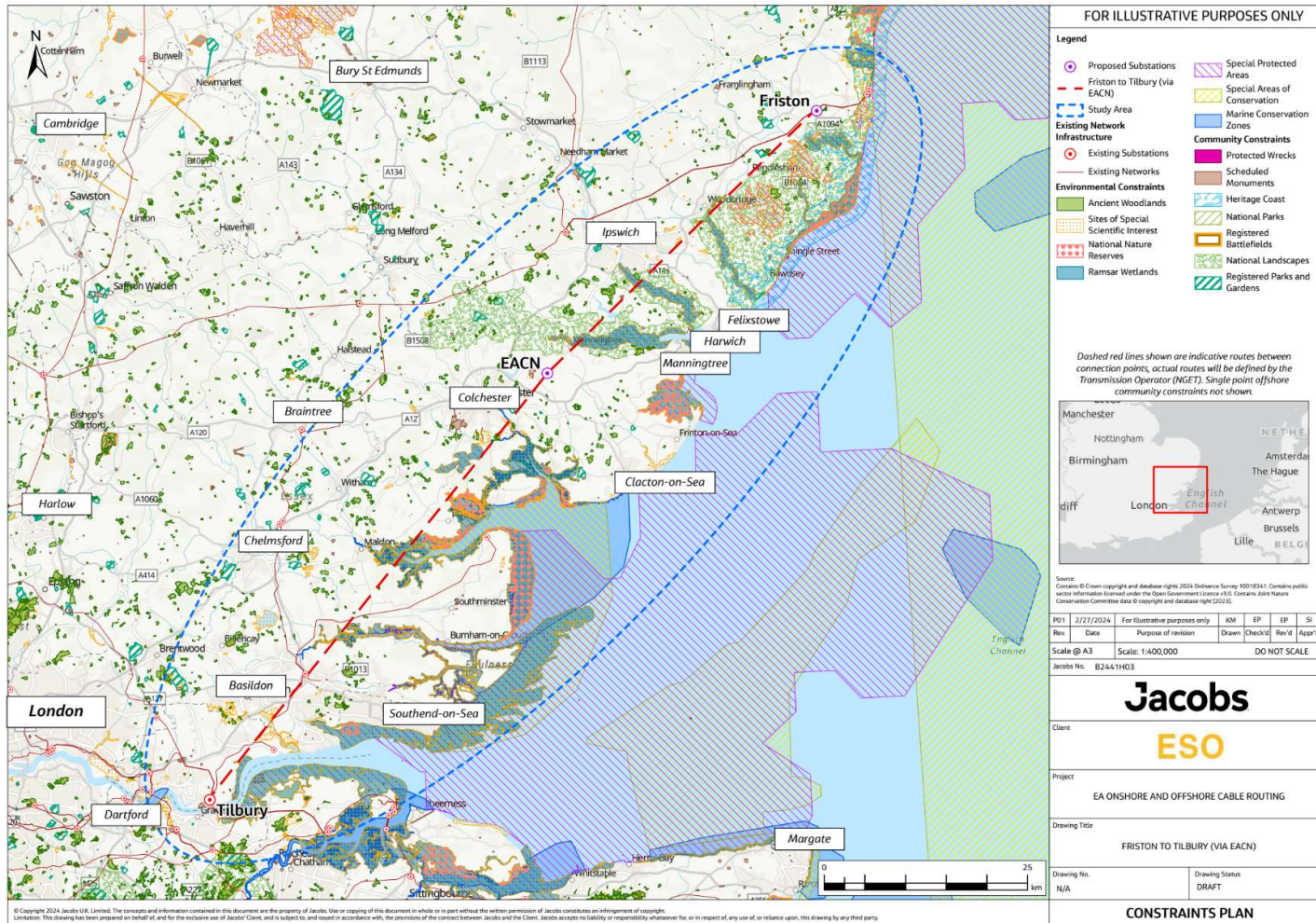
<p><b>Scope of works</b></p>	<p>The works include installing new overhead lines and the construction of a new substation that will require some physical changes to the environment and as such, will therefore be affected by the constraints described in the constraints table in Section 2.2.4. This is reflected in the BRAG ratings.</p>
<p><b>Number and area of constraints</b></p>	<p>Within the study area there are 12 different community constraint types present. As noted above, the most constrained area is within the north onshore section of the study area, as Dedham Vale and Suffolk Coast &amp; Heaths National Landscape sites span across a significant part of this area. The number and location of scheduled monuments and small-scale settlements also constrain much of the study area.</p>
<p><b>BRAG ratings of constraints</b></p>	<p>Within the study area there are 12 community constraint types present. Of these, one has a rating of red under the HND methodology after mitigation, five have a rating of amber after mitigation and six have rating of green after mitigation.</p> <p>The one red rated constraint includes:</p> <ul style="list-style-type: none"> <li>• Small Scale Settlements (Socio-Economics)</li> </ul> <p>The five amber rated constraints include:</p> <ul style="list-style-type: none"> <li>• National Landscapes</li> <li>• Scheduled Monuments</li> <li>• Listed Buildings</li> <li>• Small Scale Settlements (Noise)</li> <li>• Major Settlements (Socio-Economics)</li> </ul> <p>The six green rated constraints include:</p> <ul style="list-style-type: none"> <li>• Heritage Coasts</li> <li>• Registered Parks and Gardens</li> <li>• Registered Battlefields</li> <li>• AQMA</li> <li>• Major Settlements (Noise)</li> <li>• National Trust Land</li> </ul>

An amber BRAG rating has been assigned after mitigation measures due to the number and spatial distribution of the red and amber constraints across the breadth of the study area. In particular, the potential requirement for undergrounding in line with the Holford Rules due to the National Landscapes sites, combined with the presence of Scheduled Monuments and the many small-scale settlements, creates a large constraint which may be difficult to avoid entirely. However, although avoidance may be challenging, there are opportunities for detailed route design and implementation of appropriate construction methodologies to reduce the overall impacts.

## 2.2.4. Constraints Table

The following table details the environmental and community constraints for Friston to EACN to Tilbury Study Area for developing OHL reinforcement with the construction of a new substation. It describes the constraints present within the study area, the potential mitigation measures to avoid or reduce risks, and a BRAG rating before and after mitigation measures have been applied.

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**Constraints Plan 2: Study Area Friston to EACN to Tilbury showing Nationally and Internationally Designated Sites**

Constraint Type	Name	Description/Features	OHL	Onshore station	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
<b>Ecology (Environmental)</b>						
SACs	Onshore and offshore UK SACs	<p>There are six SACs within the proposed study area:</p> <ul style="list-style-type: none"> <li>- Essex Estuaries SAC,</li> <li>- Hamford Water SAC,</li> <li>- Orfordness-Shingle Street SAC,</li> <li>- Alde-Ore &amp; Butley Estuaries SAC,</li> <li>- Staverton Park &amp; The Thicks, Wantisden SAC,</li> <li>- Minsmere to Walberswick Heaths &amp; Marshes</li> </ul> <p>The Essex Estuaries SAC occupies the largest area among the above in the centre of study area.</p>	R	N/A	<p>Due to the limited areas of the study area constrained by these SACs, only eastern areas in the centre and eastern areas in the northern parts of this study area are heavily constrained. There are potential opportunities to avoid interaction with these heavily constrained areas by considering the route west of Essex Estuaries SAC, as well as for the rest of the identified SACs.</p> <p>Consideration should be given to the routing of the OHL to avoid negative impacts such as habitat loss and fragmentation, soil erosion and sedimentation. Planning of construction activities and access routes should be undertaken, including the implementation of buffer zones as appropriate to avoid associated impacts e.g., relating to access roads and construction waste stockpiles. A HRA Screening is likely to be required as the route could have a significant effect on these SACs.</p> <p>An amber BRAG rating has been assigned in view of the importance and size of the constraints requiring the need for routing to avoid sensitive areas and other mitigation measures for construction activities.</p>	A

Constraint Type	Name	Description/Features	OHL	Onshore station	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		There are no SACs within 2km of the proposed EACN substation.				
cSACs	England cSACs	There are no cSACs located in the study area.	N/A	N/A	N/A	N/A
SPAs	Onshore and offshore UK SPAs	<p>There are 14 SPAs within the proposed study area:</p> <ul style="list-style-type: none"> <li>- Thames Estuary &amp; Marshes SPA</li> <li>- Benfleet and Marshes SPA</li> <li>- Crouch &amp; Roach Estuaries (mid-Essex Coast Phase 3) SPA</li> <li>- Dengie (Mid-Essex Coast Phase 1) SPA</li> <li>- Foulness (Mid-Essex Coast Phase 5) SPA</li> <li>- Blackwater Estuary (Mid-Essex Coast Phase 4) SPA</li> </ul>	R	N/A	<p>Due to the size and distribution of SPAs, the central and eastern parts of this study area are heavily constrained. There are potential opportunities to avoid interaction with these heavily constrained areas by considering the route west of identified SPAs.</p> <p>Construction mitigation in terms of reducing noise and visual disturbance will be required if the route passes close to this constraint (up to 1 km, depending on designated bird species). Consideration should be given to wider impacts such as bird migratory routes and proximity to these. There will be opportunities to mitigate risks through various measures, such as using buffer zones, screening during construction and timing of works to avoid sensitive times such as nesting or overwintering birds.</p> <p>An amber BRAG has been assigned in view of the importance of the constraint and</p>	A

Constraint Type	Name	Description/Features	OHL	Onshore station	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		<ul style="list-style-type: none"> <li>- Abberton Reservoir SPA</li> <li>- Colne Estuary (Mid-Essex Coast Phase 2) SPA</li> <li>- Hamford Water SPA</li> <li>- Stour and Orwell Estuaries SPA</li> <li>- Deben Estuary SPA</li> <li>- Sandlings SPA</li> <li>- Alde-Ore Estuary SPA</li> <li>- Minsmere-Walberswick</li> </ul> <p>There are no SPAs within 2km of the proposed EACN substation.</p>			mobile/migratory features requiring the need for detailed routing and other mitigation measures.	
pSPAs	England pSPAs	There are no pSPAs located in the study area.	N/A	N/A	N/A	N/A
SCIs	SCI	There are no SCIs located within the study area.	N/A	N/A	N/A	N/A

Constraint Type	Name	Description/Features	OHL	Onshore station	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
Ramsar sites	UK Ramsar sites	<p>There are 13 SPAs within the proposed study area, those being:</p> <ul style="list-style-type: none"> <li>- Thames Estuary &amp; Marshes,</li> <li>- Benfleet and Southend Marshes</li> <li>- Crouch &amp; Roach Estuaries (Mid-Essex Coast Phase 3)</li> <li>- Dengie (Mid-Essex Coast Phase 1)</li> <li>- Foulness (Mid-Essex Coast Phase 5)</li> <li>- Blackwater Estuary (Mid-Essex Coast Phase 4)</li> <li>- Abberton Reservoir</li> <li>- Colne Estuary (Mid-Essex Coast Phase 2)</li> <li>- Hamford Water</li> </ul>	R	N/A	<p>These Ramsar sites are predominantly coastal and encroach only marginally onshore. Due to the size and distribution of Ramsar sites within the study area, central and eastern parts of this study area are heavily constrained. There are potential opportunities to avoid interaction with these heavily constrained areas by considering the route west of identified Ramsar sites.</p> <p>Construction mitigation in terms of reducing noise and visual disturbance will be required if the route passes close to this constraint (up to 1 km, depending on designated bird species). Consideration would need to be given to wider impacts such as bird migratory routes and proximity to these. There will be opportunities to mitigate risks through various measures, such as using buffer zones, screening during construction and timing of works to avoid sensitive times such as nesting or overwintering birds.</p> <p>An amber BRAG has been assigned in view of the importance of the constraint and mobile/migratory features requiring the need for detailed routing and other mitigation measures.</p>	A

Constraint Type	Name	Description/Features	OHL	Onshore station	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		<ul style="list-style-type: none"> <li>- Stour and Orwell Estuaries</li> <li>- Deben Estuary</li> <li>- Alde-Ore Estuary</li> <li>- Minsmere-Walberwick</li> </ul> <p>There are no Ramsar sites within 2km of the proposed EACN substation.</p>				
Proposed Ramsar sites	UK Proposed Ramsar sites	There are no Proposed Ramsar sites located within the study area.	N/A	N/A	N/A	N/A
SSSIs	UK SSSIs	There are numerous SSSIs located within the study area, including, Crouch and Roach Estuaries SSSI, Blackwater Estuary SSSI, Colne Estuary SSSI, Stour Estuary SSSI, Orwell Estuary SSSI, Deben Estuary SSSI and Sandlings Forest SSSI.	R	R	<p>The most constrained part of the study area is the central and eastern part. There are multiple small SSSIs throughout the entire study area that can be avoided with selective routing and buffer zones to minimise disruption to sensitive areas. This will need detailed planning at the next stage, as well as the implementation of best practices during construction in order to avoid impacts on these constraints.</p> <p>There is a SSSI approximately 1.7km southwest of the proposed substation, which</p>	A



Constraint Type	Name	Description/Features	OHL	Onshore station	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		Ardleigh Gravel Pit SSSI is located approximately 1.7km from the proposed EACN substation.			will require careful consideration within the design and construction phases. An amber BRAG has been assigned on a precautionary basis in view of their concentrated distribution, the need for detailed routing, and the importance of this constraint.	
NNRs	UK NNRs	<p>There are several NNRs within the study area:</p> <ul style="list-style-type: none"> <li>- Swanscombe Skull Site</li> <li>- High Halstow</li> <li>- Leigh</li> <li>- Dengie</li> <li>- Blackwater Estuary</li> <li>- Colne Estuary</li> <li>- Hamford</li> <li>- Orfordness-Havergate</li> <li>- Westleton Heath</li> </ul> <p>There are no NNRs within 2km of the proposed EACN substation.</p>	R	N/A	<p>The majority of this study area is not constrained by an NNR, but there are several small NNRs distributed mostly across the eastern part of the study area. There are potential opportunities to avoid interaction with these heavily constrained areas by selective routing.</p> <p>Therefore, it is necessary to mitigate risks through detailed routing and siting, as well as implementing buffer zones. Planning of construction activities and access routes should be undertaken, including the implementation of buffer zones as appropriate to avoid impacts relating to access roads and construction waste stockpiles.</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through routing, an amber BRAG rating has been applied.</p>	A

Constraint Type	Name	Description/Features	OHL	Onshore station	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
Biosphere Reserves	UK Biosphere Reserves	There are no Biosphere Reserves within the study area.	N/A	N/A	N/A	N/A
Ancient Woodlands	UK Ancient Woodlands	<p>There are numerous areas of Ancient Woodland throughout the study area.</p> <p>Ancient &amp; Semi-Natural Woodland is located approximately 1.3km from the proposed EACN substation.</p>	R	R	<p>There are numerous, sparsely distributed, small areas of the study area that are constrained by Ancient Woodland. There are opportunities to mitigate risks through the routing process so that the pylons and OHLs do not cross areas of Ancient Woodland.</p> <p>Any risks during construction could be controlled through appropriate construction environmental management practices, for example in relation to the siting of access routes and implementing buffer zones around Ancient woodland areas.</p> <p>There is only one patch of Ancient &amp; Semi-Natural Woodland approximately 1.3km southwest of the proposed substation.</p> <p>A green BRAG has been assigned due to the sparse distribution of Ancient Woodlands, and in view that there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	G
IBAs	UK IBAs	There are twelve IBAs within the study area, at Mid-Essex Coast (central Section),	G	N/A	OHL development may be constrained by IBAs directly due to the risk of habitat loss, indirectly via disturbance during construction	G

Constraint Type	Name	Description/Features	OHL	Onshore station	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		<p>Abberton Reservoir, Alde-Ore Estuary, Benfleet and Southend Marshes, Deben Estuary, Hamford Water, Minsmere-Walberswick, Stour and Orwell Estuaries, Suffolk Sandlings, Thames Estuary and Marshes, Mid-Essex Coast (Southern and Northern Sections).</p> <p>There are no IBAs within 2km of the proposed EACN substation.</p>			<p>(i.e., noise/lighting) or via disturbance to flight paths once operational.</p> <p>The twelve contained IBAs within this study area will need to be avoided and therefore represent a constraint particularly to the centre and east of the study area. However, the majority of western of the study area is not constrained by IBAs.</p> <p>Connections between sites and bird flight paths would need to be considered including for construction and maintenance activities. OHLs can cause displacement and barrier effects as birds are deterred from using their normal routes to feeding or roosting grounds. There will be opportunities to mitigate risks through various measures, such as using buffer zones, screening during construction and timing of works to avoid sensitive times such as nesting or overwintering birds. Connections between sites and bird flight paths would need to be considered.</p> <p>If routed close by (up to 1 km, dependent on species), bird usage of the area would need to be considered where any disturbance risks are identified. Operational mitigation such as bird-friendly power line designs may be required for OHL. During construction, noise impacts and visual disturbance risks will need to be considered and mitigated accordingly</p>	

Constraint Type	Name	Description/Features	OHL	Onshore station	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
					(e.g., through screening). It is expected that with routing design, this could be avoided. As a result of the distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.	
RSPB Reserves	UK RSPB Reserves	<p>There are 13 UK RSPB Reserves within the study area, at Northward Hill, Stour Estuary, Minsmere, North Warren, Old Hall Marshes, Havergate Island &amp; Boyton Marshes, Snape, Shorne Marshes, Cliffe Pools, Rainham Marshes, Wallasea Island, South Essex Marshes and Wolves Wood Reserves.</p> <p>There are no RSPB reserves within 2km of the proposed EACN substation.</p>	A	N/A	<p>OHL development may be constrained by RSPB Reserves due to direct risks via habitat loss, indirect risks via disturbance during construction (i.e., noise/lighting) or via disturbance to flight paths once operational. There are significant sections of the study area that are not constrained by RSPB Reserves, and there are opportunities to reduce direct risks through the routing process. Connections between sites and bird flight paths would need to be considered. During construction, noise impacts and visual disturbance risks will need to be considered and mitigated accordingly (e.g., through screening).</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	G
<b>Geology and Soils (Environmental)</b>						

Constraint Type	Name	Description/Features	OHL	Onshore station	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
Peatland	UK Peatland	<p>There are three areas of Peatland within the study area, located within north part of study area at Woodbridge related to River Deben and at Iken and Blaxhall related to River Alde.</p> <p>There are no areas of peatland within 2km of the proposed EACN substation.</p>	A	N/A	<p>Areas of peatland have the potential to constrain the development of this reinforcement as a result of construction and operational risks. The loss and fragmentation of habitats is a key concern. However, there are significant sections of the study area that are not constrained by peatland. There are opportunities to reduce risks through the routing process. There may be temporary construction disturbance impacts that would need further consideration and mitigation.</p> <p>As a result of the small areas of peatland and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	G
Geoparks	UK Geoparks	There are no UNESCO Global Geoparks within the study area.	N/A	N/A	N/A	N/A
National Flood Zones/Areas Benefiting from Defences	National Flood Zones and Areas benefiting from defences	There are National Flood Zones (Flood Zone 2 and Flood Zone 3) distributed throughout the study area, associated with the numerous water body features. The most extensive Zone 3 areas (of a high	A	A	<p>OHL development including construction works may be at risk from flooding. Owing to the distribution of this constraint throughout the study area, avoidance of all areas of river flood risk will not be possible and therefore there is residual risk for the development of this option.</p> <p>There is a Flood Zone 2 and 3, located approximately 1.2km southeast from the proposed EACN substation.</p>	A

Constraint Type	Name	Description/Features	OHL	Onshore station	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		<p>probability of flooding) are surrounding related to River Thames, River Crouch, River Blackwater, River Stour, River Reach, River Deben and Long Reach.</p> <p>There is a Flood Zone 2 and 3, approximately 1.2km from the proposed EACN substation.</p>			<p>There will need to be detailed design of the installation and location of pylons within floodplains as well as planning of construction activities so that there are no increased flood levels arising from loss of floodplain storage e.g., during construction from working areas, temporary soil stockpiles, raised access tracks and watercourse crossings. Fluvial flow and surface water flow will also need to be considered in the planning of these activities so that culverts and crossings are of appropriate positioning and size and that water does not pool behind installations.</p> <p>As a result of the distribution and requirement for detailed planning to avoid this constraint through construction design and routing, an amber BRAG rating has been applied.</p>	
Former landfill sites	Historic landfills	<p>There are numerous small pockets of historic landfill sites located throughout the study area, most notably located to the south of area, surrounding Tilbury and Stanford-Hope.</p>	A	A	<p>OHL development, including construction works, may be at risk posed by sources of contamination from the former landfill sites.</p> <p>There is one historic landfill site located 1.9km southwest from the proposed EACN substation.</p> <p>Due to the distribution and small size of historic landfills within the study area there</p>	G

Constraint Type	Name	Description/Features	OHL	Onshore station	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		There is one historic landfill site located 1.9km southwest from the proposed EACN substation.			<p>are opportunities to avoid this constraint within considerate OHL routing. In addition, it is not considered that this is a strategic level constraint that should influence decision-making at this stage.</p> <p>There is an opportunity at the next stage of the siting process to avoid this constraint for OHL routing. However, this will require detailed routing for areas of higher concentrations.</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	
<b>Landscape and Visual (Community)</b>						
National Parks	UK National Parks	There are no National Parks within this study area.	N/A	N/A	N/A	N/A
National Landscapes	England National Landscapes	Dedham Vale and Suffolk Coast & Heaths are National Landscape sites that spans a large portion of the study area located at the northern part or the study area.	R	R	<p>The northern section of this study area is heavily constrained by Dedham Vale and Suffolk Coast &amp; Heaths National Landscape sites, presenting a key constraint to the development of this option. There is a risk that new OHLs would directly and indirectly disrupt it.</p> <p>Dedham Vale is located 1.5km north of the EACN substation.</p>	A

Constraint Type	Name	Description/Features	OHL	Onshore station	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		Dedham Vale is located 1.5km north from the proposed EACN substation			There might be possible opportunities for routing to avoid these National Landscapes, this constraint might be avoided by routing in small section between these National Landscapes or to the west of the study area. National Landscape sites are afforded the highest levels of protection in relation to landscape and natural beauty, having a specific statutory purpose to ensure their continued protection. The duty to have regard to the purposes of nationally designated areas also applies when considering applications for projects outside the boundaries. In line with National Policy and the Holford Rules, National Landscape sites should be avoided altogether and where this is not possible and there would be harm to landscape, visual amenity and natural beauty, there should be a strong presumption for undergrounding the section of line. As a result of the distribution and requirement for detailed planning to avoid this constraint through construction design and routing, an amber BRAG rating has been applied.	
Heritage Coasts	England Heritage Coasts	There is Suffolk Coast Heritage site within the	R	N/A	The northern sector of this study area is heavily constrained by Suffolk Heritage Coast. However, there are significant sections of the	G



Constraint Type	Name	Description/Features	OHL	Onshore station	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		north-east part of study area.  There are no Heritage Coasts within 2km of the proposed EACN substation.			northern study area that are not constrained by Heritage Coast, and there are opportunities to reduce direct risks through the routing process, by routing to the west of Suffolk Heritage Coast.  A green BRAG has been assigned as there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.	
National Trails	England National Trails	There are no National Trails within the study area.	N/A	N/A	N/A	N/A
<b>Historic Environment (Community)</b>						
World Heritage Sites	UK World Heritage Sites	There are no World Heritage Sites within the study area.	N/A	N/A	N/A	N/A
Scheduled Monuments	UK Scheduled Monuments	Within the study area there are multiple Scheduled Monuments, including a concentrated area within and surrounding Colchester and Kesgrave.  There are two scheduled monuments	R	R	OHL development has the potential to be constrained by Scheduled Monuments due to the risk construction works may have upon the feature and/or associated archaeological features as well as during operation via risk to the setting of the Scheduled Monuments. Due to this, without mitigation the distribution of Scheduled Monuments across the study area is likely to constrain OHL route options and require consideration of the mitigation hierarchy.	A

Constraint Type	Name	Description/Features	OHL	Onshore station	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		1.5km and 2km of the proposed EACN substation.			<p>There are two scheduled monuments 1.5km and 2km of the proposed EACN substation. Crop mark site S of Ardleigh is located 1.5km west and Settlement site NNE of Lawford House 2km northeast; these will require careful design, construction and mitigation considerations.</p> <p>It is considered that there are opportunities to mitigate risks to the individual Scheduled Monuments in the study area through the routing and siting process. There may be opportunities for the type of reinforcement to be changed (e.g., undergrounding as opposed to OHL) to avoid effects on setting, considering the nature of the development and the location/extent of the constraint. However, there would need to be detailed considerations required for this type of construction. If undergrounding is implemented, there are opportunities during design development to avoid or mitigate risks via avoidance or considerate design (i.e., landscape screening).</p> <p>It may be possible to avoid direct risks to Scheduled Monuments due to the density of the sites in the study area, but indirect risks (i.e. to the areas surrounding the Scheduled Monuments) may be more difficult to avoid.</p>	

Constraint Type	Name	Description/Features	OHL	Onshore station	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
					An amber BRAG rating has been applied as it is considered that there is a heavily constrained area where detailed route design and construction methodology is required.	
Listed Buildings	UK listed buildings (Grade I, II* and II listed buildings)	<p>There are a large number of Listed Buildings throughout the study area, including Grade I, Grade II*, and Grade II. There is a high concentration of Listed Buildings in Gravesend, Brentwood, Southend-on-Sea, Maldon, Chelmsford, Witham, Coggeshall, Colchester, Ipswich and Woodbridge.</p> <p>There are approximately 46 grade II listed buildings and two grade II* listed buildings within 2km of the EACN substation with the highest</p>	A	R	<p>OHL development may be constrained by Listed Buildings due to the risk of physical loss or damage to the listing, or indirectly via disturbance to the listed building's setting. There may also be risks to the curtilage (the area around, or any other building that is around and associated with a listed building). Whilst there is a large number of Listed Buildings within the study area, there are opportunities to reduce direct risks through the routing and siting process.</p> <p>In addition to potential accidental damage during construction if works or transport links are close by, there may be a risk on setting depending upon the location of the OHL route and any cable sealing end compounds. Bounds Farmhouse Grade II is located west of the EACN substation, specifically, the listed building is located on the other side of the Hungerdown Lane from the proposed EACN location. Therefore, construction activities will require careful consideration.</p>	A

Constraint Type	Name	Description/Features	OHL	Onshore station	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		concentration occurring in Ardeleigh.			<p>Works and transport routes need to be considered in terms of their proximity to listed buildings near the highway (e.g., accidental damage risk from HGVs in narrow lanes or other restricted areas) or groundworks (i.e., if any vibration generating works are close enough to cause damage to buildings).</p> <p>There are opportunities for avoidance of this constraint through detailed routing and construction best practices for OHL. However there will need to be careful planning considerations to reduce any potential impacts from the EACN substation on the surrounding listed buildings. Therefore, an amber BRAG rating has been applied.</p>	
Registered Parks and Gardens	Registered Parks and Gardens	Within the study area there are several Registered Parks and Gardens. The north of the study area is more constrained than the south due to a higher concentration of Registered Parks and Gardens.	A	N/A	<p>The Registered Parks and Gardens sites have the potential to constrain the development of this reinforcement as a result of construction risks and risks as a result of changes to setting during operation. However, there are significant sections of the study area that are not constrained by Registered Parks and Gardens. There are opportunities to reduce risks through avoidance within the routing process.</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint</p>	G

Constraint Type	Name	Description/Features	OHL	Onshore station	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		There are no Registered Parks and Gardens within 2km of the proposed EACN substation.			through routing, a green BRAG rating has been applied.	
Registered Battlefields	England Registered Battlefields	<p>There is one Registered Battlefield within the study area, at the site of the Battle of Maldon 991.</p> <p>There are no Registered Battlefields within 2km of the proposed EACN substation.</p>	A	N/A	<p>The Registered Battlefield constrains the development of this option due to the potential for direct harm during construction, or from changes to the setting of the sites during operation. However, there are significant sections of the study area that are not constrained by Registered Battlefields. There are opportunities to mitigate risks via avoidance through the routing process.</p> <p>As a result of the potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	G
<b>Air Quality (Community)</b>						
AQMAs (AQMs)	UK AQMs	There are several AQMs within the study area, those being Northfleet Industrial Area AQMA, Dartford AQMA No.2, Tilbury AQMA 24, Greys AQMA No. 1, Havering AQMA, Chelmsford Army and Navy AQMA,	G	N/A	<p>Given the small number and small spatial area constrained by the AQMs, through careful design and construction planning, avoiding/ mitigating direct and indirect adverse risks the sites are not considered to constrain the development of the option.</p> <p>As a result of the low density distribution and potential opportunities for avoidance of this</p>	G

Constraint Type	Name	Description/Features	OHL	Onshore station	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		<p>MDC Air Quality Management Area number 1, Rayleigh AQMA, Colchester Area 1 – Central Corridors AQMA, and Ipswich AQMA No.3</p> <p>There are no AQMAs within 2km of the proposed EACN substation.</p>			constraint through routing, a green BRAG rating has been applied.	
<b>Noise (Community)</b>						
Major Settlements	UK Major Urban Settlements	<p>Within the study area, much of the environment is a natural/rural setting. There are five Major Urban Settlements located at Basildon, Southend-On-Sea, Chelmsford, Colchester and Ipswich.</p> <p>There are no Major Settlements within</p>	A	N/A	<p>There is potential for the construction of a new OHL to generate noise during construction and operation that would affect residents of settlements, including within several Noise Important Areas.</p> <p>Owing to the spatial separation between settlements over the majority of the study area, it is considered that any potential construction and noise impacts could be effectively controlled through appropriate routing and the use of best practice mitigation measures such as a CEMP during construction. Operational noise would also require further consideration at the next stage of the option development process.</p>	G

Constraint Type	Name	Description/Features	OHL	Onshore station	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		2km of the proposed EACN substation.			As a result of the distribution and opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.	
Small Scale Settlements	UK Small Scale Urban Settlements	<p>Within the study area, there are many small-scale settlements.</p> <p>There are a few small-scale settlements within 2km of the proposed EACN substation i.e. Ardleigh, Bromley Cross, Foxash Estate and Lawford.</p>	A	A	<p>There is potential for the construction of a new OHL to generate noise during construction and operation that would affect residents of settlements, including within several Noise Important Areas.</p> <p>In addition, there is potential for the proposed substation to generate noise during construction and operation that may affect residents of small-scale settlements.</p> <p>Owing to the spatial separation between settlements over the majority of the study area, it is considered that any potential construction and noise impacts could be effectively controlled through appropriate routing and the use of best practice mitigation measures such as a CEMP during construction. Operational noise would also require further consideration at the next stage of the option development process.</p> <p>Although there are potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, this will not be possible for all of the smaller</p>	A

Constraint Type	Name	Description/Features	OHL	Onshore station	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
					settlements, therefore, an amber BRAG rating has been applied.	
<b>Socio-Economics (Community)</b>						
Major Settlements	UK Major Urban Settlements (Socio-Economics)	<p>Within the study area, much of the environment is a natural/rural setting. There are five Major Urban Settlements located at Basildon, Southend-On-Sea, Chelmsford, Colchester, and Ipswich.</p> <p>There are no Major Settlements within 2km of the proposed EACN substation.</p>	R	N/A	<p>There is potential for the construction and operation of a new OHL to impact residents as a result of changes to visual amenity. Where the Major Urban Settlements are located, they occupy a large part of the study area at Basildon and Southend-On-Sea. However, mitigation of this constraint through routing is possible. There are opportunities to mitigate potential direct risks through vegetation screening and landscaping, and innovative tower designs. Potential positive impacts of this reinforcement may include employment generation during construction. Mitigation measures should also carefully consider the tourism and recreation socio-economic sensitivities of the study area and seek to mitigate risks to key receptors associated with the settlements. This will be applicable in the construction and operational stages.</p> <p>As a result of the distribution and nature of effects, avoidance of this constraint will require careful planning, design iterations and assessment in the following stages,</p>	A



Constraint Type	Name	Description/Features	OHL	Onshore station	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
					therefore an amber BRAG rating has been applied.	
Small Scale Settlements	UK Small Scale Urban Settlements	<p>Within the study area, there are many small-scale settlements.</p> <p>There are a few small-scale settlements within 2km of the proposed EACN substation i.e. Ardleigh, Bromley Cross, Foxash Estate and Lawford.</p>	R	R	<p>There is potential for the construction and operation of a new OHL to impact residents as a result of changes to visual amenity.</p> <p>In addition, construction and operation of a new substation will impact residents of near settlements as a result of changes to visual amenity.</p> <p>Small-Scale Urban Settlements are located throughout the study area and therefore mitigation of this constraint through routing is likely to only be partially successful. There are opportunities to mitigate potential direct risks through vegetation screening and landscaping, and innovative tower designs, however again, fully mitigating impacts will not be possible.</p> <p>Potential positive impacts of this reinforcement may include employment generation during construction.</p> <p>Mitigation measures should also carefully consider the tourism and recreation socio-economic sensitivities of the study area and seek to mitigate risks to key receptors associated with the settlements. This will be applicable in the construction and operational stages.</p>	R

Constraint Type	Name	Description/Features	OHL	Onshore station	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
					As a result of the distribution and nature of effects, avoidance of this constraint will require considerable planning, design iterations and assessment in the following stages; nevertheless some small-scale settlements will still be affected, therefore a red BRAG rating has been applied.	
National Trust Land	National Trust Open Land and Limited Access Land	<p>There are many small areas of National Trust Land within this study area, most notably surrounding Dedham, but there are also small areas near to Maldon, Danbury, Great Wigborough, Colchester, Dedham and Woodbridge.</p> <p>There are no National Trust Land sites within 2km of the proposed EACN substation.</p>	A	N/A	<p>There is potential for these sites to constrain development of this option due to the potential for direct and indirect risks, such as loss of land or disturbance to views.</p> <p>There are opportunities to mitigate risks through the routing process and therefore the presence of National Trust Land is not considered a constraint to the option. There may be a risk on setting and temporary construction disturbance depending upon the location of the route, which should be carefully considered.</p> <p>As a result of the low-density distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	G

## 2.3. Friston to Tilbury Study Area (HVDC)

Start point	Via	End point	Applicable to shortlisted designs:
Friston	EACN (East Anglia Connection Node)	Tilbury	Yes

### 2.3.1. Reinforcement Details

Reinforcement type (if known)	Reinforcement Length (if known)
HVDC	N/A

#### Technology assumptions

This reinforcement includes the development of HVDC underground onshore cable route between Friston and Tilbury.

### 2.3.2. Environmental Summary

BRAG rating with mitigation measures:

A

The study area includes multiple environmental constraints, including international and national designations.

There are several parts of the study area that are heavily constrained as seen in the constraints table below. The most significantly constrained areas are within the offshore and eastern onshore sections of the study area, as there are several separate areas where multiple environmental designations overlap.

In these areas, there are:

- SACs,
- SPAs,
- Ramsar sites,
- SSSIs,
- NNRs.

Mitigation measures associated with these constraints should include:

- HRA Screening,
- Detailed route planning,
- Best practice construction measures.

There are also several Ancient Woodlands, Important bird areas (IBAs), Former Landfills, Peatlands, and RSPB reserves. These sites are small and distributed throughout the study area, as shown on the constraints plan. Taken together, it is considered that these sites moderately constrain the onshore areas of the study area.

There are also a number of National Flood Zones (Flood Zones 2 and 3) as well as main rivers distributed throughout the study area, which broadly follow the numerous surface water features in the area.

During construction it would be necessary to implement best practice construction measures with considerably planned access routes and buffer zones that are relevant to the constrained areas mentioned. However, the broad distribution of these constraints means that opportunities for avoidance through detailed route planning may be marginal, and therefore subsequent design stages should consider the mitigation hierarchy to further mitigate risk.

As explained in Section 1.2.2 (Study Area Environmental and Community Summary BRAG Ratings), the following factors have been considered in determining an overall Environmental BRAG rating for this Study Area.

Table 2.3.2: Overall Environmental BRAG rating for the Friston to Tilbury Study Area (HVDC).

<b>Scope of works</b>	The works include development of new HVDC underground cable route that will require some physical changes to the environment and as such, will therefore be affected by the constraints described in the constraints table in Section 2.3.4. This is reflected in the BRAG ratings.
<b>Number and area of constraints</b>	Within the study area there are 11 different environmental constraint types present. As noted above, the most constrained area is within the offshore and eastern onshore sections of the study area, as there are several separate constrained areas where multiple environmental designations overlap. Further onshore, the constraints, though many, cover a smaller total area.
<b>BRAG ratings of constraints</b>	<p>Within the study area there are 11 environmental constraint types present. Of these, zero have a rating of red under the HND methodology after mitigation, five have a rating of amber after mitigation and six, a rating of green after mitigation.</p> <p>The five amber rated constraints include:</p> <ul style="list-style-type: none"> <li>• SACs</li> <li>• SPAs</li> <li>• Ramsar sites</li> <li>• SSSIs</li> <li>• NNRs</li> </ul> <p>The six green rated constraints include:</p> <ul style="list-style-type: none"> <li>• Ancient woodlands</li> <li>• Important bird areas</li> <li>• RSPB reserves</li> <li>• Area of peatland</li> <li>• National Flood Zones</li> <li>• Historic landfill sites</li> </ul>

Overall, an amber BRAG rating has been assigned to this study area after mitigation measures, which reflect the factors described above. This is a moderately constrained area which is likely to be viable, however, may have to overcome some environmental issues.

## 2.3.3. Community Summary

BRAG rating with mitigation measures

G

There are numerous community constraints in the study area, including national and international designations.

There are many small settlements distributed throughout the study area, which have been given an amber BRAG rating after mitigation due to potential visual impacts during construction.

Additionally, the presence of Scheduled Monuments across the study area, in particular surrounding Colchester and Kesgrave, creates a large constraint for this reinforcement due to the risk construction works may have upon the feature and/or associated archaeological features.

One of the areas of constraint is the presence of Dedham Vale and Suffolk Coast & Heaths National Landscape sites, which span a significant part of the northern section of the study area. In accordance with the Holford Rules, it is necessary to install a route that minimises impacts as far as possible. If avoidance of the National Landscape is not possible and there would be harm to landscape, visual amenity and natural beauty, there should be a strong presumption for undergrounding the section of line.

Constraints that may be avoided with best practice construction management measures and selective routing include Heritage Coasts, Listed Buildings, Registered Parks and Gardens, Registered Battlefields, AQMAs, Noise Important Areas, and National Trust Land.

As explained in Section 1.2.2 (Study Area Environmental and Community Summary BRAG Ratings), the following factors have been considered in determining an overall Community BRAG rating for this Study Area.

Table 2.3.3: Overall Community BRAG rating for the Friston to Tilbury Study Area (HVDC).

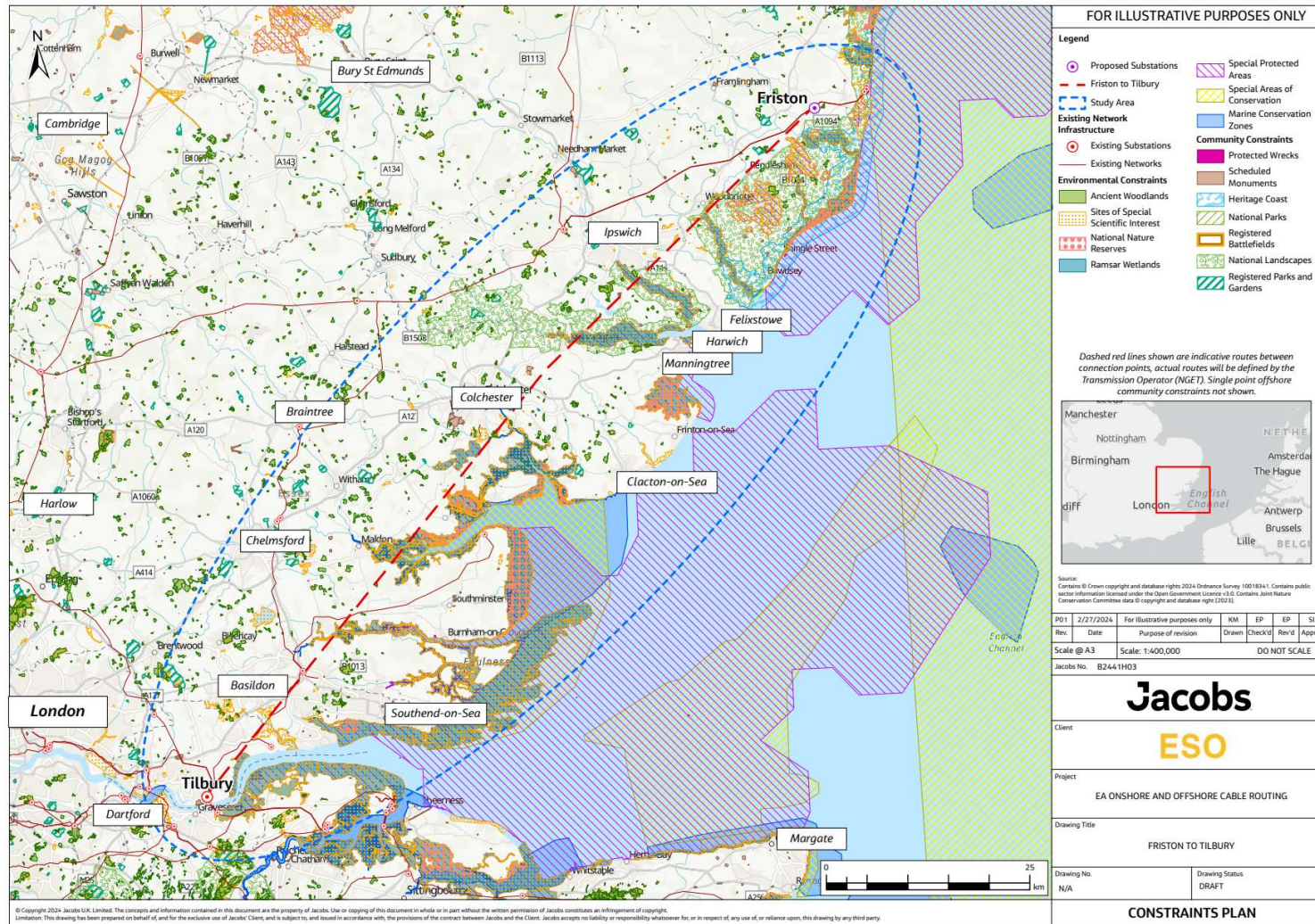
<b>Scope of works</b>	The works include development of new HVDC underground cable route that will require some physical changes to the environment and as such, will therefore be affected by the constraints described in the constraints table in Section 2.3.4. This is reflected in the BRAG ratings.
<b>Number and area of constraints</b>	Within the study area there are 12 different community constraint types present. The number and location of scheduled monuments and small-scale settlements constrain much of the study area.
<b>BRAG ratings of constraints</b>	<p>Within the study area there are 12 community constraint types present. Of these, zero has a rating of red under the HND methodology after mitigation, two have a rating of amber after mitigation and ten have rating of green after mitigation.</p> <p>The two amber rated constraints include:</p> <ul style="list-style-type: none"> <li>• Scheduled Monuments</li> <li>• Small Scale Settlements (Socio-Economics)</li> </ul> <p>The ten green rated constraints include:</p> <ul style="list-style-type: none"> <li>• National Landscapes</li> <li>• Heritage Coasts</li> </ul>

	<ul style="list-style-type: none"> <li>• Listed Buildings</li> <li>• Registered Parks and Gardens</li> <li>• Registered Battlefields</li> <li>• AQMA</li> <li>• Major Settlements (Noise)</li> <li>• Small Scale Settlements (Noise)</li> <li>• Major Settlements (Socio-Economics)</li> <li>• National Trust Land</li> </ul>
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A green BRAG rating has been assigned after mitigation measures due to the number and spatial distribution of the amber constraints across the breadth of the study area. In particular, the presence of Scheduled Monuments and the many small scale settlements, creates a moderate constraint, however the impacts on them will be temporary due to the fact that the impacts will occur only during construction stage. Although avoidance may be challenging, there are opportunities for detailed route design and implementation of appropriate construction methodologies to reduce the overall impacts.

### 2.3.4. Constraints Table

The following table details the environmental and community constraints for Friston to Tilbury Study Area for HVDC reinforcement. It describes the constraints present within the study area, the potential mitigation measures to avoid or reduce risks, and a BRAG rating before and after mitigation measures have been applied.



**Constraints Plan 3: Study Area Friston to Tilbury showing Nationally and Internationally Designated Sites**

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
<b>Ecology (Environmental)</b>					
SACs	Onshore and offshore UK SACs	<p>There are six SACs within the proposed study area:</p> <ul style="list-style-type: none"> <li>- Essex Estuaries SAC,</li> <li>- Hamford Water SAC,</li> <li>- Orfordness-Shingle Street SAC,</li> <li>- Alde-Ore &amp; Butley Estuaries SAC,</li> <li>- Staverton Park &amp; The Thicks, Wantisden SAC,</li> <li>- Minsmere to Walberswick Heaths &amp; Marshes</li> </ul> <p>The Essex Estuaries SAC occupies the largest area among the above in the centre of study area.</p>	R	<p>Due to the limited areas of the study area constrained by these SACs, only eastern areas in the centre and eastern areas in the northern parts of this study area are heavily constrained. There are potential opportunities to avoid interaction with these heavily constrained areas by considering the route west of Essex Estuaries SAC, as well as for the rest of the identified SACs.</p> <p>Consideration will be given to the routing of the HVDC underground cabling to avoid negative impacts such as habitat loss and fragmentation, soil erosion and sedimentation. Planning of construction activities and access routes should be undertaken, including the implementation of buffer zones as appropriate to avoid associated impacts e.g., relating to access roads and construction waste stockpiles. A HRA Screening is likely to be required as the route could have a significant effect on these SACs.</p> <p>An amber BRAG rating has been assigned in view of the importance and size of the constraints requiring the need for routing to avoid sensitive areas and other mitigation measures for construction activities.</p>	A



Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
cSACs	England cSACs	There are no cSACs located in the study area.	N/A	N/A	N/A
SPAs	Onshore and offshore UK SPAs	<p>There are 14 SPAs within the proposed study area:</p> <ul style="list-style-type: none"> <li>- Thames Estuary &amp; Marshes SPA</li> <li>- Benfleet and Marshes SPA</li> <li>- Crouch &amp; Roach Estuaries (mid-Essex Coast Phase 3) SPA</li> <li>- Dengie (Mid-Essex Coast Phase 1) SPA</li> <li>- Foulness (Mid-Essex Coast Phase 5) SPA</li> <li>- Blackwater Estuary (Mid-Essex Coast Phase 4) SPA</li> <li>- Abberton Reservoir SPA</li> <li>- Colne Estuary (Mid-Essex Coast Phase 2) SPA</li> </ul>	R	<p>Due to the size and distribution of SPAs, the central and eastern parts of this study area are heavily constrained. There are potential opportunities to avoid interaction with these heavily constrained areas by considering the route west of identified SPAs.</p> <p>Construction mitigation in terms of reducing noise and visual disturbance will be required if the route passes close to this constraint (up to 1 km, depending on designated bird species).</p> <p>There will be opportunities to mitigate risks through various measures, such as using buffer zones, screening during construction and timing of works to avoid sensitive times such as nesting or overwintering birds.</p> <p>An amber BRAG has been assigned in view of the importance of the constraint and mobile/migratory features requiring the need for detailed routing and other mitigation measures.</p>	A

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		<ul style="list-style-type: none"> <li>- Hamford Water SPA</li> <li>- Stour and Orwell Estuaries SPA</li> <li>- Deben Estuary SPA</li> <li>- Sandlings SPA</li> <li>- Alde-Ore Estuary SPA</li> <li>- Minsmere-Walberswick</li> </ul>			
pSPAs	England pSPAs	There are no pSPAs located in the study area.	N/A	N/A	N/A
SCIs	SCI	There are no SCIs located within the study area.	N/A	N/A	N/A
Ramsar sites	UK Ramsar sites	<p>There are 13 SPAs within the proposed study area, those being:</p> <ul style="list-style-type: none"> <li>- Thames Estuary &amp; Marshes,</li> <li>- Benfleet and Southend Marshes</li> <li>- Crouch &amp; Roach Estuaries (Mid-</li> </ul>	R	<p>These Ramsar sites are predominantly coastal and encroach only marginally onshore. Due to the size and distribution of Ramsar sites within the study area, central and eastern part of this study area are heavily constrained. There are potential opportunities to avoid interaction with these heavily constrained areas by considering the route west of identified Ramsar sites.</p> <p>Construction mitigation in terms of reducing noise and visual disturbance will be required if the route passes close to this constraint (up to 1 km, depending on designated bird species).</p> <p>There will be opportunities to mitigate risks through various measures, such as using buffer zones, screening during construction and timing</p>	A

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		<ul style="list-style-type: none"> <li>Essex Coast Phase 3)</li> <li>- Dengie (Mid-Essex Coast Phase 1)</li> <li>- Foulness (Mid-Essex Coast Phase 5)</li> <li>- Blackwater Estuary (Mid-Essex Coast Phase 4)</li> <li>- Abberton Reservoir</li> <li>- Colne Estuary (Mid-Essex Coast Phase 2)</li> <li>- Hamford Water</li> <li>- Stour and Orwell Estuaries</li> <li>- Deben Estuary</li> <li>- Alde-Ore Estuary</li> <li>- Minsmere-Walberwick</li> </ul>		<p>of works to avoid sensitive times such as nesting or overwintering birds.</p> <p>An amber BRAG has been assigned in view of the importance of the constraint and mobile/migratory features requiring the need for detailed routing and other mitigation measures.</p>	
Proposed Ramsar sites	UK Proposed Ramsar sites	There are no Proposed Ramsar sites located within the study area.	N/A	N/A	N/A
SSSIs	UK SSSIs	There are numerous SSSIs located within the study area,	R	The most constrained part of the study area is the central and eastern part. There are multiple small SSSIs throughout the entire study area that can be avoided with selective routing and buffer	A

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		including, Crouch and Roach Estuaries SSSI, Blackwater Estuary SSSI, Colne Estuary SSSI, Stour Estuary SSSI, Orwell Estuary SSSI, Deben Estuary SSSI and Sandlings Forest SSSI.		<p>zones to minimise disruption to sensitive areas. This will need detailed planning at the next stage, as well as the implementation of best practices during construction in order to avoid impacts on these constraints.</p> <p>An amber BRAG has been assigned on a precautionary basis in view of their contained concentrated distribution, the need for detailed routing, and the importance of this constraint.</p>	
NNRs	UK NNRs	<p>There are several NNRs within the study area:</p> <ul style="list-style-type: none"> <li>- Swanscombe Skull Site</li> <li>- High Halstow</li> <li>- Leigh</li> <li>- Dengie</li> <li>- Blackwater Estuary</li> <li>- Colne Estuary</li> <li>- Hamford</li> <li>- Orfordness-Havergate</li> <li>- Westleton Heath</li> </ul>	R	<p>The majority of this study area is not constrained by an NNR, but there are several small NNRs distributed mostly across the eastern part of the study area. There are potential opportunities to avoid interaction with these heavily constrained areas by selective routing. Therefore, it is necessary to mitigate risks through detailed routing and siting, as well as implementing buffer zones. Planning of construction activities and access routes should be undertaken, including the implementation of buffer zones as appropriate to avoid impacts relating to access roads and construction waste stockpiles.</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through routing, an amber BRAG rating has been applied.</p>	A
Biosphere Reserves	UK Biosphere Reserves	There are no Biosphere Reserves within the study area.	N/A	N/A	N/A
Ancient Woodlands	UK Ancient Woodlands	There are numerous areas of Ancient	A	There are numerous, sparsely distributed, small areas of the study area that are constrained by Ancient Woodland. There are opportunities to mitigate risks through the routing process so that	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		Woodland throughout the study area.		<p>the HVDC underground cable route do not cross areas of Ancient Woodland.</p> <p>Any risks during construction could be controlled through appropriate construction environmental management practices, for example in relation to the siting of access routes and implementing buffer zones around Ancient woodland areas.</p> <p>A green BRAG has been assigned due to the sparse distribution of Ancient Woodlands, and in view that there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	
IBAs	UK IBAs	There are twelve IBAs within the study area, at Mid-Essex Coast (central Section), Abberton Reservoir, Alde-Ore Estuary, Benfleet and Southend Marshes, Deben Estuary, Hamford Water, Minsmere-Walberswick, Stour and Orwell Estuaries, Suffolk Sandlings, Thames Estuary and Marshes, Mid-Essex Coast (Southern and Northern Sections).	G	<p>HVDC underground cable route development may be constrained by IBAs directly due to the risk of habitat loss or indirectly via disturbance during construction (i.e., noise/lighting).</p> <p>The twelve contained IBAs within this study area will need to be avoided and therefore represent a constraint particularly to the centre and east of the study area. However, the majority of western of the study area is not constrained by IBAs.</p> <p>During construction, noise impacts and visual disturbance risks will need to be considered and mitigated accordingly (e.g., through screening). It is expected that with routing design, this could be avoided.</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
RSPB Reserves	UK RSPB Reserves	There are 13 UK RSPB Reserves within the study area, at Northward Hill, Stour Estuary, Minsmere, North Warren, Old Hall Marshes, Havergate Island & Boyton Marshes, Snape, Shorne Marshes, Cliffe Pools, Rainham Marshes, Wallasea Island, South Essex Marshes and Wolves Wood Reserves.	G	<p>HVDC underground cable route development may be constrained by RSPB Reserves due to direct risks via habitat loss or indirect risks via disturbance during construction (i.e., noise/lighting).</p> <p>There are significant sections of the study area that are not constrained by RSPB Reserves, and there are opportunities to reduce direct risks through the routing process. During construction, noise impacts and visual disturbance risks will need to be considered and mitigated accordingly (e.g., through screening).</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	G
<b>Geology and Soils (Environmental)</b>					
Peatland	UK Peatland	There are three areas of Peatland within the study area, located within north part of study area at Woodbridge related to River Deben and at Iken and Blaxhall related to River Alde.	A	<p>Areas of peatland have the potential to constrain the development of this reinforcement as a result of construction and operational risks. The loss and fragmentation of habitats is a key concern. However, there are significant sections of the study area that are not constrained by peatland. There are opportunities to reduce risks through the routing process. There may be temporary construction disturbance impacts that would need further consideration and mitigation.</p> <p>As a result of the small areas of peatland and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
Geoparks	UK Geoparks	There are no UNESCO Global Geoparks within the study area.	N/A	N/A	N/A
National Flood Zones/Areas Benefiting from Defences	National Flood Zones and Areas benefiting from defences	There are National Flood Zones (Flood Zone 2 and Flood Zone 3) distributed throughout the study area, associated with the numerous water body features. The most extensive Zone 3 areas (of a high probability of flooding) are surrounding related to River Thames, River Crouch, River Blackwater, River Stour, River Reach, River Deben and Long Reach.	G	<p>HVDC underground cable route development including construction works may be at risk from flooding. Owing to the distribution of this constraint throughout the study area, avoidance of all areas of river flood risk will not be possible and therefore there is residual risk for the development of this option.</p> <p>There will need to be planning of construction activities so that there are no increased flood levels arising from loss of floodplain storage e.g., during construction from working areas, temporary soil stockpiles, raised access tracks and watercourse crossings. Fluvial flow and surface water flow will also need to be considered in the planning of these activities so that culverts and crossings are of appropriate positioning and size and that water does not pool behind installations.</p> <p>As a result of the opportunities for avoidance of this constraint through construction best practices, a green BRAG rating has been applied.</p>	G
Former landfill sites	Historic landfills	There are numerous small pockets of historic landfill sites located throughout the study area, most notably located to the south of area,	A	HVDC underground cable route development, including construction works, may be at risk posed by sources of contamination from the former landfill sites. Due to the distribution and small size of historic landfills within the study area there are opportunities to avoid this constraint within considerate HVDC routing. In addition, it is not considered that this is a strategic level constraint that should influence decision-making at this stage.	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		surrounding Tilbury and Stanford-Hope.		There is an opportunity at the next stage of the siting process to avoid this constraint for HVDC routing. However, this will require detailed routing for areas of higher concentrations. As a result of the distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.	
<b>Landscape and Visual (Community)</b>					
National Parks	UK National Parks	There are no National Parks within this study area.	N/A	N/A	N/A
National Landscapes	England National Landscapes	Dedham Vale and Suffolk Coast & Heaths are National Landscape sites that spans a large portion of the study area located at the northern part or the study area.	A	The northern section of this study area is moderately constrained by Dedham Vale and Suffolk Coast & Heaths National Landscape sites, presenting a constraint to the development of this option. There is a risk that new HVDC would directly and indirectly disrupt it. There might be possible opportunities for routing to avoid these National Landscapes, this constraint might be avoided by routing in small section between these National Landscapes or to the west of the study area. National Landscape sites are afforded the highest levels of protection in relation to landscape and natural beauty, having a specific statutory purpose to ensure their continued protection. The duty to have regard to the purposes of nationally designated areas also applies when considering applications for projects outside the boundaries. In line with National Policy and the Holford Rules, National Landscape sites should be avoided altogether and where this is not possible and there would be harm to landscape, visual amenity and natural beauty, there should be a strong presumption for undergrounding the section of line. HVDC underground cable	G



Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				<p>reinforcement at such constrained locations should therefore be considered as a priority.</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through construction best practices, a green BRAG rating has been applied.</p>	
Heritage Coasts	England Heritage Coasts	There is Suffolk Coast Heritage site within the north-east part of study area.	A	<p>The northern sector of this study area is moderately constrained by Suffolk Heritage Coast. However, there are significant sections of the northern study area that are not constrained by Heritage Coast, and there are opportunities to reduce direct risks through the routing process, by routing to the west of Suffolk Heritage Coast.</p> <p>A green BRAG has been assigned as there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	G
National Trails	England National Trails	There are no National Trails within the study area.	N/A	N/A	N/A
<b>Historic Environment (Community)</b>					
World Heritage Sites	UK World Heritage Sites	There are no World Heritage Sites within the study area.	N/A	N/A	N/A
Scheduled Monuments	UK Scheduled Monuments	Within the study area there are multiple Scheduled Monuments, including a concentrated area within and surrounding Colchester and Kesgrave.	R	<p>HVDC underground cable route development has the potential to be constrained by Scheduled Monuments due to the risk construction works may have upon the feature and/or associated archaeological features. Due to this, without mitigation the distribution of Scheduled Monuments across the study area is likely to constrain HVDC cable route options and require consideration of the mitigation hierarchy.</p> <p>It is considered that there are opportunities to mitigate risks to the individual Scheduled Monuments in the study area through the</p>	A

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				<p>routing and siting process. HVDC underground cables' type of reinforcement as opposed to OHL provide potential opportunities to avoid effects on setting, considering the nature of the development and the location/extent of the constraint. Once HVDC undergrounding is chosen, there are opportunities during design development to avoid or mitigate risks via avoidance or considerate design (i.e., landscape screening).</p> <p>The areas surrounding the Scheduled Monuments may also require mitigation when carrying out groundworks, due to presence of undiscovered associated features (i.e., archaeological remains). Consultation with Historic England would need to be required to determine the most appropriate mitigation.</p> <p>It may be possible to avoid direct risks to Scheduled Monuments due to the density of the sites in the study area, but indirect risks (i.e. to the areas surrounding the Scheduled Monuments) may be more difficult to avoid.</p> <p>An amber BRAG rating has been applied as it is considered that there is a heavily constrained area where detailed route design and construction methodology is required.</p>	
Listed Buildings	UK listed buildings (Grade I, II* and II listed buildings)	There are a large number of Listed Buildings throughout the study area, including Grade I, Grade II*, and Grade II. There is a high concentration of Listed Buildings in Gravesend, Brentwood, Southend-	A	<p>HVDC underground cable route development may be constrained by Listed Buildings due to the risk of physical loss or damage to the listing, or indirectly via disturbance to the listed building's setting. There may also be risks to the curtilage (the area around, or any other building that is around and associated with a listed building). Whilst there is a large number of Listed Buildings within the study area, there are opportunities to reduce direct risks through the routing and siting process.</p> <p>Works and transport routes need to be considered in terms of their proximity to listed buildings near the highway (e.g., accidental</p>	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		on-Sea, Maldon, Chelmsford, Witham, Coggeshall, Colchester, Ipswich and Woodbridge.		damage risk from HGVs in narrow lanes or other restricted areas) or groundworks (i.e., if any vibration generating works are close enough to cause damage to buildings). As a result of the opportunities for avoidance of this constraint through detailed routing and construction best practices, a green BRAG rating has been applied.	
Registered Parks and Gardens	Registered Parks and Gardens	Within the study area there are several Registered Parks and Gardens. The north of the study area is more constrained than the south due to a higher concentration of Registered Parks and Gardens.	A	The Registered Parks and Gardens sites have the potential to constrain the development of this reinforcement as a result of construction risks. However, there are significant sections of the study area that are not constrained by Registered Parks and Gardens. There are opportunities to reduce risks through avoidance within the routing process. As a result of the distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.	G
Registered Battlefields	England Registered Battlefields	There is one Registered Battlefield within the study area, at the site of the Battle of Maldon 991.	A	The Registered Battlefield constrains the development of this option due to the potential for direct harm during construction. However, there are significant sections of the study area that are not constrained by Registered Battlefields. There are opportunities to mitigate risks via avoidance through the routing process. As a result of the potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.	G
<b>Air Quality (Community)</b>					
AQMAs (AQMs)	UK AQMs	There are several AQMs within the study area, those being Northfleet Industrial	G	Given the small number and small spatial area constrained by the AQMs, through careful design and construction planning, avoiding/mitigating direct and indirect adverse risks the sites are not considered to constrain the development of the option.	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		Area AQMA, Dartford AQMA No.2, Tilbury AQMA 24, Greys AQMA No. 1, Havering AQMA, Chelmsford Army and Navy AQMA, MDC Air Quality Management Area number 1, Rayleigh AQMA, Colchester Area 1 – Central Corridors AQMA, and Ipswich AQMA No.3		As a result of the low density distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.	
<b>Noise (Community)</b>					
Major Settlements	UK Major Urban Settlements	Within the study area, much of the environment is a natural/rural setting. There are five Major Urban Settlements located at Basildon, Southend-On-Sea, Chelmsford, Colchester and Ipswich.	G	<p>There is potential for the construction of a new HVDC underground cable route to generate noise during construction that would affect residents of settlements, including within several Noise Important Areas.</p> <p>Owing to the spatial separation between settlements over the majority of the study area, it is considered that any potential construction and noise impacts could be effectively controlled through appropriate routing and the use of best practice mitigation measures such as a CEMP during construction.</p> <p>As a result of the distribution and opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.</p>	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
Small Scale Settlements	UK Small Scale Urban Settlements	Within the study area, there are many small scale settlements.	G	<p>There is potential for the construction of a new HVDC underground cable route to generate noise during construction that would affect residents of settlements, including within several Noise Important Areas.</p> <p>Owing to the spatial separation between settlements over the majority of the study area, it is considered that any potential construction and noise impacts could be effectively controlled through appropriate routing and the use of best practice mitigation measures such as a CEMP during construction.</p> <p>Although there are potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, this will not be possible for all of the smaller settlements. A green BRAG rating has been applied.</p>	G
<b>Socio-Economics (Community)</b>					
Major Settlements	UK Major Urban Settlements (Socio-Economics)	Within the study area, much of the environment is a natural/rural setting. There are five Major Urban Settlements located at Basildon, Southend-On-Sea, Chelmsford, Colchester, and Ipswich.	A	<p>There is potential for the construction of a new HVDC underground cable route to impact residents as a result of temporary changes to visual amenity. Where the Major Urban Settlements are located, they occupy a large part of the study area at Basildon and Southend-On-Sea. However, mitigation of this constraint through routing is possible. In accordance with the Holford Rules, it is necessary to install a route that minimises impacts as far as possible. If avoidance is not possible and there would be harm to landscape, visual amenity and natural beauty, there should be a strong presumption for undergrounding the section of line. HVDC underground cable reinforcement at such constrained locations should therefore be considered as a priority.</p> <p>Potential positive impacts of this reinforcement may include employment generation during construction.</p>	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				<p>Mitigation measures should also carefully consider the tourism and recreation socio-economic sensitivities of the study area and seek to mitigate risks to key receptors associated with the settlements. This will be applicable in the construction stage.</p> <p>As a result of the distribution, potential opportunities for avoidance of this constraint through routing and best practice mitigation measures as well as only temporary nature of effects during construction, a green BRAG rating has been applied.</p>	
Small Scale Settlements	UK Small Scale Urban Settlements	Within the study area, there are many small-scale settlements.	A	<p>There is potential for the construction and operation of a new HVDC underground cable route to impact residents as a result of changes to visual amenity. Small-Scale Urban Settlements are located throughout the study area and therefore mitigation of this constraint through routing is likely to only be partially successful. In accordance with the Holford Rules, it is necessary to install a route that minimise impacts as far as possible. If avoidance is not possible and there would be harm to landscape, visual amenity and natural beauty, there should be a strong presumption for undergrounding the section of line. HVDC underground cable reinforcement at such constrained locations should therefore be considered as a priority.</p> <p>Potential positive impacts of this reinforcement may include employment generation during construction.</p> <p>Mitigation measures should also carefully consider the tourism and recreation socio-economic sensitivities of the study area and seek to mitigate risks to key receptors associated with the settlements. This will be applicable in the construction stage.</p> <p>As a result of the distribution and temporary nature of effects during construction, avoidance of this constraint will require considerable planning; nevertheless some small scale settlements may still be</p>	A

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				affected during construction, therefore an amber BRAG rating has been applied.	
National Trust Land	National Trust Open Land and Limited Access Land	12 small areas of National Trust Land are located within this study area, most notably surrounding Dedham, but there are also small areas near to Maldon, Danbury, Great Wigborough, Colchester, Dedham and Woodbridge.	A	<p>There is potential for these sites to constrain development of this option due to the potential for direct and indirect risks, such as loss of land or disturbance to views.</p> <p>There are opportunities to mitigate risks through the routing process and therefore the presence of National Trust Land is not considered a constraint to the option. There may be a risk on setting and temporary construction disturbance depending upon the location of the route, which should be carefully considered.</p> <p>As a result of the low-density distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	G

**2.4. Bramford to EACN Study Area (OHL)**

Start point	End point	Applicable to shortlisted designs:
Bramford	EACN	Yes

**2.4.1. Reinforcement Details**

Reinforcement type (if known)	Reinforcement Length (if known)
AC OHL	N/A

**Technology assumptions**

This reinforcement includes the development of a 400kV AC OHL between Bramford and EACN.

**2.4.2. Environmental Summary** BRAG rating with mitigation measures: **A**

The study area includes several environmental constraints, including national and international designations.

The main area of constraint is across the central perimeter of the study area near Manningtree, with clusters of designations which moderately constrain the study area:

- SACs,
- SPAs,
- Ramsar Sites
- SSSIs
- National flood zones

Mitigation measures relevant to these constraints should include the implementation of:

- Buffer zones,
- Selective routing of OHL and siting of Pylons
- Habitat Regulations Assessment (HRA) Screening
- Construction mitigation to reduce noise and visual disturbance.

There are also a large number of National Flood Zones (Flood Zones 2 and 3) which broadly follow the numerous surface water features in the area. Flood Zone 3 requires detailed design considerations for the installation and location of pylons within floodplains, as well as planning of construction activities to ensure no increased flood levels arise from the loss of floodplain storage.

There are also several Ancient Woodlands, Former Landfills, Peatlands, and RSPB reserves which are sparsely distributed throughout the study area. Despite their distribution, when combined this presents a high constraint.

During construction it would be necessary to implement best practice construction measures with considerably planned access routes and buffer zones. However, the broad distribution of



these constraints means that opportunities for avoidance through detailed route planning may be marginal, and therefore subsequent design stages should consider the mitigation hierarchy to mitigate risk further.

As explained in Section 1.2.2 (Study Area Environmental and Community Summary BRAG Ratings), the following factors have been considered in determining an overall Environmental BRAG rating for this Study Area.

Table 2.4.2: Overall Environmental BRAG rating for the Bramford to EACN Study Area.

<b>Scope of works</b>	The works include installing new overhead lines between Bramford and EACN, that will require some physical changes to the environment and as such, will therefore be affected by the constraints described in the constraints table in Section 2.4.4. This is reflected in the BRAG ratings.
<b>Number and area of constraints</b>	Within the study area there are 10 different environmental constraint types present. As noted above, the most constrained area is within the central section of the study area, as there are clusters of designations.
<b>BRAG ratings of constraints</b>	<p>Within the study area there are 10 environmental constraint types present. Of these, zero have a rating of red under the HND methodology after mitigation, four have a rating of amber after mitigation and six have rating of green after mitigation.</p> <p>The four amber rated constraints include:</p> <ul style="list-style-type: none"> <li>• SPA</li> <li>• Ramsar Sites</li> <li>• SSSI</li> <li>• National Flood Zones</li> </ul> <p>The six green rated constraints include:</p> <ul style="list-style-type: none"> <li>• SAC</li> <li>• Ancient Woodland</li> <li>• IBAs</li> <li>• RSPB Reserves</li> <li>• Petland</li> <li>• Former Landfill Sites</li> </ul>

As shown on the constraint plan, there are possible opportunities to avoid the above constraints through construction design and routing, except National Flood Zones located within the study area, as avoidance of all areas of river flood risk may not be possible. There are potential opportunities to avoid intersection with SPA, SSSIs and Ramsar sites by considering the route west of the identified constrained areas. The only possible opportunities to avoid all these constraints is by routing between the National Landscape's, SPA's and Ramsar sites.

An amber BRAG rating has been assigned to this study area after mitigation measures, which reflect the factors described above. This is a moderately constrained area which could be viable, however, may have to overcome some environmental issues.

## 2.4.3. Community Summary

BRAG rating with mitigation measures:

R

There are numerous community constraints in the study area, including national designations.

One of the most significant areas of constraint is in the central section of the study area, due to the presence of Dedham Vale National Landscape which spans a significant part of the study area. In line with National Policy and the Holford Rules, National Landscapes should be avoided altogether and where this is not possible and there would be harm to landscape, visual amenity and natural beauty, there should be a strong presumption for undergrounding the section of line.

There are also many small settlements distributed throughout the study area, which has been given a red BRAG rating after mitigation due to the potential for visual impacts. Major settlements have also been given a red BRAG rating after mitigation due to Ipswich being within the study area.

Additionally, the presence of Scheduled Monuments across the study area, in particular surrounding Colchester, creates a large constraint for this reinforcement due to the risk construction works may have upon the feature and/or associated archaeological features, as well as during operation via risk to the setting of the Scheduled Monuments.

Additional constraints that may be avoided with best practice construction management measures and selective routing include Listed Buildings, Registered Parks and Gardens, Registered Battlefields, AQMAs, Noise Important Areas, and National Trust Land.

As explained in Section 1.2.2 (Study Area Environmental and Community Summary BRAG Ratings), the following factors have been considered in determining an overall Community BRAG rating for this Study Area.

Table 2.4.3: Overall Community BRAG rating for the Bramford to EACN Study Area.

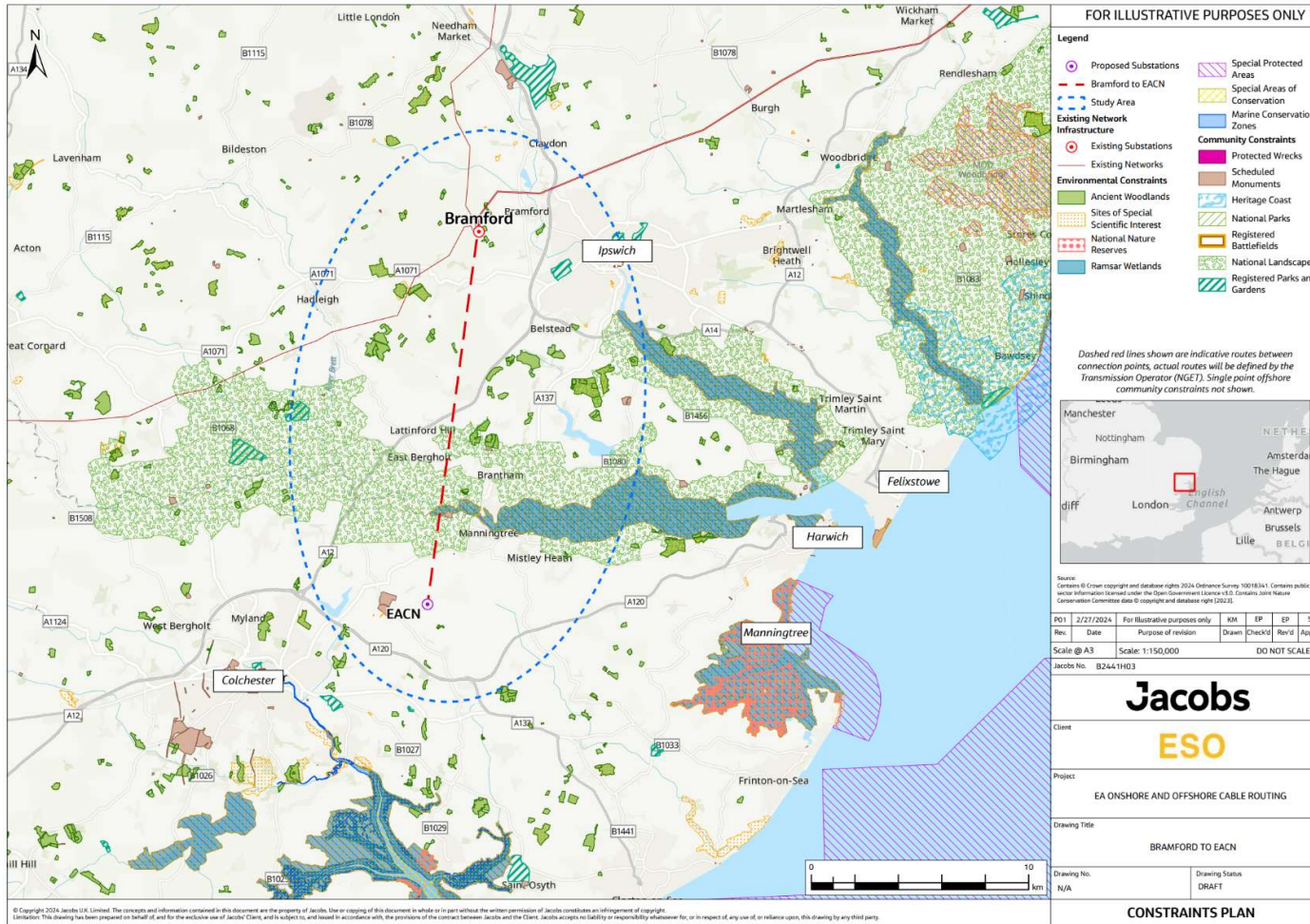
<b>Scope of works</b>	The works include installing new overhead lines between Bramford and EACN, that will require some physical changes to the environment and as such, will therefore be affected by the constraints described in the constraints table in Section 2.4.4. This is reflected in the BRAG ratings.
<b>Number and area of constraints</b>	Within the study area there are 10 different community constraint types present. As noted above, the most constrained area is in the north of the study area, due to the presence of Dedham Vale National Landscape, spanning a significant part of width of the study area.
<b>BRAG ratings of constraints</b>	<p>Within the study area there are 10 community constraint types present. Of these, two have a rating of red under the HND methodology after mitigation, three have a rating of amber after mitigation and five have rating of green after mitigation.</p> <p>The two red rated constraints include:</p> <ul style="list-style-type: none"> <li>• Major Settlements (Socio-Economics)</li> <li>• Small Scale Settlements (Socio-Economics)</li> </ul> <p>The three amber rated constraints include:</p>

	<ul style="list-style-type: none"> <li>• National Landscapes</li> <li>• Scheduled Monuments</li> <li>• Small Scale Settlements (Noise)</li> </ul> <p>The five green rated constraints include:</p> <ul style="list-style-type: none"> <li>• Listed Buildings</li> <li>• Registered Parks and Gardens</li> <li>• AQMA</li> <li>• Major Settlements (Noise)</li> <li>• National Trust Land</li> </ul>
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A red BRAG rating has been assigned after mitigation measures have been considered, due to the number and spatial distribution of many key constraints. Many small-scale settlements are within the study area, as well as a major settlement. National Landscape and Scheduled Monuments within the study area also means that avoidance of them may be challenging. In particular, the potential requirement for undergrounding in line with the Holford Rules due to the National Landscape, combined with the presence of Scheduled Monuments and their potential associated archaeological features, creates a large constraint.

#### 2.4.4. Constraints Table

The following table details the environmental and community constraints for Bramford to EACN Study Area. It describes the constraints present within the study area, the potential mitigation measures to avoid or reduce risks, and a BRAG rating before and after mitigation measures have been applied.



**Constraints Plan 4: Study Area Bramford to EACN showing Nationally and Internationally Designated Sites**

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
<b>Ecology (Environmental)</b>					
SACs	Onshore and offshore UK SACs	Hamford Water SAC is located east of EACN proposed substation.	A	<p>Due to the limited area of the study area constrained by this SAC, only a small area of this study area is heavily constrained. Consideration should be given to the routing of the OHL to avoid negative impacts such as habitat loss and fragmentation, soil erosion and sedimentation. Planning of construction activities and access routes should be undertaken, including the implementation of buffer zones as appropriate to avoid associated impacts e.g., relating to access roads and construction waste stockpiles. A HRA Screening is likely to be required as the route could have a significant effect on the SAC.</p> <p>A Green BRAG rating has been assigned in view of the importance and size of the constraints requiring the need for routing to avoid sensitive areas and other mitigation measures for construction activities.</p>	G
cSACs	England cSACs	There are no cSACs located in the study area.	N/A	N/A	N/A
SPAs	Onshore and offshore UK SPAs	There is one SPA within the proposed study area, Stour and Orwell Estuaries.	R	<p>Stour and Orwell Estuaries SPA constrains a small section of this study area. There are possible opportunities to avoid this constraint by selective routing to the west from identified SPA.</p> <p>Construction mitigation in terms of reducing noise and visual disturbance will be required if the route passes close to this constraint (up to 1 km, depending on designated bird species). Consideration should be given to wider impacts such as bird migratory routes and proximity to these. There will be opportunities to mitigate risks through various measures, such as using buffer zones, screening during construction and timing of works to avoid sensitive times such as nesting or overwintering birds.</p>	A

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				An amber BRAG has been assigned in view of the importance of the constraint and mobile/migratory features requiring the need for detailed routing and other mitigation measures.	
pSPAs	England pSPAs	There are no pSPAs located in the study area.	N/A	N/A	N/A
SCIs	SCI	There are no SCIs located within the study area.	N/A	N/A	N/A
Ramsar sites	UK Ramsar sites	Stour and Orwell Estuaries is located within the study area.	R	<p>Stour and Orwell Estuaries Ramsar site constrains a small section of this study area. There are possible opportunities to avoid this constraint by selective routing to the west from identified Ramsar site.</p> <p>Consideration should be given to wider impacts on Stour and Orwell Estuaries during construction in terms of reducing noise and visual disturbance (e.g., through screening and buffer zones) if the route passes close to this constraint (up to 1 km, depending on designated bird species) or associated bird migratory and foraging routes. There will be opportunities to mitigate risks through various measures, such as using buffer zones, screening during construction and timing of works to avoid sensitive times such as nesting or overwintering birds.</p> <p>An amber BRAG has been assigned in view of the importance of the constraint and mobile/migratory features requiring the need for detailed routing and other mitigation measures.</p>	A
Proposed Ramsar sites	UK Proposed Ramsar sites	There are no Proposed Ramsar sites located within the study area.	N/A	N/A	N/A

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
SSSIs	UK SSSIs	There are numerous SSSIs located within the study area, including, Stour and Orwell Estuaries, Stour and Coppears Woods, Cattawade Marshes, Freston and Cutlers Woods with Holbrook Park, Bobbitshole, Belstead; Stoke Tunnel Cutting, Hintlesham Woods, and Elmsett Park Woods.	R	<p>The most constrained part of the study area is within Stour and Orwell Estuaries. There are multiple small SSSIs that can be avoided with selective routing and buffer zones to minimise disruption to sensitive areas. This will need detailed planning at the next stage, as well as the implementation of best practices during construction in order to avoid impacts on these constraints.</p> <p>An amber BRAG has been assigned on a precautionary basis in view of their contained moderately concentrated distribution, the need for detailed routing, and the importance of this constraint.</p>	A
NNRs	UK NNRs	There are no NNRs in the study area.	N/A	N/A	N/A
Biosphere Reserves	UK Biosphere Reserves	There are no Biosphere Reserves within the study area.	N/A	N/A	N/A
Ancient Woodlands	UK Ancient Woodlands	There are multiple areas of Ancient Woodland	R	There are multiple, sparsely distributed, small areas of the study area that are constrained by Ancient Woodland. There are opportunities to mitigate risks through the routing process so that the pylons and OHLs do not cross areas of Ancient Woodland.	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		throughout the study area		<p>Any risks during construction could be controlled through appropriate construction environmental management practices, for example in relation to the siting of access routes and implementing buffer zones around ancient woodland areas.</p> <p>A green BRAG has been assigned due to the sparse distribution of Ancient Woodlands, and in view that there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	
IBAs	UK IBAs	Stour and Orwell Estuaries IBA is within the study area.	G	<p>OHL development may be constrained by IBAs directly due to the risk of habitat loss, indirectly via disturbance during construction (i.e., noise/lighting) or via disturbance to flight paths once operational.</p> <p>The IBA within this study area will need to be avoided and therefore represent a constraint particularly to the east of the study area. However, the majority of the study area is not constrained by IBAs.</p> <p>Connections between sites and bird flight paths would need to be considered including for construction and maintenance activities. OHLs can cause displacement and barrier effects as birds are deterred from using their normal routes to feeding or roosting grounds. There are opportunities to reduce direct risks through the routing process and implementing OHL mitigation measures such as deflectors. Connections between sites and bird flight paths would need to be considered.</p> <p>If routed close by (up to 1 km, dependent on species), bird usage of the area would need to be considered where any disturbance risks are identified. Operational mitigation such as bird-friendly power line designs may be required for OHL. During construction, noise impacts and visual disturbance risks will need to be considered and mitigated accordingly (e.g., through screening). It is expected that with routing design, this could be avoided.</p>	G



Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				As a result of the distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.	
RSPB Reserves	UK RSPB Reserves	Wolves Wood Reserves and Stour Estuary UK RSPB Reserves are within the study area.	A	<p>OHL development may be constrained by RSPB Reserves due to direct risks via habitat loss, indirect risks via disturbance during construction (i.e., noise/lighting) or via disturbance to flight paths once operational. There are significant sections of the study area that are not constrained by RSPB Reserves, and there are opportunities to reduce direct risks through the routing process. Connections between sites and bird flight paths would need to be considered. During construction, noise impacts and visual disturbance risks will need to be considered and mitigated accordingly (e.g., through screening).</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	G
<b>Geology and Soils (Environmental)</b>					
Peatland	UK Peatland	There is one area of Peatland within the study area, located within Bramford.	A	<p>The area of peatland has the potential to constrain the development of this reinforcement as a result of construction and operational risks. The loss and fragmentation of habitats is a key concern. However, there are significant sections of the study area that are not constrained by peatland. There are opportunities to reduce risks through the routing process. There may be temporary construction disturbance impacts that would need further consideration and mitigation.</p> <p>As a result of the small area of peatland and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	G
Geoparks	UK Geoparks	There are no UNESCO Global	N/A	N/A	N/A

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		Geoparks within the study area.			
National Flood Zones/Areas Benefiting from Defences	National Flood Zones and Areas benefiting from defences	There are National Flood Zones (Flood Zone 2 and Flood Zone 3) distributed throughout the study area, associated with the numerous water body features. The most extensive Zone 3 areas (of a high probability of flooding) are surrounding Manningtree.	A	OHL development including construction works may be at risk from flooding. Owing to the distribution of this constraint throughout the study area, avoidance of all areas of river flood risk may not be possible and therefore there is residual risk for the development of this option. There will need to be detailed design of the installation and location of pylons within floodplains as well as planning of construction activities so that there are no increased flood levels arising from loss of floodplain storage e.g., during construction from working areas, temporary soil stockpiles, raised access tracks and watercourse crossings. Fluvial flow and surface water flow will also need to be considered in the planning of these activities so that culverts and crossings are of appropriate positioning and size and that water does not pool behind installations. As a result of the distribution and requirement for detailed planning to avoid this constraint through construction design and routing, an amber BRAG rating has been applied.	A
Former landfill sites	Historic landfills	There are several small pockets of historic landfill sites located throughout the study area, most notably located to the east of Ipswich.	A	OHL development, including construction works, may be at risk posed by sources of contamination from the former landfill sites. Due to the distribution and small size of historic landfills within the study area there are opportunities to avoid this constraint within considerate OHL routing. In addition, it is not considered that this is a strategic level constraint that should influence decision-making at this stage. There is an opportunity at the next stage of the siting process to avoid this constraint for OHL routing. However, this will require detailed routing for areas of higher concentrations.	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				As a result of the distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.	
<b>Landscape and Visual (Community)</b>					
National Parks	UK National Parks	There are no National Parks within this study area.	N/A	N/A	N/A
National Landscapes	England National Landscapes	Suffolk Coast and Heaths and also Dedham Vale are a National Landscapes that spans a large portion of the central study area.	R	<p>The central section of this study area is heavily constrained by Suffolk Coast and Heaths, and Dedham Vale National Landscapes, presenting a key constraint to the development of this option.</p> <p>There is a risk that new OHLs would directly and indirectly disrupt it. There might be opportunities for routing to avoid Suffolk Coast and Heaths and Dedham Vale National Landscapes, this constraint might be avoided by routing between patches of National Landscapes.</p> <p>National Landscapes are afforded the highest levels of protection in relation to landscape and natural beauty, having a specific statutory purpose to ensure their continued protection. The duty to have regard to the purposes of nationally designated areas also applies when considering applications for projects outside the boundaries. In line with National Policy and the Holford Rules, National Landscapes should be avoided altogether and where this is not possible and there would be harm to landscape, visual amenity and natural beauty, there should be a strong presumption for undergrounding the section of line.</p> <p>As a result of the distribution and potential opportunity for avoidance of this constraint, an amber BRAG rating has been applied.</p>	A

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
Heritage Coasts	England Heritage Coasts	There are no Heritage Coasts within the study area.	N/A	N/A	N/A
National Trails	England National Trails	There are no National Trails within the study area.	N/A	N/A	N/A
<b>Historic Environment (Community)</b>					
World Heritage Sites	UK World Heritage Sites	There are no World Heritage Sites within the study area.	N/A	N/A	N/A
Scheduled Monuments	UK Scheduled Monuments	Within the study area there are multiple Scheduled Monuments.	R	<p>OHL development has the potential to be constrained by Scheduled Monuments due to the risk construction works may have upon the feature and/or associated archaeological features as well as during operation via risk to the setting of the Scheduled Monument. Due to this, without mitigation the distribution of Scheduled Monuments across the study area is likely to constrain OHL route options and require consideration of the mitigation hierarchy.</p> <p>It is considered that there are opportunities to mitigate risks to the individual Scheduled Monuments in the study area through the routing and siting process. There may be opportunities for the type of reinforcement to be changed (e.g., undergrounding as opposed to OHL) to avoid effects on setting, construction vibration considerations, considering the nature of the development and the location/extent of the constraint. However, there would need to be detailed considerations required for this type of construction. If undergrounding is</p>	A

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				<p>implemented, there are opportunities during design development to avoid or mitigate risks via avoidance or considerate design (i.e., landscape screening).</p> <p>There is opportunity to avoid direct risks to Scheduled Monuments due to the density of the sites in the study area, through detailed design, but indirect risks may be more difficult to avoid.</p> <p>An amber BRAG rating has been applied as detailed route design and construction methodology is required to ensure this constraint is avoided, and any potential impacts are mitigated effectively.</p>	
Listed Buildings	UK listed buildings (Grade I, II* and II listed buildings)	There are a large number of Listed Buildings throughout the study area, including Grade I, Grade II*, and Grade II. There is a high concentration of Listed Buildings in Ipswich.	A	<p>OHL development may be constrained by Listed Buildings due to the risk of physical loss or damage to the listing, or indirectly via disturbance to the listed building's setting. There may also be risks to the curtilage (the area around, or any other building that is around and associated with a listed building).</p> <p>Whilst there is a large number of Listed Buildings within the study area, there are opportunities to reduce direct risks through the routing and siting process.</p> <p>In addition to potential accidental damage during construction if works or transport links are close by, there may be a risk on setting depending upon the location of the OHL route and any cable sealing end compounds.</p> <p>Works and transport routes need to be considered in terms of their proximity to listed buildings near the highway (e.g., accidental damage risk from HGVs in narrow lanes or other restricted areas) or groundworks (i.e., if any vibration generating works are close enough to cause damage to buildings).</p> <p>As a result of the opportunities for avoidance of this constraint through detailed routing and construction best practices, a green BRAG rating has been applied.</p>	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
Registered Parks and Gardens	Registered Parks and Gardens	Within the study area there are several Registered Parks and Gardens, all grade II. Beth Chatto Gardens and Thorpe Hall is south of the study area, Chantry Park, Christchurch Mansion and Old and New Cemetery, Ipswich is located north.	A	<p>The Registered Parks and Gardens sites have the potential to constrain the development of this reinforcement as a result of construction risks and risks as a result of changes to setting during operation. However, there are significant sections of the study area that are not constrained by Registered Parks and Gardens. There are opportunities to reduce risks through avoidance within the routing process.</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	G
Registered Battlefields	England Registered Battlefields	There are no Registered Battlefield within the study area.	N/A	N/A	N/A
<b>Air Quality (Community)</b>					
AQMAs (AQMA)	UK AQMA	Ipswich AQMA No.1 is within the study area.	G	<p>Given the small number and small spatial area constrained by the AQMA, through careful design and construction planning, avoiding/mitigating direct and indirect adverse risks the sites are not considered to constrain the development of the option.</p> <p>As a result of the low density distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	G
<b>Noise (Community)</b>					

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
Major Settlements	UK Major Urban Settlements	Within the study area, much of the environment is a natural/rural setting. There is one Major Urban Settlement located in Ipswich	A	<p>There is potential for the construction of a new OHL to generate noise during construction and operation that would affect residents of settlements, including within several Noise Important Areas.</p> <p>It is considered that any potential construction and noise impacts could be effectively controlled through appropriate routing and the use of best practice mitigation measures such as a CEMP during construction. Operational noise would also require further consideration at the next stage of the option development process.</p> <p>As a result of the distribution and opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.</p>	G
Small Scale Settlements	UK Small Scale Urban Settlements	Within the study area, there are several small-scale settlements.	A	<p>There is potential for the construction of a new OHL to generate noise during construction and operation that would affect residents of settlements, including within several Noise Important Areas.</p> <p>It is considered that any potential construction and noise impacts could be effectively controlled through appropriate routing and the use of best practice mitigation measures such as a CEMP during construction. Operational noise would also require further consideration at the next stage of the option development process.</p> <p>Although there are potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, this will not be possible for all of the smaller settlements, therefore, an amber BRAG rating has been applied.</p>	A
<b>Socio-Economics (Community)</b>					
Major Settlements	UK Major Urban Settlements	Within the study area, much of the environment is a natural/rural	R	<p>There is potential for the construction and operation of a new OHL to impact residents as a result of changes to visual amenity within Ipswich. This is an issue as mitigation of this constraint through routing is unlikely to be successful. In cases such as this, in accordance with the</p>	R

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
	(Socio-Economics)	setting. There is one Major Urban Settlement located in Ipswich		<p>Holford Rules, it is necessary to install a route that minimise impacts as far as possible. Undergrounding of the line at such points should be considered, as well as vegetation screening and landscaping, and implementing innovative tower designs.</p> <p>Residents may also have concerns about the health risks of new OHLs in the vicinity of their houses and schools and therefore public information events should be held and leaflets produced to reduce any concerns.</p> <p>Potential positive impacts of this reinforcement may include employment generation during construction.</p> <p>Mitigation measures should also carefully consider the tourism and recreation socio-economic sensitivities of the study area and seek to mitigate risks to key receptors associated with the settlements. This will be applicable in the construction and operational stages.</p> <p>As a result of the distribution and nature of effects, avoidance of this constraint will require considerable planning, design iterations and assessment in the following stages, nevertheless, some major settlements might still be affected by this reinforcement, therefore a red BRAG rating has been applied.</p>	
Small Scale Settlements	UK Small Scale Urban Settlements	Within the study area, there are several small-scale settlements.	R	<p>There is potential for the construction and operation of a new OHL to impact residents as a result of changes to visual amenity. Where the Small-Scale Urban Settlements are located throughout the study area and therefore. However, mitigation of this constraint through routing is likely to only be partially successful possible. There are opportunities to mitigate potential direct risks through vegetation screening and landscaping, and innovative tower designs, however again, fully mitigating impacts will not be possible.</p> <p>Potential positive impacts of this reinforcement may include employment generation during construction.</p>	R



Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				<p>Mitigation measures should also carefully consider the tourism and recreation socio-economic sensitivities of the study area and seek to mitigate risks to key receptors associated with the settlements. This will be applicable in the construction and operational stages.</p> <p>As a result of the distribution and nature of effects, avoidance of this constraint will require considerable planning, design iterations and assessment in the following stages. After this, some major settlements still might be affected by this reinforcement, therefore a red BRAG rating has been applied.</p>	
National Trust Land	National Trust Open Land and Limited Access Land	There are several small areas of National Trust Land within this study area, most notably surrounding Dedham.	A	<p>There is potential for these sites to constrain development of this option due to the potential for direct and indirect risks, such as loss of land or disturbance to views.</p> <p>There are opportunities to mitigate risks through the routing process and therefore the presence of National Trust Land is not considered a constraint to the option. There may be a risk on setting and temporary construction disturbance depending upon the location of the route, which should be carefully considered.</p> <p>As a result of the low-density distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	G

**2.5. Bramford to EACN Study Area (HVDC)**

Start point	End point	Applicable to shortlisted designs:
Bramford	EACN	Yes

**2.5.1. Reinforcement Details**

Reinforcement type (if known)	Reinforcement Length (if known)
HVDC	N/A

**Technology assumptions**

This reinforcement includes the development of HVDC underground onshore cable route between Bramford and EACN.

**2.5.2. Environmental Summary** BRAG rating with mitigation measures: **A**

The study area includes several environmental constraints, including national and international designations.

The main area of constraint is across the central perimeter of the study area near Manningtree, with clusters of designations which moderately constrain the study area:

- SPAs,
- Ramsar Sites
- SSSIs

Mitigation measures relevant to these constraints should include the implementation of:

- Buffer zones,
- Habitat Regulations Assessment (HRA) Screening
- Construction mitigation to reduce noise and visual disturbance.

There are also several SACs, Ancient Woodlands, Former Landfills, Peatlands, IBAs and RSPB reserves which are sparsely distributed throughout the study area. Despite their distribution, when combined this presents a high constraint.

There are also a number of National Flood Zones (Flood Zones 2 and 3) distributed throughout the study area, which broadly follow the numerous surface water features in the area.

During construction it would be necessary to implement best practice construction measures with considerably planned access routes and buffer zones. However, the broad distribution of these constraints means that opportunities for avoidance through detailed route planning may be marginal, and therefore subsequent design stages should consider the mitigation hierarchy to mitigate risk further.

As explained in Section 1.2.2 (Study Area Environmental and Community Summary BRAG Ratings), the following factors have been considered in determining an overall Environmental BRAG rating for this Study Area.

Table 2.5.2: Overall Environmental BRAG rating for the Bramford to EACN Study Area (HVDC).

<b>Scope of works</b>	The works include development of new HVDC onshore cable route between Bramford and EACN, that will require some physical changes to the environment and as such, will therefore be affected by the constraints described in the constraints table in Section 2.5.4. This is reflected in the BRAG ratings.
<b>Number and area of constraints</b>	Within the study area there are 10 different environmental constraint types present. As noted above, the most constrained area is within the central section of the study area, as there are clusters of designations.
<b>BRAG ratings of constraints</b>	<p>Within the study area there are 10 environmental constraint types present. Of these, zero have a rating of red under the HND methodology after mitigation, three have a rating of amber after mitigation and seven have rating of green after mitigation.</p> <p>The three amber rated constraints include:</p> <ul style="list-style-type: none"> <li>• SPA</li> <li>• Ramsar Sites</li> <li>• SSSI</li> </ul> <p>The seven green rated constraints include:</p> <ul style="list-style-type: none"> <li>• SAC</li> <li>• Ancient Woodland</li> <li>• IBAs</li> <li>• RSPB Reserves</li> <li>• Petland</li> <li>• National Flood Zones</li> <li>• Former Landfill Sites</li> </ul>

As shown on the constraint plan, there are possible opportunities to avoid the above constraints through construction design and routing, except National Flood Zones located within the study area, as avoidance of all areas of river flood risk may not be possible. There are potential opportunities to avoid intersection with SPA, SSSIs and Ramsar sites by considering the route west of the identified constrained areas. The only possible opportunities to avoid all these constraints is by routing between the National Landscape's, SPA's and Ramsar sites.

An amber BRAG rating has been assigned to this study area after mitigation measures, which reflect the factors described above. This is a moderately constrained area which could be viable, however, may have to overcome some environmental issues.

## 2.5.3. Community Summary

BRAG rating with mitigation measures:

A

There are numerous community constraints in the study area, including national designations.

There are many small settlements distributed throughout the study area, which has been given an amber BRAG rating after mitigation due to the potential for visual impacts. Major settlements have also been given an amber BRAG rating after mitigation due to Ipswich being within the study area.

Additionally, the presence of Scheduled Monuments across the study area, in particular surrounding Colchester, creates a large constraint for this reinforcement due to the risk construction works may have upon the feature and/or associated archaeological features.

Additional areas of constraint is in the central section of the study area, due to the presence of Dedham Vale National Landscape which spans a significant part of the study area. In accordance with the Holford Rules, it is necessary to install a route that minimises impacts as far as possible. If avoidance of the National Landscape is not possible and there would be harm to landscape, visual amenity and natural beauty, there should be a strong presumption for undergrounding the section of line. HVDC underground cable reinforcement at such constrained locations should therefore be considered as a priority.

Additional constraints that may be avoided with best practice construction management measures and selective routing include Listed Buildings, Registered Parks and Gardens, Registered Battlefields, AQMAs, Noise Important Areas, and National Trust Land.

As explained in Section 1.2.2 (Study Area Environmental and Community Summary BRAG Ratings), the following factors have been considered in determining an overall Community BRAG rating for this Study Area.

Table 2.5.3: Overall Community BRAG rating for the Bramford to EACN Study Area (HVDC).

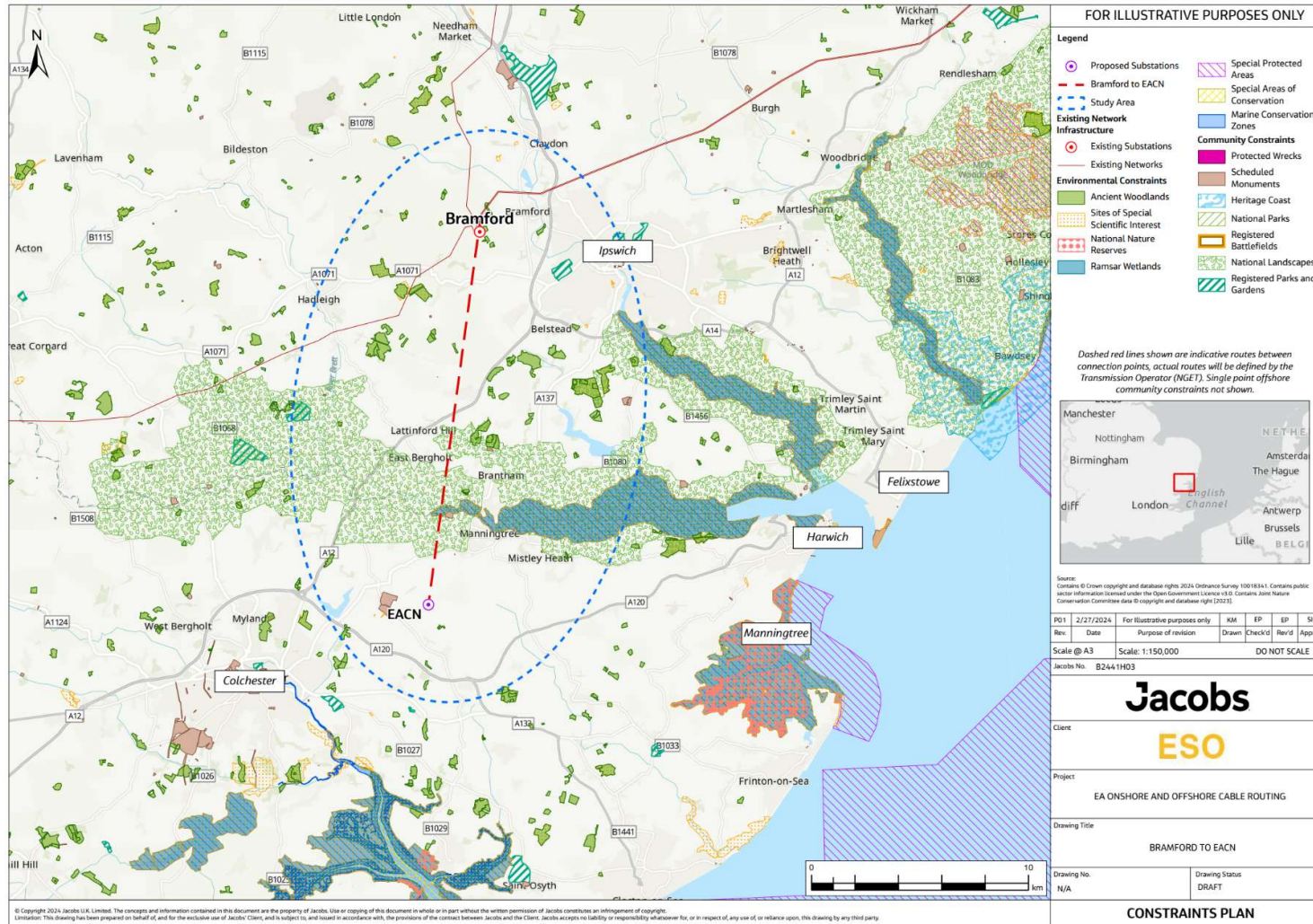
<b>Scope of works</b>	The works include development of new HVDC underground cable route between Bramford and EACN, that will require some physical changes to the environment and as such, will therefore be affected by the constraints described in the constraints table in Section 2.5.4. This is reflected in the BRAG ratings.
<b>Number and area of constraints</b>	Within the study area there are 10 different community constraint types present.
<b>BRAG ratings of constraints</b>	<p>Within the study area there are 10 community constraint types present. Of these, zero have a rating of red under the HND methodology after mitigation, three have a rating of amber after mitigation and seven have rating of green after mitigation.</p> <p>The three amber rated constraints include:</p> <ul style="list-style-type: none"> <li>• Major Settlements (Socio-Economics)</li> <li>• Small Scale Settlements (Socio-Economics)</li> <li>• Scheduled Monuments</li> </ul> <p>The seven green rated constraints include:</p> <ul style="list-style-type: none"> <li>• National Landscapes</li> </ul>

	<ul style="list-style-type: none"> <li>• Listed Buildings</li> <li>• Registered Parks and Gardens</li> <li>• AQMA</li> <li>• Major Settlements (Noise)</li> <li>• Small Scale Settlements (Noise)</li> <li>• National Trust Land</li> </ul>
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An amber BRAG rating has been assigned after mitigation measures have been considered. Many small-scale settlements are within the study area, as well as a major settlement. Scheduled Monuments within the study area also means that avoidance of them may be challenging.

#### 2.5.4. Constraints Table

The following table details the environmental and community constraints for Bramford to EACN Study Area (HVDC). It describes the constraints present within the study area, the potential mitigation measures to avoid or reduce risks, and a BRAG rating before and after mitigation measures have been applied.



**Constraints Plan 5: Study Area Bramford to EACN showing Nationally and Internationally Designated Site**

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
<b>Ecology (Environmental)</b>					
SACs	Onshore and offshore UK SACs	Hamford Water SAC is located east of EACN proposed substation.	A	<p>Due to the limited area of the study area constrained by this SAC, only a small area of this study area is moderately constrained.</p> <p>Consideration should be given to the routing of the HDVC underground cabling to avoid negative impacts such as habitat loss and fragmentation, soil erosion and sedimentation. Planning of construction activities and access routes should be undertaken, including the implementation of buffer zones as appropriate to avoid associated impacts e.g., relating to access roads and construction waste stockpiles. A HRA Screening is likely to be required as the route could have a significant effect on the SAC.</p> <p>A green BRAG rating has been assigned in view of the importance and size of the constraints requiring the need for routing to avoid sensitive areas and other mitigation measures for construction activities.</p>	G
cSACs	England cSACs	There are no cSACs located in the study area.	N/A	N/A	N/A
SPAs	Onshore and offshore UK SPAs	There is one SPA within the proposed study area, Stour and Orwell Estuaries.	R	<p>Stour and Orwell Estuaries SPA constrains a small section of this study area. There are possible opportunities to avoid this constraint by selective routing to the west from identified SPA.</p> <p>Construction mitigation in terms of reducing noise and visual disturbance will be required if the route passes close to this constraint (up to 1 km, depending on designated bird species).</p> <p>There will be opportunities to mitigate risks through various measures, such as using buffer zones, screening during construction and timing of works to avoid sensitive times such as nesting or overwintering birds.</p>	A

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				An amber BRAG has been assigned in view of the importance of the constraint and mobile/migratory features requiring the need for detailed routing and other mitigation measures.	
pSPAs	England pSPAs	There are no pSPAs located in the study area.	N/A	N/A	N/A
SCIs	SCI	There are no SCIs located within the study area.	N/A	N/A	N/A
Ramsar sites	UK Ramsar sites	Stour and Orwell Estuaries is located within the study area.	R	<p>Stour and Orwell Estuaries Ramsar site constrains a small section of this study area. There are possible opportunities to avoid this constraint by selective routing to the west from identified Ramsar site.</p> <p>Consideration should be given to wider impacts on Stour and Orwell Estuaries during construction in terms of reducing noise and visual disturbance (e.g., through screening and buffer zones) if the route passes close to this constraint (up to 1 km, depending on designated bird species) or associated bird migratory and foraging routes.</p> <p>There will be opportunities to mitigate risks through various measures, such as using buffer zones, screening during construction and timing of works to avoid sensitive times such as nesting or overwintering birds.</p> <p>An amber BRAG has been assigned in view of the importance of the constraint and mobile/migratory features requiring the need for detailed routing and other mitigation measures.</p>	A
Proposed Ramsar sites	UK Proposed Ramsar sites	There are no Proposed Ramsar sites located within the study area.	N/A	N/A	N/A



Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
SSSIs	UK SSSIs	There are numerous SSSIs located within the study area, including, Stour and Orwell Estuaries, Stour and Coppears Woods, Cattawade Marshes, Freston and Cutlers Woods with Holbrook Park, Bobbitshole, Belstead; Stoke Tunnel Cutting, Hintlesham Woods, and Elmsett Park Woods.	R	<p>The most constrained part of the study area is within Stour and Orwell Estuaries. There are multiple small SSSIs that can be avoided with selective routing and buffer zones to minimise disruption to sensitive areas. This will need detailed planning at the next stage, as well as the implementation of best practices during construction in order to avoid impacts on these constraints.</p> <p>An amber BRAG has been assigned on a precautionary basis in view of their contained moderately concentrated distribution, the need for detailed routing, and the importance of this constraint.</p>	A
NNRs	UK NNRs	There are no NNRs in the study area.	N/A	N/A	N/A
Biosphere Reserves	UK Biosphere Reserves	There are no Biosphere Reserves within the study area.	N/A	N/A	N/A
Ancient Woodlands	UK Ancient Woodlands	There are multiple areas of Ancient Woodland	A	There are multiple, sparsely distributed, small areas of the study area that are constrained by Ancient Woodland. There are opportunities to mitigate risks through the routing process so that the HVDC underground cabling do not cross areas of Ancient Woodland.	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		throughout the study area		<p>Any risks during construction could be controlled through appropriate construction environmental management practices, for example in relation to the siting of access routes and implementing buffer zones around ancient woodland areas.</p> <p>A green BRAG has been assigned due to the sparse distribution of Ancient Woodlands, and in view that there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	
IBAs	UK IBAs	Stour and Orwell Estuaries IBA is within the study area.	G	<p>HVDC underground cable route development may be constrained by IBAs directly due to the risk of habitat loss or indirectly via disturbance during construction (i.e., noise/lighting).</p> <p>The IBA within this study area will need to be avoided and therefore represent a constraint particularly to the east of the study area. However, the majority of the study area is not constrained by IBAs.</p> <p>During construction, noise impacts and visual disturbance risks will need to be considered and mitigated accordingly (e.g., through screening). It is expected that with routing design, this could be avoided.</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	G
RSPB Reserves	UK RSPB Reserves	Wolves Wood Reserves and Stour Estuary UK RSPB Reserves are within the study area.	G	<p>HVDC underground cable route development may be constrained by RSPB Reserves due to direct risks via habitat loss or indirect risks via disturbance during construction (i.e., noise/lighting).</p> <p>There are significant sections of the study area that are not constrained by RSPB Reserves, and there are opportunities to reduce direct risks through the routing process. During construction, noise impacts and visual disturbance risks will need to be considered and mitigated accordingly (e.g., through screening).</p>	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				As a result of the distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.	
<b>Geology and Soils (Environmental)</b>					
Peatland	UK Peatland	There is one area of Peatland within the study area, located within Bramford.	A	The area of peatland has the potential to constrain the development of this reinforcement as a result of construction and operational risks. The loss and fragmentation of habitats is a key concern. However, there are significant sections of the study area that are not constrained by peatland. There are opportunities to reduce risks through the routing process. There may be temporary construction disturbance impacts that would need further consideration and mitigation. As a result of the small area of peatland and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.	G
Geoparks	UK Geoparks	There are no UNESCO Global Geoparks within the study area.	N/A	N/A	N/A
National Flood Zones/Areas Benefiting from Defences	National Flood Zones and Areas benefiting from defences	There are National Flood Zones (Flood Zone 2 and Flood Zone 3) distributed throughout the study area, associated with the numerous water body	G	HVDC underground cable route development including construction works may be at risk from flooding. Owing to the distribution of this constraint throughout the study area, avoidance of all areas of river flood risk may not be possible and therefore there is residual risk for the development of this option. There will need to be planning of construction activities so that there are no increased flood levels arising from loss of floodplain storage e.g., during construction from working areas, temporary soil stockpiles, raised access tracks and watercourse crossings. Fluvial flow and surface water flow will also need to be considered in the planning of these	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		features. The most extensive Zone 3 areas (of a high probability of flooding) are surrounding Manningtree.		activities so that culverts and crossings are of appropriate positioning and size and that water does not pool behind installations. As a result of the opportunities for avoidance of this constraint through construction best practices, a green BRAG rating has been applied.	
Former landfill sites	Historic landfills	There are several small pockets of historic landfill sites located throughout the study area, most notably located to the east of Ipswich.	A	HVDC underground cable route development, including construction works, may be at risk posed by sources of contamination from the former landfill sites. Due to the distribution and small size of historic landfills within the study area there are opportunities to avoid this constraint within considerate HVDC routing. In addition, it is not considered that this is a strategic level constraint that should influence decision-making at this stage. There is an opportunity at the next stage of the siting process to avoid this constraint for HVDC routing. However, this will require detailed routing for areas of higher concentrations. As a result of the distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.	G
<b>Landscape and Visual (Community)</b>					
National Parks	UK National Parks	There are no National Parks within this study area.	N/A	N/A	N/A
National Landscapes	England National Landscapes	Suffolk Coast and Heaths and also Dedham Vale are	A	The central section of this study area is moderately constrained by Suffolk Coast and Heaths, and Dedham Vale National Landscapes, presenting a constraint to the development of this option.	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		a National Landscapes that spans a large portion of the central study area.		<p>There is a risk that new HVDC would directly and indirectly disrupt it. There might be opportunities for routing to avoid Suffolk Coast and Heaths and Dedham Vale National Landscapes, this constraint might be avoided by routing between patches of National Landscapes.</p> <p>National Landscapes are afforded the highest levels of protection in relation to landscape and natural beauty, having a specific statutory purpose to ensure their continued protection. The duty to have regard to the purposes of nationally designated areas also applies when considering applications for projects outside the boundaries. In line with National Policy and the Holford Rules, National Landscapes should be avoided altogether and where this is not possible and there would be harm to landscape, visual amenity and natural beauty, there should be a strong presumption for undergrounding the section of line. HVDC underground cable reinforcement at such constrained locations should therefore be considered as a priority.</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through construction best practices, a green BRAG rating has been applied.</p>	
Heritage Coasts	England Heritage Coasts	There are no Heritage Coasts within the study area.	N/A	N/A	N/A
National Trails	England National Trails	There are no National Trails within the study area.	N/A	N/A	N/A
<b>Historic Environment (Community)</b>					

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
World Heritage Sites	UK World Heritage Sites	There are no World Heritage Sites within the study area.	N/A	N/A	N/A
Scheduled Monuments	UK Scheduled Monuments	Within the study area there are multiple Scheduled Monuments.	R	<p>HVDC underground cable route development has the potential to be constrained by Scheduled Monuments due to the risk construction works may have upon the feature and/or associated archaeological features. Due to this, without mitigation the distribution of Scheduled Monuments across the study area is likely to constrain HVDC cable route options and require consideration of the mitigation hierarchy.</p> <p>It is considered that there are opportunities to mitigate risks to the individual Scheduled Monuments in the study area through the routing and siting process. HVDC underground cables' type of reinforcement as opposed to OHL provide potential opportunities to avoid effects on setting, construction vibration considerations, considering the nature of the development and the location/extent of the constraint. Once HVDC undergrounding is chosen, there are opportunities during design development to avoid or mitigate risks via avoidance or considerate design (i.e., landscape screening).</p> <p>The areas surrounding the Scheduled Monuments may also require mitigation when carrying out groundworks, due to the potential presence of undiscovered associated features (i.e., archaeological remains). Consultation with Historic England would need to be required to determine the most appropriate mitigation.</p> <p>There is opportunity to avoid direct risks to Scheduled Monuments due to the density of the sites in the study area, through detailed design, but indirect risks may be more difficult to avoid.</p>	A

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				An amber BRAG rating has been applied as detailed route design and construction methodology is required to ensure this constraint is avoided, and any potential impacts are mitigated effectively.	
Listed Buildings	UK listed buildings (Grade I, II* and II listed buildings)	There are a large number of Listed Buildings throughout the study area, including Grade I, Grade II*, and Grade II. There is a high concentration of Listed Buildings in Ipswich.	A	<p>HVDC underground cable route development may be constrained by Listed Buildings due to the risk of physical loss or damage to the listing, or indirectly via disturbance to the listed building's setting. There may also be risks to the curtilage (the area around, or any other building that is around and associated with a listed building).</p> <p>Whilst there is a large number of Listed Buildings within the study area, there are opportunities to reduce direct risks through the routing and siting process.</p> <p>Works and transport routes need to be considered in terms of their proximity to listed buildings near the highway (e.g., accidental damage risk from HGVs in narrow lanes or other restricted areas) or groundworks (i.e., if any vibration generating works are close enough to cause damage to buildings).</p> <p>As a result of the opportunities for avoidance of this constraint through detailed routing and construction best practices, a green BRAG rating has been applied.</p>	G
Registered Parks and Gardens	Registered Parks and Gardens	Within the study area there are several Registered Parks and Gardens, all grade II. Beth Chatto Gardens and Thorpe Hall is south of the study area, Chantry Park,	A	<p>The Registered Parks and Gardens sites have the potential to constrain the development of this reinforcement as a result of construction risks. However, there are significant sections of the study area that are not constrained by Registered Parks and Gardens. There are opportunities to reduce risks through avoidance within the routing process.</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		Christchurch Mansion and Old and New Cemetery, Ipswich is located north.			
Registered Battlefields	England Registered Battlefields	There are no Registered Battlefield within the study area.	N/A	N/A	N/A
<b>Air Quality (Community)</b>					
AQMAs (AQMA)	UK AQMA	Ipswich AQMA No.1 is within the study area.	G	Given the small number and small spatial area constrained by the AQMA, through careful design and construction planning, avoiding/mitigating direct and indirect adverse risks the sites are not considered to constrain the development of the option. As a result of the low density distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.	G
<b>Noise (Community)</b>					
Major Settlements	UK Major Urban Settlements	Within the study area, much of the environment is a natural/rural setting. There is one Major Urban Settlement located in Ipswich	G	There is potential for the construction of a new HVDC underground cable route to generate noise during construction that would affect residents of settlements, including within several Noise Important Areas. It is considered that any potential construction and noise impacts could be effectively controlled through appropriate routing and the use of best practice mitigation measures such as a CEMP during construction. As a result of the distribution and opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.	G



Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
Small Scale Settlements	UK Small Scale Urban Settlements	Within the study area, there are several small-scale settlements.	G	There is potential for the construction of a new HVDC underground cable route to generate noise during construction that would affect residents of settlements, including within several Noise Important Areas. It is considered that any potential construction and noise impacts could be effectively controlled through appropriate routing and the use of best practice mitigation measures such as a CEMP during construction. As a result of the distribution and opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.	G
<b>Socio-Economics (Community)</b>					
Major Settlements	UK Major Urban Settlements (Socio-Economics)	Within the study area, much of the environment is a natural/rural setting. There is one Major Urban Settlement located in Ipswich	A	There is potential for the construction of a new HVDC underground cable route to impact residents as a result of temporary changes to visual amenity within Ipswich. This is an issue as mitigation of this constraint through routing is unlikely to be successful. In accordance with the Holford Rules, it is necessary to install a route that minimise impacts as far as possible. If avoidance of the Major Settlements is not possible and there would be harm to landscape, visual amenity and natural beauty, there should be a strong presumption for undergrounding the section of line. Potential positive impacts of this reinforcement may include employment generation during construction. Mitigation measures should also carefully consider the tourism and recreation socio-economic sensitivities of the study area and seek to mitigate risks to key receptors associated with the settlements. This will be applicable in the construction stage. As a result of the distribution and temporary nature of effects during construction, avoidance of this constraint will require considerable	A

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				construction planning, therefore an amber BRAG rating has been applied.	
Small Scale Settlements	UK Small Scale Urban Settlements	Within the study area, there are several small scale settlements.	A	<p>There is potential for the construction of a new HVDC underground cable route to impact residents as a result of temporary changes to visual amenity. Where the Small-Scale Urban Settlements are located throughout the study area and therefore. However, mitigation of this constraint through routing is likely to only be partially successful possible. If avoidance of the Small-Scale Settlements is not possible and there would be harm to landscape, visual amenity and natural beauty, there should be a strong presumption for undergrounding the section of line. HVDC underground cable reinforcement at such constrained locations should therefore be considered as a priority. Potential positive impacts of this reinforcement may include employment generation during construction.</p> <p>Mitigation measures should also carefully consider the tourism and recreation socio-economic sensitivities of the study area and seek to mitigate risks to key receptors associated with the settlements. This will be applicable in the construction stage.</p> <p>As a result of the distribution and temporary nature of effects during construction, avoidance of this constraint will require considerable construction planning; nevertheless some small scale settlements, and these areas may still be affected during construction, therefore an amber BRAG rating has been applied.</p>	A
National Trust Land	National Trust Open Land and Limited Access Land	There are several small areas of National Trust Land within this study area, most notably	A	<p>There is potential for these sites to constrain development of this option due to the potential for direct and indirect risks, such as loss of land or disturbance to views.</p> <p>There are opportunities to mitigate risks through the routing process and therefore the presence of National Trust Land is not considered a constraint to the option. There may be a risk on setting and temporary</p>	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		surrounding Dedham.		<p>construction disturbance depending upon the location of the route, which should be carefully considered.</p> <p>As a result of the low-density distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	

2.6. Friston to Richborough Study Area (HVDC)		
Start point	End point	Applicable to shortlisted designs:
Friston	Richborough	Yes

2.6.1. Reinforcement Details	
Reinforcement type (if known)	Reinforcement Length (if known)
HVDC	N/A
Technology assumptions	

This reinforcement includes an HVDC offshore cable route, landfall infrastructure, and associated onshore cabling; within the Outer Thames Estuary from the mid Suffolk Coast to Kent (off Broadstairs). There are two proposed routes within this study area, with SCD1 comprising a more direct route between substations, and SCD2 comprising a route that curves to the east of the study area between substations.

2.6.2. Environmental Summary	BRAG rating with mitigation: <span style="background-color: yellow; border: 1px solid black; padding: 2px;">A</span>
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The study area includes multiple environmental constraints, including international and national designations.

The main area of constraint where several environmental designations are densely located or overlap is within the western and southern section of the study area and particularly along the coastline. In these areas there are several overlapping designations, including:

- MCZs,
- Ramsar sites,
- SPAs,
- SACs,
- SSSIs,
- IBAs,
- RSPB Reserves.

Mitigation measures associated with these constraints should include:

- Buffer zones,
- HRA Screening, detailed route planning,
- Best practice construction measures.

There is a large SAC to the north and east of the study area designated for mobile species rather than habitat which creates a relatively less constrained north-south corridor for the offshore cable route in the centre of the study area. Owing to the number of environmental constraints around the coastline and the variety of habitats and species designated there are very few unconstrained potential landfall points. Those locations (from an environmental point of view) which are least constrained are Felixstowe/Harwich and Sizewell (if undergrounding was an option) in the north and around the Port of Ramsgate in the south.

As explained in Section 1.2.2 (Study Area Environmental and Community Summary BRAG Ratings), the following factors have been considered in determining an overall Environmental BRAG rating for this Study Area.

Table 2.6.2: Overall Environmental BRAG rating for the Friston to Richborough Study Area.

<b>Scope of works</b>	The works include installing new onshore and offshore cabling and landfall infrastructure that will require some physical changes to the environment and as such, will therefore be affected by the constraints described in the constraints table in Section 2.6.4. This is reflected in the BRAG ratings.
<b>Number and area of constraints</b>	Within the study area there are 15 different environmental constraint types present. As noted above, although most areas are highly constrained, the most constrained area is within the western and southern sections of the study area, as there are several environmental designations that are densely located or overlap.
<b>BRAG ratings of constraints</b>	<p>Within the study area there are 15 environmental constraint types present. Of these, two have a rating of red under the HND methodology after mitigation, four have a rating of amber after mitigation and nine have rating of green after mitigation.</p> <p>The two red rated constraints include:</p> <ul style="list-style-type: none"> <li>• SAC</li> <li>• MCZ</li> </ul> <p>The four amber rated constraints include:</p> <ul style="list-style-type: none"> <li>• SPA</li> <li>• Ramsar Sites</li> <li>• SSSI</li> <li>• NNR</li> </ul> <p>The nine green rated constraints include:</p> <ul style="list-style-type: none"> <li>• Ancient Woodlands</li> <li>• IBAs</li> <li>• RSPB Reserves</li> <li>• Seabirds at Sea Density</li> <li>• UK Grey Seals</li> <li>• UK Harbour Seals</li> <li>• SCANS 3</li> <li>• Fish Spawning Grounds</li> <li>• Fish Nursery Grounds</li> </ul>

As shown on the constraint plan, there are no possible opportunities to avoid all above constraints through construction design and routing. Assessment showed that due to the size and distribution of MCZ and SACs, particularly close to the coast in the southern extremity and central section of this study area is heavily constrained. This constraint is unavoidable within proposed study area. In the first place, priority should be given to areas of highest importance such as all identified MCZs, Thanet Coast SAC and Margate and Long Sands SAC. There are potential opportunities to avoid interaction with above mentioned high important SACs by considering route between/east of the identified high importance constrained areas.

However, in this case intersection with the Southern North Sea SAC will be inevitable, as it occupies the eastern half of the study area.

An overall amber BRAG rating has been assigned after mitigation measures as although the cluster of environmental receptors means that the western and southern sections of the study area is highly constrained and will require consideration of the mitigation hierarchy with appropriate routing, siting, and buffer zones, there may also be opportunities to mitigate risks. This would be through selective routing/ placement of the cable landfall points and offshore cables to avoid or minimise impacts on sensitive habitats, taking into account ecological connectivity and the preservation of important biodiversity areas.

**2.6.3. Community Summary**

**BRAG Rating with Mitigation measures:**

**A**

There are numerous community constraints in the study area, particularly relating to landscape, historic assets, and fishing areas.

There is one National Landscape in the north of the study area, the position and extent of which does not severely constrain the project and there is potential opportunity for avoidance through the routing process or undergrounding.

In addition, there are numerous other constraints in the onshore north and south sections of the study area including listed buildings, wrecks, scheduled monuments and a large area designated as shellfish waters and therefore these are likely to affect both offshore routing and onshore cable routing around the landfall points with a potential requirement for undergrounding in line with the Holford Rules.

The southern onshore and landfall extents of the study area contain the more populated urban/port areas (namely Felixstowe/Harwich and Margate/Ramsgate). The remainder of the study area is largely offshore. Overall, landfall points around the urban areas appear to have the least constraints if mitigation can be applied and can potentially utilise existing infrastructure.

As explained in Section 1.2.2 (Study Area Environmental and Community Summary BRAG Ratings), the following factors have been considered in determining an overall Community BRAG rating for this Study Area.

Table 2.6.3: Overall Community BRAG rating for the Friston to Richborough Study Area.

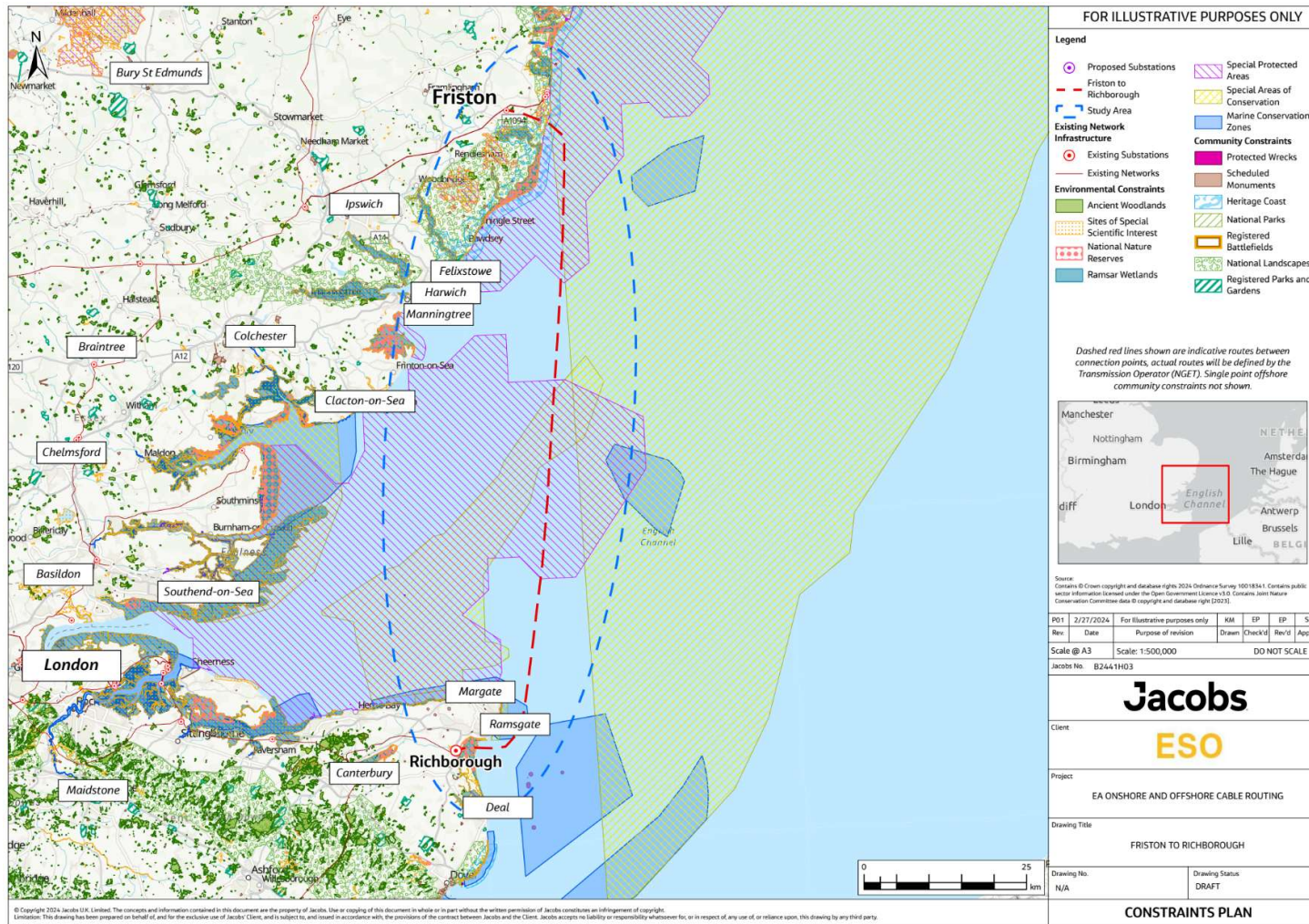
<p><b>Scope of works</b></p>	<p>The works include installing new offshore and onshore cabling and landfall infrastructure that will require some physical changes to the environment and as such, will therefore be affected by the constraints described in the constraints table in Section 2.6.4. This is reflected in the BRAG ratings.</p>
<p><b>Number and area of constraints</b></p>	<p>Within the study area there are 15 different community constraint types present. As noted above, the most constrained area is within the western and southern sections of the study area, as there are several environmental designations that are densely located or overlap.</p>

<p><b>BRAG ratings of constraints</b></p>	<p>Within the study area there are 15 community constraint types present. Of these, zero has a rating of red under the HND methodology after mitigation, two have a rating of amber after mitigation and thirteen have rating of green after mitigation.</p> <p>The two amber rated constraints include:</p> <ul style="list-style-type: none"> <li>• Wreck Locations</li> <li>• Scheduled Monuments</li> </ul> <p>The thirteen green rated constraints include:</p> <ul style="list-style-type: none"> <li>• National Landscapes</li> <li>• Heritage Coasts</li> <li>• Listed Buildings</li> <li>• Registered Parks and Gardens</li> <li>• Protected Wrecks</li> <li>• AQMA</li> <li>• Small Scale Settlements (Noise)</li> <li>• Small Scale Settlements (Socio-Economics)</li> <li>• National Trust Land</li> <li>• RYA sailing and racing areas</li> <li>• Bathing Waters</li> <li>• Shellfish Water</li> <li>• Fishing Activity</li> </ul>
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An amber BRAG rating has been assigned owing to the number and spatial distribution of many onshore key constraints. As shown on the constraints plan avoidance of all of the constraints combined may be challenging, but there are opportunities for detailed route design and construction methodology to reduce the overall impacts.

#### 2.6.4. Constraints Table

The following table details the environmental and community constraints for Friston to Richborough Study Area. It describes the constraints present within the study area, the potential mitigation measures to avoid or reduce risks, and a BRAG rating before and after mitigation has been applied.



**Constraints Plan 6: Study Area Friston to Richborough showing Nationally and Internationally Designated Sites**



Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
<b>Ecology (Environmental)</b>							
Special Area of Conservation (SAC)	Onshore and offshore UK SACs	<p>In the south of the study area there is Thanet Coast SAC.</p> <p>The Margate and Long Sands SAC occupies the southern section and centre part study area.</p> <p>There are several other SACs. In the north of the study area these are:</p> <ul style="list-style-type: none"> <li>- Minsmere To Walberswick Heaths and Marshes SAC,</li> <li>- Alde-Ore and Butley Estuaries SAC,</li> <li>- Orfordness-Shingle Street SAC,</li> <li>- Staverton Park and The Thicks, Wantisden SAC.</li> </ul> <p>The Hamford Water SAC is located on the western edge of the study area.</p> <p>In the south of the study area corridor there is Sandwich Bay SAC. The Southern North Sea SAC</p>	R	R	R	<p>Due to the size and distribution of the SACs, particularly close to the coast in the southern extremity and central section of this study area is heavily constrained. This constraint is unavoidable within proposed study area.</p> <p>This is also in light of designated sensitive receptors such as chalk reef and other benthic habitats which would be directly affected by cable installation towards the landfall points.</p> <p>Consideration would need to be given to the routing/location of the cable landfall points and short sections of onshore cables to avoid negative impacts such as habitat loss and fragmentation, soil erosion and sedimentation. Planning of landward construction activities and access routes should be undertaken, including the implementation of buffer zones as appropriate to avoid associated impacts e.g., relating to access roads and stockpiles. In terms of offshore/coastal effects, consideration should be given to avoiding or minimising impacts on sensitive seabed habitats such as chalk reefs and sandbanks from the cable installation where ploughs or</p>	R

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		occupies the eastern half of the study area.				<p>sledges are used and during operational (e.g., through scour or repair activities requiring sections of cable to be raised if faults occur). A HRA Screening would need to be conducted in the first instance as the route may have a significant effect on the SACs.</p> <p>As a result of the linear nature of cables and limited opportunities for avoidance of this constraint, a red BRAG rating has been applied as this is considered to be a heavily constrained area where detailed route design and construction methodology is required.</p> <p>Areas within the offshore northern and eastern extents of this study area are moderately constrained, the latter during construction/operational maintenance owing to mobile cetaceans.</p>	
cSAC	England and Scotland cSACs	There are no cSACs within the study area.	N/A	N/A	N/A		N/A
SPAs	Onshore and offshore UK SPAs	<p>There are several SPAs within the study area.</p> <p>In the north and west of the study area there are located:</p> <ul style="list-style-type: none"> <li>- Minsmere-Walberswick SPA</li> <li>- Sandlings SPA,</li> <li>- Alde-Ore Estuary SPA,</li> <li>- Deben Estuary SPA,</li> </ul>	A	A	A	<p>Within most sections of the study area there are SPAs which cover areas on land, bays and offshore, which are likely to moderately constrain routing. The opportunities to avoid the offshore SPA: Outer Thames Estuary, are very limited.</p> <p>Construction mitigation in terms of reducing noise and visual disturbance will be required if the route passes close to this constraint</p>	A

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		<ul style="list-style-type: none"> <li>- Stour And Orwell Estuaries SPA,</li> <li>- Hamford Water SPA.</li> </ul> <p>The Thanet Coast and Sandwich Bay SPA is located in the south of the study area.</p> <p>There is in addition one SPA (offshore Marine Components GB) within the proposed study area: Outer Thames Estuary SPA occupying most part of the study area.</p>				<p>(up to 1 km, depending on designated bird species). Consideration would need to be given to wider impacts such as bird migratory routes and proximity to these. There will be opportunities to mitigate risks through various measures, such as using buffer zones, screening during construction and timing of works to avoid sensitive times such as nesting or overwintering birds.</p> <p>There may also be opportunities to mitigate risks to these SPAs through selective routing/placement of the Cable Landfall Points and Offshore/Onshore cables.</p> <p>As a result of the linear nature and limited opportunities for avoidance of this constraint, an amber BRAG rating has been applied as this is considered to be a moderately constrained area where detailed route design and construction methodology is likely to be required.</p>	
pSPA	England and Scotland pSPAs	There are no pSPAs located in the study area.	N/A	N/A	N/A	N/A	N/A
SCIs	SCIs	There are no SCIs located within the study area.	N/A	N/A	N/A	N/A	N/A
Ramsar sites	UK Ramsar sites	There are several Ramsar sites within the study area.	A	A	A	The Ramsar sites are located across an area of the northern and southern sections of the study area.	A

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		<p>In the north and west of the study area these are:</p> <ul style="list-style-type: none"> <li>- Alde-Ore Estuary,</li> <li>- Deben Estuary,</li> <li>- Minsmere-Walberswick,</li> <li>- Hamford Water,</li> <li>- Stour And Orwell Estuaries.</li> </ul> <p>The Thanet Coast and Sandwich Bay Ramsar site is located in the south of the study area.</p>				<p>There are limited opportunities to mitigate risks via avoidance measures during subsequent routing stages, and as designated species are mobile, effects outside of the site may also require mitigation dependent on whether they interact with associated habitats. Consideration should be given to wider impacts during construction in terms of reducing noise and visual disturbance (e.g., through screening) if the route passes close to this constraint (up to 1 km, dependent on bird species) or associated bird migratory and foraging routes.</p> <p>Owing to the large extent of this constraint within the study area, the main mitigation would be through avoidance and implementation of buffer zones via subsequent routing stages, as appropriate.</p> <p>As a result of the linear nature and limited opportunities for avoidance of this constraint, an amber BRAG rating has been applied as this is considered to be a moderately constrained area where detailed route design and construction methodology is likely to be required.</p>	
Proposed Ramsar sites	UK Proposed Ramsar sites	There are no Proposed Ramsar sites located within the study area.	N/A	N/A	N/A	N/A	N/A

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
SSSIs	UK SSSIs	There are numerous SSSIs located within the study area. In the north and west of the study area there are over 10 SSSIs and in the southern section there are two SSSIs.	A	A	A	<p>There are a large number of SSSIs distributed throughout the study area, mostly concentrated in the northern part with the most constrained area around Aldeburgh Bay.</p> <p>Mitigation for these SSSIs must consider routing, including locations of access tracks and buffer zones more acutely to minimise disruption to sensitive areas. This will need detailed planning at the next stage, as well as implementation of best practices during construction in order to avoid impacts on this constraint.</p> <p>As a result of the linear nature and limited opportunities for avoidance of this constraint, an amber BRAG rating has been applied as this is considered to be a moderately constrained area where detailed route design and construction methodology is likely required.</p>	A
NNRs	UK NNRs	There are three NNRs located in this study area: Orfordness-Havergate, Hamford Water and Sandwich and Pegwell Bay.	A	A	A	<p>The majority of this study area is not constrained by an NNR, but there are three NNRs present along the Suffolk and Kent coasts.</p> <p>Therefore, it is necessary to mitigate risks through detailed routing and siting. Planning of construction activities and access routes should be undertaken, including the implementation of buffer zones as</p>	A

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
						<p>appropriate to avoid impacts relating to access roads and construction waste stockpiles.</p> <p>As a result of the sparse distribution and potential opportunities for avoidance of this constraint through routing, an amber BRAG rating has been applied.</p>	
Biosphere Reserves	UK Biosphere Reserves	There are no Biosphere Reserves within the study area.	N/A	N/A	N/A	N/A	N/A
MCZs	UK MCZs	<p>There are four MCZs within the study area:</p> <ul style="list-style-type: none"> <li>- Goodwin Sands,</li> <li>- Thanet Coast,</li> <li>- Kentish Knock East,</li> <li>- Orford Inshore.</li> </ul>	R	R	N/A	<p>Due to the size and distribution of Thanet Coast MCZ, within the southern extremity this study area is heavily constrained.</p> <p>Consideration should be given to the routing/location of the cable landfall points and offshore cables to avoid negative impacts such as seabed sediment and habitat disturbance and sediment suspension, alteration of substrate cover and composition, and hydrodynamic changes.</p> <p>There may also be opportunities to mitigate risks to these MCZs through selective routing/ placement of the Cable Landfall Points and Offshore cables to avoid or minimise impacts on sensitive habitats, taking into account ecological connectivity and the preservation of important biodiversity areas.</p>	R

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
						As a result of the linear nature and limited opportunities for avoidance of this constraint, a red BRAG rating has been applied as this is considered to be a heavily constrained area where detailed route design and construction methodology is required.	
Highly Protected Marine Areas (HPMA)	Digitised from HPMA consultation documents	There are no HPMA within the study area.	N/A	N/A	N/A	N/A	N/A
Ancient Woodlands	UK Ancient Woodlands	There are many small ancient woodlands within the north of the study area. But no ancient woodlands located on the coastline, the nearest is north of the study area at Dunwich (Greyfriars Wood).	N/A	N/A	A	There are ancient woodlands located within the northern onshore part of this study area, however there are no coastal areas within the study area that are constrained by ancient woodland. Opportunity exists in the next stage to mitigate any risks further inland through the routing process so that connections to the cable landfall points do not cross areas of ancient woodland. A green BRAG has been assigned in view of there being no constraints for the coastal aspects of the routing associated with this constraint.	G
IBAs	UK IBAs	There are several Important Bird Areas within the study area. In the north and west of the study area there are located:	G	G	G	There are large stretches of coastal IBAs associated with this study area that will need to be avoided and therefore represent a constraint to the majority the study area's coastal infrastructure.	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		<ul style="list-style-type: none"> <li>- Alde-Ore Estuary,</li> <li>- Deben Estuary,</li> <li>- Minsmere-Walberswick,</li> <li>- Hamford Water,</li> <li>- Stour And Orwell Estuaries,</li> <li>- Suffolk Sandlings.</li> </ul> <p>Thanet Coast and Sandwich is located in the south of the study area.</p>				<p>Consideration should be given to wider impacts such as during construction of cable landfall points and offshore cables in terms of interaction risk with landfall infrastructure or vessels (implement interaction risk mitigation measures, such as effective deterrent systems, monitoring, and operational procedures, to minimise the potential for bird interactions).</p> <p>During construction of Onshore cables if routed close by, bird usage of the area would need to be considered where any disturbance risks are identified. Construction activities may result in the direct removal or destruction of bird nests. Displacement from nesting sites can disrupt breeding patterns and affect reproductive success.</p> <p>Consideration would need to be given to conduct nesting surveys prior to construction to identify active nests and breeding sites. Measures would need to be implemented to avoid and create buffer zones around active nests, ensuring that appropriate timing and methods are used to minimise disturbance. Alternative nesting structures or nearby suitable habitats should be installed or created to compensate for any loss of nesting sites.</p> <p>Construction activities should be scheduled to avoid critical periods for breeding, nesting</p>	



Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
						<p>and migration of sensitive species. Foraging areas will also be avoided through the detailed routing process.</p> <p>A green BRAG has been assigned in view as although this is considered to be a highly constrained area that there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	
RSPB Reserves	UK RSPB Reserves	<p>There are four UK RSPB Reserves within the study area.</p> <p>The North Warren, Snape and Havergate Island, Minsmere and Boyton Marshes are located in the north.</p>	G	G	G	<p>Onshore cables development may be constrained by RSPB Reserves due to excavation activities which lead to soil disturbance, vegetation removal and indirect risks via disturbance during construction (i.e., noise/lighting).</p> <p>During construction of onshore cables if routed close by, bird usage of the area would need to be considered where any disturbance risks are identified. Construction activities may result in the direct removal or destruction of bird nests. Displacement from nesting sites can disrupt breeding patterns and affect reproductive success.</p> <p>Consideration should be given to conduct nesting surveys prior to construction to identify active nests and breeding sites.</p> <p>Measures would need to be implemented to avoid and create buffer zones around active nests, ensuring that appropriate timing and</p>	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
						<p>methods are used to minimise disturbance. Alternative nesting structures or nearby suitable habitats should be installed or created to compensate for any loss of nesting sites.</p> <p>Construction activities should be scheduled to avoid critical periods for breeding, nesting and migration of sensitive species. Foraging areas will also be avoided through the detailed routing process.</p> <p>A green BRAG has been assigned in view as this is considered to be a lightly constrained area and that there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	
Seabirds at Sea Density (Summer/Winter)	UK Seabirds at Sea Density		G	N/A	N/A	<p>There are European seabird at sea records throughout the study area, with the highest density of records towards the northern boundary. These data would need to be used at the detailed design stage where there may be sensitive species and corresponding periods where construction mitigation is required. Construction activities should be scheduled to avoid critical periods and areas e.g., for foraging during breeding season and key migration routes of sensitive species. This will occur during the detailed routing process.</p>	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
						A green BRAG has been assigned as it is considered that there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.	
Annex 1 Reefs outside designated areas	UK Annex 1 Reefs	There are no Annex 1 Reefs polygon or point records outside the designated areas.	N/A	N/A	N/A	N/A	N/A
Annex 1 Sandbanks outside designated areas	UK Annex 1 Sandbanks	There are Annex 1 Sandbanks which are slightly covered by seawater all of the time polygon or point records outside the designated areas.	N/A	N/A	N/A	N/A	N/A
Annex 1 Submarine Structures outside designated areas	UK Annex 1 Submarine Structures	There are no Annex 1 Submarine structures made by leaking gas polygon or point records outside the designated areas.	N/A	N/A	N/A	N/A	N/A
Annex 1 Saltmarsh outside designated areas	UK Annex 1 Saltmarsh	There are no Annex 1 Saltmarsh polygon or point records outside the designated areas.	N/A	N/A	N/A	N/A	N/A
UK Grey Seals	UK Grey Seal - High density	There is one small grey seal breeding colony: Goodwin Sands in the south of study area.	G	G	N/A	Consideration should be given to the routing/location of the cable landfall points and offshore cables to avoid negative impacts such as noise and visual disturbance,	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
						<p>alteration of foraging and haul out habitat, displacement of individuals from breeding areas and interaction risk.</p> <p>For noise and vibrations this will include implementing best practice such as the use of marine mammal observers and noise reduction measures. Interaction risk mitigation measures, such as effective deterrent systems, monitoring and operational procedures will reduce the potential for effects on seals.</p> <p>As there may be opportunities to mitigate risks through selective routing/placement of the cable landfall points and offshore cables to avoid or minimise impacts on associated habitats and breeding areas, a green BRAG has been assigned.</p>	
UK Harbour Seals	UK Harbour Seal – High density	<p>Within the study area, harbour seals are present in the following densities per location:</p> <ul style="list-style-type: none"> <li>- 12 locations with between 1-10 harbour seal count</li> <li>- 2 locations with between 11-20 harbour seal count</li> <li>- 1 location with between 21-40 harbour seal count</li> <li>- 1 location with between 41-80 harbour seal count</li> </ul>	G	G	N/A	<p>Consideration should be given to the routing/location of the cable landfall points and offshore cables to avoid negative impacts such as noise and visual disturbance, alteration of foraging and haul out habitat, displacement of individuals and interaction risk.</p> <p>For noise and vibration impacts this will include implementing best practice such as the use of marine mammal observers and noise reduction measures. Interaction risk mitigation measures, such as effective</p>	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		- 1 location with between 81 -160 harbour seal count.				deterrent systems, monitoring and operational procedures will reduce the potential for effects on seals. As there may be opportunities to mitigate risks through selective routing/placement of the cable landfall points and offshore cables to avoid or minimise impacts on associated habitats and breeding areas, a green BRAG has been assigned.	
SCANS 3 (marine mammal densities)		Pilot whale – Low density (0.0-0.1 animals per km <sup>2</sup> ) Minke whale – Low density (0.0-0.01 animals per km <sup>2</sup> ) Harbour porpoise – Low density (0.25-0.5 animals per km <sup>2</sup> ) Fin whale – Low density (0.0-0.025 animals per km <sup>2</sup> ) Common dolphin – Low density (0.0-0.07 animals per km <sup>2</sup> ) Common and or striped dolphin – Low density (0.0-0.04 animals per km <sup>2</sup> ) Bottlenose dolphin – Low density (0.0-0.025 animals per km <sup>2</sup> )	G	G	N/A	Consideration should be given to the routing/location of the cable landfall points and offshore cables to avoid negative impacts on foraging areas such as seabed disturbance, alteration of substrate cover and composition, hydrodynamic changes, as well as disturbance, displacement, and interaction risk for cetaceans. For noise and vibration impacts this will include implementing construction and operational maintenance best practice such as the use of marine mammal observers and noise reduction measures. Interaction risk mitigation measures, such as effective deterrent systems, monitoring and operational procedures will reduce the potential for effects on cetaceans. A green BRAG has therefore been assigned in view of the above and that there are many opportunities to mitigate the risks associated	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		<p>Beaked whales – Low density (0.0-0.1 animals per km<sup>2</sup>)</p> <p>Striped dolphin – Low density (0.0-0.05 animals per km<sup>2</sup>)</p> <p>White beaked dolphin – Low density (0.0-0.05 animals per km<sup>2</sup>)</p>				with this constraint, with detailed routing and construction best practices.	
Fish spawning grounds	UK Fish spawning grounds 2010	<p>Within the study area there are spawning grounds for species such as cod, sand eel, Dover sole and plaice.</p> <p>Overall, there are multiple records of spawning ground locations with the study area.</p>	G	N/A	N/A	<p>Consideration should be given to the routing/location of the offshore cables to avoid negative impacts on spawning areas such as minimising seabed disturbance, alteration of substrate cover and composition, hydrodynamic changes and general disturbance.</p> <p>Consideration would need to be given to wider impacts during construction in terms of reducing noise and vibrations (e.g., implement best practices to minimise underwater noise, including the use of noise mitigation measures and construction methodologies that reduce disturbance to fish).</p> <p>A green BRAG has been assigned in view as there are many opportunities to mitigate the risks associated with this constraint with detailed routing and construction best practices.</p>	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
Fish nursery grounds	UK Fish Nursery grounds 2010	Within the study area there are nursery grounds for species such as cod, tope shark, herring, mackerel, plaice, sole, sand eel, thornback ray and whiting. There are multiple records of nursery ground locations with the study area.	G	N/A	N/A	<p>Consideration should be given to the routing/location of the offshore cables to avoid negative impacts on nursery areas such as minimising seabed disturbance, alteration of substrate cover and composition, hydrodynamic changes and general disturbance.</p> <p>Consideration would need to be given to wider impacts during construction in terms of reducing noise and vibration (e.g., implement best practices to minimise underwater noise, including the use of noise mitigation measures and construction methodologies that reduce disturbance to fish).</p> <p>A green BRAG has been assigned in view as there are many opportunities to mitigate the risks associated with this constraint with detailed routing and construction best practices.</p>	G
<b>Geology and Soils (Environmental)</b>							
Geoparks	UK Geoparks	There are no UNESCO Global Geoparks within the study area.	N/A	N/A	N/A	N/A	N/A
<b>Landscape and Visual (Community)</b>							
National Parks	UK National Parks	There are no National Parks within this study area.	N/A	N/A	N/A	N/A	N/A

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
National Landscapes	England National Landscapes	There is one National Landscape within the study area. Suffolk Coast and Heaths National Landscape is located in the north of the study area.	N/A	A	A	<p>The northern sector of this study area is moderately constrained by Suffolk Coast and Heaths National Landscape.</p> <p>While underground cables onshore cables are less visually prominent compared to overhead lines, the construction and maintenance of landfall infrastructure can still have visual impacts on the surrounding area.</p> <p>The most suitable route to be identified for onshore cables and landfall infrastructure will consider existing coastal land use and environmental sensitivities, also to explore opportunities to co-locate cables with existing coastal infrastructure corridors, such as roadways and utility corridors, to minimise the need for additional land acquisition or disruption.</p> <p>During operations, depending on the location there may be periodic vegetation management activities, such as tree trimming or clearing around access points, to ensure the integrity and accessibility of the underground cables. These activities may have temporary visual impacts.</p> <p>As a mitigation there should be implementation of appropriate landscaping strategies, such as the planting of trees, shrubs, or other vegetation, to visually</p>	G



Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
						<p>integrate infrastructure elements, such as landfall installations, into the surrounding environment. The design guidelines or standards should be adhered to that aim to minimise visual impacts during the installation and operation of underground cable systems. This can include considerations for equipment placement, surface installations, and landscaping.</p> <p>A green BRAG has been assigned in view as this is considered to be a moderately constrained area and there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	
Heritage Coasts	England Heritage Coasts	The Suffolk Heritage Coast is located in the north of the study area.	N/A	A	A	<p>The northern sector of this study area is moderately constrained by Suffolk Heritage Coast.</p> <p>While underground cables are less visually prominent compared to overhead lines, the construction and maintenance landfall infrastructure can still have visual impacts on the surrounding area.</p> <p>The most suitable location for landfall infrastructure and coastal onshore cables will consider existing land use and environmental sensitivities, and also will explore opportunities to co-locate cables with existing infrastructure corridors, such as</p>	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
						<p>roadways and utility corridors, to minimise the need for additional land acquisition or disruption.</p> <p>During operations, depending on the location there may be periodic vegetation management activities, such as tree trimming or clearing around access points, to ensure the integrity and accessibility of the underground cables. These activities may have temporary visual impacts.</p> <p>There should be implementation of appropriate landscaping strategies, such as the planting of trees, shrubs, or other vegetation, to visually integrate infrastructure elements, such landfall installations, into the surrounding environment. The design guidelines or standards should be adhered to, that aim to minimise visual impacts during the installation and operation of underground cable systems. This can include considerations for equipment placement, surface installations, and landscaping.</p> <p>A green BRAG has been assigned as this is considered to be a moderately constrained area and there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
National Trails	England National Trails	There are no National Trails within the study area.	N/A	N/A	N/A	N/A	N/A
<b>Historic Environment (Community)</b>							
World Heritage Sites	UK World Heritage Sites	There are no World Heritage Sites within the study area.	N/A	N/A	N/A	N/A	N/A
Scheduled Monuments	UK Scheduled Monuments	Within the study area there are multiple Scheduled Monuments.	R	R	R	Offshore/onshore cables and cable landfall points/routing has the potential to be constrained by Scheduled Monuments due to the risk construction works may have upon the feature and/or associated archaeological features. Due to this, without mitigation the distribution of Scheduled Monuments in the north and south sections of study area is likely to constrain overall routing and require consideration of the mitigation hierarchy. It is considered that there are opportunities to mitigate risks to the individual Scheduled Monuments in the study area through the routing and siting process, including implementation of buffer zones. The areas surrounding the Scheduled Monuments may also require mitigation when carrying out groundworks, due to the potential presence of undiscovered associated features (i.e., archaeological remains). Consultation with Historic England	A

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
						<p>would need to be required to determine the most appropriate mitigation.</p> <p>It may be possible to avoid direct risks to Scheduled Monuments, but due to their distribution along the coastline in the study area, indirect risks may be more difficult to avoid.</p> <p>As a result of the opportunities for avoidance of this constraint in the area, an amber BRAG rating has been applied as this is considered to be a heavily constrained area where detailed route design and construction methodology is required.</p>	
Listed Buildings	UK listed buildings (Grade I, II* and II listed buildings)	There are an extensive number of listed buildings throughout the north and south sections of study area, including Grade I, Grade II*, and Grade II.	N/A	A	A	<p>Offshore/onshore cables and cable landfall points/routing may be moderately constrained by listed buildings due to the risk of physical loss or damage to the building, or indirectly via disturbance to the listed building's setting. There may also be risks to the curtilage (the area around, or any other building that is around and associated with a listed building).</p> <p>Whilst there is a large number of Listed Buildings within the coastal sector of the study area, opportunity exists in the next stages to reduce direct risks through the routing and siting process.</p> <p>Works and transport routes need to be considered in terms of their proximity to</p>	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
						<p>listed buildings near the highway (e.g., accidental damage risk from HGVs in narrow lanes or other restricted areas) or groundworks (i.e., if any vibration generating works are close enough to cause damage to buildings).</p> <p>A green BRAG has been assigned in view as although this is considered to be a moderately constrained area, there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	
Registered Parks and Gardens and Designed Landscape	Registered Parks and Gardens	Within the coastal sector of the study area there are three Registered Parks and Gardens.	N/A	G	G	<p>Given the limited areas covered by Registered Parks and Gardens, through careful design and construction planning, avoiding/ mitigating direct and indirect adverse risks the sites are not considered to constrain the development of the option.</p> <p>As a result of the low density distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	G
Wreck locations	UK wreck locations	There are multiple wreck locations in the south section of the study area.	R	R	N/A	<p>It is important that the proposed route avoids disturbing known or suspected wrecks, especially where there might be caches of unexploded ordnance.</p> <p>As a result of the number of wrecks and requirement for avoidance of this constraint through routing and potential further</p>	A

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
						investigations, an amber BRAG rating has been applied.	
Protected wrecks	England protected wrecks	South Edinburgh Channel protected wreck site is within the study area.	G	G	N/A	Given the limited number of protected wreck sites, through careful design and construction planning, avoiding/ mitigating direct and indirect adverse risks the sites are not considered to constrain the development of the option. As a result of the low density distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.	G
Ship Hulk	Other obstructions (ship hulk)	There are no ship hulks recorded within the study area	N/A	N/A	N/A	N/A	N/A
Registered Battlefields	England Registered Battlefields	There are no Registered Battlefields within the study area.	N/A	N/A	N/A	N/A	N/A
<b>Air Quality (Community)</b>							
AQMAs	UK AQMAs	There is one AQMA within the study area. Thanet Urban AQMA is located in the south and encompasses a number of urban areas within Thanet.	N/A	N/A	G	Given the small portion of the study area covered by AQMA, through careful design and construction planning, avoiding/ mitigating direct and indirect adverse risks the sites are not considered to constrain the development of the option. As a result of the low density distribution and potential opportunities for avoidance of this	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
						constraint through routing, a green BRAG rating has been applied.	
<b>Noise (Community)</b>							
Major Settlements	UK Major Urban Settlements	Within the study area, much of the study area is offshore, the coastal land environment within the study area is mainly in a natural/rural setting. There are no major urban settlements located within the study area. Built up areas comprise Margate/Ramsgate, Felixstowe and Harwich.	N/A	N/A	N/A	N/A	N/A
Small Scale Settlements	UK Small Scale Urban Settlements	Within the study area, there are several small scale settlements.	N/A	G	G	There is potential for the construction of onshore cables and cable landfall points to generate noise during construction, and operation that would affect residents of the built up areas, including within Noise Important Areas. Owing to the small area covered by settlements it is considered that any potential construction and noise impacts could be effectively controlled through appropriate routing and the use of best practice mitigation measures such as a CEMP. Operational noise would also require	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
						further consideration at the next stage of the option development process. As a result of the distribution and potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.	
<b>Socio-Economics (Community)</b>							
Major Settlements	UK Major Urban Settlements (Socio-Economics)	Within the study area, much of the study area is offshore, the coastal land environment within the study area is mainly in a natural/rural setting. There are no Major Urban Settlements located within the study area. Built up areas comprise Margate/Ramsgate, Felixstowe and Harwich.	N/A	N/A	N/A	N/A	N/A
Small Scale Settlements	UK Small Scale Urban Settlements	Within the study area, there are several small scale settlements.	N/A	G	G	There is potential for the construction of onshore cables and cable landfall points to impact residents as a result of changes to visual amenity. Constraints to the positioning of landfall infrastructure and onshore cables are associated with the socio-economic aspects of these settlements. Residents may have concerns about the health risks of new onshore cables in the	G



Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
						<p>vicinity of their houses and schools and therefore public information events should be held and leaflets produced to reduce any concerns.</p> <p>Potential positive impacts of this reinforcement may include employment generation during construction.</p> <p>Mitigation should carefully consider the tourism and recreation socio-economic sensitivities of the study area and seek to mitigate risks to key receptors associated with the settlements. This will be applicable in the construction and operational stages.</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.</p>	
National Trust Land	National Trust Open Land and Limited Access Land	<p>There are several areas of National Trust Land within this study area. Orford Ness and Part of Orford Beach are located in the north of study area.</p> <p>In the south section there are: Land lying east of Sandwich Road, Land at River Stout, Pegwell Bay and Saltings, Sandwich Bay.</p>	N/A	A	A	<p>There is potential for these sites to constrain development of this option due to the potential for direct and indirect risks, such as loss of land.</p> <p>Opportunity exists in the next stages to mitigate risks through the routing process and therefore the presence of National Trust Land is not considered a major constraint to the option. There may be a risk on setting and temporary construction disturbance</p>	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
						depending upon the location of the route, which should be carefully considered. As a result of the low-density distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.	
RYA sailing and racing areas	RYA sailing and racing areas	<p>There are 70 sailing/yacht clubs locations in the north and west sections of the study area.</p> <p>There are two yacht clubs, two sailing clubs, one windsurfing club and sea school located in the south section of study area.</p> <p>The Automatic Identification Systems (AIS) intensity is low/medium through study area.</p>	G	G	N/A	<p>Construction activities may temporarily affect sailing activities, particularly in coastal areas near cable landing points (e.g. higher intensity inshore recreational/local club sailing and racing) but also offshore installation areas where there may be lower density sailing and racing. Limited access to certain areas may affect the community, sailing activities and associated tourism. Construction and operational maintenance activities will be conducted with the aim of avoiding RYA sailing and racing areas and also providing appropriate notice to mariners and exclusion zones. The RYA's Coastal Atlas would need to be used to inform the detailed routing.</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.</p>	G
Bathing waters	UK Bathing Waters	There are approximately 20 Bathing water locations within the study area. These	G	G	N/A	Construction activities may temporarily disrupt the daily life of local communities, particularly in coastal areas near cable	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		are mostly concentrated in south by Isle of Thanet and on the western edge of the study area.				<p>landing points or onshore infrastructure sites. Limited access to certain areas and potential public perception of changes to bathing water appearance (e.g., through suspension of sediments and appearance of surface foams/scum rather than affecting bathing water quality through release of faecal indicator organisms) during construction may reduce bathing activities and tourism. Bathing waters may be avoided during the detailed routing stage and mitigation measures implemented through reducing sediment disturbance.</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.</p>	
Shellfish waters	Shellfish waters	There are seven shellfish water locations: Alde, Butley River, Deben, Margate, Outer Thames, Swalecliffe and Walton Backwaters.	G	G	N/A	<p>The south and east of the study area has the greatest constraint, particularly owing to the location of the Outer Thames Shellfish Water. Offshore cabling and landfall construction may damage shellfish beds, reduce water quality through suspended sediment release and interfere with harvesting activities.</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through routing to the west and best practice mitigation measures implemented to reduce</p>	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
						the footprint and sediment disturbance, a green BRAG rating has been applied.	
Fishing activity	UK Fishing activity – Areas of high intensity fishing effort	<p>The fishing effort within the study area comprises the following:</p> <ul style="list-style-type: none"> <li>- demersal species – Medium/High,</li> <li>- pelagic species – Low,</li> <li>- of shrimp trawlers – none,</li> <li>- static gears – High,</li> <li>- beam trawl – Low/Medium.</li> </ul> <p>International Fishing Effort of North Sea beam trawl (1995) within the study area is Medium/High.</p>	G	G	N/A	<p>The presence of offshore HVDC infrastructure and maintenance vessels can impact traditional fishing grounds and disrupt other maritime activities, potentially affecting the livelihoods and economic activities of coastal communities.</p> <p>Consideration should be given to engage with local fishing communities and relevant stakeholders during the planning and design phases to understand their concerns and identify measures to minimise impacts. Compensation measures to mitigate economic losses should be considered.</p> <p>There is a need to establish communication channels to coordinate with fishers and ensure their safety and access to fishing areas during maintenance options.</p> <p>As a result of potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.</p>	G
Marine Fish Farms	UK Seawater Finfish Farms	UK marine finfish farms are located primarily in Scotland and the west coast.	N/A	N/A	N/A	N/A	N/A

## 2.7. Norwich to Bramford Study Area (OHL)

Start point	End point	Applicable to shortlisted designs:
Norwich	Bramford	Yes

### 2.7.1. Reinforcement Details

Reinforcement type (if known)	Reinforcement Length (if known)
AC OHL	N/A
Technology assumptions	

This reinforcement includes a new circuit of 400 kV AC OHL between Norwich and Bramford.

### 2.7.2. Environmental Summary

BRAG rating with mitigation measures: **G**

The study area includes several environmental constraints, including national and international designations. Key constraints include the presence of National Flood Zones (Zone 2 and Zone 3).

There are a large number of National Flood Zones (Flood Zones 2 and 3) which broadly follow the numerous surface water features in the area. This requires detailed design considerations for the installation and location of pylons within floodplains, as well as planning of construction activities to ensure no increased flood levels arise from the loss of floodplain storage.

There are also minor constraints within this study area presented by:

- SACs,
- SPAs,
- Ramsar sites,
- SSSIs,
- NNRs,
- Ancient Woodland,
- IBAs,
- RSPB Reserves,
- UK Peatland,
- Historic Landfill sites.

These ecological and hydrological constraints occupy small areas throughout the study area, as shown on the constraints plan. Meaning that opportunities for avoidance and risk mitigation during both construction and operation may be successful through:

- Detailed routing,
- Buffer zones,
- Effective CEMPs
- Consideration of the mitigation hierarchy in subsequent design stages.

As explained in Section 1.2.2 (Study Area Environmental and Community Summary BRAG Ratings), the following factors have been considered in determining an overall Environmental BRAG rating for this Study Area.

Table 2.7.2: Overall Environmental BRAG rating for the Norwich to Bramford Study Area.

<b>Scope of works</b>	This reinforcement includes a new circuit of 400 kV AC OHL between Norwich and Bramford that will require some physical changes to the environment and as such, will therefore be affected by the constraints described in the constraints table in Section 2.7.4. This is reflected in the BRAG ratings.
<b>Number and area of constraints</b>	Within the study area there are 11 different environmental constraint types present. As noted above, the most constraining feature is the large number of National Flood Zones (Flood Zones 2 and 3) which broadly follow the numerous surface water features in the area. Other minor constraints occupy small areas throughout the study area, as shown on the constraints plan.
<b>BRAG ratings of constraints</b>	<p>Within the study area there are 11 environmental constraint types present. Of these, zero have a rating of red under the HND methodology after mitigation, one has a rating of amber after mitigation and ten have rating of green after mitigation.</p> <p>The one amber rated constraints include:</p> <ul style="list-style-type: none"> <li>• National Flood Zones</li> </ul> <p>The ten green rated constraints include:</p> <ul style="list-style-type: none"> <li>• SACs</li> <li>• SPAs</li> <li>• Ramsar Sites</li> <li>• SSSIs</li> <li>• NNRs</li> <li>• Ancient Woodland</li> <li>• IBAs</li> <li>• RSPB Reserves</li> <li>• Peatlands</li> <li>• Former Landfill Sites</li> </ul>

This study area has been given a green BRAG rating. Constraints are distributed in small clusters throughout the study area. Avoidance of all areas of river flood risk may not be possible, but due to this study area being relatively large, opportunities for avoidance of all the remaining constraints combined should be possible through rerouting and detailed design.

<p><b>2.7.3. Community Summary</b></p>	<p><b>BRAG rating with mitigation measures:</b> <b>A</b></p>
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There are several community constraints within the Norwich to Bramford Study Area, including national designations.

Key constraints include Major Urban Settlements, Small Urban Settlements and Scheduled Monuments. These community designations present moderate community constraints that are likely to require detailed routing considerations and the implementation of mitigation measures. For example, there are two Major Urban Settlements located at Ipswich, and Norwich, as well as multiple small settlements distributed throughout the study area. There is potential for the operation and construction of this reinforcement to disrupt residents as a result of changes to visual amenity. There are opportunities to mitigate direct risks through selective routing, vegetation screening and landscaping, and using innovative tower designs, which involve considering potential alternative pylon designs that are less visually intrusive compared to standard pylons.

At the next stage, to avoid risks to the Scheduled Monuments, routing and siting of pylons and further mitigation measures should be considered.

Further minor constraints within the study area include the Broads National Park, Suffolk Coast and Heaths National Landscape, Listed Buildings, Registered Parks and Gardens, AQMAs, Major Urban Settlements (Noise), and National Trust Land. These constraints are distributed in small clusters throughout the study area, so they may be easily avoided through selective routing and siting of pylons.

As explained in Section 1.2.2 (Study Area Environmental and Community Summary BRAG Ratings), the following factors have been considered in determining an overall Community BRAG rating for this Study Area.

Table 2.7.3: Overall Community BRAG rating for the Norwich to Bramford Study Area.

<b>Scope of works</b>	This reinforcement includes a new circuit of 400 kV AC OHL between Norwich and Bramford that will require some physical changes to the environment and as such, will therefore be affected by the constraints described in the constraints table in Section 2.7.4. This is reflected in the BRAG ratings.
<b>Number and area of constraints</b>	Within the study area there are 11 different community constraint types present. As noted above, constraints are sparsely distributed throughout the study area, as seen on the constraints plan.
<b>BRAG ratings of constraints</b>	<p>Within the study area there are 11 community constraint types present. Of these, one has a rating of red under the HND methodology after mitigation, three have a rating of amber after mitigation and seven a rating of green after mitigation.</p> <p>The one red rated constraint include:</p> <ul style="list-style-type: none"> <li>• Small Scale Settlements (Socio-Economics)</li> </ul> <p>The three amber rated constraints include:</p> <ul style="list-style-type: none"> <li>• Scheduled Monuments</li> <li>• Small Scale Settlements (Noise)</li> <li>• Major Settlements (Socio-Economics)</li> </ul> <p>The seven green rated constraints include:</p> <ul style="list-style-type: none"> <li>• National Parks</li> <li>• National Landscapes</li> <li>• Listed Buildings</li> </ul>

	<ul style="list-style-type: none"><li>• Registered Parks and Gardens</li><li>• AQMA</li><li>• Major Settlements (Noise)</li><li>• National Trust Land</li></ul>
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An amber BRAG rating has been assigned due to small settlements being distributed across the whole study area. As shown on the constraints plan avoidance of all of the constraints combined may be challenging, but there are opportunities for detailed route design and construction methodology to reduce the overall impacts. Any mitigation measures to minimise the visual impacts should be implemented, however these are likely to only be partially successful.

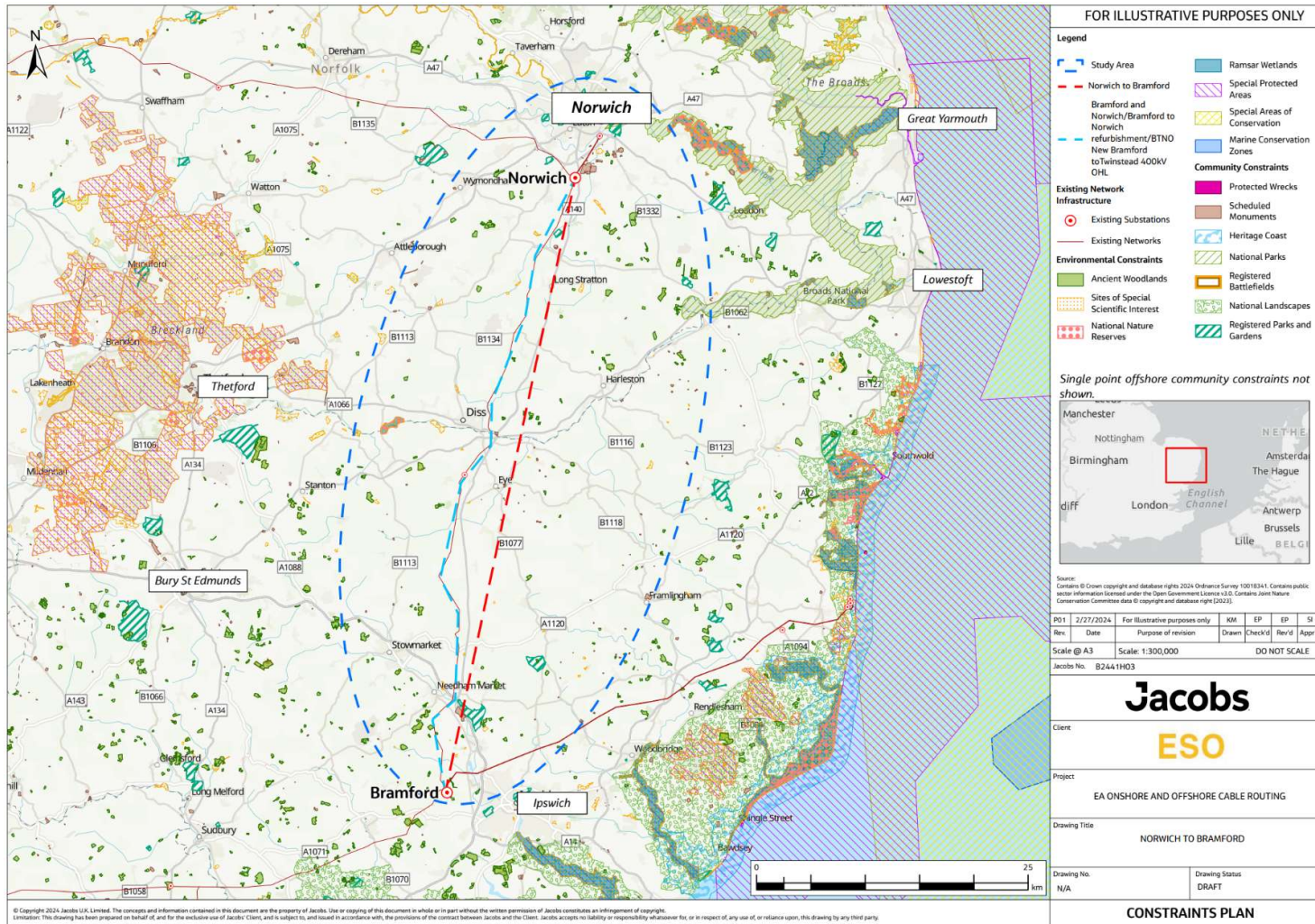
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### 2.7.4. Constraints Table

The following constraints table describes the environmental and community constraints associated with Norwich to Bramford Study Area. It describes the constraints present within the study area, the potential measures to mitigate risks, and a BRAG rating before and after mitigation measures have been applied.

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**Constraints Plan 7: Study Area Norwich to Bramford showing Nationally and Internationally Designated Sites**

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
<b>Ecology (Environmental)</b>					
SACs	Onshore and offshore UK SACs	There are three SACs within the study area. Small SACs areas include The Broads, Norfolk Valley Fens, and River Wensum, all located in the northern part of study area.	R	<p>With consideration of the limited extent of SACs within the study area, very small sections of the northern regions of the study area are the most heavily constrained.</p> <p>These SACs are contained in small pockets which may be easily avoided with selective routing of OHL. This would likely avoid negative impacts such as habitat loss and fragmentation, soil erosion and sedimentation. Further to this, best practice construction measures should be implemented, and dependent on the route, a HRA Screening is likely to be required if the route could have a significant effect on the SAC.</p> <p>An green BRAG rating has been assigned in view there are opportunities to avoid sensitive areas and other mitigation measures for construction activities.</p>	G
cSACs	England cSACs	There are no cSACs located in the study area.	N/A	N/A	N/A
SPAs	Onshore and offshore UK SPAs	There are two SPAs within the study area. Small area of Broadland SPA is located on the north-east boundary of study area and small part of Stour and Orwell Estuaries SPA occupy south-east part of study area.	R	<p>The small areas of onshore SPAs that present a constraint may be easily avoided through selective routing and buffer zones.</p> <p>Construction mitigation in terms of reducing noise and visual disturbance will be required if the route passes close to this constraint (up to 1 km, depending on designated bird species). Consideration should be given to wider impacts such as bird migratory routes and proximity to these. There will be opportunities to mitigate risks through various measures, such as using buffer zones, screening during construction and timing of works to avoid sensitive times such as nesting or overwintering birds.</p>	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				A green BRAG rating has been assigned in view there are opportunities to avoid sensitive areas and other mitigation measures for construction activities.	
pSPAs	England pSPAs	There are no pSPAs located in the study area.	N/A	N/A	N/A
SCIs	SCIs	There are no SCIs located within the study area.	N/A	N/A	N/A
Ramsar sites	UK Ramsar sites	There are two Ramsar sites within the study area. Small area of Broadland is located on the north-east boundary of study area and small part of Stour and Orwell Estuaries occupy south-east part of study area.	R	<p>The Ramsar sites are only partially located within the study area and constrain only small portions of the study area. The small areas of Ramsar that present a constraint may be easily avoided through selective routing and buffer zones.</p> <p>There will be opportunities to mitigate risks through various measures, such as using buffer zones, screening during construction and timing of works to avoid sensitive times such as nesting or overwintering birds.</p> <p>In light of the opportunities for avoidance through routing and mitigation measures, as well as consideration of the mobile/ migratory features associated with this constraint, a green BRAG rating has been assigned</p>	G
Proposed Ramsar sites	UK Proposed Ramsar sites	There are no Proposed Ramsar sites located within the study area.	N/A	N/A	N/A
SSSIs	UK SSSIs	There are many small SSSIs located throughout the study area, that	R	Numerous SSSIs are distributed throughout the study area. Due to the small size and distribution of this constraint there are possible opportunities to avoid interaction with these SSSIs by selective routing.	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		present high areas of constraint.		Mitigation through routing and/or buffer zones to minimise disruption to sensitive areas will need detailed planning at the next stage, as well as implementing best practices during construction in order to avoid impacts on this constraint. A green BRAG has been assigned, as the size and distribution of SSSIs within the study area allows for consideration of routing opportunities to avoid this constraint.	
NNRs	UK NNRs	There is one NNR within the study area: Mid-Yare NNR.	A	The Mid-Yare NNR is only partially located within the study area and constrain only small north-east portion of the study area. There are significant sections of the study area that are not affected by NNRs. The small area of NNR that present a constraint may be easily avoided through selective routing and implementing buffer zone so that this site can be avoided. As a result of the distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.	G
Biosphere Reserves	UK Biosphere Reserves	There are no Biosphere Reserves within the study area.	N/A	N/A	N/A
Ancient Woodlands	UK Ancient Woodlands	There are multiple small areas of Ancient Woodland throughout the study area. The southern half of the study area has a higher concentration of Ancient Woodland, but	R	There are multiple sections of the study area that are constrained by sparsely distributed Ancient Woodland, in particular the southern sector. There are opportunities to mitigate risks through the routing process so that the pylons and OHLs do not cross areas of Ancient Woodland. Any risks during construction could be controlled through appropriate construction environmental management practices,	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		pockets remain small throughout.		for example in relation to the siting of access routes and implementing buffer zones around ancient woodland areas. A green BRAG has been assigned with consideration for the sparse distribution of this constraint, and the fact that there are many opportunities to mitigate risks through routing and best practice construction measures.	
IBAs	UK IBAs	There are two IBAs within the study area. Small area of Broadland is located on the north-east boundary of study area and small part of Stour and Orwell Estuaries occupy south-east part of study area.	G	OHL development may be constrained by IBAs directly due to the risk of habitat loss, indirectly via disturbance during construction (i.e., noise/lighting) or via disturbance to flight paths once operational. Connections between sites and bird flight paths would need to be considered including for construction and maintenance activities. OHLs can cause displacement and barrier effects as birds are deterred from using their normal routes to feeding or roosting grounds. There will be opportunities to mitigate risks through various measures, such as using buffer zones, screening during construction and timing of works to avoid sensitive times such as nesting or overwintering birds. If routed close by (up to 1 km, dependent on species), bird usage of the area would need to be considered where any disturbance risks are identified. Operational mitigation such as bird-friendly power line designs may be required for OHL. During construction, noise impacts and visual disturbance risks will need to be considered and mitigated accordingly (e.g., through screening). It is expected that with routing design, this could be avoided. As a result of the distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
RSPB Reserves	UK RSPB Reserves	<p>There are two UK RSPB Reserves within the study area.</p> <p>Small area of Mid Yare Valley is located on the north-east boundary of study area and Wolves Wood Reserves occupy south-west part of study area.</p>	A	<p>OHL development may be constrained by RSPB Reserves due to direct risks via habitat loss, indirect risks via disturbance during construction (i.e., noise/lighting) or via disturbance to flight paths once operational.</p> <p>There are significant sections of the study area that are not constrained by RSPB Reserves, and there are opportunities to easily reduce direct risks through the routing process. Connections between sites and bird flight paths would need to be considered. During construction, noise impacts and visual disturbance risks will need to be considered and mitigated accordingly (e.g., through screening).</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	G
<b>Geology and Soils (Environmental)</b>					
Peatland	UK Peatland	<p>There are several areas of Peatland intersecting mostly the centre and the north of this study area.</p> <p>There are thin bands of Deep Peaty Soils and Soils with Peaty Deposits between Ipswich and Norwich.</p>	A	<p>The thin bands of Peatland in the north of the study area have the potential to constrain the development of this reinforcement as a result of construction and operational risks. Key concerns include the loss and fragmentation of habitats. However, there are significant sections of the study area that are not constrained by peatland, and there are opportunities to reduce risks through the routing process. There may be temporary construction disturbance impacts that would need further consideration and mitigation.</p> <p>As a result of the small area of peatland and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
Geoparks	UK Geoparks	There are no UNESCO Global Geoparks within the study area.	N/A	N/A	N/A
National Flood Zones/Areas Benefiting from Defences	National Flood Zones and Areas benefiting from Defences	There are National Flood Zones (Flood Zone 2 and Flood Zone 3) distributed throughout the study area through a variety of large and linear features.	A	<p>Owing to the distribution of this constraint throughout the study area, avoidance of all areas of river flood risk may not be possible and therefore there is residual risk for the development of this option. OHL development, including construction works may be at risk from flooding.</p> <p>There will need to be detailed design of the installation and location of pylons within floodplains, as well as planning of construction activities so that there are no increased flood levels arise from loss of floodplain storage e.g., during construction from working areas and temporary soil stockpiles. Fluvial flow and surface water flow will also need to be considered in the planning of these activities so that culverts and crossings are of appropriate positioning and size and that water does not pool behind installations.</p> <p>As a result of the distribution and requirement for detailed planning to avoid this constraint through construction design and routing, an amber BRAG rating has been applied.</p>	A
Former landfill sites	Historic landfills	There are numerous small pockets of historic landfill sites located throughout the study area, most notably in the south of the study, surrounding Ipswich.	A	OHL development, including construction works, may be at risk posed by sources of contamination from the former landfill sites. Due to the distribution and small size of historic landfills within the study area there are opportunities to avoid this constraint within considerate OHL routing. In addition, it is not considered that this is a strategic level constraint that should influence decision-making at this stage.	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				<p>There is an opportunity at the next stage of the siting process to avoid this constraint for OHL routing. However, this will require detailed routing for areas of higher concentrations.</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	
<b>Landscape and Visual (Community)</b>					
National Parks	UK National Parks	<p>Within the study area there is one National Park. A small area of The Broads National Park is located in the far north of the study area just outside of Norwich, extending beyond the study area boundary.</p>	R	<p>The Broads National Park is largely located outside of the border of the study area, but there is a small area near Norwich within the study area that may be affected, which present a key constraint to the development of this reinforcement. There is a risk that new OHLs would directly and indirectly disrupt The Broads National Park.</p> <p>OHL development may be constrained by National Parks due to visual, landscape and noise risks from construction works, and potentially permanent risks through the new permanent structures causing visual intrusion and disrupting landscape character.</p> <p>National Parks and National Landscapes are afforded the highest levels of protection in relation to landscape and natural beauty and has a specific statutory purpose to ensure their continued protection. The duty to have regard to the purposes of nationally designated areas also applies when considering applications for projects outside the boundaries. In line with National Policy and the Holford Rules, National Parks should be avoided altogether and where this is not possible and there would be harm to landscape, visual amenity, and natural beauty, there should be a strong starting presumption for undergrounding the section of line.</p>	G



Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				Although before mitigation a red BRAG rating has been assigned, as a result of the distribution and opportunities for avoidance of this constraint through routing or undergrounding short sections of OHL, a green BRAG rating has been applied.	
National Landscapes	England National Landscapes	There is one National Landscape site within the study area. Suffolk Coast and Heaths is located in the southern perimeter of the study area near Ipswich.	R	<p>The southern perimeter of this study area is constrained by Suffolk Coast and Heaths National Landscape. There is a small risk that new OHLs would directly and indirectly disrupt these National Landscapes.</p> <p>National Landscapes are afforded the highest levels of protection in relation to landscape and natural beauty, having a specific statutory purpose to ensure their continued protection. The duty to have regard to the purposes of nationally designated areas also applies when considering applications for projects outside the boundaries. In line with National Policy and the Holford Rules, National Landscapes should be avoided altogether and where this is not possible and there would be harm to landscape, visual amenity and natural beauty, there should be a strong presumption for undergrounding the section of line.</p> <p>There are opportunities for routing to avoid this National Landscape, and for buffer zones to be implemented to reduce any residual risks. As a result of distribution and opportunity to easily avoid this constraint, a green BRAG rating has been applied.</p>	G
Heritage Coasts	England Heritage Coasts	There are no Heritage Coasts within the study area.	N/A	N/A	N/A
National Trails	England National Trails	There are no National Trails within the study area.	N/A	N/A	N/A

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
<b>Historic Environment (Community)</b>					
World Heritage Sites	UK World Heritage Sites	There are no World Heritage Sites within the study area.	N/A	N/A	N/A
Scheduled Monuments	UK Scheduled Monuments	Within the study area there are multiple Scheduled Monuments, including a large concentration of Scheduled Monuments in the area surrounding Norwich.	R	<p>OHL development has the potential to be constrained by Scheduled Monuments due to the risk construction works may have upon the feature and/or associated archaeological features as well as during operation via risk to the setting of the Scheduled Monument. Due to this, without mitigation, the distribution of Scheduled Monuments across the study area is likely to constrain OHL route options and require consideration of the mitigation hierarchy.</p> <p>There may be opportunities for the type of reinforcement to be changed (e.g., undergrounding as opposed to OHL) to avoid effects on setting, considering the nature of the development and the location/extent of the constraint. However, there would need to be detailed considerations required for this type of construction. If undergrounding is implemented, there are opportunities during design development to avoid or mitigate risks via avoidance or considerate design (i.e., landscape screening).</p> <p>It is considered that there are also opportunities to mitigate risks to the individual Scheduled Monuments in the study area, via avoidance through subsequent route stages. Consultation with Historic England would need to be required to determine the most appropriate mitigation.</p>	A

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				<p>It may be possible to avoid direct risks to Scheduled Monuments; due to their density of the sites in the study area, indirect risks may be more difficult to avoid.</p> <p>As a result of the opportunities for avoidance of this constraint, an amber BRAG rating has been applied as this is considered to be a moderately constrained area where detailed route design and construction methodology is required.</p>	
Listed Buildings	UK listed buildings (Grade I, II* and II listed buildings)	There are a large number of Listed Buildings throughout the study area, including Grade I, Grade II* and Grade II. There are areas of highly concentrated Listed Buildings located at Ipswich and Norwich.	A	<p>OHL development may be constrained by Listed Buildings due to the risk of physical loss or damage to the listing, or indirectly via disturbance to the listed building's setting. There may also be risks to the curtilage (the area around, or any other building that is around and associated with a listed building).</p> <p>Whilst there is a large number of listed buildings within the study area, there are opportunities to reduce direct risks through the routing and siting process.</p> <p>In addition to potential accidental damage during construction if works or transport links are close by, there may be a risk on setting depending upon the location of the OHL route and any cable sealing end compounds.</p> <p>Works and transport routes need to be considered in terms of their proximity to listed buildings near the highway (e.g., accidental damage risk from HGVs in narrow lanes or other restricted areas) or groundworks (i.e., if any vibration generating works are close enough to cause damage to buildings).</p> <p>As a result of the potential opportunities for avoidance of this constraint through detailed routing and construction best practices, a green BRAG rating has been applied.</p>	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
Registered Parks and Gardens	Registered Parks and Gardens	Within the study area there are multiple Registered Parks and Gardens. There are multiple located in Norwich, and several across the south of the study area.	A	The sites have the potential to constrain the development of this reinforcement as a result of construction risks and risks as a result of changes to setting during operation. However, there are significant sections of the study area that are not constrained by Registered Parks and Gardens. There are opportunities to reduce risks through the routing process. As a result of the low-density distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.	G
Registered Battlefields	England Registered Battlefields	There are no Registered Battlefields within the study area.	N/A	N/A	N/A
<b>Air Quality (Community)</b>					
AQMAs (AQMA)	UK AQMA	There are two AQMAs within the study area. Most notably, Central Norwich AQMA is located in the north of the study area and Ipswich AQMA No.3 is located in the south.	G	Through careful design and construction planning, avoiding/mitigating direct and indirect adverse risks the sites are not considered to constrain the development of the option. As a result of the low-density distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.	G
<b>Noise (Community)</b>					
Major Settlements	UK Major Urban Settlements (Noise)	Within the study area, much of the environment is a natural/rural setting. There are Major Urban Settlements located at Ipswich and Norwich.	A	There is potential for the construction of a new OHL to generate noise during construction and operation that would affect residents of settlements. Owing to the spatial separation between settlements over the majority of the study area, it is considered that any potential construction and noise impacts could be effectively controlled	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				<p>through appropriate routing and the use of best practice mitigation measures such as a CEMP during construction. Operational noise would also require further consideration at the next stage of the option development process.</p> <p>As a result of the distribution and opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.</p>	
Small Scale Settlements	UK Small Scale Urban Settlements	Within the study area, there are several small scale settlements.	A	<p>There is potential for the construction of a new OHL to generate noise during construction and operation that would affect residents of settlements, including within several Noise Important Areas.</p> <p>Owing to the spatial separation between settlements over the majority of the study area, it is considered that any potential construction and noise impacts could be effectively controlled through appropriate routing and the use of best practice mitigation measures such as a CEMP during construction. Operational noise would also require further consideration at the next stage of the option development process.</p> <p>Although there are potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, this will not be possible for all of the smaller settlements, therefore, an amber BRAG rating has been applied.</p>	A
<b>Socio-Economics (Community)</b>					
Major Settlements	UK Major Urban Settlements (Socio-Economics)	Within the study area, much of the environment is a natural/rural setting. There are Major Urban	R	<p>There is potential for the construction and operation of a new OHL to impact residents as a result of changes to visual amenity. Owing to the spatial separation between settlements, there are opportunities to mitigate potential direct risks to most major settlements through the routing process, vegetation screening and</p>	A

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		Settlements located at Ipswich and Norwich.		<p>landscaping, and innovative tower designs. However, the settlements located near to the substations should be given further consideration.</p> <p>Residents may also have concerns about the health risks of new OHLs in the vicinity of their houses and schools and therefore public information events should be held and leaflets produced to reduce any concerns.</p> <p>Potential positive impacts of this reinforcement may include employment generation during construction.</p> <p>Mitigation measures should carefully consider the tourism and recreation socio-economic sensitivities of the study area and seek to mitigate risks to key receptors associated with the settlements. This will be applicable in the construction and operational stages.</p> <p>As a result of the distribution and nature of effects, avoidance of this constraint will require careful planning, design iterations and assessment in the following stages, therefore an amber BRAG rating has been applied.</p>	
Small Scale Settlements	UK Small Scale Urban Settlements	Within the study area, there are several small scale settlements.	R	<p>There is potential for the construction and operation of a new OHL to impact residents as a result of changes to visual amenity. Where the Small-Scale Urban Settlements are located throughout the study area therefore. However, mitigation of this constraint through routing is likely to only be partially successful possible. There are opportunities to mitigate potential direct risks through vegetation screening and landscaping, and innovative tower designs, however again, fully mitigating impacts will not be possible.</p> <p>Potential positive impacts of this reinforcement may include employment generation during construction.</p>	R

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				<p>Mitigation measures should also carefully consider the tourism and recreation socio-economic sensitivities of the study area and seek to mitigate risks to key receptors associated with the settlements. This will be applicable in the construction and operational stages.</p> <p>As a result of the distribution and nature of effects, avoidance of this constraint will require considerable planning, design iterations and assessment in the following stages; nevertheless some small scale settlements, and these areas will still be affected, therefore a red BRAG rating has been applied.</p>	
National Trust Land	National Trust Open Land and Limited Access Land	There is one very small area of National Trust Land within this study area. Darrow Wood is located close to Alburgh in the centre of study area.	A	<p>There are definitely opportunities to mitigate risks through the routing process and therefore the presence of National Trust Land is not considered a constraint to the option. There may be a risk on setting and temporary construction disturbance depending upon the location of the route, which should be carefully considered.</p> <p>As a result of potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	G

## 2.8. Norwich to Bramford Study Area (HVDC)

Start point	End point	Applicable to shortlisted designs:
Norwich	Bramford	Yes

### 2.8.1. Reinforcement Details

Reinforcement type (if known)	Reinforcement Length (if known)
HVDC	N/A

#### Technology assumptions

This reinforcement includes development of HVDC underground onshore cable route between Norwich and Bramford.

### 2.8.2. Environmental Summary

BRAG rating with mitigation measures: **G**

The study area includes several environmental constraints, including national and international designations.

There are a large number of National Flood Zones (Flood Zones 2 and 3) which broadly follow the numerous surface water features in the area. This requires planning of construction activities to ensure no increased flood levels arise from the loss of floodplain storage.

There are also minor constraints within this study area presented by:

- SACs,
- SPAs,
- Ramsar sites,
- SSSIs,
- NNRs,
- Ancient Woodland,
- IBAs,
- RSPB Reserves,
- UK Peatland,
- National Flood Zone,
- Historic Landfill sites.

These ecological and hydrological constraints occupy small areas throughout the study area, as shown on the constraints plan. Meaning that opportunities for avoidance and risk mitigation during both construction and operation may be successful through:

- Buffer zones,
- Effective CEMPs
- Consideration of the mitigation hierarchy in subsequent design stages.



As explained in Section 1.2.2 (Study Area Environmental and Community Summary BRAG Ratings), the following factors have been considered in determining an overall Environmental BRAG rating for this Study Area.

Table 2.8.2: Overall Environmental BRAG rating for the Norwich to Bramford Study Area (HVDC).

<b>Scope of works</b>	This reinforcement includes development of HVDC underground onshore cable route between Norwich and Bramford that will require some physical changes to the environment and as such, will therefore be affected by the constraints described in the constraints table in Section 2.8.4. This is reflected in the BRAG ratings.
<b>Number and area of constraints</b>	Within the study area there are 11 different environmental constraint types present. As noted above, there are only minor constraints as National Flood Zones (Flood Zones 2 and 3) which broadly follow the numerous surface water features in the area and other minor constraints that occupy small areas throughout the study area, as shown on the constraints plan.
<b>BRAG ratings of constraints</b>	<p>Within the study area there are 11 environmental constraint types present. Of these, zero have a rating of red under the HND methodology after mitigation and zero have a rating of amber after mitigation. All 11 identified constraints have rating of green after mitigation.</p> <p>The eleven green rated constraints include:</p> <ul style="list-style-type: none"> <li>• SACs</li> <li>• SPAs</li> <li>• Ramsar Sites</li> <li>• SSSIs</li> <li>• NNRs</li> <li>• Ancient Woodland</li> <li>• IBAs</li> <li>• RSPB Reserves</li> <li>• Peatlands</li> <li>• National Flood Zones</li> <li>• Former Landfill Sites</li> </ul>

This study area has been given a green BRAG rating. Constraints are distributed in small clusters throughout the study area. Avoidance of all areas of river flood risk may not be possible, but due to this study area being relatively large, opportunities for avoidance of all the remaining constraints combined should be possible through rerouting and detailed design.

<h3>2.8.3. Community Summary</h3>	<p>BRAG rating with mitigation measures: <b>G</b></p>
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There are several community constraints within the Norwich to Bramford Study Area, including national designations.

There are multiple small settlements and scheduled monuments distributed throughout the study area, which have been given an amber BRAG rating after mitigation due to potential visual impacts during construction. These community designations present moderate community constraints that are likely to require detailed routing considerations and the implementation of mitigation measures. . There is potential for the construction of this reinforcement to disrupt residents as a result of changes to visual amenity, however there are opportunities to mitigate direct risks through selective routing..

At the next stage, to avoid risks to the Scheduled Monuments, routing and further mitigation measures should be considered.

Further minor constraints within the study area include the Broads National Park, Suffolk Coast and Heaths National Landscape, Listed Buildings, Registered Parks and Gardens, AQMAs, Major Urban Settlements (Noise and Socio-Economics), and National Trust Land. These constraints are distributed in small clusters throughout the study area, so they may be easily avoided through selective routing and siting of pylons.

As explained in Section 1.2.2 (Study Area Environmental and Community Summary BRAG Ratings), the following factors have been considered in determining an overall Community BRAG rating for this Study Area.

Table 2.8.3: Overall Community BRAG rating for the Norwich to Bramford Study Area (HVDC).

<b>Scope of works</b>	This reinforcement includes development of HVDC underground onshore cable route between Norwich and Bramford that will require some physical changes to the environment and as such, will therefore be affected by the constraints described in the constraints table in Section 2.8.4. This is reflected in the BRAG ratings.
<b>Number and area of constraints</b>	Within the study area there are 11 different community constraint types present. As noted above, constraints are sparsely distributed throughout the study area, as seen on the constraints plan.
<b>BRAG ratings of constraints</b>	<p>Within the study area there are 11 community constraint types present. Of these, zero has a rating of red under the HND methodology after mitigation, two have a rating of amber after mitigation and nine a rating of green after mitigation.</p> <p>The two amber rated constraints include:</p> <ul style="list-style-type: none"> <li>• Scheduled Monuments</li> <li>• Small Scale Settlements (Socio-Economics)</li> </ul> <p>The nine green rated constraints include:</p> <ul style="list-style-type: none"> <li>• National Parks</li> <li>• National Landscapes</li> <li>• Listed Buildings</li> <li>• Registered Parks and Gardens</li> <li>• AQMA</li> <li>• Major Settlements (Noise)</li> <li>• Small Scale Settlements (Noise)</li> <li>• Major Settlements (Socio-Economics)</li> <li>• National Trust Land</li> </ul>

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A green BRAG rating has been assigned after mitigation due to the number and spatial distribution of the amber constraints (small settlements and scheduled monuments) across the whole study area. The presence of Scheduled Monuments and the multiple small-scale settlements, creates a moderate constraint, however the impacts on them will be temporary due to the fact that they will occur only during the construction stage. Although avoidance may be challenging, there are opportunities for detailed route design and implementation of appropriate construction methodologies to reduce the overall impacts.

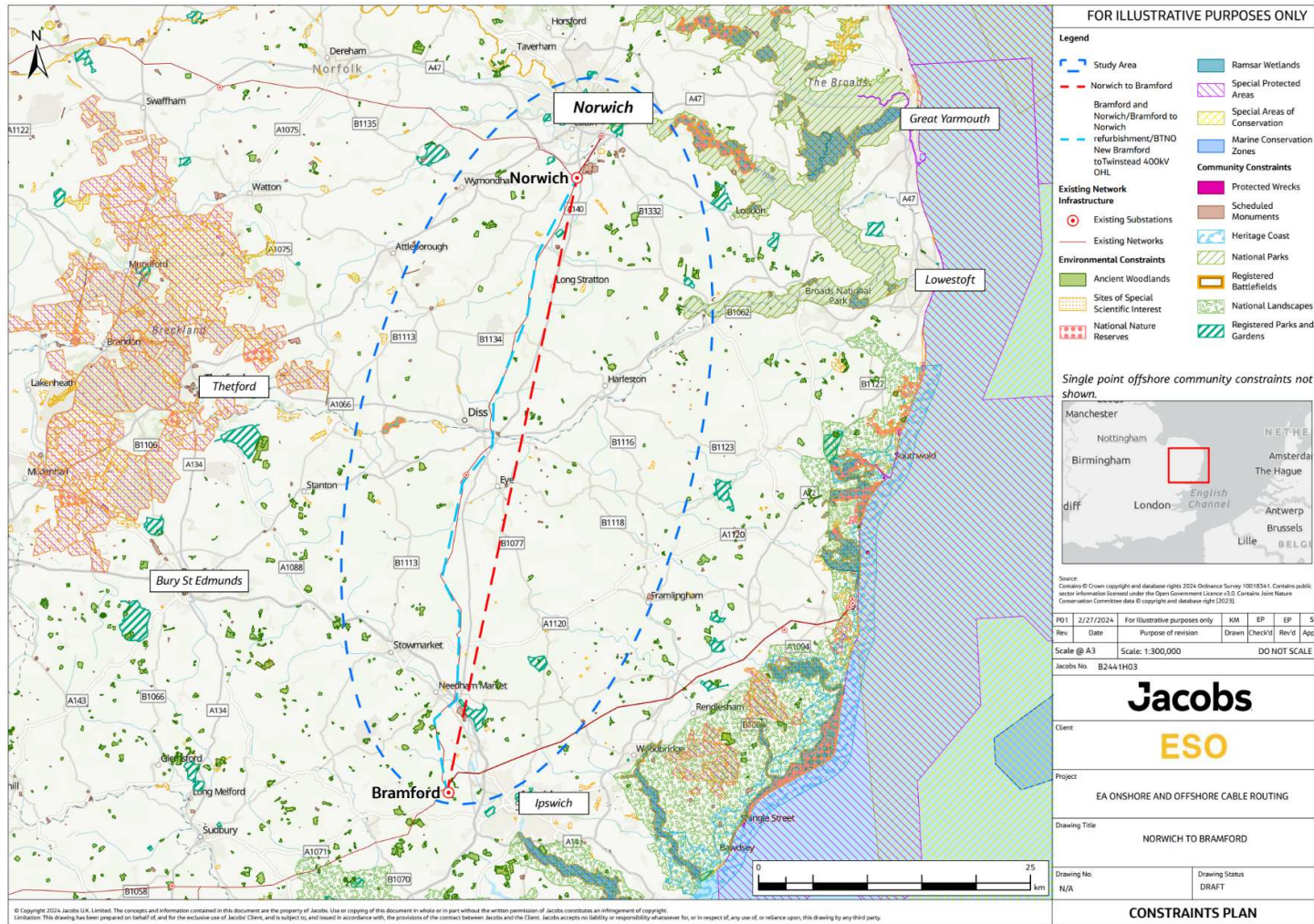
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#### 2.8.4. Constraints Table

The following constraints table describes the environmental and community constraints associated with Norwich to Bramford Study Area for HVDC underground reinforcement. It describes the constraints present within the study area, the potential measures to mitigate risks, and a BRAG rating before and after mitigation measures have been applied.

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**Constraints Plan 8: Study Area Norwich to Bramford showing Nationally and Internationally Designated Sites**

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
<b>Ecology (Environmental)</b>					
SACs	Onshore and offshore UK SACs	There are three SACs within the study area. Small SACs areas include The Broads, Norfolk Valley Fens, and River Wensum, all located in the northern part of study area.	R	<p>With consideration of the limited extent of SACs within the study area, very small sections of the northern regions of the study area are the most heavily constrained.</p> <p>These SACs are contained in small pockets which may be easily avoided with selective routing of HVDC underground cable route. Consideration should be given to the routing of the HVDC to avoid negative impacts such as habitat loss and fragmentation, soil erosion and sedimentation. Further to this, best practice construction measures should be implemented, and dependent on the route, a HRA Screening is likely to be required if the route could have a significant effect on the SAC.</p> <p>An green BRAG rating has been assigned in view there are opportunities to avoid sensitive areas and other mitigation measures for construction activities.</p>	G
cSACs	England cSACs	There are no cSACs located in the study area.	N/A	N/A	N/A
SPAs	Onshore and offshore UK SPAs	There are two SPAs within the study area. Small area of Broadland SPA is located on the north-east boundary of study area and small part of Stour and Orwell Estuaries SPA occupy south-east part of study area.	R	<p>The small areas of onshore SPAs that present a constraint may be easily avoided through selective routing and buffer zones.</p> <p>Construction mitigation in terms of reducing noise and visual disturbance will be required if the route passes close to this constraint (up to 1 km, depending on designated bird species). There will be opportunities to mitigate risks through various measures, such as using buffer zones, screening during construction and timing of works to avoid sensitive times such as nesting or overwintering birds.</p>	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				A green BRAG rating has been assigned in view there are opportunities to avoid sensitive areas and other mitigation measures for construction activities.	
pSPAs	England pSPAs	There are no pSPAs located in the study area.	N/A	N/A	N/A
SCIs	SCIs	There are no SCIs located within the study area.	N/A	N/A	N/A
Ramsar sites	UK Ramsar sites	There are two Ramsar sites within the study area. Small area of Broadland is located on the north-east boundary of study area and small part of Stour and Orwell Estuaries occupy south-east part of study area.	R	<p>The Ramsar sites are only partially located within the study area and constrain only small portions of the study area. The small areas of Ramsar that present a constraint may be easily avoided through selective routing and buffer zones.</p> <p>There will be opportunities to mitigate risks through various measures, such as using buffer zones, screening during construction and timing of works to avoid sensitive times such as nesting or overwintering birds.</p> <p>In light of the opportunities for avoidance through routing and mitigation measures, as well as consideration of the mobile/ migratory features associated with this constraint, a green BRAG rating has been assigned</p>	G
Proposed Ramsar sites	UK Proposed Ramsar sites	There are no Proposed Ramsar sites located within the study area.	N/A	N/A	N/A
SSSIs	UK SSSIs	There are many small SSSIs located throughout the study area, that	R	Numerous SSSIs are distributed throughout the study area. Due to the small size and distribution of this constraint there are possible opportunities to avoid interaction with these SSSIs by selective routing.	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		present high areas of constraint.		<p>Mitigation through routing and/or buffer zones to minimise disruption to sensitive areas will need detailed planning at the next stage, as well as implementing best practices during construction in order to avoid impacts on this constraint.</p> <p>A green BRAG has been assigned, as the size and distribution of SSSIs within the study area allows for consideration of routing opportunities to avoid this constraint.</p>	
NNRs	UK NNRs	There is one NNR within the study area: Mid-Yare NNR.	A	<p>The Mid-Yare NNR is only partially located within the study area and constrain only small north-east portion of the study area. There are significant sections of the study area that are not affected by NNRs.</p> <p>The small area of NNR that present a constraint may be easily avoided through selective routing and implementing buffer zone so that this site can be avoided.</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	G
Biosphere Reserves	UK Biosphere Reserves	There are no Biosphere Reserves within the study area.	N/A	N/A	N/A
Ancient Woodlands	UK Ancient Woodlands	There are multiple small areas of Ancient Woodland throughout the study area. The southern half of the study area has a higher concentration of Ancient Woodland, but	A	<p>There are multiple sections of the study area that are constrained by sparsely distributed Ancient Woodland, in particular the southern sector. There are opportunities to mitigate risks through the routing process so that the HVDC underground cable route does not cross areas of Ancient Woodland.</p> <p>Any risks during construction could be controlled through appropriate construction environmental management practices,</p>	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		pockets remain small throughout.		for example in relation to the siting of access routes and implementing buffer zones around ancient woodland areas. A green BRAG has been assigned with consideration for the sparse distribution of this constraint, and the fact that there are many opportunities to mitigate risks through routing and best practice construction measures.	
IBAs	UK IBAs	There are two IBAs within the study area. Small area of Broadland is located on the north-east boundary of study area and small part of Stour and Orwell Estuaries occupy south-east part of study area.	G	HVDC underground cable route development may be constrained by IBAs directly due to the risk of habitat loss or indirectly via disturbance during construction (i.e., noise/lighting). During construction, noise impacts and visual disturbance risks will need to be considered and mitigated accordingly (e.g., through screening). It is expected that with routing design, this could be avoided. As a result of the distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.	G
RSPB Reserves	UK RSPB Reserves	There are two UK RSPB Reserves within the study area. Small area of Mid Yare Valley is located on the north-east boundary of study area and Wolves Wood Reserves occupy south-west part of study area.	G	HVDC underground cable route development may be constrained by RSPB Reserves due to direct risks via habitat loss or indirect risks via disturbance during construction (i.e., noise/lighting). There are significant sections of the study area that are not constrained by RSPB Reserves, and there are opportunities to easily reduce direct risks through the routing process. During construction, noise impacts and visual disturbance risks will need to be considered and mitigated accordingly (e.g., through screening). As a result of the distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.	G



Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
<b>Geology and Soils (Environmental)</b>					
Peatland	UK Peatland	There are several areas of Peatland intersecting mostly the centre and the north of this study area. There are thin bands of Deep Peaty Soils and Soils with Peaty Deposits between Ipswich and Norwich.	A	The thin bands of Peatland in the north of the study area have the potential to constrain the development of this reinforcement as a result of construction and operational risks. Key concerns include the loss and fragmentation of habitats. However, there are significant sections of the study area that are not constrained by peatland, and there are opportunities to reduce risks through the routing process. There may be temporary construction disturbance impacts that would need further consideration and mitigation. As a result of the small area of peatland and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.	G
Geoparks	UK Geoparks	There are no UNESCO Global Geoparks within the study area.	N/A	N/A	N/A
National Flood Zones/Areas Benefiting from Defences	National Flood Zones and Areas benefiting from Defences	There are National Flood Zones (Flood Zone 2 and Flood Zone 3) distributed throughout the study area through a variety of large and linear features.	G	HVDC underground cable route development including construction works may be at risk from flooding. Owing to the distribution of this constraint throughout the study area, avoidance of all areas of river flood risk may not be possible and therefore there is residual risk for the development of this option. There will need to be planning of construction activities so that there are no increased flood levels arise from loss of floodplain storage e.g., during construction from working areas and temporary soil stockpiles. Fluvial flow and surface water flow will also need to be considered in the planning of these activities so that culverts and crossings are of appropriate positioning and size and that water does not pool behind installations.	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				As a result of the opportunities for avoidance of this constraint through construction best practices, a green BRAG rating has been applied.	
Former landfill sites	Historic landfills	There are numerous small pockets of historic landfill sites located throughout the study area, most notably in the south of the study, surrounding Ipswich.	A	<p>HVDC underground cable route development, including construction works, may be at risk posed by sources of contamination from the former landfill sites. Due to the distribution and small size of historic landfills within the study area there are opportunities to avoid this constraint within considerate HVDC routing. In addition, it is not considered that this is a strategic level constraint that should influence decision-making at this stage.</p> <p>There is an opportunity at the next stage of the siting process to avoid this constraint for HVDC routing. However, this will require detailed routing for areas of higher concentrations.</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	G
<b>Landscape and Visual (Community)</b>					
National Parks	UK National Parks	Within the study area there is one National Park. A small area of The Broads National Park is located in the far north of the study area just outside of Norwich, extending beyond the study area boundary.	A	<p>The Broads National Park is largely located outside of the border of the study area, but there is a small area near Norwich within the study area that may be affected, which present a constraint to the development of this reinforcement. There is a risk that new HVDC would directly and indirectly disrupt The Broads National Park.</p> <p>HVDC underground cable route development may be constrained by National Parks due to visual, landscape and noise risks from construction works.</p> <p>National Parks and National Landscapes are afforded the highest levels of protection in relation to landscape and natural beauty and</p>	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				<p>has a specific statutory purpose to ensure their continued protection. The duty to have regard to the purposes of nationally designated areas also applies when considering applications for projects outside the boundaries. In line with National Policy and the Holford Rules, National Parks should be avoided altogether and where this is not possible and there would be harm to landscape, visual amenity, and natural beauty, there should be a strong starting presumption for undergrounding the section of line. HVDC underground cable reinforcement at such constrained locations should therefore be considered as a priority.</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through construction best practices, a green BRAG rating has been applied.</p>	
National Landscapes	England National Landscapes	There is one National Landscape site within the study area. Suffolk Coast and Heaths is located in the southern perimeter of the study area near Ipswich.	A	<p>The southern perimeter of this study area is constrained by Suffolk Coast and Heaths National Landscape. There is a small risk that new HVDC underground cable route would directly and indirectly disrupt this National Landscape.</p> <p>National Landscapes are afforded the highest levels of protection in relation to landscape and natural beauty, having a specific statutory purpose to ensure their continued protection. The duty to have regard to the purposes of nationally designated areas also applies when considering applications for projects outside the boundaries. In line with National Policy and the Holford Rules, National Landscapes should be avoided altogether and where this is not possible and there would be harm to landscape, visual amenity and natural beauty, there should be a strong presumption for undergrounding the section of line. HVDC underground cable reinforcement at such constrained locations should therefore be considered as a priority.</p>	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				There are opportunities for routing to avoid this National Landscape, and for buffer zones to be implemented to reduce any residual risks. As a result of distribution and opportunity to easily avoid this constraint, a green BRAG rating has been applied.	
Heritage Coasts	England Heritage Coasts	There are no Heritage Coasts within the study area.	N/A	N/A	N/A
National Trails	England National Trails	There are no National Trails within the study area.	N/A	N/A	N/A
<b>Historic Environment (Community)</b>					
World Heritage Sites	UK World Heritage Sites	There are no World Heritage Sites within the study area.	N/A	N/A	N/A
Scheduled Monuments	UK Scheduled Monuments	Within the study area there are multiple Scheduled Monuments, including a large concentration of Scheduled Monuments in the area surrounding Norwich.	R	<p>HVDC underground cable route development has the potential to be constrained by Scheduled Monuments due to the risk construction works may have upon the feature and/or associated archaeological features. Due to this, without mitigation, the distribution of Scheduled Monuments across the study area is likely to constrain HVDC cable route options and require consideration of the mitigation hierarchy.</p> <p>It is considered that there are opportunities to mitigate risks to the individual Scheduled Monuments in the study area through the routing and siting process. HVDC underground cables' type of reinforcement as opposed to OHL provide potential opportunities to avoid effects on setting, construction vibration considerations, considering the nature of the development and the location/extent</p>	A

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				<p>of the constraint. Once HVDC undergrounding is chosen, there are opportunities during design development to avoid or mitigate risks via avoidance or considerate design (i.e., landscape screening).</p> <p>The areas surrounding the Scheduled Monuments may also require mitigation when carrying out groundworks, due to presence of undiscovered associated features (i.e., archaeological remains). Consultation with Historic England would need to be required to determine the most appropriate mitigation.</p> <p>It may be possible to avoid direct risks to Scheduled Monuments; due to their density of the sites in the study area, but indirect risks may be more difficult to avoid.</p> <p>An amber BRAG rating has been applied as it is considered that there is a heavily constrained area where detailed route design and construction methodology is required.</p>	
Listed Buildings	UK listed buildings (Grade I, II* and II listed buildings)	There are a large number of Listed Buildings throughout the study area, including Grade I, Grade II* and Grade II. There are areas of highly concentrated Listed Buildings located at Ipswich and Norwich.	A	<p>HVDC underground cable route development may be constrained by Listed Buildings due to the risk of physical loss or damage to the listing, or indirectly via disturbance to the listed building's setting. There may also be risks to the curtilage (the area around, or any other building that is around and associated with a listed building). Whilst there is a large number of listed buildings within the study area, there are opportunities to reduce direct risks through the routing and siting process.</p> <p>Works and transport routes need to be considered in terms of their proximity to listed buildings near the highway (e.g., accidental damage risk from HGVs in narrow lanes or other restricted areas) or groundworks (i.e., if any vibration generating works are close enough to cause damage to buildings).</p>	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				As a result of the potential opportunities for avoidance of this constraint through detailed routing and construction best practices, a green BRAG rating has been applied.	
Registered Parks and Gardens	Registered Parks and Gardens	Within the study area there are multiple Registered Parks and Gardens. There are multiple located in Norwich, and several across the south of the study area.	A	The sites have the potential to constrain the development of this reinforcement as a result of construction risks. However, there are significant sections of the study area that are not constrained by Registered Parks and Gardens. There are opportunities to reduce risks through the routing process. As a result of the low-density distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.	G
Registered Battlefields	England Registered Battlefields	There are no Registered Battlefields within the study area.	N/A	N/A	N/A
<b>Air Quality (Community)</b>					
AQMAs (AQMA)	UK AQMA	There are two AQMAs within the study area. Most notably, Central Norwich AQMA is located in the north of the study area and Ipswich AQMA No.3 is located in the south.	G	Given the small number and small spatial area constrained by the AQMAs, through careful design and construction planning, avoiding/ mitigating direct and indirect adverse risks the sites are not considered to constrain the development of the option. As a result of the low-density distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.	G
<b>Noise (Community)</b>					
Major Settlements	UK Major Urban Settlements (Noise)	Within the study area, much of the environment is a natural/rural setting. There are Major Urban	G	There is potential for the construction of a new HVDC underground cable route to generate noise during construction and operation that would affect residents of settlements.	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		Settlements located at Ipswich and Norwich.		Owing to the spatial separation between settlements over the majority of the study area, it is considered that any potential construction and noise impacts could be effectively controlled through appropriate routing and the use of best practice mitigation measures such as a CEMP during construction. As a result of the distribution and opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.	
Small Scale Settlements	UK Small Scale Urban Settlements	Within the study area, there are several small scale settlements.	G	There is potential for the construction of a new HVDC underground cable route to generate noise during construction that would affect residents of settlements, including within several Noise Important Areas. Owing to the spatial separation between settlements over the majority of the study area, it is considered that any potential construction and noise impacts could be effectively controlled through appropriate routing and the use of best practice mitigation measures such as a CEMP during construction. As a result of the distribution and potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.	G
<b>Socio-Economics (Community)</b>					
Major Settlements	UK Major Urban Settlements (Socio-Economics)	Within the study area, much of the environment is a natural/rural setting. There are Major Urban Settlements located at Ipswich and Norwich.	A	There is potential for the construction of a new HVDC underground cable route to impact residents as a result of changes to visual amenity. Owing to the spatial separation between settlements, there are opportunities to mitigate potential direct risks to most major settlements through the routing process. However, the settlements located near to the substations should be given further consideration.	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				<p>If avoidance of the Major Settlements is not possible and there would be harm to landscape, visual amenity and natural beauty, there should be a strong presumption for undergrounding the section of line. HVDC underground cable reinforcement at such constrained locations should therefore be considered as a priority. Potential positive impacts of this reinforcement may include employment generation during construction.</p> <p>Mitigation measures should carefully consider the tourism and recreation socio-economic sensitivities of the study area and seek to mitigate risks to key receptors associated with the settlements. This will be applicable in the construction stage.</p> <p>As a result of the distribution and temporary nature of effects during construction, and potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.</p>	
Small Scale Settlements	UK Small Scale Urban Settlements	Within the study area, there are several small scale settlements.	A	<p>There is potential for the construction and operation of a new HVDC underground cable route to impact residents as a result of changes to visual amenity. Where the Small-Scale Urban Settlements are located throughout the study area therefore. However, mitigation of this constraint through routing is likely to only be partially successful possible. If avoidance of the Small Scale Settlements is not possible and there would be harm to landscape, visual amenity and natural beauty, there should be a strong presumption for undergrounding the section of line. HVDC underground cable reinforcement at such constrained locations should therefore be considered as a priority.</p> <p>Potential positive impacts of this reinforcement may include employment generation during construction.</p>	A



Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				<p>Mitigation measures should also carefully consider the tourism and recreation socio-economic sensitivities of the study area and seek to mitigate risks to key receptors associated with the settlements. This will be applicable in the construction stage.</p> <p>As a result of the distribution and temporary nature of effects during construction, avoidance of this constraint will require considerable planning; nevertheless some small scale settlements, and these areas may still be affected during construction, therefore an amber BRAG rating has been applied.</p>	
National Trust Land	National Trust Open Land and Limited Access Land	There is one very small area of National Trust Land within this study area. Darrow Wood is located close to Alburgh in the centre of study area.	A	<p>There are definitely opportunities to mitigate risks through the routing process and therefore the presence of National Trust Land is not considered a constraint to the option. There may be a risk on setting and temporary construction disturbance depending upon the location of the route, which should be carefully considered.</p> <p>As a result of potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	G

**2.9. Norwich to Grain Study Area (HVDC)**

Start point	End point	Applicable to shortlisted designs:
Norwich	Grain	Yes

**2.9.1. Reinforcement Details**

Reinforcement type (if known)	Reinforcement Length (if known)
HVDC	N/A

**Technology assumptions**

This reinforcement includes a HVDC offshore cable route, landfall infrastructure and associated onshore cabling reinforcement between Norwich and Grain.

<b>2.9.2. Environmental Summary</b>	<b>BRAG rating with mitigation measures:</b>	<b>R</b>
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The study area includes multiple environmental constraints, including international and national designations.

The main area of constraint where several environmental designations are densely located, or overlap is within the southern offshore section of the study area. In these areas there are several designations including:

- SPAs,
- SACs,
- SSSIs,
- Ramsar sites,
- IBAs
- RSPB Reserves.

There is a large SAC offshore within the east of the study area designated for mobile species rather than habitat, which creates a relatively less constrained area for the offshore cable route if mitigation is applied.

To the north, although there are a number of environmental constraints around the coastline and there are a variety of habitats and species designated there are some relatively unconstrained potential landfall points. Those locations which are least constrained are between Gorleston on Sea and Lowestoft, south of Lowestoft and north of Caister.

In the south around the Isle of Grain there are more restricted landfall opportunities, with nearly all the coastline having environmental constraints; there is a small section on the eastern coast which is less restricted and may possibly encompass a potential landfall location.

As explained in Section 1.2.2 (Study Area Environmental and Community Summary BRAG Ratings), the following factors have been considered in determining an overall Environmental BRAG rating for this Study Area.

Table 2.9.2: Overall Environmental BRAG rating for the Norwich to Grain Study Area.

<b>Scope of works</b>	This reinforcement includes a HVDC offshore cable route, landfall infrastructure and associated onshore cabling reinforcement between Norwich and Grain that will require some physical changes to the environment and as such, will therefore be affected by the constraints described in the constraints table in Section 2.9.4. This is reflected in the BRAG ratings.
<b>Number and area of constraints</b>	Within the study area there are 15 different environmental constraint types present. As noted above, the most constrained area is within the southern section of the study area where several environmental designations are densely located, or overlap.
<b>BRAG ratings of constraints</b>	<p>Within the study area there are 15 environmental constraint types present. Of these, one has a rating of red under the HND methodology after mitigation, five have a rating of amber after mitigation and ten have rating of green after mitigation.</p> <p>The one red rated constraints include:</p> <ul style="list-style-type: none"> <li>• SACs</li> </ul> <p>The five amber rated constraints include:</p> <ul style="list-style-type: none"> <li>• cSAC</li> <li>• SPAs</li> <li>• Ramsar Sites</li> <li>• SSSIs</li> <li>• MCZs</li> </ul> <p>The nine green rated constraints include:</p> <ul style="list-style-type: none"> <li>• NNRs</li> <li>• Ancient Woodland</li> <li>• RSPB Reserves</li> <li>• Seabird At Sea Density</li> <li>• UK Grey Seals</li> <li>• UK Harbour Seals</li> <li>• SCANS 3</li> <li>• Fish Spawning Grounds</li> <li>• Fish Nursery Grounds</li> </ul>

As shown on the constraints plan, due to the size and distribution of the SACs, re routing and detailed design may be inaccessible in avoiding all of the constraints combined, so consideration of the mitigation hierarchy with appropriate routing, siting, and buffer zones would need to be required to reduce the impacts.

An overall red BRAG rating has been assigned as the cumulative combination of all the designations and receptors throughout the study area, mostly in the southern section of the study area, means that many sectors of this study area are highly constrained. With limited opportunities to avoid these constrains through redesign and rerouting.

**2.9.3. Community Summary**

BRAG rating with mitigation measures:

A

There are numerous community constraints in the study area, particularly relating to landscape, historic assets, and fishing areas.

There are two National Landscapes in the north of the study area, the position and extent of which constrain approximately half of the northern sector’s onshore and offshore section. However, there is some opportunity for avoidance through the routing process or undergrounding.

In addition, there are numerous other constraints in this offshore and southern onshore area including listed buildings, wrecks, scheduled monuments and a large area designated as shellfish waters in the far south of the study area around the outer Thames Estuary. Therefore, these constraints are likely to affect both offshore routing and onshore cable routing around the landfall points with should be avoided through rerouting where possible.

The eastern coast of East Anglia in the northern sector of the study area contains the largest built up areas (namely Great Yarmouth, Gorleston-on-Sea and Lowestoft. The remainder of the study area is more natural/rural and less densely populated. Overall, landfall points around these urban areas (as outlined in the Environmental Summary above) appear to have the least constraints if mitigation can be applied and existing infrastructure utilised.

As explained in Section 1.2.2 (Study Area Environmental and Community Summary BRAG Ratings), the following factors have been considered in determining an overall Community BRAG rating for this Study Area.

Table 2.9.3: Overall Community BRAG rating for the Norwich to Grain Study Area.

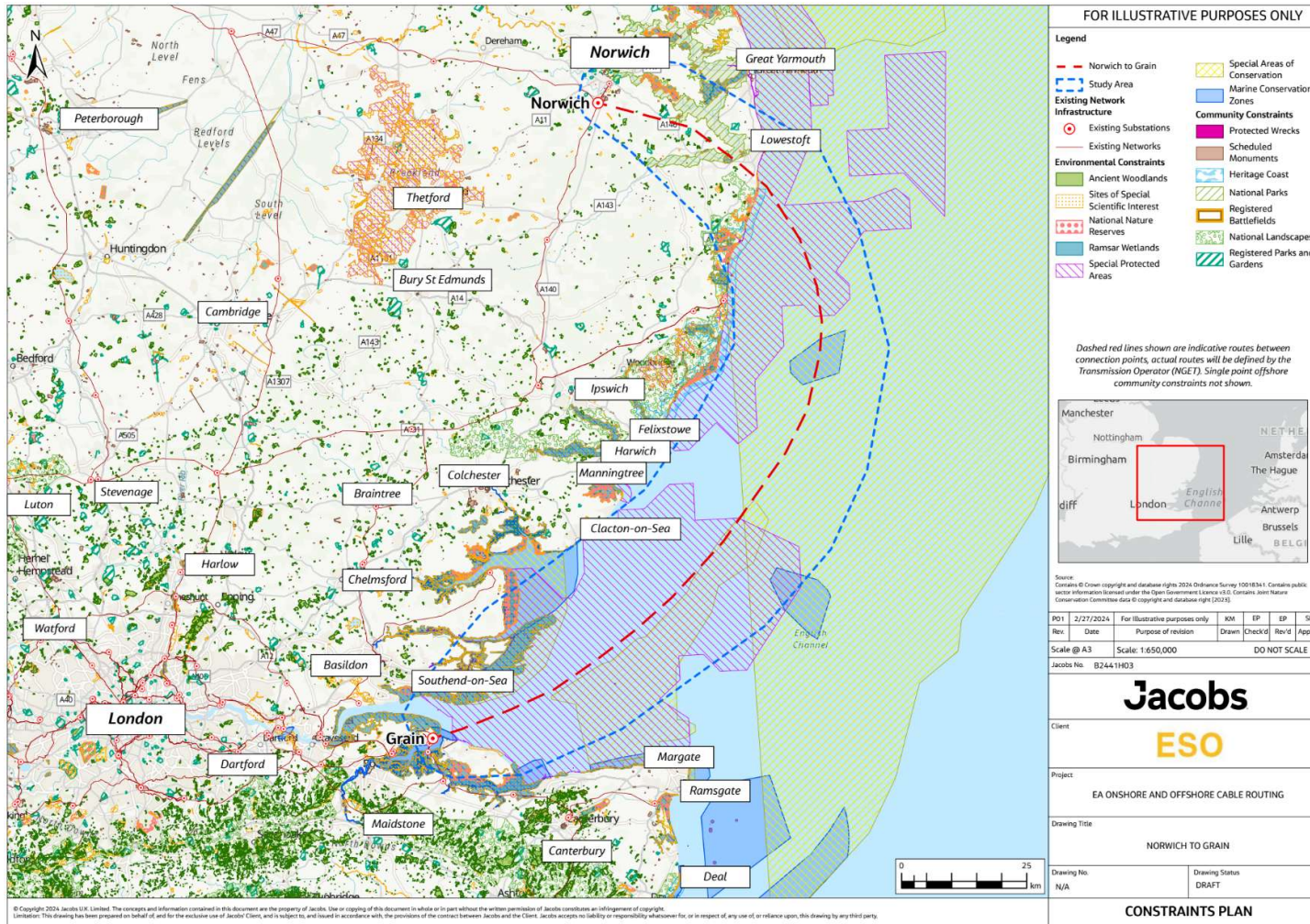
<b>Scope of works</b>	This reinforcement includes a HVDC offshore cable route, landfall infrastructure and associated onshore cabling reinforcement between Norwich and Grain that will require some physical changes to the environment and as such, will therefore be affected by the constraints described in the constraints table in Section 2.9.4. This is reflected in the BRAG ratings.
<b>Number and area of constraints</b>	Within the study area there are 18 different community constraint types present. As noted above, the constraints are distributed throughout the study area, both onshore and offshore.
<b>BRAG ratings of constraints</b>	<p>Within the study area there are 18 community constraint types present. Of these, zero has a rating of red under the HND methodology after mitigation, two has a rating of amber after mitigation and sixteen have rating of green after mitigation.</p> <p>The two amber rated constraints include:</p> <ul style="list-style-type: none"> <li>• Wreck Locations</li> <li>• Scheduled Monuments</li> </ul> <p>The sixteen green rated constraints include:</p> <ul style="list-style-type: none"> <li>• National Parks</li> </ul>

	<ul style="list-style-type: none"> <li>• National Landscapes</li> <li>• Heritage Coasts</li> <li>• Listed Buildings</li> <li>• Registered Parks and Gardens</li> <li>• Protected Wrecks</li> <li>• AQMA</li> <li>• Major Settlements (Noise)</li> <li>• Small Scale Settlements (Noise)</li> <li>• Major Settlements (Socio-Economics)</li> <li>• Small Scale Settlements (Socio-Economics)</li> <li>• National Trust Land</li> <li>• RYA sailing and racing areas</li> <li>• Bathing Waters</li> <li>• Shellfish Waters</li> <li>• Fishing Activity</li> </ul>
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An amber BRAG rating has been assigned owing to the number and spatial distribution of many onshore key constraints. As shown on the constraints plan avoidance of all of the constraints combined may be challenging, but there are opportunities for detailed route design and construction methodology to potentially avoid these constraints and reduce the overall impacts.

#### 2.9.4. Constraints Table

The following table depicts the environmental and community constraints for Norwich to Grain Study Area. It describes the constraints present within the study area, the potential mitigation measures to avoid or reduce risks, and a BRAG rating before and after mitigation measures have been applied.



**Constraints Plan 9: Study Area Norwich to Grain showing Nationally and Internationally Designated Sites**

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
<b>Ecology (Environmental)</b>							
SACs	Onshore and offshore UK SACs	<p>There are four marine SACs (offshore Marine Components GB) within the proposed study area: the Southern North Sea SAC occupying the eastern and centre half of the study area, Margate and Long Sands SAC occupying the southern section of the study area; Haisborough, Hammond and Winterton SAC and North Norfolk Sandbanks and Saturn Reef in the north part of study area.</p> <p>In the north of the study area there are the following SACs:</p> <ul style="list-style-type: none"> <li>- Benacre To Easton Barents Lagoons SAC,</li> <li>- Norfolk Valley Fens SAC,</li> </ul>	R	R	R	<p>Due to the size and distribution of the land-based SACs close to the coast, the southern portion of the East Anglia-Essex coast within this study area is most constrained. Areas offshore of East Anglia are moderately constrained during construction/operational maintenance owing to a large SAC designated for mobile cetaceans.</p> <p>Consideration would need to be given to the routing/location of the cable landfall points and short sections of onshore cables to avoid negative impacts such as habitat loss and fragmentation, soil erosion and sedimentation. Planning of landward construction activities and access routes should be undertaken, including the implementation of buffer zones as appropriate to avoid associated impacts e.g., relating to access roads and stockpiles. In terms of offshore/coastal effects, consideration should be given to avoiding where possible or minimising impacts on sensitive habitats where ploughs or sledges are used and during operation (e.g., through scour or repair activities requiring sections of cable to be raised if faults occur). A HRA Screening would need to be</p>	R

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
		<ul style="list-style-type: none"> <li>- Paston Great Barn SAC,</li> <li>- River Wensum SAC,</li> <li>- The Broads SAC,</li> <li>- Winterton-Horsey Dunes SAC.</li> </ul>				<p>conducted in the first instance as the route may have a significant effect on the SACs.</p> <p>As a result of the linear nature of cables and limited opportunities for avoidance of this constraint particularly offshore and along coastal sections, a red BRAG rating has been applied as this is considered to be a heavily constrained area where detailed route design and construction methodology is required.</p>	
cSAC	England and Scotland cSACs	There is one cSAC: Southern North Sea occupying the eastern half of the study area (also fully designated).	A	A	A	<p>Due to the size and distribution of this Possible SAC, an area of the eastern half of the study area is moderately constrained.</p> <p>Consideration should be given to the routing/location of the cable landfall points and offshore cables to avoid negative impacts such as seabed disturbance, alteration of substrate cover and composition, hydrodynamic changes, disturbance and habitat displacement and interaction risk for marine species.</p> <p>As a result of the there being no opportunities for avoidance of this constraint through routing, an amber BRAG rating has been applied.</p>	A
SPAs	Onshore and offshore UK SPAs	There are several SPAs within the study area. In the south part of the study area there are located:	A	A	A	<p>Within most sections of the study area there are SPAs which cover areas on land, bays and offshore, which are likely to moderately constrain routing.</p>	A



Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
		<ul style="list-style-type: none"> <li>- Medway Estuary and Marshes SPA,</li> <li>- Thames Estuary and Marshes SPA,</li> <li>- The Swale SPA,</li> </ul> <p>In the north part of the study area there are:</p> <ul style="list-style-type: none"> <li>- Benacre To Easton Barents SPA,</li> <li>- Breydon Water SPA,</li> <li>- Broadland SPA,</li> <li>- Great Yarmouth North Denes SPA.</li> </ul> <p>There are in addition two SPAs (offshore Marine Components GB) within the proposed study area: Outer Thames Estuary SPA occupying the southern, western and centre part of the study area and Greater Wash SPA on the northern edge.</p>				<p>Construction mitigation in terms of reducing noise and visual disturbance will be required if the route passes close to this constraint (up to 1 km, depending on designated bird species). Consideration should be given to wider impacts such as bird migratory routes and proximity to these. There will be opportunities to mitigate risks through various measures, such as using buffer zones, screening during construction and timing of works to avoid sensitive times such as nesting or overwintering birds.</p> <p>There may also be opportunities to mitigate risks to these SPAs through selective routing/placement of the cable landfall points and offshore/onshore cables.</p> <p>As a result of the linear nature and limited opportunities for avoidance of this constraint, an amber BRAG rating has been applied as this is considered to be moderately constrained area where detailed route design and construction methodology is likely required.</p>	
pSPA	England pSPAs	There are no pSPAs located in the study area.	N/A	N/A	N/A	N/A	N/A

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
SCIs	SCIs	There are no SCIs located within the study area.	N/A	N/A	N/A	N/A	N/A
Ramsar sites	UK Ramsar sites	<p>There are several Ramsar sites within the study area.</p> <p>In the north of the study area there are located:</p> <ul style="list-style-type: none"> <li>- Breydon Water,</li> <li>- Broadland.</li> </ul> <p>In the south of the study area there are located:</p> <ul style="list-style-type: none"> <li>- Medway Estuary and Marshes,</li> <li>- Thames Estuary and Marshes,</li> <li>- The Swale.</li> </ul>	A	A	A	<p>The Ramsar sites are located across an area of the northern and southern sections of the study area. The sites are situated further inland off the coast in the north compared to those in the Thames Estuary.</p> <p>Consideration should be given to the routing/location of the cable landfall points (particularly within the Thames Estuary) and offshore/onshore cables to avoid negative impacts during construction in terms of reducing noise and visual disturbance (e.g., through screening) if the route passes close to this constraint (up to 1 km, dependent on bird species) or associated bird migratory and foraging routes.</p> <p>Planning of construction activities and access routes should be undertaken, including the implementation of buffer zones as appropriate to avoid associated impacts e.g., relating to access roads and stockpiles. A HRA Screening should be undertaken as the route may have a significant effect, particularly on the Ramsar sites in the south of the study area around the landfall.</p> <p>Although there are potential opportunities for avoidance of this constraint in the north through routing as sites are further inland, an</p>	A

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						amber BRAG rating has been applied owing to the vicinity of this constraint to the coastal environment in the southern sector.	
Proposed Ramsar sites	UK Proposed Ramsar sites	There are no Proposed Ramsar sites located within the study area.	N/A	N/A	N/A	N/A	N/A
SSSIs	UK SSSIs	There are several SSSIs located within the study area. In the north and west of the study area there are approximately 10 SSSIs directly on the coast and in the southern section there are 3 SSSIs.	N/A	A	A	There is a large number of SSSIs distributed throughout the study area, concentrated in the northern part with the southern sector extensively covered by fewer SSSIs. Mitigation for these SSSIs must consider routing and buffer zones more acutely to minimise disruption to sensitive areas. This will need detailed planning at the next stage, as well as implementing best practices during construction in order to avoid impacts on this constraint. Although there are potential opportunities for avoidance of this constraint through routing, an amber BRAG rating has been applied owing to the extent of SSSIs in the south.	A
NNRs	UK NNRs	There are eleven NNRs located in this study area. In the north there are: <ul style="list-style-type: none"> <li>- Ant Broads And Marshes,</li> <li>- Benacre,</li> <li>- Bure Marshes,</li> </ul>	N/A	A	A	The majority of this offshore study area is not constrained by an NNR, but there are several small NNRs distributed in the north of the study area. Therefore, it is necessary to mitigate risks through detailed routing and siting. Planning of construction activities and access routes should be undertaken, including the	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
		<ul style="list-style-type: none"> <li>- Calthorpe Broad,</li> <li>- Hickling Broad,</li> <li>- How Hill,</li> <li>- Ludham and Potter Heigham Marshes,</li> <li>- Martham Broad,</li> <li>- Mid-Yare,</li> <li>- Paston Great Barn,</li> <li>- Winterton Dunes.</li> </ul>				<p>implementation of buffer zones as appropriate to avoid impacts relating to access roads and construction waste stockpiles.</p> <p>As a result of the potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	
Biosphere Reserves	UK Biosphere Reserves	There are no Biosphere Reserves within the study area.	N/A	N/A	N/A	N/A	N/A
MCZs	UK MCZs	<p>There are six MCZs within the study area:</p> <ul style="list-style-type: none"> <li>- Cromer Shoal Chalk Beds,</li> <li>- Kentish Knock East,</li> <li>- Orford Inshore.</li> <li>- Medway Estuary – Zone 1,</li> <li>- Medway Estuary – Zone 2,</li> <li>- The Swale Estuary.</li> </ul>	R	R	N/A	<p>Due to the relatively spaced out distribution of the MCZs this study area is moderately constrained.</p> <p>Consideration should be given to the routing/location of the cable landfall points and offshore cables to avoid negative impacts such as seabed sediment and habitat disturbance and sediment suspension, alteration of substrate cover and composition, and hydrodynamic changes.</p> <p>There may also be opportunities to mitigate risks to these MCZs through selective routing/placement of the cable landfall points and offshore cables to avoid or minimise impacts on sensitive habitats, taking into account ecological connectivity and the preservation of important biodiversity areas.</p>	A

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						Although there are opportunities for avoidance of this constraint, an amber BRAG rating has been applied as this is considered to be a moderately constrained area where a detailed route design and construction methodology are still required.	
HPMA	Digitised from HPMA consultation documents	There are no HPMA within the study area.	N/A	N/A	N/A	N/A	N/A
Ancient Woodlands	UK Ancient Woodlands	There are two areas of coastal ancient woodland located in the north and east section of the study area.	N/A	A	A	There are two discrete coastal sites within the study area that are constrained by ancient woodland. Opportunity exists in the next stage to mitigate risks through the routing process so that the cable landfall points and offshore cables do not cross areas of ancient woodland. Any risks during construction may be controlled through appropriate construction environmental management practices, for example in relation to the siting of access routes and implementing buffer zones around ancient woodland areas.  A green BRAG has been assigned in view that there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.	G
Important Bird Areas	UK Important Bird Areas	There are several Important Bird Areas within the study area.	G	G	G	There are areas of this study area that will need to be avoided and therefore represent a	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
		<p>In the north and west of the study area there are located:</p> <ul style="list-style-type: none"> <li>- Benacre To Easton Barents,</li> <li>- Breydon Water,</li> <li>- Broadland,</li> <li>- Great Yarmouth North Denes.</li> </ul> <p>In the south section of study area:</p> <ul style="list-style-type: none"> <li>- Medway Estuary and Marshes,</li> <li>- Thames Estuary and Marshes,</li> <li>- The Swale.</li> </ul>				<p>constraint to the north, west and south of the study area.</p> <p>Consideration should be given to wider impacts such as during construction of cable landfall points and offshore cables in terms of interaction risk with landfall infrastructure or vessels (implement interaction risk mitigation measures, such as effective deterrent systems, monitoring, and operational procedures, to minimise the potential for bird interactions).</p> <p>During construction of Onshore cables if routed close by, bird usage of the area would need to be considered where any disturbance risks are identified. Construction activities may result in the direct removal or destruction of bird nests. Displacement from nesting sites can disrupt breeding patterns and affect reproductive success. Consideration would need to be given to conduct nesting surveys prior to construction to identify active nests and breeding sites. Measures would need to be implemented to avoid and create buffer zones around active nests, ensuring that appropriate timing and methods are used to minimise disturbance. Alternative nesting structures or nearby suitable habitats should be installed or created to compensate for any loss of nesting sites.</p> <p>Construction activities should be scheduled to avoid critical periods for breeding, nesting and migration of sensitive species. Foraging areas</p>	

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						<p>will also be avoided through the detailed routing process.</p> <p>A green BRAG has been assigned in view as although this is considered to be a highly constrained area that there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	
Royal Society for the Protection of Birds (RSPB) Reserves	UK RSPB Reserves	<p>There are several UK RSPB Reserves within the coastal zone of the study area.</p> <p>Berney Marshes and Breydon Water; Dingle Marshes and Minsmere are located in the north and west part of proposed study area.</p> <p>There are also Reserve areas on the isle of Grain, including Northward Hill.</p>	G	G	G	<p>Onshore cables development may be constrained by RSPB Reserves due to excavation activities which lead to soil disturbance, vegetation removal and indirect risks via disturbance during construction (i.e., noise/lighting).</p> <p>During construction of onshore cables if routed close by, bird usage of the area would need to be considered where any disturbance risks are identified. Construction activities may result in the direct removal or destruction of bird nests. Displacement from nesting sites can disrupt breeding patterns and affect reproductive success. Consideration should be given to conduct nesting surveys prior to construction to identify active nests and breeding sites. Measures would need to be implemented to avoid and create buffer zones around active nests, ensuring that appropriate timing and methods are used to minimise disturbance. Alternative nesting structures or nearby</p>	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						<p>suitable habitats should be installed or created to compensate for any loss of nesting sites.</p> <p>Construction activities should be scheduled to avoid critical periods for breeding, nesting and migration of sensitive species. Foraging areas will also be avoided through the detailed routing process.</p> <p>A green BRAG has been assigned in view as this is considered to be a lightly constrained area and that there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	
Seabird At Sea Density (Summer/Winter)	UK Seabirds at Sea Density		G	N/A	N/A	<p>There are European seabird at sea records throughout the study area, with the highest density of records towards the coasts. These data would need to be used at the detailed design stage where there may be sensitive species and corresponding periods where construction mitigation is required.</p> <p>Construction activities should be scheduled to avoid critical periods and areas e.g., for foraging during breeding season and key migration routes of sensitive species. This will occur during the detailed routing process.</p> <p>A green BRAG has been assigned as it is considered that there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	



Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
Annex 1 Reefs outside designated areas	UK Annex 1 Reefs	There are no Annex 1 Reefs polygon or point records outside the designated areas.	N/A	N/A	N/A	N/A	N/A
Annex 1 Sandbanks outside designated areas	UK Annex 1 Sandbanks	There are Annex 1 Sandbanks which are slightly covered by seawater all of the time polygon or point records outside the designated areas.	N/A	N/A	N/A	N/A	N/A
Annex 1 Submarine Structures outside designated areas	UK Annex 1 Submarine Structures	There are no Annex 1 Submarine structures made by leaking gas polygon or point records outside the designated areas.	N/A	N/A	N/A	N/A	N/A
Annex 1 Saltmarsh outside designated areas	UK Annex 1 Saltmarsh	There are no Annex 1 Saltmarsh polygon or point records outside the designated areas.	N/A	N/A	N/A	N/A	N/A
UK Grey Seals	UK Grey Seal -High density	There are no Grey Seal Breeding Colonies within the study area. Within the study area there are: - six locations with between 1-10 grey seal count	G	G	N/A	Consideration should be given to the routing/location of the Cable Landfall Points and offshore cables to avoid negative impacts on any seals in the area such as from noise and visual disturbance, alteration of foraging and haul out habitat, displacement of individuals from breeding areas and interaction risk.	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
		<ul style="list-style-type: none"> <li>- 2 locations with between 21 – 40 grey seal count</li> <li>- 2 locations with between 81 -160 grey seal count</li> </ul>				<p>For noise and vibrations this will include implementing best practice such as the use of marine mammal observers and noise reduction measures. Interaction risk mitigation measures, such as effective deterrent systems, monitoring and operational procedures will reduce the potential for effects on seals.</p> <p>As there may be opportunities to mitigate risks through selective routing/placement of the cable landfall points and offshore cables to avoid or minimise impacts on associated habitats and breeding areas, a green BRAG has been assigned.</p>	
UK Harbour Seals	UK Harbour Seal – High density	<p>Within the study area there are:</p> <ul style="list-style-type: none"> <li>- 11 locations with between 1-10 harbour seal count</li> <li>- 2 locations with between 11 – 20 harbour seal count</li> <li>- 1 location with between 41 – 80 harbour seal count</li> </ul>	G	G	N/A	<p>Consideration should be given to the routing/location of the cable landfall points and offshore cables to avoid negative impacts such as noise and visual disturbance, alteration of foraging and haul out habitat, displacement of individuals and interaction risk.</p> <p>For noise and vibration impacts this will include implementing best practice such as the use of marine mammal observers and noise reduction measures. Interaction risk mitigation measures, such as effective deterrent systems, monitoring and operational procedures will reduce the potential for effects on seals.</p> <p>As there may be opportunities to mitigate risks through selective routing/placement of the cable landfall points and offshore cables to avoid or mitigate the risks associated with this</p>	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						constraint, with detailed routing and construction best practices.	
SCANS 3 (marine mammal densities)	Marine mammal densities	Pilot whale – Low density (0.0-0.1 animals per km <sup>2</sup> ) Minke whale – Low density (0.0-0.01 animals per km <sup>2</sup> ) Harbour porpoise – Medium/High density (0.25-1.25 animals per km <sup>2</sup> ) Fin whale – Low density (0.0-0.025 animals per km <sup>2</sup> ) Common dolphin – Low density (0.0-0.07 animals per km <sup>2</sup> ) Common and or striped dolphin – Low density (0.0-0.04 animals per km <sup>2</sup> ) Bottlenose dolphin – Low density (0.0-0.025 animals per km <sup>2</sup> ) Beaked whales – Low density (0.0-0.1 animals per km <sup>2</sup> )	G	G	N/A	Consideration should be given to the routing/location of the cable landfall points and offshore cables to avoid negative impacts on foraging areas such as seabed disturbance, alteration of substrate cover and composition, hydrodynamic changes, as well as disturbance, displacement and interaction risk for cetaceans.  For noise and vibration impacts this will include implementing construction and operational maintenance best practice such as the use of marine mammal observers and noise reduction measures. Interaction risk mitigation measures, such as effective deterrent systems, monitoring and operational procedures will reduce the potential for effects on cetaceans.  A green BRAG has therefore been assigned in view of the above and that there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
		Striped dolphin – – Low density (0.0-0.05 animals per km <sup>2</sup> ) White beaked dolphin – Low density (0.0-0.05 animals per km <sup>2</sup> )					
Fish spawning grounds	UK Fish spawning grounds 2010	Within the study area there are spawning grounds for species like cod, sand eel, sole, plaice and whiting. There are multiple records of spawning locations with the study area.	G	N/A	N/A	Consideration should be given to the routing/location of the offshore cables to avoid negative impacts on spawning areas such as minimising seabed disturbance, alteration of substrate cover and composition, hydrodynamic changes and general disturbance. Consideration would need to be given to wider impacts during construction in terms of reducing noise and vibrations (e.g., implement best practices to minimise underwater noise, including the use of noise mitigation measures and construction methodologies that reduce disturbance to fish). A green BRAG has been assigned in view as there are many opportunities to mitigate the risks associated with this constraint with detailed routing and construction best practices	G
Fish nursery grounds	UK Fish Nursery grounds 2010	Within the study area there are nursery grounds for species like cod, tope shark, herring, mackerel, plaice, sole,	G	N/A	N/A	Consideration should be given to the routing/location of the offshore cables to avoid negative impacts on nursery areas such as minimising seabed disturbance, alteration of substrate cover and composition,	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
		sand eel, thornback ray and whiting. There are multiple records of nursery ground locations with the study area.				hydrodynamic changes and general disturbance. Consideration would need to be given to wider impacts during construction in terms of reducing noise and vibration (e.g., implement best practices to minimise underwater noise, including the use of noise mitigation measures and construction methodologies that reduce disturbance to fish). A green BRAG has been assigned in view as there are many opportunities to mitigate the risks associated with this constraint with detailed routing and construction best practices.	
<b>Geology and Soils (Environmental)</b>							
Geoparks	UK Geoparks	There are no UNESCO Global Geoparks within the study area.	N/A	N/A	N/A	N/A	N/A
<b>Landscape and Visual (Community)</b>							
National Parks	UK National Parks	There is one National Park within this study area: The Broads National Park located in the north part of study area.	N/A	A	A	The northern sector of this study area is moderately constrained by The Broads National Park. While underground cables are less visually prominent compared to overhead lines, the construction and maintenance of the landfall and associated infrastructure can still have visual impacts on the surrounding area. The most suitable route to minimise the need for onshore cables and landfall infrastructure	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						<p>will consider existing coastal land use and environmental sensitivities, also to explore opportunities to co-locate cables with existing coastal infrastructure corridors, such as roadways and utility corridors, to minimise the need for additional land acquisition or disruption.</p> <p>During operations, depending on the location there may be periodic vegetation management activities, such as tree trimming or clearing around access points, to ensure the integrity and accessibility of the underground cables. These activities may have underground cables. These activities may have temporary visual impacts.</p> <p>As a mitigation there should be implementation of appropriate landscaping strategies, such as the planting of trees, shrubs, or other vegetation, to visually integrate infrastructure elements, such as landfall installations, into the surrounding environment. The design guidelines or standards should adhere to that aim to minimise visual impacts during the installation and operation of underground cable systems. This can include considerations for equipment placement, surface installations, and landscaping.</p> <p>A green BRAG has been assigned in view as this is considered to be a moderately constrained area and there are many</p>	

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.	
National Landscapes	England National Landscapes	<p>There are two National Landscapes within the study area.</p> <p>There are Suffolk Coast and Heaths and Norfolk Coast located in the north of the study area.</p>	N/A	A	A	<p>The northern sector of this study area is moderately constrained by Suffolk Coast and Heaths and Norfolk Coast.</p> <p>While underground cables are less visually prominent compared to overhead lines, the construction and maintenance landfall infrastructure can still have visual impacts on the surrounding area.</p> <p>The most suitable location for landfall infrastructure and coastal onshore cables will consider existing land use and environmental sensitivities, and also will explore opportunities to co-locate cables with existing infrastructure corridors, such as roadways and utility corridors, to minimise the need for additional land acquisition or disruption.</p> <p>During operations, depending on the location there may be periodic vegetation management activities, such as tree trimming or clearing around access points, to ensure the integrity and accessibility of the underground cables. These activities may have temporary visual impacts.</p> <p>There should be implementation of appropriate landscaping strategies, such as the planting of trees, shrubs, or other vegetation, to visually integrate infrastructure</p>	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						<p>elements, such as landfall installations, into the surrounding environment. The design guidelines or standards should be adhered to, that aim to minimise visual impacts during the installation and operation of underground cable systems. This can include considerations for equipment placement, surface installations, and landscaping.</p> <p>A green BRAG has been assigned as this is considered to be a moderately constrained area and there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	
Heritage Coasts	England Heritage Coasts	There is one Heritage Coast within the study area. Suffolk Heritage Coast is located in the north of the study area.	N/A	G	G	<p>The northern sector of this study area is lightly constrained by Suffolk Heritage Coast. While underground cables are less visually prominent compared to overhead lines, the construction and maintenance landfall infrastructure can still have visual impacts on the surrounding area.</p> <p>The most suitable location for landfall infrastructure and coastal onshore cables will consider existing land use and environmental sensitivities, and also will explore opportunities to co-locate cables with existing infrastructure corridors, such as roadways and utility corridors, to minimise the need for additional land acquisition or disruption.</p>	G



Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						<p>During operations, depending on the location there may be periodic vegetation management activities, such as tree trimming or clearing around access points, to ensure the integrity and accessibility of the underground cables. These activities may have temporary visual impacts.</p> <p>There should be implementation of appropriate landscaping strategies, such as the planting of trees, shrubs, or other vegetation, to visually integrate infrastructure elements, such landfall installations, into the surrounding environment. The design guidelines or standards should be adhered to, that aim to minimise visual impacts during the installation and operation of underground cable systems. This can include considerations for equipment placement, surface installations, and landscaping.</p> <p>A green BRAG has been assigned as this is considered to be a lightly constrained area and there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	
National Trails	England National Trails	There are no National Trails within the study area.	N/A	N/A	N/A	N/A	N/A
<b>Historic Environment (Community)</b>							

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
World Heritage Sites	UK World Heritage Sites	There are no World Heritage Sites within the study area.	N/A	N/A	N/A	N/A	N/A
Scheduled Monuments	UK Scheduled Monuments	Within the study area there are multiple Scheduled Monuments in the north section and several records in south.	R	R	R	<p>Offshore/onshore cables and cable landfall points/routing development has the potential to be constrained by Scheduled Monuments due to the risk construction works may have upon the feature and/or associated archaeological features. Due to this, without mitigation the distribution of Scheduled Monuments in the north and south sections of study area is likely to constrain overall routing and require consideration of the mitigation hierarchy.</p> <p>It is considered that there are opportunities to mitigate risks to the individual Scheduled Monuments in the study area through the routing and siting process, including implementation of buffer zones. There will be detailed considerations required for this type of construction.</p> <p>The areas surrounding the Scheduled Monuments may also require mitigation when carrying out groundworks, due to the potential presence of undiscovered associated features (i.e., archaeological remains).</p> <p>Consultation with historic England would need to be required to determine the most appropriate mitigation.</p>	A

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						<p>It may be possible to avoid direct risks to Scheduled Monuments, but due to their distribution along the coastline in the study area, indirect risks may be more difficult to avoid.</p> <p>As a result of the opportunities for avoidance of this constraint in the area, an amber BRAG rating has been applied as this is considered to be a heavily constrained area where detailed route design and construction methodology is required.</p>	
Listed Buildings	UK listed buildings (Grade I, II* and II listed buildings)	There are numerous Listed Buildings throughout the north and south sections of study area, including Grade I, Grade II*, and Grade II.	N/A	A	A	<p>Offshore/onshore cables and cable landfall points/routing may be moderately constrained by listed buildings due to the risk of physical loss or damage to the building, or indirectly via disturbance to the listed building's setting. There may also be risks to the curtilage (the area around, or any other building that is around and associated with a listed building).</p> <p>Whilst there is a large number of Listed Buildings within the coastal sector of the study area, opportunity exists in the next stages to reduce direct risks through the routing and siting process.</p> <p>Works and transport routes need to be considered in terms of their proximity to listed buildings near the highway (e.g., accidental damage risk from HGVs in narrow lanes or other restricted areas) or groundworks (i.e., if</p>	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						any vibration generating works are close enough to cause damage to buildings). A green BRAG has been assigned in view as although this is considered to be a moderately constrained area, there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.	
Registered Parks and Gardens and Designed Landscape	Registered Parks and Gardens	Within the study area there are 3 Registered Parks and Gardens on the coast, all located in the northern sector.	N/A	G	G	Given the limited areas covered by Registered Parks and Gardens, through careful design and construction planning, avoiding/ mitigating direct and indirect adverse risks the sites are not considered to constrain the development of the option.  As a result of the low density distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.	G
Wreck locations	UK wreck locations	There are multiple wreck locations in the south section of the study area.	R	R	N/A	It is important that the proposed route avoids disturbing known or suspected wrecks, especially where there might be caches of unexploded ordnance.  As a result of wrecks being present within the study area and the requirement for avoidance of this constraint through routing and potential further investigations, an amber BRAG rating has been applied.	A
Protected wrecks	England protected wrecks	There is only one protected wreck site	G	G	N/A	Given the individual protected wreck site, through careful design and construction	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
		within the study area: South Edinburgh Channel, located in the south.				planning, site is not considered to constrain the development of the option. As a result of the low density distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.	
Ship Hulk	Other obstructions (ship hulk)	There are no ship hulks recorded within the study area	N/A	N/A	N/A	N/A	N/A
Registered Battlefields	England Registered Battlefields	There are no Registered Battlefields within the study area.	N/A	N/A	N/A	N/A	N/A
<b>Air Quality (Community)</b>							
Air Quality Management Areas (AQMA)	UK AQMA	There is one AQMA within the study area. Central Norwich AQMA is located in the south.	N/A	N/A	G	Given the small area covered by an AQMA, through careful design and construction planning, avoiding/ mitigating direct and indirect adverse risks the sites are not considered to constrain the development of the option. As a result of the low density distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.	G
<b>Noise (Community)</b>							
Major Settlements	UK Major Urban Settlements	Much of the study area is offshore; land environment within the study area is a natural/rural setting.	N/A	G	G	There is potential for the construction of onshore cables and cable landfall points to generate noise during construction, and	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
		There are the settlements of Lowestoft and Great Yarmouth located within the study area along the coast in the northern sector. Norwich (as a Major Urban Settlement) is further inland and would not be within the vicinity of offshore/coastal landfall works.				operation that would affect residents, including within Noise Important Areas. Owing to the settlements' small areas over the majority of the coastal study area, it is considered that any potential construction and noise impacts could be effectively controlled through appropriate routing and the use of best practice mitigation measures such as a CEMP during construction. Operational noise would also require further consideration at the next stage of the option development process. As a result of the distribution and potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.	
Small Scale Settlements	UK Small Scale Urban Settlements	Within the study area, there are several small scale settlements.	N/A			There is potential for the construction of onshore cables and cable landfall points to generate noise during construction, and operation that would affect residents, including within Noise Important Areas. Owing to the settlements' small areas over the majority of the coastal study area, it is considered that any potential construction and noise impacts could be effectively controlled through appropriate routing and the use of best practice mitigation measures such as a CEMP during construction. Operational noise would also require further	

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						<p>consideration at the next stage of the option development process.</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.</p>	
<b>Socio-Economics (Community)</b>							
Major Settlements	UK Major Urban Settlements (Socio-Economics)	<p>Much of the study area is offshore; land environment within the study area is a natural/rural setting. There are the settlements of Lowestoft and Great Yarmouth located within the study area along the coast in the northern sector. Norwich (as a Major Urban Settlement) is further inland and would not be within the vicinity of offshore/coastal landfall works.</p>	N/A	G	G	<p>There is potential for the construction of onshore cables and cable landfall points to impact residents as a result of changes to visual amenity. Constraints to the positioning of landfall infrastructure and onshore cables are associated with the socio-economic aspects of these settlements.</p> <p>Residents may have concerns about the health risks of new onshore cables in the vicinity of their houses and schools and therefore public information events should be held and leaflets produced to reduce any concerns.</p> <p>Potential positive impacts of this reinforcement may include employment generation during construction.</p> <p>Mitigation should carefully consider the tourism and recreation socio-economic sensitivities of the study area and seek to mitigate risks to key receptors associated with the settlements. This will be applicable in the construction and operational stages.</p>	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						As a result of the distribution and potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.	
Small Scale Settlements	UK Small Scale Urban Settlements	Within the study area, there are several small scale settlements.	N/A	G	G	<p>There is potential for the construction of onshore cables and cable landfall points to impact residents as a result of changes to visual amenity. Constraints to the positioning of landfall infrastructure and onshore cables are associated with the socio-economic aspects of these settlements.</p> <p>Residents may have concerns about the health risks of new onshore cables in the vicinity of their houses and schools and therefore public information events should be held and leaflets produced to reduce any concerns.</p> <p>Potential positive impacts of this reinforcement may include employment generation during construction.</p> <p>Mitigation should carefully consider the tourism and recreation socio-economic sensitivities of the study area and seek to mitigate risks to key receptors associated with the settlements. This will be applicable in the construction and operational stages.</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through routing and best practice mitigation</p>	G



Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						measures, a green BRAG rating has been applied.	
National Trust Land	National Trust Open Land and Limited Access Land	<p>There are several areas of National Trust Land within this study area.</p> <p>There are NTL areas located in the north:</p> <ul style="list-style-type: none"> <li>- Horsey Hall Estate,</li> <li>- Horsey Poor Marsh,</li> <li>- 240 Acres Heigham Holmes,</li> <li>- 220 Acres Heigham Holmes,</li> <li>- 4 South Quay,</li> <li>- Darrow Wood.</li> </ul>	N/A	A	A	<p>There is potential for these sites to constrain development of this option due to the potential for direct and indirect risks, such as loss of land.</p> <p>Opportunity exists in the next stages to mitigate risks through the routing process and therefore the presence of National Trust Land is not considered a large constraint to the option. There may be a risk on setting and temporary construction disturbance depending upon the location of the route, which should be carefully considered.</p> <p>As a result of the low-density distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	G
RYA sailing and racing areas	RYA sailing and racing areas	<p>There are 30 Sailing/Yacht Clubs locations in the north and west sections of the study area.</p> <p>There are 4 Sailing/Yacht/Boat Clubs located in the south section of study area.</p>	G	G	N/A	<p>Construction activities may temporarily affect sailing activities, particularly in coastal areas near cable landing points (e.g. higher intensity inshore local club sailing and racing) but also offshore installation areas where there may be lower density sailing and racing. Limited access to certain areas may affect the community, sailing activities and associated tourism.</p> <p>Construction and operational maintenance activities would need to be conducted with the aim of avoiding RYA sailing and racing areas and also providing appropriate notice to</p>	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
		The AIS Intensity is low/medium through study area.				mariners and exclusion zones. The RYA's Coastal Atlas would need to be used to inform the detailed routing. As a result of the distribution and potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.	
Bathing waters	Bathing waters	There are 15 Bathing water locations within the study area. Mostly concentrated in north of the study area.	G	G	N/A	Construction activities may temporarily disrupt the daily life of local communities, particularly in coastal areas near cable landing points or onshore infrastructure sites. Limited access to certain areas and potential public perception of changes to bathing water appearance (e.g., through suspension of sediments and appearance of surface foams/scum rather than affecting bathing water quality through release of faecal indicator organisms) during construction may reduce bathing activities and tourism. Bathing waters may be avoided during the detailed routing stage and mitigation measures implemented through reducing sediment disturbance. As a result of the distribution and potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
Shellfish waters	Shellfish waters	There are six shellfish water locations within the study area and more to the east: Foulness, Margate, Outer Thames, Sheppey, Swalecliffe and Southend.	G	G	N/A	The south and east of the study area has the greatest constraint, particularly owing to the location of the Outer Thames Shellfish Water. Offshore cabling and landfall construction may damage shellfish beds, reduce water quality through suspended sediment release and interfere with harvesting activities. As a result of the distribution and potential opportunities for avoidance of this constraint through routing to the west and best practice mitigation measures implemented to reduce the footprint and sediment disturbance, a green BRAG rating has been applied.	G
Fishing activity	UK Fishing activity – Areas of high intensity fishing effort	The Fishing Effort within the study area comprises the following: <ul style="list-style-type: none"> <li>- demersal species – Lowest/Low/Medium/High,</li> <li>- pelagic species – Lowest/Low,</li> <li>- shrimp trawlers – none,</li> <li>- static gears – Medium/High/High est,</li> <li>- beam trawl – Lowest/Low.</li> </ul>	G	G	N/A	The presence of offshore HVDC infrastructure and maintenance vessels can impact traditional fishing grounds and disrupt other maritime activities, potentially affecting the livelihoods and economic activities of coastal communities. Consideration should be given to engage with local fishing communities and relevant stakeholders during the planning and design phases to understand their concerns and identify measures to minimise impacts. Compensation measures to mitigate economic losses should be provided. There is need to establish communication channels to coordinate with fishers and ensure their safety and access to fishing areas during maintenance options. As a result of potential opportunities for	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
		International Fishing Effort of North Sea beam trawl (1995) within the study area is Low/Medium/High/Highest.				avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.	
Marine Fish Farms	UK Seawater Finfish Farms	UK marine finfish farms are located primarily in Scotland and the west coast.	N/A	N/A	N/A	N/A	N/A

## 2.10. Friston to Sellindge Study Area (HVDC)

Start point	End point	Applicable to shortlisted designs:
Friston	Sellindge	Yes

### 2.10.1. Reinforcement Details

Reinforcement type (if known)	Reinforcement Length (if known)
HVDC	N/A
<b>Technology assumptions</b>	

This reinforcement includes a HVDC offshore reinforcement between Friston in Suffolk and Sellindge in south east Kent.

### 2.10.2. Environmental Summary

BRAG Rating  
with mitigation  
measures:

A

The study area includes multiple environmental constraints including international and national designations.

The main area of constraint where several environmental designations are densely located or overlap is within the north and southern section of the study area and particularly around the offshore sections. In these areas there are several overlapping designations including:

- MCZs,
- Ramsar sites,
- SPAs,
- SACs,
- SSSIs,
- IBAs,
- RSPB Reserves.

Several MCZs are within the heavily constrained south section of the study area. There may be opportunity to mitigate risks to these MCZs through selective routing/placement of offshore cables.

The broad distribution of the Southern North Sea SAC occupying the eastern half of the study area and designated for mobile species rather than habitat creates a relatively less constrained north-south corridor for the offshore cable route in the centre of the study area. Owing to the number of environmental constraints around the coastline and the variety of habitats and species designated, there are very few unconstrained potential landfall points. Those locations (from an environmental point of view) which are least constrained are Felixstowe/Harwich and Sizewell (if undergrounding was an option) in the north and to the south of Folkestone and around Deal in the south.

This region therefore requires extensive routing in subsequent design stages. This will require the implementation of:

- Buffer zones,
- Consideration of marine species and bird migration routes
- Implementation of interaction risk mitigation measures,
- Underwater noise and vibration mitigation measures,
- HRA Screening,
- Best practice appropriate construction management practices (e.g., siting of access routes and buffer zones).

As explained in Section 1.2.2 (Study Area Environmental and Community Summary BRAG Ratings), the following factors have been considered in determining an overall Environmental BRAG rating for this Study Area.

Table 2.10.2: Overall Environmental BRAG rating for the Friston to Sellindge Study Area.

<b>Scope of works</b>	This reinforcement includes a HVDC offshore reinforcement between Friston in Suffolk and Sellindge in south east Kent, that will require some physical changes to the environment and as such, will therefore be affected by the constraints described in the constraints table in Section 2.10.4. This is reflected in the BRAG ratings.
<b>Number and area of constraints</b>	Within the study area there are 16 different environmental constraint types present. As noted above, the main area of constraint where several environmental designations are densely located or overlap is within the north, western and southern section of the study area and particularly around the offshore sections.
<b>BRAG ratings of constraints</b>	<p>Within the study area there are 16 environmental constraint types present. Of these, two have a rating of red under the HND methodology after mitigation, one has a rating of amber after mitigation and 13 have a rating of green after mitigation.</p> <p>The two red rated constraints include:</p> <ul style="list-style-type: none"> <li>• SAC</li> <li>• MCZ</li> </ul> <p>The one amber rated constraint include:</p> <ul style="list-style-type: none"> <li>• SPA</li> </ul> <p>The thirteen green rated constraints include:</p> <ul style="list-style-type: none"> <li>• pSAC</li> <li>• Ramsar Sites</li> <li>• SSSI</li> <li>• NNR</li> <li>• Ancient Woodland</li> <li>• IBA</li> <li>• RSPB Reserves</li> <li>• Seabird At Sea Density</li> <li>• UK Grey Seals</li> <li>• UK Harbour Seals</li> <li>• SCANS 3</li> </ul>

	<ul style="list-style-type: none"> <li>• Fish Spawning Grounds</li> <li>• Fish Nursery Grounds</li> </ul>
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As shown on the constraint plan, there are no possible opportunities to avoid all above constraints through construction design and routing. Assessment showed that due to the size and distribution of MCZs and SACs, particularly close to the coast in the southern extremity and central section of this study area is heavily constrained. This constraint is unavoidable within proposed study area. In the first place, priority should be given to areas of highest importance such as all identified MCZs, Thanet Coast SAC and Margate and Long Sands SAC. There are potential opportunities to avoid intersection with above mentioned high important SACs by considering route between/east of the identified high importance constrained areas.

However, in this case a interaction with Southern North Sea SAC will be inevitable, as it occupies the eastern half of the study area. An overall amber BRAG rating has been assigned after mitigation measures. As shown on the constraints plan, due to the locations of the SACs, SPAs and MCZ re routing and detailed design may be inaccessible in avoiding all of the constraints, so consideration of the mitigation hierarchy with appropriate routing, siting, and buffer zones would need to be required to reduce the impacts. This would be through selective routing/ placement of the cable landfall points and offshore cables to avoid or minimise impacts on sensitive habitats, taking into account ecological connectivity and the preservation of important biodiversity areas.

<b>2.10.3. Community Summary</b>	<b>BRAG Rating with mitigation measures:</b>	<b>A</b>
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There are numerous community constraints in the study area, particularly relating to landscape, historic assets and fishing areas.

There are two National Landscapes in the study area, one in the northern part of the study area and one in the southern part. The northern area’s position and extent does not severely constrain the project and there is potential opportunity for avoidance through the routing process or undergrounding. The presence of National Landscape and Heritage coast distributed across the southern section of the study area presents the greatest constraint and is likely to require detailed consideration of onshore cable routing.

In addition, there are numerous other constraints in the southern section of the study area including listed buildings, wrecks, scheduled monuments and a large area designated as shellfish waters.

These constraints are likely to affect both offshore routing and onshore cable routing around the landfall points with a potential requirement for undergrounding in line with the Holford Rules. Also, additional offshore community constraints such as RYA sailing and racing areas, bathing waters, fishing activity (areas of high intensity fishing effort) will need selective routing and compensation measures. The construction may temporarily disrupt the daily life of local communities and maritime activities. Consideration should be given to engage with local communities/ fishing communities and relevant stakeholders during the planning and design phases to understand their concerns and identify measures to

minimise impacts. Compensation measures to mitigate economic losses may be considered.

Throughout the construction process, works and transport routes need to be considered in terms of their proximity to features near the highway or groundworks (i.e., if any vibration generating works are close enough to cause damage to buildings) and employ appropriate construction management plans to mitigate temporary construction disturbance. These constraints may need further consideration at future design stages. Given the limited number of Protected Wreck Sites, through careful design and construction planning, avoiding direct and indirect adverse risks the sites are not considered to constrain the development of the option. Additional community constraints which may be easily avoided with selective routing and siting include the presence of Registered Parks and Gardens, National Trust Land, Noise Important Areas and AQMAs.

The western and southern onshore extent of the study area contain the more populated urban/port areas (namely Felixstowe/Harwich and Dover/Folkestone). The remainder of the study area is more natural/rural and less densely populated. Overall, landfall points around the urban areas appear to have the least constraints if mitigation can be applied and can potentially utilise existing infrastructure.

As explained in Section 1.2.2 (Study Area Environmental and Community Summary BRAG Ratings), the following factors have been considered in determining an overall Environmental BRAG rating for this Study Area.

Table 2.10.3: Overall Community BRAG rating for the Friston to Sellindge Study Area.

<b>Scope of works</b>	This reinforcement includes a HVDC offshore reinforcement between Friston in Suffolk and Sellindge in southeast Kent, that will require some physical changes to the environment and as such, will therefore be affected by the constraints described in the constraints table in Section 2.10.4. This is reflected in the BRAG ratings.
<b>Number and area of constraints</b>	Within the study area there are 16 different community constraint types present. As noted above, the most constrained area is within the northern onshore sections of the study area, as well as many constraints distributed within the offshore section.
<b>BRAG ratings of constraints</b>	<p>Within the study area there are 16 community constraint types present. Of these, zero has a rating of red under the HND methodology after mitigation, two has a rating of amber after mitigation and fourteen have rating of green after mitigation.</p> <p>The two amber rated constraints include:</p> <ul style="list-style-type: none"> <li>• Wreck Locations</li> <li>• Scheduled Monuments</li> </ul> <p>The fourteen green rated constraints include:</p> <ul style="list-style-type: none"> <li>• National Landscapes</li> <li>• Heritage Coasts</li> <li>• National Trails</li> <li>• Listed Buildings</li> <li>• Registered Parks and Gardens</li> <li>• Protected Wrecks</li> <li>• AQMA</li> </ul>



	<ul style="list-style-type: none"> <li>• Small Scale Settlements (Noise)</li> <li>• Small Scale Settlements (Socio-Economics)</li> <li>• National Trust Land</li> <li>• RYA Sailing and Racing Areas</li> <li>• Bathing Waters</li> <li>• Shellfish Waters</li> <li>• Fishing Activity</li> </ul>
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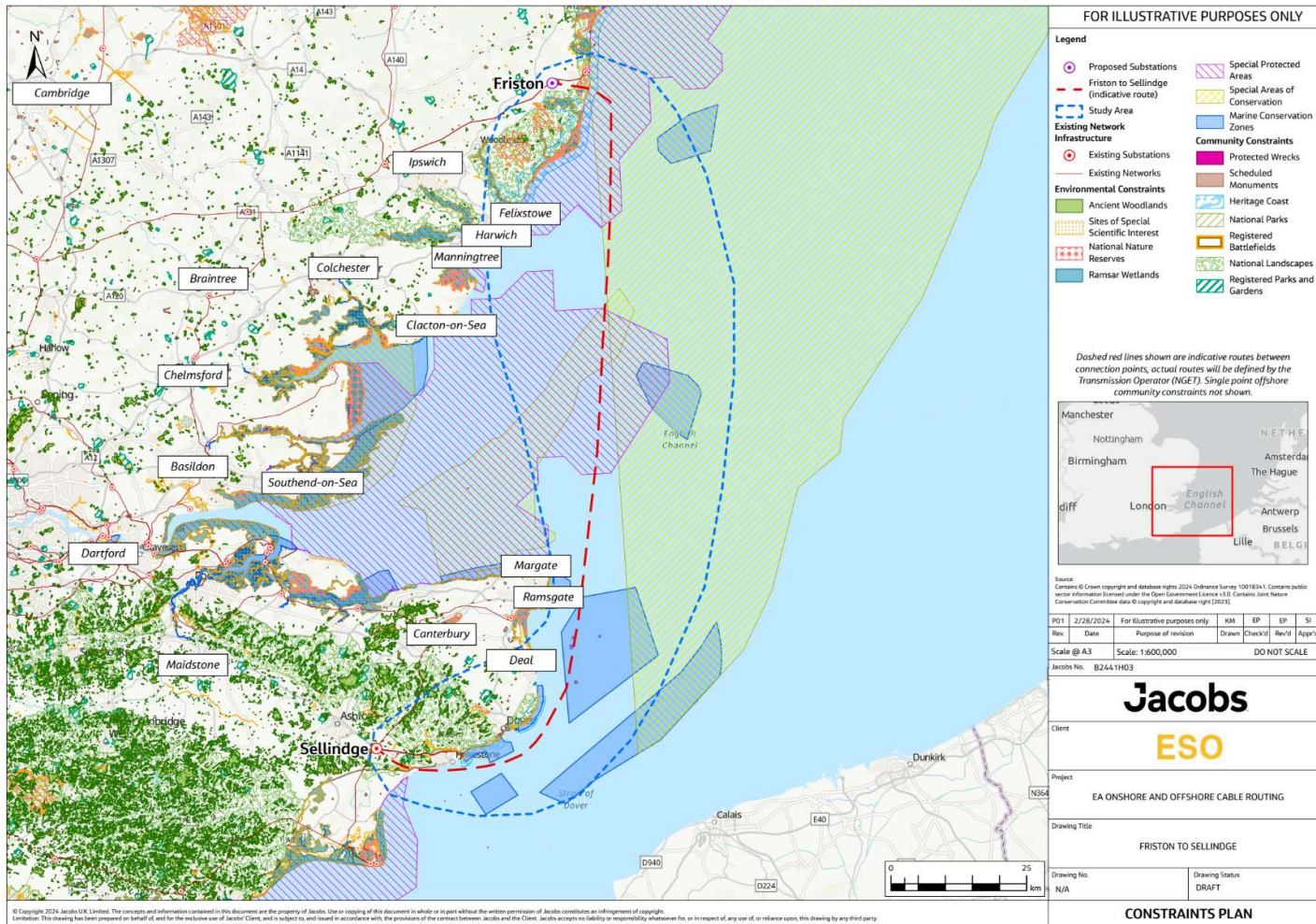
An amber BRAG rating has been assigned after mitigation measures due to the number and spatial distribution of these constraints across the breadth of the study area, as shown on the constraints plan avoidance of all of the constraints may be challenging, but there may be opportunities to avoid all the constraints through careful offshore routing, a construction methodology should also be considered to reduce the overall impacts.

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#### 2.10.4. Constraints Table

The following table depicts the environmental and community constraints for Friston to Sellindge Study Area. It describes the constraints present within the study area, the potential mitigation measures to avoid or reduce risks, and a BRAG rating before and after mitigation measures have been applied.

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**Constraints Plan 10: Study Area Friston to Sellindge showing Nationally and Internationally Designated Sites**

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
<b>Ecology (Environmental)</b>							
SAC	Onshore and offshore UK SACs	<p>There are several SACs within the proposed study area. In the north of the study area there are located:</p> <ul style="list-style-type: none"> <li>- Minsmere To Walberswick Heaths and Marshes SAC,</li> <li>- Alde-Ore and Butley Estuaries SAC,</li> <li>- Orfordness-Shingle Street SAC,</li> <li>- Staverton Park and The Thicks, Wantisden SAC.</li> </ul> <p>Margate and Long Sands SAC occupies the centre part of the study area.</p> <p>In the south of the study area there is:</p> <ul style="list-style-type: none"> <li>- Dover To Kingsdown Cliffs SAC,</li> <li>- Folkestone To Etchinghill Escarpment SAC,</li> <li>- Lydden and Temple Ewell Downs SAC,</li> <li>- Parkgate Down SAC,</li> <li>- Sandwich Bay SAC,</li> <li>- Thanet Coast SAC,</li> </ul> <p>There is in addition one SAC (offshore Marine Components GB) within the proposed study area:</p>	R	R	R	<p>Due to the size and distribution of the SACs, particularly close to the coast the southern extremity and centre section of this study area is heavily constrained. This is also in light of designated sensitive receptors such as chalk reef and other benthic habitats which would be directly affected by cable installation towards the landfall points.</p> <p>Consideration should be given to the routing/location of the cable landfall points and short sections of onshore cables to avoid negative impacts such as habitat loss and fragmentation, soil erosion and sedimentation. Planning of landward construction activities and access routes should be undertaken, including the implementation of buffer zones as appropriate to avoid associated impacts e.g., relating to access roads and stockpiles. In terms of offshore/coastal effects, consideration would need to be given to avoiding or minimising impacts on sensitive seabed habitats such as chalk reefs and sandbanks from the cable installation where ploughs or sledges are used and during operation (e.g., through scour or repair activities requiring sections of cable to be raised if faults occur). A HRA Screening would need to be conducted in the first instance as the route may have a significant effect on the SACs.</p>	R

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
		Southern North Sea SAC occupying the eastern half of the study area.				<p>As a result of the linear nature of cables and limited opportunities for avoidance of this constraint, a red BRAG rating has been applied as this is considered to be a heavily constrained area where detailed route design and construction methodology is required.</p> <p>Areas within the offshore northern and eastern extents of this study area are moderately constrained, the latter during construction/operational maintenance owing to mobile cetaceans.</p>	
pSAC	England and Scotland pSACs	There is one Possible SAC: Southern North Sea occupying the eastern half of the study area.	A	A	A	<p>Due to the size and distribution of this Possible SAC, an area of the eastern half of the study area is moderately constrained.</p> <p>Consideration should be given to the routing/location of the cable landfall points and offshore cables to avoid negative impacts such as seabed disturbance, alteration of substrate cover and composition, hydrodynamic changes, disturbance and habitat displacement and interaction risk for marine species.</p> <p>As a result of the potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	G
SPA	Onshore and offshore UK SPAs	<p>There are several SPAs within the study area.</p> <p>In the north of the study area there are located:</p> <ul style="list-style-type: none"> <li>- Minsmere-Walberswick SPA,</li> <li>- Sandlings SPA,</li> </ul>	A	A	A	<p>Within most sections of the study area there are SPAs which cover areas on land, bays and offshore, which are likely to moderately constrain routing.</p> <p>Construction mitigation in terms of reducing noise and visual disturbance will be required if the route</p>	A

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
		<ul style="list-style-type: none"> <li>- Alde-Ore Estuary SPA,</li> <li>- Deben Estuary SPA.</li> </ul> <p>In the south of the study area there is located: Thanet Coast and Sandwich Bay SPA.</p> <p>There are in addition two SPAs (offshore Marine Components GB) within the proposed study area: Outer Thames Estuary SPA occupying the central part of the study area and Dungeness, Romney Marsh and Rye Bay SPA on the southern edge.</p>				<p>passes close to this constraint (up to 1 km, depending on designated bird species). Consideration should be given to wider impacts such as bird migratory routes and proximity to these. There will be opportunities to mitigate risks through various measures, such as using buffer zones, screening during construction and timing of works to avoid sensitive times such as nesting or overwintering birds.</p> <p>There may also be opportunities to mitigate risks to these SPAs through selective routing/placement of the Cable Landfall Points and Offshore/Onshore cables.</p> <p>As a result of the linear nature and limited opportunities for avoidance of this constraint, an amber BRAG rating has been applied as this is considered to be moderately constrained area where detailed route design and construction methodology is likely to be required.</p>	
pSPA	England and Scotland pSPAs	There are no pSPAs located in the study area.	N/A	N/A	N/A	N/A	N/A
SCI	SCI	There are no SCIs located within the study area.	N/A	N/A	N/A	N/A	N/A
Ramsar sites	UK Ramsar sites	<p>There are several Ramsar sites within the study area.</p> <p>In the north of the study area there are located:</p> <ul style="list-style-type: none"> <li>- Alde-Ore Estuary,</li> <li>- Deben Estuary,</li> </ul>	A	A	A	<p>The Ramsar sites are located across an area of the northern and southern sections of the study area.</p> <p>There are opportunities to mitigate risks via avoidance measures during subsequent routing stages, and as designated species are mobile, effects outside of the site may also require</p>	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
		<ul style="list-style-type: none"> <li>- Minsmere-Walberswick.</li> <li>- In the south of the study area there is located: Thanet Coast and Sandwich Bay.</li> <li>-</li> </ul>				<p>mitigation dependent on whether they interact with associated habitats. Consideration should be given to wider impacts during construction in terms of reducing noise and visual disturbance (e.g., through screening) if the route passes close to this constraint (up to 1 km, dependent on bird species) or associated bird migratory and foraging routes.</p> <p>Owing to the distribution of this constraint within the study area, the main mitigation would be through avoidance as there are areas where there are no Ramsar sites along potential landfall sites and/or implementation of buffer zones via subsequent routing stages, as appropriate.</p> <p>As a result of the opportunities for avoidance of this constraint, a green BRAG rating has been applied as this there are less constrained areas where opportunities for route design and construction methodology changes can mitigate and avoid potential risks.</p>	
Proposed Ramsar sites	UK Proposed Ramsar sites	There are no Proposed Ramsar sites located within the study area.	N/A	N/A	N/A	N/A	N/A
Site of Special Scientific Interest (SSSI)	UK SSSIs	There are numerous coastal SSSIs located within the study area. In the north of the study area there are around 30 SSSIs and in the southern section there are over 10 SSSIs.	N/A	A	A	<p>There is a large number of SSSIs distributed throughout the study area, mostly concentrated in the northern part with the most constrained area around Aldeburgh Bay.</p> <p>Mitigation for these SSSIs must consider routing, including locations of access tracks and buffer zones more acutely to minimise disruption to sensitive areas. This will need detailed planning at the next stage, as well as implementation of best</p>	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						practices during construction in order to avoid impacts on this constraint. As a result of the opportunities for avoidance of this constraint, a green BRAG rating has been applied as this there are less constrained areas where opportunities for route design and construction methodology changes can mitigate and avoid potential risks.	
National Nature Reserve (NNR)	UK NNRs	There are two NNRs located in this study area. In the north there is Orfordness-Havergate NNR. - In the south section of study area there is Lydden Temple Ewell.	N/A	A	A	The majority of this study area is not constrained by an NNR, but there is one NNR present along the Suffolk coast. Therefore, it is necessary to mitigate risks through detailed routing and siting. Planning of construction activities and access routes should be undertaken, including the implementation of buffer zones as appropriate to avoid impacts relating to access roads and construction waste stockpiles. As a result of the sparse distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.	G
Biosphere Reserves	UK Biosphere Reserves	There are no Biosphere Reserves within the study area.	N/A	N/A	N/A	N/A	N/A
Marine Conservation Zones	UK Marine Conservation Zones	There are eight Marine Conservation Zones within the study area: - Dover to Deal, - Dover to Folkestone, - Folkestone Pomerania,	R	R	N/A	Due to the size and distribution of Marine Conservation Zones, area within the south extremity of this study area is heavily constrained. Consideration would need to be given to the routing/location of the cable landfall points and offshore cables to avoid negative impacts such as	R

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
		<ul style="list-style-type: none"> <li>- Foreland,</li> <li>- Goodwin Sands,</li> <li>- Thanet Coast,</li> <li>- Kentish Knock East,</li> <li>- Orford Inshore.</li> </ul>				<p>seabed sediment and habitat disturbance and sediment suspension, alteration of substrate cover and composition, and hydrodynamic changes.</p> <p>There may also be opportunities to mitigate risks to these Marine Conservation Zones through selective routing/placement of the cable landfall points and offshore cables to avoid or minimise impacts on sensitive habitats, taking into account ecological connectivity and the preservation of important biodiversity areas.</p> <p>As a result of the linear nature and limited opportunities for avoidance of this constraint, a red BRAG rating has been applied as this is considered to be a heavily constrained area where detailed route design and construction methodology is required.</p>	
HPMA	Digitised from HPMA consultation documents	There are no HPMA within the study area.	N/A	N/A	N/A	N/A	N/A
Ancient Woodlands	UK Ancient Woodlands	There are many small ancient woodlands within the north and south of the study area. However no ancient woodlands located on the coastline.	N/A	A	A	<p>There are limited sections of the study area that are constrained by Ancient Woodland, as these are located inland from the coast. Opportunity exists in the next stage to mitigate risks through the routing process so that the cable landfall points and onshore cables do not cross areas of Ancient Woodland.</p> <p>Any risks during construction may be controlled through appropriate construction environmental management practices, for example in relation to</p>	G



Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						the siting of access routes and implementing buffer zones around ancient woodland areas. A green BRAG has been assigned in view that There are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.	
Important Bird Areas	UK Important Bird Areas	<p>There are several Important Bird Areas within the study area.</p> <p>In the north and west of the study area there are located:</p> <ul style="list-style-type: none"> <li>- Alde-Ore Estuary,</li> <li>- Deben Estuary,</li> <li>- Minsmere-Walberswick,</li> <li>- Suffolk Sandlings.</li> </ul> <p>In the south section of study area:</p> <ul style="list-style-type: none"> <li>- Dungeness To Pett Levels,</li> <li>- Thanet Coast and Sandwich Bay.</li> <li>-</li> </ul>	G	G	G	<p>There are large stretches of coastal Important Bird Areas associated with this study area that will need to be avoided and therefore represent a constraint to the majority the study area's coastal infrastructure.</p> <p>Consideration should be given to wider impacts such as during construction of cable landfall points and offshore cables in terms of interaction risk with landfall infrastructure or vessels (implement interaction risk mitigation measures, such as effective deterrent systems, monitoring, and operational procedures, to minimise the potential for bird interactions).</p> <p>During construction of Onshore cables if routed close by, bird usage of the area would need to be considered where any disturbance risks are identified. Construction activities may result in the direct removal or destruction of bird nests. Displacement from nesting sites can disrupt breeding patterns and affect reproductive success. Consideration would need to be given to conduct nesting surveys prior to construction to identify active nests and breeding sites. Measures should be implemented to avoid and create buffer zones around active nests, ensuring that appropriate</p>	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						<p>timing and methods are used to minimise disturbance. Alternative nesting structures or nearby suitable habitats should be installed or created to compensate for any loss of nesting sites.</p> <p>Construction activities should be scheduled to avoid critical periods for breeding, nesting and migration of sensitive species. Foraging areas will also be avoided through the detailed routing process.</p> <p>A green BRAG has been assigned in view as although this is considered to be a highly constrained area that there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	
Royal Society for the Protection of Birds (RSPB) Reserves	UK RSPB Reserves	<p>There are five UK RSPB Reserves within the study area.</p> <p>The North Warren, Snape, Minsmere and Havergate Island and Boyton Marshes are located in the north.</p> <p>In south there is Lydden Valley.</p>	G	G	G	<p>Onshore cables development may be constrained by RSPB Reserves due to excavation activities which lead to soil disturbance, vegetation removal and indirect risks via disturbance during construction (i.e., noise/lighting).</p> <p>During construction of onshore cables if routed close by, bird usage of the area would need to be considered where any disturbance risks are identified. Construction activities may result in the direct removal or destruction of bird nests. Displacement from nesting sites can disrupt breeding patterns and affect reproductive success. Consideration should be given to conduct nesting surveys prior to construction to identify active nests and breeding sites. Measures should be</p>	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						<p>implemented to avoid and create buffer zones around active nests, ensuring that appropriate timing and methods are used to minimise disturbance. Alternative nesting structures or nearby suitable habitats should be installed or created to compensate for any loss of nesting sites.</p> <p>Construction activities should be scheduled to avoid critical periods for breeding, nesting and migration of sensitive species. Foraging areas will also be avoided through the detailed routing process.</p> <p>A green BRAG has been assigned in view as this is considered to be a lightly constrained area and that there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	
Seabird At Sea Density (Summer/Winter)	UK Seabirds at Sea Density		G	N/A	N/A	<p>There are European seabird at sea records throughout the study area, with the highest density of records towards the northern boundary. These data would need to be used at the detailed design stage where there may be sensitive species and corresponding periods where construction mitigation is required. Construction activities should be scheduled to avoid critical periods and areas e.g., for foraging during breeding season and key migration routes of sensitive species. This will occur during the detailed routing process.</p> <p>A green BRAG has been assigned as it is considered that there are many opportunities to mitigate the risks associated with this constraint,</p>	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						with detailed routing and construction best practices.	
Annex 1 Reefs outside designated areas	UK Annex 1 Reefs	There are no Annex 1 Reefs polygon or point records outside the designated areas.	N/A	N/A	N/A	N/A	N/A
Annex 1 Sandbanks outside designated areas	UK Annex 1 Sandbanks	There are Annex 1 Sandbanks which are slightly covered by seawater all of the time polygon or point records outside the designated areas.	N/A	N/A	N/A	N/A	N/A
Annex 1 Submarine Structures outside designated areas	UK Annex 1 Submarine Structures	There are no Annex 1 Submarine structures made by leaking gas polygon or point records outside the designated areas-.	N/A	N/A	N/A	N/A	N/A
Annex 1 Saltmarsh outside designated areas	UK Annex 1 Saltmarsh	There are no Annex 1 Saltmarsh polygon or point records outside the designated areas.	N/A	N/A	N/A	N/A	N/A
UK Grey Seals	UK Grey Seal - High density	There is one small size Grey Seal Breeding Colony: Goodwin Sands in the south of study area.	G	A	N/A	Consideration should be given to the routing/location of the cable landfall points and offshore cables to avoid negative impacts such as noise and visual disturbance, alteration of foraging and haul out habitat, displacement of individuals from breeding areas and interaction risk. For noise and vibrations this will include implementing best practice such as the use of	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						<p>marine mammal observers and noise reduction measures. Interaction risk mitigation measures, such as effective deterrent systems, monitoring and operational procedures will reduce the potential for effects on seals.</p> <p>As there may be opportunities to mitigate risks through selective routing/placement of the cable landfall points and offshore cables to avoid or minimise impacts on associated habitats and breeding areas, a green BRAG has been assigned.</p>	
UK Harbour Seals	UK Harbour Seal – High density	<p>Within the route corridor there are:</p> <ul style="list-style-type: none"> <li>- 4 locations with between 1-10 harbour seal count</li> <li>- 2 locations with between 21 – 40 harbour seal count</li> <li>- 1 location with between 41 – 80 harbour seal count</li> </ul>	G	A	N/A	<p>Consideration should be given to the routing/location of the cable landfall points and offshore cables to avoid negative impacts such as noise and visual disturbance, alteration of foraging and haul out habitat, displacement of individuals and interaction risk.</p> <p>For noise and vibration impacts this will include implementing best practice such as the use of marine mammal observers and noise reduction measures. Interaction risk mitigation measures, such as effective deterrent systems, monitoring and operational procedures will reduce the potential for effects on seals.</p> <p>As there may be opportunities to mitigate risks through selective routing/placement of the cable landfall points and offshore cables to avoid or minimise impacts on associated habitats and breeding areas, a green BRAG has been assigned.</p>	G
SCANS 3 (marine		Pilot whale – Low density (0.0-0.1 animals per km <sup>2</sup> )	G	G	N/A	<p>Consideration should be given to the routing/location of the cable landfall points and offshore cables to avoid negative impacts on</p>	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
mammal densities)		<p>Minke whale – Low density (0.0-0.01 animals per km<sup>2</sup>)</p> <p>Harbour porpoise – Low density (0.0-0.5 animals per km<sup>2</sup>)</p> <p>Fin whale – Low density (0.0-0.025 animals per km<sup>2</sup>)</p> <p>Common dolphin – Low density (0.0-0.07 animals per km<sup>2</sup>)</p> <p>Common and or striped dolphin – Low density (0.0-0.04 animals per km<sup>2</sup>)</p> <p>Bottlenose dolphin – Low density (0.0-0.025 animals per km<sup>2</sup>)</p> <p>Beaked whales – Low density (0.0-0.1 animals per km<sup>2</sup>)</p> <p>Striped dolphin – – Low density (0.0-0.05 animals per km<sup>2</sup>)</p> <p>White beaked dolphin – Low density (0.0-0.05 animals per km<sup>2</sup>)</p>				<p>foraging areas such as seabed disturbance, alteration of substrate cover and composition, hydrodynamic changes, as well as disturbance, displacement and interaction risk for cetaceans.</p> <p>For noise and vibration impacts this will include implementing construction and operational maintenance best practice such as the use of marine mammal observers and noise reduction measures. Interaction risk mitigation measures, such as effective deterrent systems, monitoring and operational procedures will reduce the potential for effects on cetaceans.</p> <p>A green BRAG has therefore been assigned in view of the above and that there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	
Fish spawning grounds	UK Fish spawning grounds 2010	<p>Within the study area there are spawning grounds for species such as cod, sand eel, Dover sole, plaice, mackerel and horse mackerel.</p> <p>Overall, there are multiple records of spawning locations with the study area.</p>	G	N/A	N/A	<p>Consideration should be given to the routing/location of the offshore cables to avoid negative impacts on spawning areas such as minimising seabed disturbance, alteration of substrate cover and composition, hydrodynamic changes and general disturbance.</p> <p>Consideration should be given to wider impacts during construction in terms of reducing noise and vibrations (e.g., implement best practice to minimise underwater noise, including the use of</p>	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						noise mitigation measures and construction methodologies that reduce disturbance to fish). A green BRAG has been assigned in view as there are many opportunities to mitigate the risks associated with this constraint with detailed routing and construction best practices.	
Fish nursery grounds	UK Fish Nursery grounds 2010	Within the study area there are nursery grounds for species such as cod, tope shark, herring, mackerel, plaice, sole, sand eel, thornback ray and whiting. There are multiple records of nursery ground locations with the study area.	G	N/A	N/A	Consideration should be given to the routing/location of the offshore cables to avoid negative impacts on nursery areas such as minimising seabed disturbance, alteration of substrate cover and composition, hydrodynamic changes and general disturbance. Consideration would need to be given to wider impacts during construction in terms of reducing noise and vibration (e.g., implement best practice to minimise underwater noise, including the use of noise mitigation measures and construction methodologies that reduce disturbance to fish). A green BRAG has been assigned in view as there are many opportunities to mitigate the risks associated with this constraint with detailed routing and construction best practices.	G
<b>Geology and Soils (Environmental)</b>							
Geoparks	UK Geoparks	There are no UNESCO Global Geoparks within the study area.	N/A	N/A	N/A	N/A	N/A
<b>Landscape and Visual (Community)</b>							
National Parks	UK National Parks	There are no National Parks within this study area.	N/A	N/A	N/A	N/A	N/A

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
National Landscapes	England National Landscapes	There are two National Landscapes within the study area. Suffolk Coast and Heaths is located in the north of the study area and Kent Downs is located in south.	N/A	A	A	<p>The northern and southern sector of this study area is moderately constrained by Suffolk Coast and Heaths and Kent Down.</p> <p>While underground cables onshore cables are less visually prominent compared to overhead lines, the construction and maintenance of landfall infrastructure can still have visual impacts on the surrounding area.</p> <p>The most suitable route to be identified for onshore cables and landfall infrastructure will consider existing coastal land use and environmental sensitivities, also to explore opportunities to co-locate cables with existing coastal infrastructure corridors, such as roadways and utility corridors, to minimise the need for additional land acquisition or disruption.</p> <p>During operations, depending on the location there may be periodic vegetation management activities, such as tree trimming or clearing around access points, to ensure the integrity and accessibility of the underground cables. These activities may have temporary visual impacts.</p> <p>As a mitigation there should be implementation of appropriate landscaping strategies, such as the planting of trees, shrubs, or other vegetation, to visually integrate infrastructure elements, such as landfall installations, into the surrounding environment. The design guidelines or standards should adhered to that aim to minimise visual impacts during the installation and operation of underground cable systems. This can include</p>	G



Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						<p>considerations for equipment placement, surface installations, and landscaping.</p> <p>A green BRAG has been assigned in view as this is considered to be a moderately constrained area and there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	
Heritage Coasts	England Heritage Coasts	There are three Heritage Coasts within the study area. Suffolk Heritage Coast is located in the north of the study area, in south there are South Foreland Heritage Coast and Dover-Folkestone Coast.	N/A	A	A	<p>The northern sector of this study area is moderately constrained by Suffolk Heritage Coast and southern section by the South Foreland Heritage Coast and Dover-Folkestone Coast.</p> <p>While underground cables are less visually prominent compared to overhead lines, the construction and maintenance landfall infrastructure can still have visual impacts on the surrounding area.</p> <p>The most suitable location for landfall infrastructure and coastal onshore cables will consider existing land use and environmental sensitivities, and also will explore opportunities to co-locate cables with existing infrastructure corridors, such as roadways and utility corridors, to minimise the need for additional land acquisition or disruption.</p> <p>During operations, depending on the location there may be periodic vegetation management activities, such as tree trimming or clearing around access points, to ensure the integrity and accessibility of the underground cables. These activities may have temporary visual impacts.</p>	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						<p>There should be implementation of appropriate landscaping strategies, such as the planting of trees, shrubs, or other vegetation, to visually integrate infrastructure elements, such landfall installations, into the surrounding environment. The design guidelines or standards should be adhered to, that aim to minimise visual impacts during the installation and operation of underground cable systems. This can include considerations for equipment placement, surface installations, and landscaping.</p> <p>A green BRAG rating has been assigned as this is considered to be a moderately constrained area and there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	
National Trails	England National Trails	There is the North Downs Way National Trails within the study area, located in the south.	N/A	A	A	<p>Onshore cables and cables landfall points development may be moderately constrained by North Downs Way National Trail.</p> <p>Measure to avoid North Downs Way National Trail would need to be investigated at the detailed routing stage.</p> <p>A green BRAG rating has been assigned in view as this is considered to be a moderately constrained area and that there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	G
<b>Historic Environment (Community)</b>							

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
World Heritage Sites	UK World Heritage Sites	There are no World Heritage Site within the coastal sector of the study area.	N/A	N/A	N/A	N/A	N/A
Scheduled Monuments	UK Scheduled Monuments	Within the study area there are multiple Scheduled Monuments.	R	R	R	<p>Offshore/onshore cables and cable landfall points/routing has the potential to be constrained by Scheduled Monuments due to the risk construction works may have upon the feature and/or associated archaeological features. Due to this, without mitigation the distribution of Scheduled Monuments in the north and south sections of study area is likely to constrain overall route options and require consideration of the mitigation hierarchy.</p> <p>It is considered that there are opportunities to mitigate risks to the individual Scheduled Monuments in the study area through the routing and siting process, including implementation of buffer zones. There will be detailed considerations required for this type of construction.</p> <p>The areas surrounding the Scheduled Monuments may also require mitigation when carrying out groundworks, due to the potential presence of undiscovered associated features (i.e., archaeological remains). Consultation with Historic England would need to be required to determine the most appropriate mitigation.</p> <p>It may be possible to avoid direct risks to Monuments, but due to their distribution along the coastline in the study area, indirect risks may be more difficult to avoid.</p>	A

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						As a result of the opportunities for avoidance of this constraint in the area, an amber BRAG rating has been applied as this is considered to be a heavily constrained area where detailed route design and construction methodology is required.	
Listed Buildings	UK listed buildings (Grade I, II* and II listed buildings)	There are an extensive number of Listed Buildings throughout the north and south sections of study area, including Grade I, Grade II*, and Grade II.	N/A	A	A	<p>Offshore/onshore cables and cable landfall points/routing may be moderately constrained by listed buildings due to the risk of physical loss or damage to the building, or indirectly via disturbance to the listed building's setting. There may also be risks to the curtilage (the area around, or any other building that is around and associated with a listed building).</p> <p>Whilst there is a large number of Listed Buildings within the coastal sector of the study area, opportunity exists in the next stages to reduce direct risks through the routing and siting process.</p> <p>Works and transport routes need to be considered in terms of their proximity to listed buildings near the highway (e.g., accidental damage risk from HGVs in narrow lanes or other restricted areas) or groundworks (i.e., if any vibration generating works are close enough to cause damage to buildings).</p> <p>A green BRAG has been assigned in view as although this is considered to be a moderately constrained area, there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
Registered Parks and Gardens and Designed Landscape	Registered Parks and Gardens	Within the coastal sector of the study area there are over ten Registered Parks and Gardens.	N/A	A	A	Given the limited areas covered by Registered Parks and Gardens, through careful design and construction planning, avoiding/ mitigating direct and indirect adverse risks the sites are not considered to constrain the development of the option. As a result of the low-density distribution and potential opportunities for avoidance of this constraint through detailed routing and construction best practices, a green BRAG rating has been applied.	G
Wreck locations	UK wreck locations	There are multiple wreck locations in the south section of the study area.	R	R	N/A	It is important that the proposed route avoids disturbing known or suspected wrecks, especially where there might be caches of unexploded ordnance. As a result of wrecks being present within the study area and the requirement for avoidance of this constraint through routing and potential further investigations, an amber BRAG rating has been applied.	A
Protected wrecks	England protected wrecks	There are several Protected Wreck Sites within the study area: <ul style="list-style-type: none"> <li>- Stirling Castle,</li> <li>- The Rooswijk,</li> <li>- Restoration,</li> <li>- Northumberland,</li> <li>- Unknown Wreck (GAD8; previously known as the 'Goodwins Cannon' Site'),</li> <li>- Admiral Gardner,</li> <li>- Langdon Bay.</li> </ul>	R	R	N/A	Given the limited number of protected wreck sites, through careful design and construction planning, avoiding/ mitigating direct and indirect adverse risks the sites are not considered to constrain the development of the option. As a result of the low density distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
Ship Hulk	Other obstructions (ship hulk)	There are no ship hulks recorded within the study area	N/A	N/A	N/A	N/A	N/A
Registered Battlefields	England Registered Battlefields	There are no Registered Battlefields within the study area.	N/A	N/A	N/A	N/A	N/A
<b>Air Quality (Community)</b>							
Air Quality Management Areas (AQMA)	UK AQMA	There are several AQMAs within the study area. A20 AQMA and High Street/Ladywell AQMA are located in Dover city.	N/A	N/A	G	Given the small areas covered by AQMAs, through careful design and construction planning, avoiding/ mitigating direct and indirect adverse risks the sites are not considered to constrain the development of the option. As a result of the low-density distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.	G
<b>Noise (Community)</b>							
Major Settlements	UK Major Urban Settlements	Within the study area, much of the study area is offshore, land environment within the study area is a natural/rural setting. There are no major urban settlements located within the study area.	N/A	N/A	N/A	N/A	N/A
Small Scale Settlements	UK Small Scale Urban Settlements	Within the study area, there are many small-scale settlements.	N/A	G	G	There is potential for the construction of onshore cables and cable landfall points to generate noise during construction, and operation that would affect residents of the built up areas, including within Noise Important Areas.	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						<p>Owing to the small area covered by settlements it is considered that any potential construction and noise impacts could be effectively controlled through appropriate routing and the use of best practice mitigation measures such as a CEMP. Operational noise would also require further consideration at the next stage of the option development process.</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.</p>	
<b>Socio-Economics (Community)</b>							
Major Settlements	UK Major Urban Settlements (Socio-Economics)	Within the study area, much of the study area is offshore, land environment within the study area is a natural/rural setting. There are no Major Urban Settlements located within the study area.	N/A	N/A	N/A	N/A	N/A
Small Scale Settlements	UK Small Scale Urban Settlements	Within the study area, there are many small-scale settlements.	N/A	A	A	<p>There is potential for the construction of onshore cables and cable landfall points to generate noise during construction, and operation that would affect residents of the built-up areas, including within Noise Important Areas.</p> <p>Owing to the small area covered by settlements it is considered that any potential construction and noise impacts could be effectively controlled through appropriate routing and the use of best practice mitigation measures such as a Construction Environmental Management Plan. Operational noise would also require further</p>	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						consideration at the next stage of the option development process. As a result of the distribution and potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.	
National Trust Land	National Trust Open Land and Limited Access Land	<p>There are several areas of National Trust Land within this study area. Orford Ness and Part of Orford Beach are located in the north of study area and there are also clusters of small areas in Woodbridge.</p> <p>In the south section there are:</p> <ul style="list-style-type: none"> <li>- Land lying west of Victoria Road,</li> <li>- The Leas, Kingsdown,</li> <li>- Bockhill Farm, St. Margarets-at-Cliffe,</li> <li>- Townsend Farm,</li> <li>- St. Margaret's Freedown,</li> <li>- Land south east of The Droeway,</li> <li>- Land at Bockell Hill,</li> <li>- Land at Leathercoat Point,</li> <li>- Land at St Margarets-at-Cliffe,</li> <li>- Lighthouse Down,</li> <li>- Part of Wanstone Court Farm,</li> <li>- Langdon Hole, Dover,</li> <li>- Foxhill Down, Langdon Cliffs,</li> </ul>	N/A	A	A	<p>There is potential for these sites to constrain development of this option due to the potential for direct and indirect risks, such as loss of land. Opportunity exists in the next stages to mitigate risks through the routing process and therefore the presence of National Trust Land is not considered a large constraint to the option. There may be a risk on setting and temporary construction disturbance depending upon the location of the route, which should be carefully considered.</p> <p>As a result of the low-density distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	G



Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
		<ul style="list-style-type: none"> <li>- Land at Langdon Cliff, Cliff Road,</li> <li>- Land at Dover,</li> <li>- Property known as Kingpost, Elham.</li> </ul>					
RYA sailing and racing areas	-	<p>There are approximately 20 Sailing/Yacht Clubs locations in the north section of the study area.</p> <p>There are approximately 10 Sailing/Yacht Clubs located in the south section of study area.</p> <p>The AIS Intensity is low/medium through study area.</p>	G	G	N/A	<p>Construction activities may temporarily affect sailing activities, particularly in coastal areas near cable landing points (e.g. higher intensity inshore recreational/local club sailing and racing) but also offshore installation areas where there may be lower density sailing and racing. Limited access to certain areas may affect the community, sailing activities and associated tourism.</p> <p>Construction and operational maintenance activities would need to be conducted with the aim of avoiding RYA sailing and racing areas and also providing appropriate notice to mariners and exclusion zones. The RYA's Coastal Atlas would need to be used to inform the detailed routing. As a result of the distribution and potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.</p>	G
Bathing waters	-	<p>There are over 10 Bathing water locations within the study area. Mostly concentrated in south by Isle of Thanet.</p>	G	G	N/A	<p>Construction activities may temporarily disrupt the daily life of local communities, particularly in coastal areas near cable landing points or onshore infrastructure sites. Limited access to certain areas and potential public perception of changes to bathing water appearance (e.g., through suspension of sediments and appearance of surface foams/scum rather than affecting bathing water quality through release of faecal indicator</p>	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						organisms) during construction may reduce bathing activities and tourism. Bathing waters may be avoided during the detailed routing stage and mitigation measures implemented through reducing sediment disturbance. As a result of the distribution and potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.	
Shellfish waters	-	There are three Shellfish water locations: Alde, Butley River and Deben, .	G	G	N/A	The south and east of the study area has the greatest constraint, particularly owing to the location of the Outer Thames Shellfish Water. Offshore cabling and landfall construction may damage shellfish beds, reduce water quality through suspended sediment release and interfere with harvesting activities. As a result of the distribution and potential opportunities for avoidance of this constraint through routing to the west and best practice mitigation measures implemented to reduce the footprint and sediment disturbance, a green BRAG rating has been applied.	G
Fishing activity	UK Fishing activity – Areas of high intensity fishing effort	The Fishing Effort within the study area: <ul style="list-style-type: none"> <li>- demersal species – Low/Medium/High,</li> <li>- pelagic species – Lowest/Low,</li> <li>- shrimp trawlers – none,</li> <li>- static gears – High,</li> <li>- beam trawl – Low/Medium.</li> </ul>	G	G	N/A	The presence of offshore HVDC infrastructure and maintenance vessels can impact traditional fishing grounds and disrupt other maritime activities, potentially affecting the livelihoods and economic activities of coastal communities. Consideration should be given to engage with local fishing communities and relevant stakeholders during the planning and design	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
		International Fishing Effort of North Sea beam trawl (1995) within the study area is Low/Medium/High.				<p>phases to understand their concerns and identify measures to minimise impacts.</p> <p>Compensation measures to mitigate economic losses should be provided.</p> <p>There is need to establish communication channels to coordinate with fishers and ensure their safety and access to fishing areas during maintenance options.</p> <p>As a result of potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.</p>	
Marine Fish Farms	UK Seawater Finfish Farms	UK marine finfish farms are located primarily in Scotland and the west coast.	N/A	N/A	N/A	N/A	N/A

## 2.11. Bradwell to Rayleigh Study Area (OHL)

Start point	Via	End point	Applicable to shortlisted designs:
Bradwell		Rayleigh	Yes

### 2.11.1. Reinforcement Details

Reinforcement type (if known)	Reinforcement Length (if known)
AC OHL	N/A

#### Technology assumptions

This reinforcement includes the development of a 400kV AC OHL between Bradwell and Rayleigh.

### 2.11.2. Environmental Summary

BRAG rating with mitigation measures:

A

The study area includes multiple environmental constraints, including international and national designations.

There are several parts of the study area that are constrained as seen in the constraints table below. The most significantly constrained areas of this study area are located within the central and northern part of the study area, where many constraints are densely distributed.

In these areas, there are:

- SACs
- SPAs
- Ramsar Sites
- SSSIs
- IBAs
- National Flood Zones

Mitigation measures associated with these constraints should include:

- Consideration of buffer zones for bird migration routes,
- HRA Screening,
- Detailed route planning,
- Best practice construction measures.

During construction it would be necessary to implement best practice construction measures with considerably planned access routes and buffer zones that are relevant to the constrained areas mentioned. The distribution of these constraints means that opportunities for avoidance through detailed route planning may be possible, however, the design stages should consider the mitigation hierarchy to further mitigate risk.

As explained in Section 1.2.2 (Study Area Environmental and Community Summary BRAG Ratings), the following factors have been considered in determining an overall Environmental BRAG rating for this Study Area.

Table 2.11.2: Overall Environmental BRAG rating for the Bradwell to Rayleigh Study Area.

<b>Scope of works</b>	The works include installing new overhead lines that will require some physical changes to the environment and as such, will therefore be affected by the constraints described in the constraints table in Section 2.11.4. This is reflected in the BRAG ratings.
<b>Number and area of constraints</b>	Within the study area there are nine different environmental constraint types present. As noted above, the most constrained area is within the northern and central areas of the study area.
<b>BRAG ratings of constraints</b>	<p>Within the study area there are nine environmental constraint types present. Of these, zero have a rating of red under the HND methodology after mitigation, five have a rating of amber after mitigation and four have a rating of green after mitigation.</p> <p>The five amber rated constraints include:</p> <ul style="list-style-type: none"> <li>• SACs</li> <li>• SPAs</li> <li>• Ramsar Sites</li> <li>• SSSIs</li> <li>• National Flood Zones</li> </ul> <p>The four green rated constraints include:</p> <ul style="list-style-type: none"> <li>• NNRs</li> <li>• Ancient Woodlands</li> <li>• IBAs</li> <li>• Former Landfill Sites</li> </ul>

Between Bradwell and Rayleigh there is an existing disused OHL, this is strategically located to avoid the constraints stated above. Therefore the routing design could utilise this or a similar route to reduce the potential impacts.

Overall, an amber BRAG rating has been assigned to this study area after mitigation measures, which reflect the factors described above. This is a moderately constrained area which is likely to be viable, however, may have to overcome some environmental issues.

### 2.11.3. Community Summary

BRAG rating with mitigation measures:

A

There are numerous community constraints in the study area, including national designations.

One of the most significant areas of constraint is the presence of small settlements distributed throughout the study area, which have been given a red BRAG rating after mitigation due to potential visual impacts and an amber rating for noise.

Constraints that may be avoided with best practice construction management measures and selective routing include Scheduled monuments, Listed buildings, Registered Battlefields, AQMAs, Major Settlements (Noise), Major Settlements (Community) and National Trust Land.

As explained in Section 1.2.2 (Study Area Environmental and Community Summary BRAG Ratings), the following factors have been considered in determining an overall Community BRAG rating for this Study Area.

Table 2.11.3: Overall Community BRAG rating for the Bradwell to Raleigh Study Area.

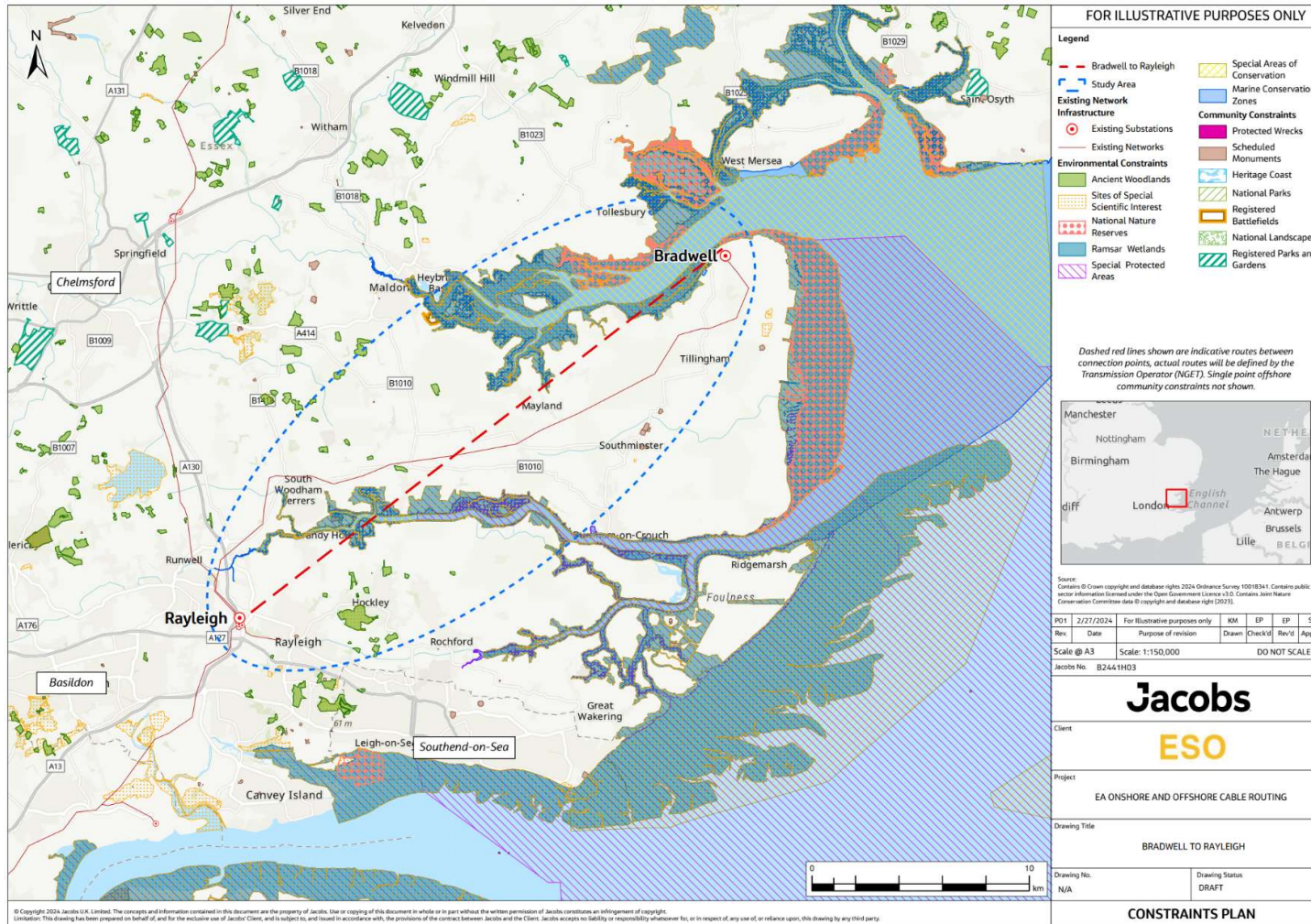
<b>Scope of works</b>	The works include installing new overhead lines that will require some physical changes to the environment and as such, will therefore be affected by the constraints described in the constraints table in Section 2.11.4. This is reflected in the BRAG ratings.
<b>Number and area of constraints</b>	Within the study area there are nine different community constraint types present. As noted above, numerous community constraints are distributed throughout the entire study area mostly concentrated within settlements.
<b>BRAG ratings of constraints</b>	<p>Within the study area there are nine community constraint types present. Of these, one has a rating of red under the HND methodology after mitigation, two have a rating of amber after mitigation and six have rating of green after mitigation.</p> <p>The one red rated constraint includes:</p> <ul style="list-style-type: none"> <li>• Small Scale Settlements (Community)</li> </ul> <p>The two amber rated constraint include:</p> <ul style="list-style-type: none"> <li>• Small Scale Settlements (Noise)</li> <li>• Major Settlements (Community)</li> </ul> <p>The six green rated constraints include:</p> <ul style="list-style-type: none"> <li>• Scheduled monuments</li> <li>• Listed buildings</li> <li>• Registered Battlefields</li> <li>• AQMAs</li> <li>• Major Settlements (Noise)</li> <li>• National Trust Land</li> </ul>

An amber BRAG rating has been assigned after mitigation measures due to the number and spatial distribution of small-scale settlements across the breadth of the study area, which have been rated as red. The majority of the remaining constraints however have been rated as green. Although avoidance may be challenging, there are opportunities for detailed route design and implementation of appropriate construction methodologies to reduce impacts.

## 2.11.4. Constraints Table

The following table details the environmental and community constraints for Bradwell to Rayleigh Study Area. It describes the constraints present within the study area, the potential mitigation measures to avoid or reduce risks, and a BRAG rating before and after mitigation measures have been applied.

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**Constraints Plan 11: Study Area Bradwell to Rayleigh showing Nationally and Internationally Designated Sites**



Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
<b>Ecology (Environmental)</b>					
SACs	Onshore and offshore UK SACs	Essex Estuaries SAC is distributed in the northern and south-eastern parts of the study area.	R	<p>Due to the size and distribution of the SAC, the northern and south-eastern parts of this study area are heavily constrained. There are potential opportunities to avoid intersection with this designation by considering routes west of Essex Estuaries SAC.</p> <p>Consideration will be given to the routing of the OHL to avoid negative impacts such as habitat loss and fragmentation, soil erosion and sedimentation. Planning of construction activities and access routes should be undertaken, including the implementation of buffer zones as appropriate to avoid associated impacts e.g., relating to access roads and construction waste stockpiles. A HRA Screening is likely to be required as the route could potentially have an effect on this SAC.</p> <p>An amber BRAG rating has been assigned in view of the importance and size of the constraint requiring the need for routing to avoid sensitive areas and other mitigation measures for construction activities.</p>	A
cSACs	England cSACs	There are no cSACs located in the study area.	N/A	N/A	N/A
SPAs	Onshore and offshore UK SPAs	<p>There are 3 SPAs within the proposed study area:</p> <ul style="list-style-type: none"> <li>- Crouch &amp; Roach Estuaries (Mid-</li> </ul>	R	<p>Due to the size and distribution of SPAs, the northern and south-eastern parts of this study area are heavily constrained. There are potential opportunities to avoid intersection with this designation by considering routes to the west of Crouch &amp; Roach Estuaries (Mid-Essex</p>	A

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		<p>Essex Coast Phase 3)</p> <ul style="list-style-type: none"> <li>- Blackwater Estuary (Mid-Essex Coast Phase 4)</li> <li>- Dengie (Mid-Essex Coast Phase 1)</li> </ul>		<p>Coast Phase 3) SPA and to the east of the Blackwater Estuary (Mid-Essex Coast Phase 4) SPA.</p> <p>Construction mitigation in terms of reducing noise and visual disturbance will be required if the route passes close to this constraint (up to 1 km, depending on designated bird species). Consideration would need to be given to wider impacts such as bird migratory routes and proximity to these. There will be opportunities to mitigate risks through various measures, such as using buffer zones, screening during construction and timing of works to avoid sensitive times such as nesting or overwintering birds.</p> <p>An amber BRAG has been assigned in view of the importance of the constraint and mobile/migratory features requiring the need for detailed routing and other mitigation measures.</p>	
pSPAs	England pSPAs	There are no pSPAs located in the study area.	N/A	N/A	N/A
SCIs	SCI	There are no SCIs located within the study area.	N/A	N/A	N/A
Ramsar sites	UK Ramsar sites	<p>There are 3 Ramsar Sites within the proposed study area:</p> <ul style="list-style-type: none"> <li>- Crouch &amp; Roach Estuaries (Mid-Essex Coast Phase 3)</li> </ul>	R	<p>Due to the size and distribution of Ramsar sites, the northern and south-eastern parts of this study area are heavily constrained. There are potential opportunities to avoid intersection with this designation by considering routes west of the Crouch &amp; Roach Estuaries (Mid-Essex Coast Phase 3) Ramsar site and east of the Blackwater Estuary (Mid-Essex Coast Phase 4) Ramsar site.</p> <p>Construction mitigation in terms of reducing noise and visual disturbance will be required if the route passes close to this constraint</p>	A

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		<ul style="list-style-type: none"> <li>- Blackwater Estuary (Mid-Essex Coast Phase 4)</li> <li>- Dengie (Mid-Essex Coast Phase 1)</li> </ul>		<p>(up to 1 km, depending on designated bird species). Consideration would need to be given to wider impacts such as bird migratory routes and proximity to these. There will be opportunities to mitigate risks through various measures, such as using buffer zones, screening during construction and timing of works to avoid sensitive times such as nesting or overwintering birds.</p> <p>An amber BRAG has been assigned in view of the importance of the constraint and mobile/migratory features requiring the need for detailed routing and other mitigation measures.</p>	
Proposed Ramsar sites	UK Proposed Ramsar sites	There are no Proposed Ramsar sites located within the study area.	N/A	N/A	N/A
SSSIs	UK SSSIs	<p>There are five SSSIs located within the study area, these include:</p> <ul style="list-style-type: none"> <li>- Hockley Woods SSSI</li> <li>- Crouch and Roach Estuaries SSSI</li> <li>- The Cliff, Burnham-On-Crouch SSSI</li> <li>- Blackwater Estuary SSSI</li> <li>- Dengie SSSI</li> </ul>	R	<p>The most constrained parts of the study area are the north and south - east, however there are SSSIs throughout the entire study area and these can be avoided with selective routing and buffer zones to minimise disruption to sensitive areas. This will need detailed planning at the next stage, as well as the implementation of best practices during construction in order to avoid impacts on this constraint.</p> <p>An amber BRAG has been assigned on a precautionary basis in view of the constraint moderately constraining the study area, the need for detailed routing, and the importance of this constraint.</p>	A
NNRs	UK NNRs	Blackwater Estuary and Dengie NNRs are	R	The majority of this study area is not constrained by an NNR; the two NNRs within the study area are located in the north. There are	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		located within the study area.		<p>opportunities to avoid intersection with this designation by selective routing.</p> <p>Therefore, it is necessary to mitigate risks through detailed routing and siting. Planning of construction activities and access routes should be undertaken, including the implementation of buffer zones as appropriate to avoid impacts relating to access roads and construction waste stockpiles.</p> <p>As a result of the constraint being located in only a small area within the study area and the opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	
Biosphere Reserves	UK Biosphere Reserves	There are no Biosphere Reserves within the study area.	N/A	N/A	N/A
Ancient Woodlands	UK Ancient Woodlands	There are many areas of Ancient Woodland predominantly within the southwest of the study area.	R	<p>There are many, sparsely distributed, small areas of the study area that are constrained by Ancient Woodland. There are opportunities to mitigate risks through the routing process so that the pylons and OHLs do not cross areas of Ancient Woodland.</p> <p>Any risks during construction could be controlled through appropriate construction environmental management practices, for example in relation to the siting of access routes and implementing buffer zones around Ancient Woodland areas.</p> <p>A green BRAG has been assigned due to the sparse distribution of Ancient Woodlands, and because there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	G
IBAs	UK IBAs	Mid-Essex Coast (central Section) IBA is within the study area.	G	OHL development may be constrained by the IBA directly due to the risk of habitat loss, indirectly via disturbance during construction (i.e., noise/lighting) or via disturbance to flight paths once operational.	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				<p>Mid-Essex Coast (central Section) will need to be avoided and therefore represent a constraint particularly in the north and east of the study area. However, the majority of the western part of the study area is not constrained by the IBA.</p> <p>Connections between sites and bird flight paths would need to be considered including for construction and maintenance activities. OHLs can cause displacement and barrier effects as birds are deterred from using their normal routes to feeding or roosting grounds. There will be opportunities to mitigate risks through various measures, such as using buffer zones, screening during construction and timing of works to avoid sensitive times such as nesting or overwintering birds. Connections between sites and bird flight paths would need to be considered.</p> <p>If routed close by (up to 1 km, dependent on species), bird usage of the area would need to be considered where any disturbance risks are identified. Operational mitigation such as bird-friendly power line designs may be required for OHL. During construction, noise impacts and visual disturbance risks will need to be considered and mitigated accordingly (e.g., through screening). It is expected that with routing design, this could be avoided.</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	
RSPB Reserves	UK RSPB Reserves	There are no RSPB reserves within the Study Area	N/A	N/A	N/A
<b>Geology and Soils (Environmental)</b>					

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
Peatland	UK Peatland	There are no peatlands within the study area.	N/A	N/A	N/A
Geoparks	UK Geoparks	There are no UNESCO Global Geoparks within the study area.	N/A	N/A	N/A
National Flood Zones/Areas Benefiting from Defences	National Flood Zones and Areas benefiting from defences	There are National Flood Zones (Flood Zone 2 and Flood Zone 3) distributed throughout the study area, associated with numerous water body features. The most extensive Zone 3 areas (of a high probability of flooding) are surrounding related to River Thames, River Crouch, River Blackwater, River Stour, River Reach, River Deben and Long Reach.	A	<p>OHL development including construction works may be at risk from flooding. Owing to the distribution of this constraint throughout the study area, avoidance of all areas of river flood risk will not be possible and therefore there is residual risk for the development of this option.</p> <p>There will need to be detailed design of the installation and location of pylons within floodplains as well as planning of construction activities so that there are no increased flood levels arising from loss of floodplain storage e.g., during construction from working areas, temporary soil stockpiles, raised access tracks and watercourse crossings. Fluvial flow and surface water flow will also need to be considered in the planning of these activities so that culverts and crossings are of appropriate positioning and size and that water does not pool behind installations.</p> <p>As a result of the distribution and requirement for detailed planning to avoid this constraint through construction design and routing, an amber BRAG rating has been applied.</p>	A
Former landfill sites	Historic landfills	There are numerous small pockets of historic landfill sites located throughout the study area.	A	OHL development, including construction works, may be at risk posed by sources of contamination from former landfill sites. Due to the distribution and small size of historic landfills within the study area there are opportunities to avoid this constraint with considerate	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				<p>OHL routing. In addition, it is not considered that this is a strategic level constraint that should influence decision-making at this stage. There is an opportunity at the next stage of the siting process to avoid this constraint for OHL routing as they are sparsely distributed. However, this will require detailed routing for areas of higher concentrations.</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	
<b>Landscape and Visual (Community)</b>					
National Parks	UK National Parks	There are no National Parks within this study area.	N/A	N/A	N/A
National Landscapes	England National Landscapes	There are no national landscapes within the study area.	N/A	N/A	N/A
Heritage Coasts	England Heritage Coasts	There are no England Heritage Coasts within the study area.	N/A	N/A	N/A
National Trails	England National Trails	There are no National Trails within the study area.	N/A	N/A	N/A
<b>Historic Environment (Community)</b>					
World Heritage Sites	UK World Heritage Sites	There are no World Heritage Sites within the study area.	N/A	N/A	N/A

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
Scheduled Monuments	UK Scheduled Monuments	Within the study area there are dozen Scheduled Monuments. They are distributed throughout entire study area	R	<p>Only a dozen Scheduled Monuments are distributed sporadically throughout entire study area, there are opportunities for avoidance of this constraint through routing.</p> <p>OHL development has the potential to be constrained by Scheduled Monuments due to the risk construction works may have upon the feature and/or associated archaeological features as well as during operation via risk to the setting of the Scheduled Monuments.</p> <p>It is considered that there are opportunities to mitigate risks to the individual Scheduled Monuments in the study area through the routing and siting process. There may be opportunities for the type of reinforcement to be changed (e.g., undergrounding as opposed to OHL) to avoid effects on setting, considering the nature of the development and the location/extent of the constraint. However, there will be detailed considerations required for this type of construction. If undergrounding is implemented, there are opportunities during design development to avoid or mitigate risks via avoidance or considerate design (i.e., landscape screening).</p> <p>It is highly possible to avoid direct risks to Scheduled Monuments due to their density in the study area.</p> <p>A green BRAG rating has been applied as through detailed route design and construction methodology these sites can be avoided.</p>	G
Listed Buildings	UK listed buildings (Grade I, II* and II listed buildings)	There are a large number of Listed Buildings throughout the study area, including Grade II*, and Grade II.	A	<p>OHL development may be constrained by Listed Buildings due to the risk of physical loss or damage to the listing, or indirectly via disturbance to the listed building's setting. There may also be risks to the curtilage (the area around, or any other building that is around and associated with a listed building).</p> <p>Whilst there is a large number of Listed Buildings within the study area, there are opportunities to reduce direct risks through the routing and siting process.</p>	G



Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				<p>In addition to potential accidental damage during construction if works or transport links are close by, there may be a risk on setting depending upon the location of the OHL route and any cable sealing end compounds.</p> <p>Works and transport routes need to be considered in terms of their proximity to listed buildings near the highway (e.g., accidental damage risk from HGVs in narrow lanes or other restricted areas) or groundworks (i.e., if any vibration generating works are close enough to cause damage to buildings).</p> <p>As a result of the potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	
Registered Parks and Gardens	Registered Parks and Gardens	There are no Registered Parks and Gardens within the study area.	N/A	N/A	N/A
Registered Battlefields	England Registered Battlefields	There is one Registered Battlefield within the study area, at the site of the Battle of Maldon 991.	A	<p>The Registered Battlefield constrains the development of this option due to the potential for direct harm during construction, or from changes to the setting of the site during operation. However, there are significant sections of the study area that are not constrained by the Registered Battlefield. There are opportunities to mitigate risks via avoidance through the routing process.</p> <p>As a result of the potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	G
<b>Air Quality (Community)</b>					
AQMAs (AQMA)	UK AQMAs	Rayleigh AQMA (Rochford District Council) is within the study area.	G	Given the small spatial area constrained by the AQMA, through careful design and construction planning, avoiding/ mitigating direct and indirect adverse risks the sites are not considered to constrain the development of the option.	G

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				As a result of the low density distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.	
<b>Noise (Community)</b>					
Major Settlements	UK Major Urban Settlements	Within the study area, much of the environment is a natural/rural setting. There is one Major Urban Settlement located partially within the study area: South-end-On-Sea in the southeast. South Woodham Ferrers and Rayleigh are being the most populated built-up areas in the study area.	A	<p>There is potential for the construction of a new OHL to generate noise during construction and operation that would affect residents of settlements, including within several Noise Important Areas.</p> <p>Owing to the spatial separation between settlements over the majority of the study area, it is considered that any potential construction noise impacts could be effectively controlled through appropriate routing and the use of best practice mitigation measures such as a CEMP during construction. Operational noise would also require further consideration at the next stage of the option development process.</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.</p>	G
Small Scale Settlements	UK Small Scale Urban Settlements	Within the study area, there are many small-scale settlements.	A	<p>There is potential for the construction of a new OHL to generate noise during construction and operation that would affect residents of small-scale settlements, including within several Noise Important Areas.</p> <p>Owing to the spatial separation between settlements over the majority of the study area, it is considered that any potential construction noise impacts could be effectively controlled through appropriate routing and the use of best practice mitigation measures such as a CEMP during construction. Operational noise would also</p>	A

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				<p>require further consideration at the next stage of the option development process.</p> <p>Although there are potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, this will not be possible for all small scale settlements, therefore, an amber BRAG rating has been applied.</p>	
<b>Socio-Economics (Community)</b>					
Major Settlements	UK Major Urban Settlements (Socio-Economics)	<p>Within the study area, much of the environment is a natural/rural setting. There is one Major Urban Settlement partially located within the study area: Southend-on-Sea in the southeast. South Woodham Ferrers and Rayleigh are being the most populated built-up areas in the study area.</p>	R	<p>There is potential for the construction and operation of a new OHL to impact residents as a result of changes to visual amenity. Where the Major Urban Settlement is located, its occupy only a small part of the study area at Southend-On-Sea. Mitigation of this constraint through routing is highly possible. There are opportunities to mitigate potential direct risks through vegetation screening and landscaping, and innovative tower designs.</p> <p>Potential positive impacts of this reinforcement may include employment generation during construction.</p> <p>Mitigation measures should also carefully consider the tourism and recreation socio-economic sensitivities of the study area and seek to mitigate risks to key receptors associated with the settlements. This will be applicable in the construction and operational stages.</p> <p>As a result of the distribution and nature of effects, and opportunities for avoidance of this constraint through routing, an amber BRAG rating has been applied.</p>	A
Small Scale Settlements	UK Small Scale Urban Settlements	<p>Within the study area, there are many small scale settlements.</p>	R	<p>There is potential for the construction and operation of a new OHL to impact residents as a result of changes to visual amenity. Small scale settlements are located throughout the study area and therefore mitigation of this constraint through routing is likely to only be partially successful. There are opportunities to mitigate potential</p>	R

Constraint Type	Name	Description/Features	BRAG Rating	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				<p>direct risks through vegetation screening and landscaping, and innovative tower designs, however again, fully mitigating impacts will not be possible.</p> <p>Potential positive impacts of this reinforcement may include employment generation during construction.</p> <p>Mitigation measures should also carefully consider the tourism and recreation socio-economic sensitivities of the study area and seek to mitigate risks to key receptors associated with the settlements. This will be applicable in the construction and operational stages.</p> <p>As a result of the distribution and nature of effects, avoidance of this constraint will require considerable planning, design iterations and assessment in the following stages; nevertheless some small scale settlements will still be affected, therefore a red BRAG rating has been applied.</p>	
National Trust Land	National Trust Open Land and Limited Access Land	Land at Bailey Rayleigh Mount is located within the study area.	A	<p>There is potential for this site to constrain development of this option due to the potential for direct and indirect risks, such as loss of land or disturbance to views.</p> <p>There are opportunities to mitigate risks through the routing process and therefore the presence of National Trust Land is not considered a constraint to the option. There may be a risk on setting and temporary construction disturbance depending upon the location of the route, which should be carefully considered.</p> <p>As a result of the Land at Bailey Rayleigh Mount being in a small cluster within the study area and opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	G

**2.12. Bradwell to Sellindge Study Area (HVDC)**

Start point	End point	Applicable to shortlisted designs:
Bradwell	Sellindge	Yes

**2.12.1. Reinforcement Details**

Reinforcement type (if known)	Reinforcement Length (if known)
HVDC	N/A
<b>Technology assumptions</b>	

This reinforcement includes a HVDC offshore reinforcement between Bradwell and Sellindge

<b>2.12.2. Environmental Summary</b>	<b>BRAG Rating with mitigation measures:</b>	<b>R</b>
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The study area includes multiple environmental constraints including international and national designations.

The main area of constraint where several environmental designations are densely located or overlap is within the north, central and southern section of the study area. In these areas there are several overlapping designations including:

- MCZs,
- Ramsar sites,
- SPAs,
- SACs,
- SSSIs.

Several MCZs are within the heavily constrained north and south section of the study area. There are no opportunities to avoid Blackwater, Crouch, Roach and Colne Estuaries MCZ in the north section of study area. There may be opportunity to mitigate risks to these MCZs in the south through selective routing/ placement of offshore cables.

The broad distribution of the Margate and Long Sands SAC and Outer Thames Estuary SPA occupying the central section of the study area creates a constrained corridor for the offshore cable route in the centre of the study area. Owing to the number of environmental constraints around the coastline and the variety of habitats and species designated, there are very few unconstrained potential landfall points in the south section and none at the north part of study area in Bradwell Waterside. Those locations (from an environmental point of view) which are least constrained are to the south of Folkestone and around Deal in the south.

This region therefore requires extensive routing in subsequent design stages. This will require the implementation of:

- Buffer zones,

- Consideration of marine species and bird migration routes
- Implementation of interaction risk mitigation measures,
- Underwater noise and vibration mitigation measures,
- HRA Screening,
- Best practice appropriate construction management practices (e.g., siting of access routes and buffer zones).

As explained in Section 1.2.2 (Study Area Environmental and Community Summary BRAG Ratings), the following factors have been considered in determining an overall Environmental BRAG rating for this Study Area.

Table 2.12.2: Overall Environmental BRAG rating for the Bradwell to Sellindge Study Area.

<b>Scope of works</b>	This reinforcement includes a HVDC offshore reinforcement between Bradwell in Essex and Sellindge in south east Kent, that will require some physical changes to the environment and as such, will therefore be affected by the constraints described in the constraints table in Section 2.12.4. This is reflected in the BRAG ratings.
<b>Number and area of constraints</b>	Within the study area there are 16 different environmental constraint types present. As noted above, the main areas of constraint where several environmental designations are densely located or overlap is within the north, central and southern section of the study area.
<b>BRAG ratings of constraints</b>	<p>Within the study area there are 16 environmental constraint types present. Of these, two have a rating of red under the HND methodology after mitigation, three have a rating of amber after mitigation and 11 have a rating of green after mitigation.</p> <p>The two red rated constraints include:</p> <ul style="list-style-type: none"> <li>• SAC</li> <li>• MCZ</li> </ul> <p>The three amber rated constraint include:</p> <ul style="list-style-type: none"> <li>• SPA</li> <li>• Ramsar Sites</li> <li>• SSSIs</li> </ul> <p>The eleven green rated constraints include:</p> <ul style="list-style-type: none"> <li>• pSAC</li> <li>• NNR</li> <li>• Ancient Woodland</li> <li>• IBA</li> <li>• RSPB Reserves</li> <li>• Seabird At Sea Density</li> <li>• UK Grey Seals</li> <li>• UK Harbour Seals</li> <li>• SCANS 3</li> <li>• Fish Spawning Grounds</li> <li>• Fish Nursery Grounds</li> </ul>

As shown on the constraint plan, there are no possible opportunities to avoid all of the above constraints through construction design and routing. Assessment showed that due to the size and distribution of MCZs, SACs and SPAs, particularly close to the coast in the northern extremity and central section, the study area is heavily constrained. This constraint is unavoidable. In the first place, priority should be given to areas of highest importance such as all identified MCZs, Thanet Coast SAC and Margate and Long Sands SAC. There are opportunities to mitigate risks to MCZs located in the southern sector and Thanet Coast SAC via avoidance measures during subsequent routing stages, however avoidance of the Blackwater, Crouch, Roach and Colne Estuaries in the northern sector and avoidance of the Margate and Long Sands SAC in the central section is impossible within the proposed study area.

An overall red BRAG rating has been assigned as the cumulative combination of all the designations and receptors throughout the study area, mostly in the northern and central sections of the study area, means that many sectors of this study area are highly constrained, with limited opportunities to avoid these constraints through design and routing.

### 2.12.3. Community Summary

BRAG Rating with mitigation measures:

A

There are numerous community constraints in the study area, particularly relating to landscape, historic assets and fishing areas.

There is one National Landscape in the study area, in the southern part of study area. The presence of Kent Down National Landscape and Heritage coasts distributed across the southern section of the study area present a constraint and are likely to require detailed consideration of onshore cable routing.

There is a large area designated as shellfish waters occupying the northern half of the study area. In addition, there are numerous other constraints in the southern section of the study area, including listed buildings, wreck locations and scheduled monuments.

These constraints are likely to affect both offshore routing and onshore cable routing around the landfall points with a potential requirement for undergrounding in line with the Holford Rules. Also, additional offshore community constraints such as RYA sailing and racing areas, bathing waters, fishing activity (areas of high intensity fishing effort) will need selective routing and compensation measures. The construction may temporarily disrupt the daily life of local communities and maritime activities. Consideration should be given to engaging with local communities/ fishing communities and relevant stakeholders during the planning and design phases to understand their concerns and identify measures to minimise impacts. Compensation measures to mitigate economic losses may be considered.

Throughout the construction process, works and transport routes need to be considered in terms of their proximity to features near the highway or groundworks (i.e., if any vibration generating works are close enough to cause damage to buildings) and employ appropriate construction management plans to mitigate temporary construction disturbance. These constraints may need further consideration at future design stages. Given the limited

number of Protected Wreck Sites, through careful design and construction planning, avoiding direct and indirect adverse risks the sites are not considered to constrain the development of the option. Additional community constraints which may be easily avoided with selective routing and siting include the presence of Registered Parks and Gardens, National Trust Land, Noise Important Areas and AQMAs.

The southern onshore extents of the study area contain the more populated urban/port areas (namely Dover/Folkestone). The remainder of the study area is more natural/rural and less densely populated. Overall, landfall points around the urban areas appear to have the least constraints if mitigation can be applied and can potentially utilise existing infrastructure.

As explained in Section 1.2.2 (Study Area Environmental and Community Summary BRAG Ratings), the following factors have been considered in determining an overall Environmental BRAG rating for this Study Area.

Table 2.12.3: Overall Community BRAG rating for the Bradwell to Sellindge Study Area.

<b>Scope of works</b>	This reinforcement includes a HVDC offshore reinforcement between Bradwell and Sellindge that will require some physical changes to the environment and as such, will therefore be affected by the constraints described in the constraints table in Section 2.12.4. This is reflected in the BRAG ratings.
<b>Number and area of constraints</b>	Within the study area there are 16 different community constraint types present. As noted above, the most constrained area is in southern section where Kent Down National Landscape and Heritage coasts are distributed. In addition, there are numerous other constraints in the southern section, including listed buildings, wrecks locations and scheduled monuments.
<b>BRAG ratings of constraints</b>	<p>Within the study area there are 16 community constraint types present. Of these, zero has a rating of red under the HND methodology after mitigation, two have a rating of amber after mitigation and fourteen have a rating of green after mitigation.</p> <p>The two amber rated constraints include:</p> <ul style="list-style-type: none"> <li>• Wreck Locations</li> <li>• Scheduled Monuments</li> </ul> <p>The fourteen green rated constraints include:</p> <ul style="list-style-type: none"> <li>• National Landscapes</li> <li>• Heritage Coasts</li> <li>• National Trails</li> <li>• Listed Buildings</li> <li>• Registered Parks and Gardens</li> <li>• Protected Wrecks</li> <li>• AQMA</li> <li>• Small Scale Settlements (Noise)</li> <li>• Small Scale Settlements (Socio-Economics)</li> <li>• National Trust Land</li> <li>• RYA Sailing and Racing Areas</li> </ul>



	<ul style="list-style-type: none"> <li>• Bathing Waters</li> <li>• Shellfish Waters</li> <li>• Fishing Activity</li> </ul>
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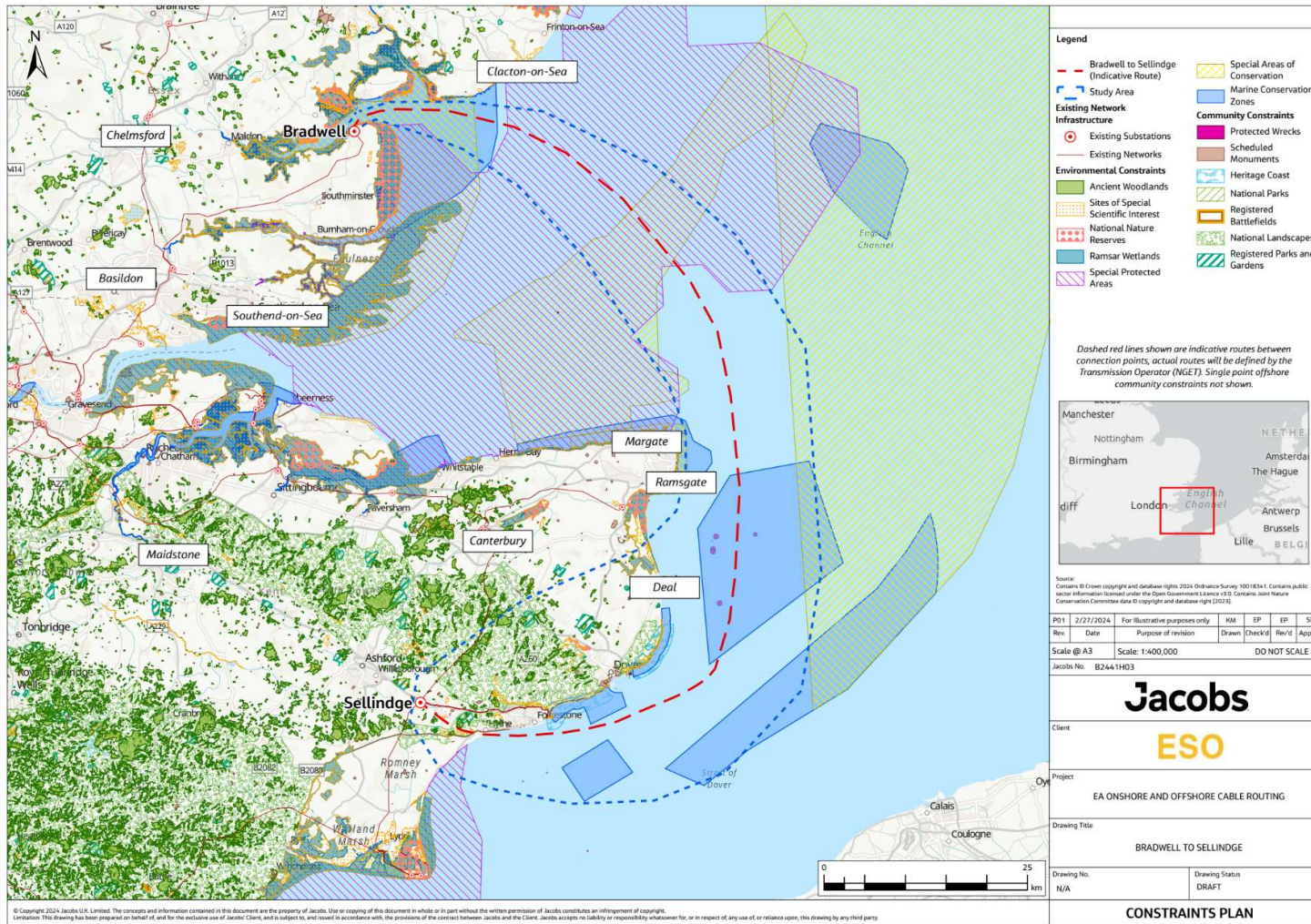
An amber BRAG rating has been assigned after mitigation measures due to the number and spatial distribution of these constraints across the breadth of the study area. As shown on the constraints plan, avoidance of all of the constraints may be challenging, but there may be opportunities to avoid constraints through careful offshore routing and implementation of best practice construction methodology to reduce the overall impacts.

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#### 2.12.4. Constraints Table

The following table depicts the environmental and community constraints for Bradwell to Sellindge Study Area. It describes the constraints present within the study area, the potential mitigation measures to avoid or reduce risks, and a BRAG rating before and after mitigation measures have been applied.

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**Constraints Plan 12: Study Area Bradwell to Sellindge showing Nationally and Internationally Designated Sites**

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
<b>Ecology (Environmental)</b>							
SAC	Onshore and offshore UK SACs	<p>There are several SACs within the proposed study area. In the north of the study area there is:</p> <ul style="list-style-type: none"> <li>- Essex Estuaries SAC.</li> </ul> <p>In the south of the study area there is:</p> <ul style="list-style-type: none"> <li>- Thanet Coast SAC,</li> <li>- Dover To Kingsdown Cliffs SAC,</li> <li>- Folkestone To Etchinghill Escarpment SAC,</li> <li>- Lydden and Temple Ewell Downs SAC,</li> <li>- Parkgate Down SAC, and</li> <li>- Sandwich Bay SAC.</li> </ul> <p>There are in addition two SACs (offshore Marine Components GB) within the proposed study area: Southern North Sea SAC occupying the eastern edge of the study area and the Margate and Long Sands SAC in the centre of the study area.</p>	R	R	R	<p>Due to the size and distribution of the SACs, particularly close to the coast the southern extremity and centre section of this study area is heavily constrained. This is also in light of designated sensitive receptors such as chalk reef and other benthic habitats which would be directly affected by cable installation towards the landfall points. There are no opportunities to avoid the Margate and Long Sands SAC within the proposed study area.</p> <p>Consideration should be given to the routing/location of the cable landfall points and short sections of onshore cables to avoid negative impacts such as habitat loss and fragmentation, soil erosion and sedimentation. Planning of landward construction activities and access routes should be undertaken, including the implementation of buffer zones as appropriate to avoid associated impacts e.g., relating to access roads and stockpiles. In terms of offshore/coastal effects, consideration would need to be given to avoiding or minimising impacts on sensitive seabed habitats such as chalk reefs and sandbanks from the cable installation where ploughs or sledges are used and during operation (e.g., through scour or repair activities requiring sections of cable to be raised if faults occur). A HRA Screening would need</p>	R

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						to be conducted in the first instance as the route may have a significant effect on the SACs.  As a result of the linear nature of cables and limited opportunities for avoidance of this constraint, a red BRAG rating has been applied as this is considered to be a heavily constrained area where detailed route design and construction methodology is required.	
pSAC	England and Scotland pSACs	There is one Possible SAC: Southern North Sea occupying the eastern edge of the study area.	A	A	A	Due to the size and distribution of this Possible SAC, an area of the eastern half of the study area is moderately constrained.  Consideration should be given to the routing/location of the offshore cables to avoid negative impacts such as seabed disturbance, alteration of substrate cover and composition, hydrodynamic changes, disturbance and habitat displacement and interaction risk for marine species.  As a result of the potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.	G
SPA	Onshore and offshore UK SPAs	There are several SPAs within the study area. In the north and west of the study area there are located: - Blackwater Estuary SPA, and - Dengie Coast SPA. In the south of the study area there is located:	A	A	A	Within most sections of the study area there are SPAs which cover areas on land, bays and offshore, which are likely to moderately constrain routing.  Construction mitigation in terms of reducing noise and visual disturbance will be required if the route passes close to this constraint (up to 1 km, depending on designated bird species). Consideration should be given to wider impacts	A

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
		<ul style="list-style-type: none"> <li>- Thanet Coast and Sandwich Bay SPA</li> </ul> <p>There are in addition two SPAs (offshore Marine Components GB) within the proposed study area: Outer Thames Estuary SPA occupying the northern half of the study area and Dungeness, Romney Marsh and Rye Bay SPA on the southern edge.</p>				<p>such as bird migratory routes and proximity to these. There will be opportunities to mitigate risks through various measures, such as using buffer zones, screening during construction and timing of works to avoid sensitive times such as nesting or overwintering birds.</p> <p>There may also be opportunities to mitigate risks to these SPAs through selective routing/placement of the Cable Landfall Points and Offshore/Onshore cables.</p> <p>As a result of the linear nature and limited opportunities for avoidance of this constraint, an amber BRAG rating has been applied as this is considered to be a moderately constrained area where detailed route design and construction methodology is likely to be required.</p>	
pSPA	England and Scotland pSPAs	There are no pSPAs located in the study area.	N/A	N/A	N/A	N/A	N/A
SCI	SCI	There are no SCIs located within the study area.	N/A	N/A	N/A	N/A	N/A
Ramsar sites	UK Ramsar sites	<p>There are several Ramsar sites within the study area.</p> <p>In the north of the study area there are located:</p> <ul style="list-style-type: none"> <li>- Blackwater Estuary,</li> <li>- Colne Estuary,</li> <li>- Dengie.</li> </ul> <p>In the south of the study area there are located:</p>	A	A	A	<p>The Ramsar sites are located across an area of the northern and southern sections of the study area. There are no opportunities to avoid both Dengie Ramsar site and Blackwater Estuary Ramsar site located in the northern sector of study area, owing to the vicinity of this constraint in the coastal environment. However, there are opportunities to mitigate risks in the southern sector via avoidance measures during subsequent</p>	A

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
		- Thanet Coast and Sandwich Bay.				<p>routing stages, and as designated species are mobile, effects outside of the site may also require mitigation dependent on whether they interact with associated habitats.</p> <p>Consideration should be given to wider impacts during construction in terms of reducing noise and visual disturbance (e.g., through screening) if the route passes close to this constraint (up to 1 km, dependent on bird species) or associated bird migratory and foraging routes.</p> <p>Owing to the distribution of this constraint within the study area, the main mitigation in the south sector would be through avoidance as there are areas where there are no Ramsar sites along potential landfall sites and/or implementation of buffer zones via subsequent routing stages, as appropriate.</p> <p>Although there are potential opportunities for avoidance of this constraint in the south through routing as sites occupy relatively small areas, an amber BRAG rating has been applied owing to the vicinity of this constraint to the coastal environment in the northern sector by Dengie and Blackwater Estuary Ramsar sites.</p>	
Proposed Ramsar sites	UK Proposed Ramsar sites	There are no Proposed Ramsar sites located within the study area.	N/A	N/A	N/A	N/A	N/A
Site of Special Scientific Interest (SSSI)	UK SSSIs	There are numerous coastal SSSIs located within the study area. In the south of the study area there are over 10 SSSIs and in the northern section there are three SSSIs.	N/A	A	A	There are multiple SSSIs distributed throughout the study area, mostly concentrated in the southern part with the most constrained area around bays.	A

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						<p>There are no opportunities to avoid Dengie SSSI and Blackwater Estuary SSSI located in the northern sector of study area, owing to the vicinity of this constraint in the coastal environment. However, there are opportunities to mitigate risks in the southern sector via avoidance measures during subsequent routing stages.</p> <p>Mitigation for these SSSIs must consider routing, including locations of access tracks and buffer zones more acutely to minimise disruption to sensitive areas. This will need detailed planning at the next stage, as well as implementation of best practices during construction in order to avoid impacts on this constraint.</p> <p>Although there are potential opportunities for avoidance of this constraint in the south through routing as sites occupy relatively small areas, an amber BRAG rating has been applied owing to the vicinity of this constraint to the coastal environment in the northern sector by Dengie SSSI and Blackwater Estuary SSSI.</p>	
National Nature Reserve (NNR)	UK NNRs	<p>There are four NNRs located in this study area.</p> <p>In the north there are Dengie and Colne Estuary NNRs.</p> <p>In the south section of study area there are Lydden Temple Ewell and Wye NNRs.</p>	N/A	A	A	<p>The majority of this study area is not constrained by an NNR, but there is Dengie NNR present along the St Peter's Flat and Bradwell Waterside in the northern sector.</p> <p>There are limited opportunities to avoid Dengie NNR located in the northern sector of study area, owing to the vicinity of this constraint in the coastal environment along the St Peter's Flat and Bradwell Waterside. However, there is the possibility for avoidance by routing to the west.</p>	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						<p>There are also opportunities to mitigate risks in the southern sector via avoidance measures during subsequent routing stages.</p> <p>Therefore, it is necessary to mitigate risks through detailed routing and siting. Planning of construction activities and access routes should be undertaken, including the implementation of buffer zones as appropriate to avoid impacts relating to access roads and construction waste stockpiles.</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through routing and best construction practices, a green BRAG rating has been applied.</p>	
Biosphere Reserves	UK Biosphere Reserves	There are no Biosphere Reserves within the study area.	N/A	N/A	N/A	N/A	N/A
Marine Conservation Zones	UK Marine Conservation Zones	<p>There are seven Marine Conservation Zones within the study area, in the north there is located:</p> <ul style="list-style-type: none"> <li>- Blackwater, Crouch, Roach and Colne Estuaries</li> </ul> <p>in the south there are located:</p> <ul style="list-style-type: none"> <li>- Dover to Deal,</li> <li>- Dover to Folkestone,</li> <li>- Folkestone Pomerania,</li> <li>- Foreland,</li> <li>- Goodwin Sands, and</li> </ul>	R	R	N/A	<p>Due to the size and distribution of Marine Conservation Zones, areas within the northern and southern portions of this study area are heavily constrained. Avoidance of the Blackwater, Crouch, Roach and Colne Estuaries in the northern sector is impossible within proposed study area. However, there are opportunities to mitigate risks in the southern sector via avoidance measures during subsequent routing stages.</p> <p>Consideration would need to be given to the routing/location of the cable landfall points and offshore cables to avoid negative impacts such as seabed sediment and habitat disturbance and sediment suspension, alteration of substrate</p>	R



Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
		- Thanet Coast.				<p>cover and composition, and hydrodynamic changes.</p> <p>There may also be opportunities to mitigate risks to these Marine Conservation Zones through selective routing/placement of the cable landfall points and offshore cables to avoid or minimise impacts on sensitive habitats, taking into account ecological connectivity and the preservation of important biodiversity areas.</p> <p>As a result of the linear nature and limited opportunities for avoidance of this constraint especially in the north section, a red BRAG rating has been applied as this is considered to be a heavily constrained area where detailed route design and construction methodology is required.</p>	
HPMA	Digitised from HPMA consultation documents	There are no HPMA within the study area.	N/A	N/A	N/A	N/A	N/A
Ancient Woodlands	UK Ancient Woodlands	There are numerous areas of Ancient Woodland located throughout the central section of the southern part of the study area (Kent). No areas are present in the northern sector.	N/A	A	A	<p>There is a considerable portion of the study area in the south that is constrained by Ancient Woodland, located inland from the coast. Opportunity exists in the next stage to mitigate risks through the routing process so that the cable landfall points and onshore cables do not cross areas of Ancient Woodland.</p> <p>Any risks during construction may be controlled through appropriate construction environmental management practices, for example in relation to the siting of access routes and implementing buffer zones around ancient woodland areas.</p>	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						A green BRAG rating has been assigned in view that there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.	
Important Bird Areas	UK Important Bird Areas	<p>There are two Important Bird Areas within the study area.</p> <p>In the north of the study area:</p> <ul style="list-style-type: none"> <li>- Mid Essex Coast</li> </ul> <p>In the south section of study area:</p> <ul style="list-style-type: none"> <li>- Thanet Coast and Sandwich Bay.</li> </ul>	G	G	G	<p>There are large stretches of coastal Important Bird Areas associated with this study area that will need to be avoided and therefore represent a constraint particularly to the study area's northern coastal infrastructure (less so in the southern half of the southern coastal sector). Consideration should be given to wider impacts such as during construction of cable landfall points and offshore cables in terms of interaction risk with landfall infrastructure or vessels (implement interaction risk mitigation measures, such as effective deterrent systems, monitoring, and operational procedures, to minimise the potential for bird interactions).</p> <p>During construction of onshore cables if routed close by, bird usage of the area would need to be considered where any disturbance risks are identified. Construction activities may result in the direct removal or destruction of bird nests. Displacement from nesting sites can disrupt breeding patterns and affect reproductive success. Consideration would need to be given to conduct nesting surveys prior to construction to identify active nests and breeding sites. Measures would need to be implemented to avoid and create buffer zones around active nests, ensuring that appropriate timing and methods are used to</p>	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						<p>minimise disturbance. Alternative nesting structures or nearby suitable habitats should be installed or created to compensate for any loss of nesting sites.</p> <p>Construction activities should be scheduled to avoid critical periods for breeding, nesting and migration of sensitive species. Foraging areas will also be avoided through the detailed routing process.</p> <p>A green BRAG rating has been assigned in view as this is considered to be a lightly constrained area and that there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and mainly construction best practices.</p>	
Royal Society for the Protection of Birds (RSPB) Reserves	UK RSPB Reserves	There is one RSPB Reserve in the study area which is Lydden Valley, between Sandwich and Deal.	G	G	G	<p>Onshore cable development may be constrained by the RSPB Reserve due to excavation activities which lead to soil disturbance, vegetation removal and indirect risks via disturbance during construction (i.e., noise/lighting).</p> <p>During construction of onshore cables if routed close by, bird usage of the area would need to be considered where any disturbance risks are identified. Construction activities may result in the direct removal or destruction of bird nests. Displacement from nesting sites can disrupt breeding patterns and affect reproductive success. Consideration should be given to conduct nesting surveys prior to construction to identify active nests and breeding sites. Measures would need to be implemented to avoid and</p>	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						<p>create buffer zones around active nests, ensuring that appropriate timing and methods are used to minimise disturbance. Alternative nesting structures or nearby suitable habitats should be installed or created to compensate for any loss of nesting sites.</p> <p>Construction activities should be scheduled to avoid critical periods for breeding, nesting and migration of sensitive species. Foraging areas will also be avoided through the detailed routing process.</p> <p>A green BRAG rating has been assigned in view as this is considered to be a lightly constrained area and that there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	
Seabird At Sea Density (Summer/Winter)	UK Seabirds at Sea Density		G	N/A	N/A	<p>There are European seabird at sea records throughout the study area, with the highest density of records towards the northern boundary. These data would need to be used at the detailed design stage where there may be sensitive species and corresponding periods where construction mitigation is required.</p> <p>Construction activities should be scheduled to avoid critical periods and areas e.g., for foraging during the breeding season and key migration routes of sensitive species. This will occur during the detailed routing process.</p> <p>A green BRAG rating has been assigned as it is considered that there are many opportunities to mitigate the risks associated with this constraint,</p>	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						with detailed routing and construction best practices.	
Annex 1 Reefs outside designated areas	UK Annex 1 Reefs	There are no Annex 1 Reefs polygon or point records outside the designated areas.	N/A	N/A	N/A	N/A	N/A
Annex 1 Sandbanks outside designated areas	UK Annex 1 Sandbanks	There are Annex 1 Sandbanks which are slightly covered by seawater all of the time polygon or point records outside the designated areas.	N/A	N/A	N/A	N/A	N/A
Annex 1 Submarine Structures outside designated areas	UK Annex 1 Submarine Structures	There are no Annex 1 Submarine structures made by leaking gas polygon or point records outside the designated areas-.	N/A	N/A	N/A	N/A	N/A
Annex 1 Saltmarsh outside designated areas	UK Annex 1 Saltmarsh	There are no Annex 1 Saltmarsh polygon or point records outside the designated areas.	N/A	N/A	N/A	N/A	N/A
UK Grey Seals	UK Grey Seal - High density	There is one small size Grey Seal Breeding Colony: Goodwin Sands in the south of study area. Within the corridor there are: - 3 locations with between 1-10 harbour seal count - 1 location with between 21-40 harbour seal count	G	A	N/A	Consideration should be given to the routing/location of the cable landfall points and offshore cables to avoid negative impacts such as noise and visual disturbance, interactions, alteration of foraging and haul out habitat, and particularly displacement of individuals from the known breeding areas.	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
		<ul style="list-style-type: none"> <li>- 1 location with between 41-80 harbour seal count</li> <li>- 1 location with between 81-160 harbour seal count</li> <li>- 1 location with between 161-313 harbour seal count</li> </ul>				<p>For noise and vibration this will include implementing best practice such as the use of marine mammal observers and noise reduction measures. Interaction risk mitigation measures, such as effective deterrent systems, monitoring and operational procedures will reduce the potential for effects on seals.</p> <p>As there may be opportunities to mitigate risks through selective routing/placement of the cable landfall points and offshore cables to avoid or minimise impacts on associated habitats and breeding areas, a green BRAG rating has been assigned.</p>	
UK Harbour Seals	UK Harbour Seal – High density	<p>Within the route corridor there are:</p> <ul style="list-style-type: none"> <li>- 6 locations with between 1-10 harbour seal count</li> <li>- 2 locations with between 21 – 40 harbour seal count</li> <li>- 1 location with between 41 – 80 harbour seal count</li> </ul>	G	A	N/A	<p>Consideration should be given to the routing/location of the cable landfall points and offshore cables to avoid negative impacts such as noise and visual disturbance, alteration of foraging and haul out habitat, displacement of individuals and interaction risk.</p> <p>For noise and vibration impacts this will include implementing best practice such as the use of marine mammal observers and noise reduction measures. Interaction risk mitigation measures, such as effective deterrent systems, monitoring and operational procedures will reduce the potential for effects on seals.</p> <p>As there may be opportunities to mitigate risks through selective routing/placement of the cable landfall points and offshore cables to avoid or minimise impacts on associated habitats and</p>	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						breeding areas, a green BRAG rating has been assigned.	
SCANS 3 (marine mammal densities)		<p>Pilot whale – Low density (0.0-0.1 animals per km<sup>2</sup>)</p> <p>Minke whale – Low density (0.0-0.01 animals per km<sup>2</sup>)</p> <p>Harbour porpoise – Low density (0.0-0.5 animals per km<sup>2</sup>)</p> <p>Fin whale – Low density (0.0-0.025 animals per km<sup>2</sup>)</p> <p>Common dolphin – Low density (0.0-0.07 animals per km<sup>2</sup>)</p> <p>Common and or striped dolphin – Low density (0.0-0.04 animals per km<sup>2</sup>)</p> <p>Bottlenose dolphin – Low density (0.0-0.025 animals per km<sup>2</sup>)</p> <p>Beaked whales – Low density (0.0-0.1 animals per km<sup>2</sup>)</p> <p>Striped dolphin – – Low density (0.0-0.05 animals per km<sup>2</sup>)</p> <p>White beaked dolphin – Low density (0.0-0.05 animals per km<sup>2</sup>)</p>	G	G	N/A	<p>Consideration should be given to the routing/location of the cable landfall points and offshore cables to avoid negative impacts on foraging areas such as seabed disturbance, alteration of substrate cover and composition, hydrodynamic changes, as well as disturbance, displacement and interaction risk for cetaceans.</p> <p>For noise and vibration impacts this will include implementing construction and operational maintenance best practice such as the use of marine mammal observers and noise reduction measures. Interaction risk mitigation measures, such as effective deterrent systems, monitoring and operational procedures will reduce the potential for effects on cetaceans.</p> <p>A green BRAG rating has therefore been assigned in view of the above and that there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	G
Fish spawning grounds	UK Fish spawning grounds 2010	Within the study area, particularly off the east Kent coast there are spawning grounds for species such as herring, cod, sand eel, Dover sole, and plaice; being high intensity spawning grounds for the latter two species. Mackerel	G	N/A	N/A	Consideration should be given to the routing/location of the offshore cables to avoid negative impacts on spawning areas (particularly those species for which the area offers important, high intensity ground such as Dover sole and plaice. Mitigation to minimise seabed disturbance, alteration of substrate cover and composition,	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
		<p>spawning areas are present at the edge of the study area.</p> <p>Overall, there are multiple spawning location records and the study area encompasses important spawning grounds.</p>				<p>hydrodynamic changes and general disturbance should be implemented.</p> <p>Consideration should be given to wider impacts during construction in terms of reducing noise and vibrations (e.g., implement best practice to minimise underwater noise, including the use of noise mitigation measures and construction methodologies that reduce disturbance to fish).</p> <p>A green BRAG rating has been assigned in view as there are many opportunities to mitigate the risks associated with this constraint with detailed routing and construction best practices.</p>	
Fish nursery grounds	UK Fish Nursery grounds 2010	<p>Within the study area there are nursery grounds for species such as tope shark, herring, mackerel, Dover sole, plaice, whiting and cod; with high intensity nursery grounds for the latter species.</p> <p>Overall, there are multiple nursery area location records and therefore the study area is of importance in this respect.</p>	G	N/A	N/A	<p>Consideration should be given to the routing/location of the offshore cables to avoid negative impacts on nursery areas such as minimising seabed disturbance, alteration of substrate cover and composition, hydrodynamic changes and general disturbance.</p> <p>Consideration would need to be given to wider impacts during construction in terms of reducing noise and vibration (e.g., implement best practice to minimise underwater noise, including the use of noise mitigation measures and construction methodologies that reduce disturbance to fish).</p> <p>A green BRAG rating has been assigned in view as there are many opportunities to mitigate the risks associated with this constraint with detailed routing and construction best practices.</p>	G
<b>Geology and Soils (Environmental)</b>							



Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
Geoparks	UK Geoparks	There are no UNESCO Global Geoparks within the study area.	N/A	N/A	N/A	N/A	N/A
<b>Landscape and Visual (Community)</b>							
National Parks	UK National Parks	There are no National Parks within this study area.	N/A	N/A	N/A	N/A	N/A
National Landscapes	England National Landscapes	There is one National Landscape within the study area. Kent Downs is located in the south of the study area.	N/A	A	A	<p>The southern sector of this study area is moderately constrained by the Kent Downs. While underground onshore cables are less visually prominent compared to overhead lines, the construction and maintenance of landfall infrastructure can still have visual impacts on the surrounding area. In line with National Policy and the Holford Rules, National Landscapes should be avoided altogether and where this is not possible and there would be harm to landscape, visual amenity and natural beauty, there should be a strong presumption for undergrounding the section of line.</p> <p>The most suitable route to be identified for onshore cables and landfall infrastructure will consider existing coastal land use and environmental sensitivities, also to explore opportunities to co-locate cables with existing coastal infrastructure corridors, such as roadways and utility corridors, to minimise the need for additional land acquisition or disruption.</p> <p>During operations, depending on the location there may be periodic vegetation management activities, such as tree trimming or clearing around access points, to ensure the integrity and</p>	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						<p>accessibility of the underground cables. These activities may have temporary visual impacts.</p> <p>As a mitigation there should be implementation of appropriate landscaping strategies, such as the planting of trees, shrubs, or other vegetation, to visually integrate infrastructure elements, such as landfall installations, into the surrounding environment. The design guidelines or standards should adhere to that aim to minimise visual impacts during the installation and operation of underground cable systems. This can include considerations for equipment placement, surface installations, and landscaping.</p> <p>A green BRAG rating has been assigned in view as this is considered to be a moderately constrained area and there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	
Heritage Coasts	England Heritage Coasts	There are two Heritage Coasts within the south of the study area. These are South Foreland Heritage Coast and Dover-Folkestone Coast.	N/A	A	A	<p>The southern sector of this study area is moderately constrained by the South Foreland Heritage Coast and Dover-Folkestone Coasts which are adjacent to Dover.</p> <p>While underground cables are less visually prominent compared to overhead lines, the construction and maintenance landfall infrastructure can still have visual impacts on the surrounding area.</p> <p>The most suitable location for landfall infrastructure and coastal onshore cables will consider existing land use and environmental sensitivities, and also will explore opportunities to</p>	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						<p>co-locate cables with existing infrastructure corridors, such as roadways and utility corridors, to minimise the need for additional land acquisition or disruption.</p> <p>During operations, depending on the location there may be periodic vegetation management activities, such as tree trimming or clearing around access points, to ensure the integrity and accessibility of the underground cables. These activities may have temporary visual impacts.</p> <p>There should be implementation of appropriate landscaping strategies, such as the planting of trees, shrubs, or other vegetation, to visually integrate infrastructure elements, such landfall installations, into the surrounding environment.</p> <p>The design guidelines or standards should be adhered to, that aim to minimise visual impacts during the installation and operation of underground cable systems. This can include considerations for equipment placement, surface installations, and landscaping.</p> <p>A green BRAG rating has been assigned as this is considered to be a moderately constrained area and there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	
National Trails	England National Trails	There is the North Downs Way National Trails within the study area, located in the south.	N/A	A	A	Onshore cables and cables landfall points development may be lightly constrained by North Downs Way National Trail.	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						<p>Measure to avoid the North Downs Way National Trail would need to be investigated at the detailed routing stage.</p> <p>A green BRAG rating has been assigned in view as this is considered to be a lightly constrained area and that there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	
<b>Historic Environment (Community)</b>							
World Heritage Sites	UK World Heritage Sites	There are no World Heritage Site within the coastal sector of the study area.	N/A	N/A	N/A	N/A	N/A
Scheduled Monuments	UK Scheduled Monuments	Within the onshore parts of the study area there are multiple Scheduled Monuments.	R	R	R	<p>Offshore/onshore cables and cable landfall points/routing has the potential to be constrained by Scheduled Monuments due to the risk construction works may have upon the feature and/or associated archaeological features. Due to this, without mitigation the distribution of Scheduled Monuments is likely to constrain overall route options and require consideration of the mitigation hierarchy.</p> <p>It is considered that there are opportunities to mitigate risks to the individual Scheduled Monuments in the study area through the routing and siting process, including implementation of buffer zones. There will be detailed considerations required for this type of construction.</p> <p>The areas surrounding the Scheduled Monuments may also require mitigation when carrying out groundworks, due to the potential presence of</p>	A

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						<p>undiscovered associated features (i.e., archaeological remains). Consultation with Historic England would need to be required to determine the most appropriate mitigation.</p> <p>It may be possible to avoid direct risks to Monuments, but due to their distribution along the coastline in the study area, indirect risks may be more difficult to avoid.</p> <p>As a result of the opportunities for avoidance of this constraint in the area, an amber BRAG rating has been applied as this is considered to be a heavily constrained area where detailed route design and construction methodology is required.</p>	
Listed Buildings	UK listed buildings (Grade I, II* and II listed buildings)	There are an extensive number of Listed Buildings throughout the onshore parts of the study area (with particularly high densities in the south), including Grade I, Grade II*, and Grade II.	N/A	A	A	<p>Offshore/onshore cables and cable landfall points/routing may be moderately constrained by listed buildings due to the risk of physical loss or damage to the building, or indirectly via disturbance to the listed building's setting. There may also be risks to the curtilage (the area around, or any other building that is around and associated with a listed building).</p> <p>Whilst there is a large number of Listed Buildings within the southern coastal sector of the study area, opportunity exists in the next stages to reduce direct risks through the routing and siting process.</p> <p>Works and transport routes need to be considered in terms of their proximity to listed buildings near the highway (e.g., accidental damage risk from HGVs in narrow lanes or other restricted areas) or groundworks (i.e., if any vibration generating</p>	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						works are close enough to cause damage to buildings). A green BRAG rating has been assigned in view as although this is considered to be a moderately constrained area, there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.	
Registered Parks and Gardens and Gardens and Designed Landscape	Registered Parks and Gardens	Within the study area there are eight Registered Parks and Gardens.	N/A	A	A	Given the limited areas covered by Registered Parks and Gardens, through careful design and construction planning, avoiding/ mitigating direct and indirect adverse risks the sites are not considered to constrain the development of the option. As a result of the low-density distribution and potential opportunities for avoidance of this constraint through detailed routing and construction best practices, a green BRAG rating has been applied.	G
Wreck locations	UK wreck locations	There are multiple wreck locations throughout the study area.	R	R	N/A	It is important that the proposed route avoids disturbing known or suspected wrecks, especially where there might be caches of unexploded ordnance. As a result of wrecks being present within the study area and the requirement for avoidance of this constraint through routing and potential further investigations, an amber BRAG rating has been applied.	A

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
Protected wrecks	England protected wrecks	There are several Protected Wreck Sites within the study area: <ul style="list-style-type: none"> <li>- South Edinburgh Channel,</li> <li>- Stirling Castle,</li> <li>- The Rooswijk,</li> <li>- Restoration,</li> <li>- Northumberland,</li> <li>- Unknown Wreck (GAD8; previously known as the 'Goodwins Cannon' Site'),</li> <li>- Admiral Gardner,</li> <li>- Langdon Bay.</li> </ul>	R	R	N/A	Given the limited number of protected wreck sites, through careful design and construction planning, avoiding/ mitigating direct and indirect adverse risks the sites are not considered to constrain the development of the option. As a result of the low density distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.	G
Ship Hulk	Other obstructions (ship hulk)	There are no ship hulks recorded within the study area	N/A	N/A	N/A	N/A	N/A
Registered Battlefields	England Registered Battlefields	There are no Registered Battlefields within the study area.	N/A	N/A	N/A	N/A	N/A
<b>Air Quality (Community)</b>							
Air Quality Management Areas (AQMA)	UK AQMA	There are two AQMA within the study area. A20 AQMA and High Street/Ladywell AQMA are located in Dover city.	N/A	N/A	G	Given the small areas covered by AQMA, through careful design and construction planning, avoiding/ mitigating direct and indirect adverse risks the sites are not considered to constrain the development of the option. As a result of the low-density distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.	G
<b>Noise (Community)</b>							

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
Major Settlements	UK Major Urban Settlements	Much of the study area is offshore. There are no major urban settlements located within the landside study area.	N/A	N/A	N/A	N/A	N/A
Small Scale Settlements	UK Small Scale Urban Settlements	Much of the study area is offshore. There are built up areas along the southern coast of the study area, mainly around Hythe, Dover, Folkestone and Deal.	N/A	G	G	<p>There is potential for the construction of onshore cables and cable landfall points to generate noise during construction, and operation that would affect residents of the built up areas, including within Noise Important Areas.</p> <p>Although there are several built up areas between Hythe and Deal it is considered that owing to the gaps between settlements, any potential construction and noise impacts could be effectively controlled through appropriate routing and the use of best practice mitigation measures such as a CEMP. Operational noise would also require further consideration at the next stage of the option development process.</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.</p>	G
<b>Socio-Economics (Community)</b>							
Major Settlements	UK Major Urban Settlements (Socio-Economics)	Much of the study area is offshore. There are no major urban settlements located within the landside study area (only several built up areas between Hythe and Deal).	N/A	N/A	N/A	N/A	N/A



Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
Small Scale Settlements	UK Small Scale Urban Settlements	Much of the study area is offshore. There are built up areas along the southern coast of the study area, mainly around Hythe, Dover, Folkestone and Deal.	N/A	A	A	<p>There is potential for the construction of onshore cables and cable landfall points to impact residents as a result of changes to visual amenity. Constraints to the positioning of landfall infrastructure and onshore cables are associated with the socio-economic aspects of these settlements.</p> <p>Residents may have concerns about the health risks of new onshore cables in the vicinity of their houses and schools and therefore public information events should be held and leaflets produced to reduce any concerns.</p> <p>Potential positive impacts of this reinforcement may include employment generation during construction.</p> <p>Mitigation should carefully consider the tourism and recreation socio-economic sensitivities of the study area and seek to mitigate risks to key receptors associated with the settlements. This will be applicable in the construction and operational stages.</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.</p>	G
National Trust Land	National Trust Open Land and Limited Access Land	<p>There are several areas of National Trust Land within this study area.</p> <p>In the south section there are:</p> <ul style="list-style-type: none"> <li>- Land lying west of Victoria Road,</li> <li>- The Leas, Kingsdown,</li> </ul>	N/A	A	A	<p>There is potential for these sites to constrain development of this option due to the potential for direct and indirect risks, such as loss of land. Opportunity exists in the next stages to mitigate risks through the routing process and therefore the presence of National Trust Land is not</p>	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
		<ul style="list-style-type: none"> <li>- Bockhill Farm, St. Margarets-at-Cliffe,</li> <li>- Townsend Farm,</li> <li>- St. Margaret's Freedown,</li> <li>- Land south east of The Droveaway,</li> <li>- Land at Bockell Hill,</li> <li>- Land at Leathercoat Point,</li> <li>- Land at St Margarets-at-Cliffe,</li> <li>- Lighthouse Down,</li> <li>- Part of Wanstone Court Farm,</li> <li>- Langdon Hole, Dover,</li> <li>- Foxhill Down, Langdon Cliffs,</li> <li>- Land at Langdon Cliff, Cliff Road,</li> <li>- Land at Dover,</li> <li>- Property known as Kingpost, Elham.</li> </ul>				<p>considered a large constraint to the option. There may be a risk on setting and temporary construction disturbance depending upon the location of the route, which should be carefully considered.</p> <p>As a result of the low-density distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	
RYA sailing and racing areas	-	<p>There are approximately 3 Sailing/Yacht Clubs located in the north section of study area.</p> <p>There are approximately 10 Sailing/Yacht Clubs locations in the south section of the study area.</p> <p>The AIS Intensity is low/medium through study area.</p>	G	G	N/A	<p>Construction activities may temporarily affect sailing activities, particularly in coastal areas near cable landing points (e.g. higher intensity inshore recreational/local club sailing and racing) but also offshore installation areas where there may be lower density sailing and racing. Limited access to certain areas may affect the community, sailing activities and associated tourism.</p> <p>Construction and operational maintenance activities would need to be conducted with the aim of avoiding RYA sailing and racing areas and also providing appropriate notice to mariners and exclusion zones. The RYA's Coastal Atlas would need to be used to inform the detailed routing.</p>	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						As a result of the distribution and potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.	
Bathing waters	-	There are six Bathing water locations within the study area from Sandwich Bay to Hythe.	G	G	N/A	Construction activities may temporarily disrupt the daily life of local communities, particularly in coastal areas near cable landing points or onshore infrastructure sites. Limited access to certain areas and potential public perception of changes to bathing water appearance (e.g., through suspension of sediments and appearance of surface foams/scum rather than affecting bathing water quality through release of faecal indicator organisms) during construction may reduce bathing activities and tourism. Bathing waters may be avoided during the detailed routing stage and mitigation measures implemented through reducing sediment disturbance. As a result of the well-spaced distribution and potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.	G
Shellfish waters	-	There are five Shellfish water locations: Blackwater, Dengie, Foulness, Outer Thames and Margate.	G	G	N/A	The northern half of the study area has the greatest constraint, particularly owing to the location of the Outer Thames Shellfish Water. Offshore cabling and landfall construction may damage shellfish beds, reduce water quality through suspended sediment release and interfere with harvesting activities.	G

Constraint Type	Name	Description/Features	Offshore cable	Landfall	Onshore cable	Mitigation Identified/Residual Risk	Ranking with Mitigation
						As a result of the distribution and potential opportunities for avoidance of this constraint through routing to the west and best practice mitigation measures implemented to reduce the footprint and sediment disturbance, a green BRAG rating has been applied.	
Fishing activity	UK Fishing activity – Areas of high intensity fishing effort	<p>The Fishing Effort within the study area:</p> <ul style="list-style-type: none"> <li>- demersal species – Medium,</li> <li>- pelagic species – Low,</li> <li>- shrimp trawlers – none,</li> <li>- static gears – Medium/High,</li> <li>- beam trawl – Low/Medium.</li> </ul> <p>International Fishing Effort of North Sea beam trawl (1995) within the study area is Low/Medium/High.</p>	G	G	N/A	<p>The presence of offshore HVDC infrastructure and maintenance vessels can impact traditional fishing grounds and disrupt other maritime activities, potentially affecting the livelihoods and economic activities of coastal communities. Consideration should be given to engage with local fishing communities and relevant stakeholders during the planning and design phases to understand their concerns and identify measures to minimise impacts. Compensation measures to mitigate economic losses should be provided. There is need to establish communication channels to coordinate with fishers and ensure their safety and access to fishing areas during maintenance options. As a result of potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.</p>	G
Marine Fish Farms	UK Seawater Finfish Farms	UK marine finfish farms are located primarily in Scotland and the west coast.	N/A	N/A	N/A	N/A	N/A

## 2.13. Summary

The table below presents a summary of the BRAG ratings for each of the study areas after mitigation measures have been applied.

Study Area	Environmental BRAG rating after mitigation measures	Community BRAG rating after mitigation measures
Friston to Tilbury Study Area (OHL)	A	A
Friston to EACN to Tilbury Study Area (OHL)	A	A
Friston to Tilbury Study Area (HVDC)	A	G
Bramford to EACN Study Area (OHL)	A	R
Bramford to EACN Study Area (HVDC)	A	A
Friston to Richborough Study Area	A	A
Norwich to Bramford Study Area (OHL)	G	A
Norwich to Bramford Study Area (HVDC)	G	G
Norwich to Grain Study Area	R	A
Friston to Sellindge Study Area	A	A
Bradwell to Rayleigh Study Area	A	A
Bradwell to Sellindge Study Area	R	A

### 3. Reinforcement Landfall Appraisal

This section presents the environmental and community constraints for each of the individual study areas. This includes three landfall infrastructure study areas. Each appraisal includes brief information on the reinforcement that is being considered within the study area, followed by environmental and community summaries of the appraisals that are detailed in the associated constraints table. These constraints tables detail the environmental and community constraints that are present in each study area. They also present a BRAG rating for each designation in line with the HND Methodology<sup>7</sup>. The constraints tables also suggest a range of mitigation measures to reduce risks to receptors in the study area, and assigns another BRAG rating based on the potential that each constraint has to constrain the development of the reinforcement, once these mitigation measures have been considered. The effectiveness of the mitigation measures and final assigned BRAG rating is based on the type, number and size of the constraints and professional judgement based on experience with similar projects. Further optioneering and appraisal will be needed to refine the impact assessment and mitigation measures.

#### 3.1. Friston Landfall Study Area

##### 3.1.1. Reinforcement Details

Reinforcement type (if known)	Reinforcement Length (if known)
Landfall infrastructure	N/A
Technology assumptions	

This reinforcement includes landfall infrastructure to a proposed site at Friston.

##### 3.1.2. Environmental Summary

BRAG rating  
with mitigation A  
measures:

The study area includes multiple environmental constraints, including international and national designations.

The main area of constraint where several environmental designations are densely located, or overlap is within the central section of the study area. In these areas there are several designations including:

- Special Protection Area (SPAs),
- Special Areas of Conservation (SACs),
- Site of Scientific Interest (SSSIs),
- National Nature Reserves (NNRs),
- Ramsar sites.

<sup>7</sup> National Grid ESO (2022) Holistic Network Design (HND) Methodology, February 2022. Available from: <https://www.nationalgrideso.com/document/239466/download>

The onshore section of the study area contains the least number of constraints. Owing to the number of environmental constraints around the coastline and the variety of the habitats and species designated, there are limited opportunities for potential landfall points.

During construction it would be necessary to implement mitigation measures that include:

- Best practice construction methods (the adoption of construction methods which minimise impacts on the environment (eg. the use of quieter machinery than might routinely be used, in order to minimise noise disturbance to people and wildlife))
- Considerately planned access routes
- Buffer zones.

However, the broad distribution of these constraints means that opportunities for avoidance through selective placement planning may be limited, and therefore subsequent design stages should consider the mitigation hierarchy to mitigate risk.

As explained in Section 1.2.2 (Study Area Environmental and Community Summary BRAG Ratings), the following factors have been considered in determining an overall Environmental BRAG rating for this Study Area.

Table 2.1.2: Overall Environmental BRAG rating for the Friston Landfall Study Area.

<b>Scope of works</b>	This reinforcement includes landfall infrastructure to a proposed site at Friston, that will require some physical changes to the environment and as such, will therefore be affected by the constraints described in the constraints table in Section 2.1.4. This is reflected in the BRAG ratings.
<b>Number and area of constraints</b>	Within the study area there are 10 different environmental constraint types present. As noted above, the most constrained area is the central section of the study area, where several environmental designations are densely located, or overlap.
<b>BRAG ratings of constraints</b>	<p>Within the study area there are 10 environmental constraint types present. Of these, zero have a rating of red under the HND methodology after mitigation, three have a rating of amber after mitigation and seven have a rating of green after mitigation.</p> <p>The three amber rated constraints include:</p> <ul style="list-style-type: none"> <li>• SAC</li> <li>• SPA</li> <li>• SSSI</li> </ul> <p>The seven green rated constraints include:</p> <ul style="list-style-type: none"> <li>• pSAC</li> <li>• Ramsar Sites</li> <li>• NNR</li> <li>• Ancient Woodland</li> <li>• IBA</li> <li>• RSPB Reserves</li> <li>• SCANS 3</li> </ul>

As shown on the constraint plan, there are no possible opportunities to avoid all above constraints through construction design and routing.

An overall amber BRAG rating has been assigned as the cumulative combination of all the designations and receptors (both amber and green) along the coast and offshore means that many sectors of this study area are moderately constrained.

### 3.1.3. Community Summary

BRAG rating  
with mitigation  
measures: **A**

There are numerous community constraints in the study area, which include scheduled monuments and listed buildings.

There is one National Landscape and heritage coast in the central section of the study area, the position and extent of which present a constraint along the whole coastline. Therefore, these are likely to affect both offshore routing and onshore cable routing around the landfall points with a potential requirement for undergrounding in line with the Holford Rules<sup>8</sup>

Additional offshore community constraints such as RYA sailing and racing areas, bathing waters and fishing activity (areas of high intensity fishing effort) will require the selective placement of cable routing and compensation measures. The construction may temporarily disrupt the daily life of local communities and maritime activities. Consideration should be given to engage with local communities/ fishing communities and relevant stakeholders during the planning and design phases to understand their concerns and identify measures to minimise impacts. Compensation measures to mitigate economic losses may be considered.

In the northern sector of the study area is the town of Southwold. The remainder of the study area is more natural/rural and less densely populated. Overall, landfall points around urban areas appear to have the fewest constraints, if mitigation can be applied and there are opportunities to co-locate cables with existing infrastructure corridors, such as roadways and utility corridors, to minimise the need for additional land acquisition or disruption.

As explained in Section 1.2.2 (Study Area Environmental and Community Summary BRAG Ratings), the following factors have been considered in determining an overall Community BRAG rating for this Study Area.

Table 2.1.3: Overall Community BRAG rating for the Friston Landfall Study Area.

<p><b>Scope of works</b></p>	<p>This reinforcement includes landfall infrastructure to a proposed site at Friston, that will require some physical changes to the environment and as such, will therefore be affected by the constraints described in the constraints table in Section 2.1.4. This is reflected in the BRAG ratings.</p>
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<sup>8</sup> Guidelines on overhead line routing which were first formulated in 1959 by Sir William Later Lord, Holford. The Holford Rules, (National Grid ESO), available at: <https://www.nationalgrid.com/sites/default/files/documents/13795-The%20Holford%20Rules.pdf>



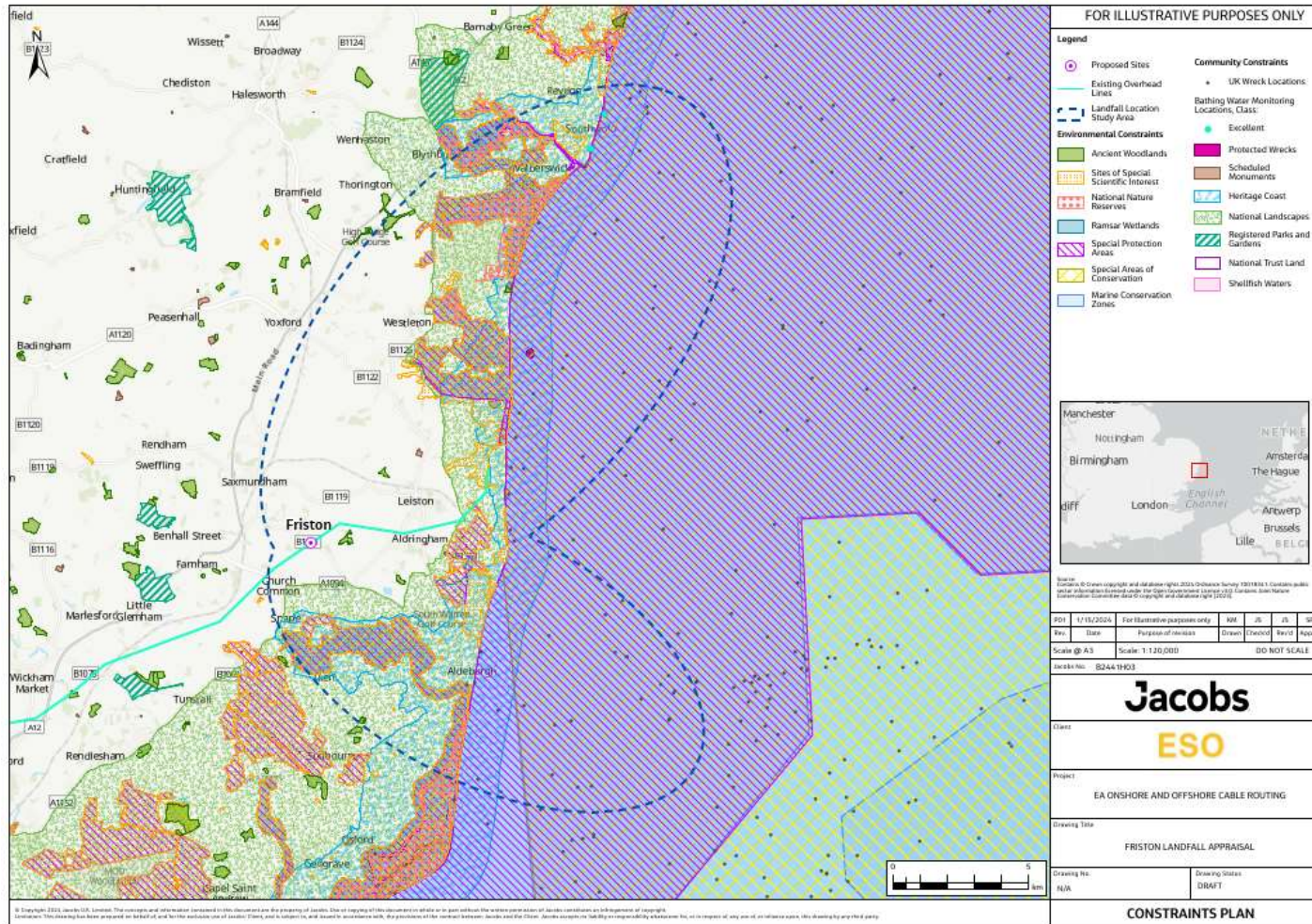
<p><b>Number and area of constraints</b></p>	<p>Within the study area there are 12 different community constraint types present. As noted above, the most constrained area is along the whole of the central section, where there is a national landscape, a heritage coast designation and a number of green rated constraints.</p>
<p><b>BRAG ratings of constraints</b></p>	<p>Within the study area there are 12 community constraint types present. Of these, zero has a rating of red under the HND methodology after mitigation, two have a rating of amber after mitigation and ten have a rating of green after mitigation.</p> <p>The two amber rated constraints include:</p> <ul style="list-style-type: none"> <li>• National Landscapes</li> <li>• Heritage Coasts</li> </ul> <p>The ten green rated constraints include:</p> <ul style="list-style-type: none"> <li>• Wreck Locations</li> <li>• Scheduled Monuments</li> <li>• Listed Buildings</li> <li>• Protected Wrecks</li> <li>• Small Scale Settlements (Noise)</li> <li>• Small Scale Settlements (Socio-Economics)</li> <li>• National Trust Land</li> <li>• RYA Sailing and Racing Areas</li> <li>• Bathing Waters</li> <li>• Fishing Activity</li> </ul>

As shown on the constraint plan, there are no possible opportunities to avoid all above constraints through construction design and routing. The landfall and offshore part of this study area contains multiple constraints that are densely located or overlap and making them unavoidable. In the first place, priority should be given to areas of highest importance such as National Landscapes which has been given an amber BRAG rating.

An amber BRAG rating has been assigned after mitigation measures due to the number and spatial distribution of these constraints across the central and offshore sections of the study area. Although avoidance of them may be challenging, there are opportunities for detailed route design and construction methodology to reduce the overall impacts.

### 3.1.4. Constraints Table

The following table details the environmental and community constraints for Friston Landfall Study Area. It describes the constraints present within the study area, the potential mitigation measures to avoid or reduce risks, and a BRAG rating before and after mitigation measures have been applied.



**Constraints Plan 13: Friston Landfall Study Area, showing Nationally and Internationally Designated Sites**

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	Ranking with Mitigation
<b>Ecology (Environmental)</b>					
SAC	Onshore and offshore UK SACs	<p>There are several SACs within the study area.</p> <ul style="list-style-type: none"> <li>- Alde-Ore &amp; Butley Estuaries SAC,</li> <li>- Orfordness-Shingle Street SAC</li> <li>- Minsmere To Walberswick Heaths &amp; Marshes SAC</li> </ul> <p>There is in addition Southern North Sea SAC (offshore Marine Components GB) occupying the eastern half of the study area.</p>	A	<p>The onshore SACs identified are mainly in the central section of proposed study area, all localised along the coastline. There are potential opportunities to avoid intersecting with these moderately constrained areas, as there are stretches of the coastline within the study area where SACs are not located. The Southern North Sea SAC (offshore Marine Components GB) however occupies almost the entire offshore area within the study area and there are therefore limited opportunities for offshore cable installation to avoid this designation.</p> <p>Consideration should be given to the location of the cable landfall points to avoid negative impacts such as habitat loss and fragmentation, soil erosion and sedimentation. Planning of landward construction activities and access routes should be undertaken, including the implementation of buffer zones as appropriate to avoid associated impacts, e.g. relating to access roads and stockpiles. In terms of offshore/coastal effects, consideration would need to be given to avoiding or minimising impacts on sensitive seabed habitats such as chalk reefs and sandbanks from the cable installation, where ploughs or sledges are used and during operation (e.g., through scour or repair activities requiring sections of cable to be raised if faults occur). A HRA Screening should be conducted in the first instance as the route may have a significant effect on the SACs.</p> <p>As a result of the limited potential landfall point locations and limited opportunities for avoidance of this constraint, an amber BRAG rating has been applied as this is considered to be a</p>	A

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	Ranking with Mitigation
				moderately constrained area where detailed route design and construction methodology is required.	
pSAC	England and Scotland pSACs	There is one Possible SAC: Southern North Sea occupying the eastern half of the study area.	A	<p>Due to the size and distribution of this Possible SAC, an area of the eastern half of the study area is moderately constrained. Consideration should be given to the location of the cable landfall points to avoid negative impacts such as seabed disturbance, alteration of substrate cover and composition, hydrodynamic changes, disturbance and habitat displacement and interaction risk for marine species.</p> <p>As a result of the potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	G
SPA	Onshore and offshore UK SPAs	<p>There are four SPAs within the study area.</p> <ul style="list-style-type: none"> <li>- Alde-Ore &amp; Butley Estuaries SPA,</li> <li>- Sandlings SPA</li> <li>- Minsmere-Walberswick SPA</li> </ul> <p>There is in addition Outer Thames Estuary SPA (offshore Marine Components GB).</p>	A	<p>Within most sections of the study area there are SPAs which cover areas on land, in bays and offshore, which are likely to moderately constrain potential cable landfall points.</p> <p>Construction mitigation in terms of reducing noise and visual disturbance will be required if the route passes close to this constraint (up to 1 km, depending on designated bird species). Consideration should be given to wider impacts such as bird migratory routes and proximity to these. There will be opportunities to mitigate risks through various measures, such as using buffer zones, screening during construction and timing of works to avoid sensitive times such as nesting or overwintering.</p> <p>There may also be opportunities to mitigate risks to these SPAs through selective placement of the cable landfall points.</p> <p>As a result of the linear nature and limited opportunities for avoidance of this constraint, an amber BRAG rating has been applied as this is considered to be a moderately constrained area where detailed route design and construction methodology is likely to be required.</p>	A

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	Ranking with Mitigation
pSPA	England and Scotland pSPAs	There are no pSPAs located in the study area.	N/A	N/A	N/A
SCI	SCI	There are no SCIs located within the study area.	N/A	N/A	N/A
Ramsar sites	UK Ramsar sites	Alde-Ore & Butley Estuaries and Minsmere-Walberswick Ramsar Sites are within the study area.	A	<p>The Ramsar sites are located in the central sections of the study area, along the coast.</p> <p>There are opportunities to mitigate risks via avoidance measures during subsequent routing stages, and as designated species are mobile, effects outside of the designated sites may also require mitigation depending on whether cable routing interact with associated habitats. Consideration should be given to wider impacts during construction in terms of reducing noise and visual disturbance (e.g., through screening) if the route passes close to this constraint (up to 1 km, dependent on bird species) or associated bird migratory and foraging routes.</p> <p>Owing to the distribution of this constraint within the study area, the main mitigation would be through avoidance as there are areas where there are no Ramsar sites at potential landfall sites and/or implementation of buffer zones during subsequent routing design stages, as appropriate.</p> <p>As a result of the opportunities for avoidance of this constraint, a green BRAG rating has been applied as there are less constrained areas where opportunities for route design and construction methodology changes can mitigate and avoid potential risks.</p>	G
Proposed Ramsar sites	UK Proposed Ramsar sites	There are no Proposed Ramsar sites located within the study area.	N/A	N/A	N/A

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	Ranking with Mitigation
Site of Special Scientific Interest (SSSI)	UK SSSIs	<p>There are numerous SSSIs within the study area:</p> <ul style="list-style-type: none"> <li>- Aldeburgh Hall Pit SSSI</li> <li>- Aldeburgh Brick Pit SSSI</li> <li>- Alde-Ore Estuary SSSI</li> <li>- Round Hill Pit, Aldeburgh SSSI</li> <li>- Snape Warren SSSI</li> <li>- Leiston - Aldeburgh SSSI</li> <li>- Crag Pit, Aldeburgh SSSI</li> <li>- Sizewell Marshes SSSI</li> <li>- Minsmere-Walberswick Heaths and Marshes SSSI</li> <li>- Potton Hall Fields, Westleton SSSI</li> <li>- Pakefield to Easton Bavents SSSI</li> <li>- Red House Farm Pit, Sudbourne SSSI</li> </ul>	A	<p>There is a large number of SSSIs distributed throughout the study area, mostly concentrated in the central coastal part of the study area.</p> <p>Mitigation for these SSSIs must consider routing, including locations of access tracks and buffer zones more acutely to minimise disruption to sensitive areas.</p> <p>As a result of the opportunities for avoidance of this constraint, an amber BRAG rating has been applied as this is a less constrained area, where opportunities for route design and construction methodology changes can mitigate and avoid potential risks.</p>	A
National Nature Reserve (NNR)	UK NNRs	<p>Orfordness-Havergate NNR, Westleton Heath and Suffolk Coast NNR are located within the central section of the study area, along the coast.</p>	A	<p>The majority of this study area is not constrained by NNRs.</p> <p>There are two NNRs closely located near the coastline, in the northern part of the study area. Orfordness-Havergate is located in the southern part of the study area, also near the coast.</p> <p>Therefore, it is necessary to mitigate risks through detailed routing and siting. Planning of construction activities and access routes should be undertaken, including the implementation of buffer zones as appropriate to avoid impacts relating to access roads.</p>	G

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	Ranking with Mitigation
				As a result of the sparse distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.	
Biosphere Reserves	UK Biosphere Reserves	There are no Biosphere Reserves within the study area.	N/A	N/A	N/A
Marine Conservation Zones	UK Marine Conservation Zones	There are no Marine Conservation Areas within the study area.	N/A	N/A	N/A
Highly Protected Marine Areas (HPMA)	Digitised from HPMA consultation documents	There are no HPMA within the study area.	N/A	N/A	N/A
Ancient Woodlands	UK Ancient Woodlands	There are several woodlands within the study area. Four Ancient & Semi-Natural Woodland, and one Ancient Replanted Woodland in the center of the study area.	A	There are very limited sections of the study area that are constrained by Ancient Woodland, as these are located inland from the coast. Opportunity exists in the next stage to mitigate risks through the routing process so that the cable landfall points do not cross areas of Ancient Woodland. Any risks during construction may be controlled through appropriate construction environmental management practices, for example in relation to the siting of access routes and implementing buffer zones around ancient woodland areas. A green BRAG has been assigned as there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.	G
Important Bird Areas	UK Important Bird Areas	There are three Important Bird Areas within the study area. - Alde-Ore Estuary,	G	There are large stretches of coastal Important Bird Areas associated with this study area that will need to be avoided where	G

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	Ranking with Mitigation
		<ul style="list-style-type: none"> <li>- Suffolk Sandlings,</li> <li>- Minsmere – Walberswick</li> </ul>		<p>possible and therefore represent a constraint to the majority of the study area's coastal infrastructure.</p> <p>Consideration should be given to wider impacts such as during construction of cable landfall points in terms of interaction risk with landfall infrastructure or vessels (implement interaction risk mitigation measures, such as effective deterrent systems, monitoring, and operational procedures, to minimise the potential for bird interactions).</p> <p>Construction activities may result in the direct removal or destruction of bird nests. Displacement from nesting sites can disrupt breeding patterns and affect reproductive success. Consideration should be given to conduct nesting surveys prior to construction to identify active nests and breeding sites. Measures would need to be implemented to avoid and create buffer zones around active nests, ensuring that appropriate timing and methods are used to minimise disturbance. Alternative nesting structures or nearby suitable habitats should be installed or created to compensate for any loss of nesting sites.</p> <p>Construction activities should be scheduled to avoid critical periods for breeding, nesting and migration of sensitive species. Foraging areas would need to also be avoided through the detailed routing process.</p> <p>A green BRAG has been assigned as there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	
Royal Society for the Protection of	UK RSPB Reserves	<p>There are four UK RSPB Reserves within the study area:</p> <ul style="list-style-type: none"> <li>- The North Warren,</li> <li>- Minsmere</li> </ul>	G	<p>The RSPB Reserves are distributed through the central and southern parts of the study area. The development may be constrained by RSPB Reserves due to excavation activities which lead to soil disturbance, vegetation removal and indirect risks via disturbance during construction (i.e., noise/lighting).</p>	G



Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	Ranking with Mitigation
Birds (RSPB) Reserves		<ul style="list-style-type: none"> <li>- Dingle Marshes</li> <li>- Snape</li> </ul>		<p>Construction activities should be scheduled to avoid these sites through the detailed routing process. During construction bird usage of the area would need to be considered where any disturbance risks are identified. Construction activities may result in the direct removal or destruction of bird nests. Displacement from nesting sites can disrupt breeding patterns and affect reproductive success. Consideration should be given to conduct nesting surveys prior to construction to identify active nests and breeding sites. Measures should be implemented to avoid and create buffer zones around active nests, ensuring that appropriate timing and methods are used to minimise disturbance. Alternative nesting structures or nearby suitable habitats would need to be installed or created to compensate for any loss of nesting sites.</p> <p>Construction activities should be scheduled to avoid critical periods for breeding, nesting and migration of sensitive species. Foraging areas would need to also be avoided through the detailed routing process.</p> <p>A green BRAG has been assigned as this is considered to be a lightly constrained area and there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	
Annex 1 Reefs outside designated areas	UK Annex 1 Reefs	There are no Annex 1 Reefs polygon or point records outside the designated areas.	N/A	N/A	N/A
Annex 1 Sandbanks outside	UK Annex 1 Sandbanks	There are Annex 1 Sandbanks which are slightly covered by seawater all of the time polygon or	N/A	N/A	N/A

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	Ranking with Mitigation
designated areas		point records outside the designated areas.			
Annex 1 Submarine Structures outside designated areas	UK Annex 1 Submarine Structures	There are no Annex 1 Submarine structures made by leaking gas polygon or point records outside the designated areas-.	N/A	N/A	N/A
Annex 1 Saltmarsh outside designated areas	UK Annex 1 Saltmarsh	There are no Annex 1 Saltmarsh polygon or point records outside the designated areas.	N/A	N/A	N/A
UK Grey Seals	UK Grey Seal -High density	There are no Grey Seal Breeding Colonies within the study area. There are no identified locations of grey seal occurrence within the study area.	N/A	N/A	N/A
UK Harbour Seals	UK Harbour Seal – High density	There are no identified locations of harbour seals occurrence within the study area.	N/A	N/A	N/A
SCANS 3 (marine mammal densities)		Pilot whale – Low density (0.0-0.1 animals per km <sup>2</sup> ) Minke whale – Low density (0.0-0.01 animals per km <sup>2</sup> ) Harbour porpoise – Low density (0.25-0.75 animals per km <sup>2</sup> ) Fin whale – Low density (0.0-0.025 animals per km <sup>2</sup> )	G	Consideration should be given to the location of the cable landfall points to avoid negative impacts on foraging areas such as seabed disturbance, alteration of substrate cover and composition, hydrodynamic changes, as well as disturbance, displacement and interaction risk for cetaceans.  For noise and vibration impacts this would need to include implementing construction and operational maintenance best practice such as the use of marine mammal observers and noise	G

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	Ranking with Mitigation
		<p>Common dolphin – Low density (0.0-0.07 animals per km<sup>2</sup>)</p> <p>Common and or striped dolphin – Low density (0.0-0.04 animals per km<sup>2</sup>)</p> <p>Bottlenose dolphin – Low density (0.0-0.025 animals per km<sup>2</sup>)</p> <p>Beaked whales – Low density (0.0-0.1 animals per km<sup>2</sup>)</p> <p>Striped dolphin – – Low density (0.0-0.05 animals per km<sup>2</sup>)</p> <p>White beaked dolphin – Low density (0.0-0.05 animals per km<sup>2</sup>)</p>		<p>reduction measures. Interaction risk mitigation measures, such as effective deterrent systems, monitoring and operational procedures will reduce the potential for effects on cetaceans.</p> <p>A green BRAG has therefore been assigned in view of the above and that there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	
<b>Geology and Soils (Environmental)</b>					
Geoparks	UK Geoparks	There are no UNESCO Global Geoparks within the study area.	N/A	N/A	N/A
<b>Landscape and Visual (Community)</b>					
National Parks	UK National Parks	There are no National Parks within this study area.	N/A	N/A	N/A
National Landscapes	England National Landscapes	<p>There is one National Landscape within the study area.</p> <p>Suffolk Coast and Heaths is located across the entire coastline of the study area.</p>	A	<p>While underground onshore cables are less visually prominent compared to overhead lines, the construction and maintenance of landfall infrastructure can still have visual impacts on the surrounding area.</p> <p>The most suitable route to be identified for landfall infrastructure would need to consider existing coastal land use and environmental sensitivities and should explore opportunities to co-locate cables with existing coastal infrastructure corridors,</p>	A

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	Ranking with Mitigation
				<p>such as roadways and utility corridors, to minimise the need for additional land acquisition or disruption.</p> <p>Consideration should be given to equipment placement, surface installations, and landscaping in order to minimise visual impacts. An appropriate landscaping strategy should be implemented, such as the planting of trees, shrubs, or other vegetation, to visually integrate infrastructure elements, such as landfall installations, into the surrounding environment.</p> <p>During operation, depending on the location, there may be periodic vegetation management activities, such as tree trimming or clearing around access points, to ensure the integrity and accessibility of the underground cables. These activities may have temporary visual impacts.</p> <p>An amber BRAG has been assigned as this is considered to be a moderately constrained area, although there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	
Heritage Coasts	England Heritage Coasts	Suffolk Heritage Coast is located across the entire coastline of the study area.	A	<p>The central sector of this study area is moderately constrained by Suffolk Heritage Coast.</p> <p>While underground cables are less visually prominent compared to overhead lines, the construction and maintenance of landfall infrastructure can still have visual impacts on the surrounding area.</p> <p>The most suitable location for landfall infrastructure should consider existing land use and environmental sensitivities, and also will explore opportunities to co-locate cables with existing infrastructure corridors, such as roadways and utility corridors, to minimise the need for additional land acquisition or disruption.</p> <p>Consideration should be given to equipment placement, surface installations, and landscaping in order to minimise visual impacts.</p>	A

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	Ranking with Mitigation
				<p>An appropriate landscaping strategy should be implemented, such as the planting of trees, shrubs, or other vegetation, to visually integrate infrastructure elements, such as landfall installations, into the surrounding environment.</p> <p>During operation, depending on the location, there may be periodic vegetation management activities, such as tree trimming or clearing around access points, to ensure the integrity and accessibility of the underground cables. These activities may have temporary visual impacts.</p> <p>An amber BRAG rating has been assigned as this is considered to be a moderately constrained area, although there are opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	
National Trails	England National Trails	There are no National Trails within the study area.	N/A	N/A	N/A
<b>Historic Environment (Community)</b>					
World Heritage Sites	UK World Heritage Sites	There are no World Heritage Sites within the study area.	N/A	N/A	N/A
Scheduled Monuments	UK Scheduled Monuments	Within the study area there are approximately 14 Scheduled Monuments.	A	<p>Cable landfall points have the potential to be constrained by Scheduled Monuments due to the risk construction works may have upon the feature and/or associated archaeological features.</p> <p>It is considered that there are opportunities to mitigate risks to individual Scheduled Monuments in the study area through the routing and siting process, including implementation of buffer zones.</p> <p>The areas surrounding the Scheduled Monuments may also require mitigation when carrying out groundworks, due to the</p>	G

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	Ranking with Mitigation
				<p>potential presence of undiscovered associated features (i.e., archaeological remains). Consultation with Historic England would need to be required to determine the most appropriate mitigation.</p> <p>It may be possible to avoid direct risks to Scheduled Monuments, but due to their distribution along the coastline in the study area, indirect risks may be more difficult to avoid.</p> <p>As a result of the opportunities for avoidance of this constraint in the study area and the possibility of mitigating any risks, a green BRAG rating has been applied.</p>	
Listed Buildings	UK listed buildings (Grade I, II* and II listed buildings)	There are an extensive number of Listed Buildings throughout the north and south sections of the study area, including Grade I, Grade II* and Grade II.	A	<p>Cable landfall points may be moderately constrained by listed buildings due to the risk of physical loss or damage to the building, or indirectly via disturbance to the listed building's setting. There may also be risks to the curtilage (the area around, or any other building that is around and associated with a listed building).</p> <p>Whilst there is a large number of Listed Buildings within the coastal sector of the study area, opportunity exists in the next stages to reduce direct risks through the routing and siting process.</p> <p>Works and transport routes need to be considered in terms of their proximity to listed buildings near the highway (e.g., accidental damage risk from HGVs in narrow lanes or other restricted areas) or groundworks (i.e., if any vibration generating works are close enough to cause damage to buildings).</p> <p>A green BRAG has been assigned as although this is considered to be a moderately constrained area, there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	G

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	Ranking with Mitigation
Registered Parks and Gardens	Registered Parks and Gardens	There are no Registered Parks and Gardens within the study area.	N/A	N/A	N/A
Wreck locations	UK wreck locations	There are multiple wreck locations in the east offshore section of the study area.	A	It is important that the proposed route avoids disturbing known or suspected wrecks, especially where there might be caches of unexploded ordnance. There are some wrecks within the study area and requirement for avoidance of this constraint through routing and potential further investigations should be possible, a green BRAG rating has been applied.	G
Protected wrecks	England protected wrecks	Dunwich Bank protected Wreck Site is within the study area.	G	Given the individual protected wreck site, through careful design and construction planning, the site is not considered to constrain the development of the option. As a result of the low-density distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.	G
Ship Hulk	Other obstructions (ship hulk)	There are no ship hulks recorded within the study area	N/A	N/A	N/A
Registered Battlefields	England Registered Battlefields	There are no Registered Battlefields within the study area.	N/A	N/A	N/A
<b>Noise (Community)</b>					
Major Settlements	UK Major Urban Settlements	The land / environment within the study area is rural. There are no major urban settlements.	N/A	N/A	N/A

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	Ranking with Mitigation
Small Scale Settlements	UK Small Scale Urban Settlements	There are many small-scale settlements within the study area.	A	<p>There is potential for the construction of cable landfall points to generate noise during construction, which could affect the small settlements.</p> <p>It is considered that any potential construction and noise impacts could be effectively controlled through appropriate routing and the use of best practice mitigation measures such as a CEMP. Operational noise would also require further consideration at the next stage of the option development process.</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.</p>	G
<b>Socio-Economics (Community)</b>					
Major Settlements	UK Major Urban Settlements (Socio-Economics)	There are no Major Urban Settlements located within the study area.	N/A	N/A	N/A
Small Scale Settlements	UK Small Scale Urban Settlements	There are many small scale settlements within the study area.	A	<p>There is potential for the construction of landfall points to generate noise during construction, and operation that would affect residents of built up areas.</p> <p>Owing to the small area covered by settlements it is considered that any potential construction and noise impacts could be effectively controlled through appropriate routing and the use of best practice mitigation measures such as a Construction Environmental Management Plan. Operational noise would also require further consideration at the next stage of the option development process.</p>	G



Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	Ranking with Mitigation
				As a result of the distribution and potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.	
National Trust Land	National Trust Open Land and Limited Access Land	There are several areas of National Trust Land within this study area which include Dunwich Common, Land at Mount Pleasant Farm and Bridge Farm Cottage.	A	<p>There is potential for these sites to constrain development of this option due to the potential for direct and indirect risks, such as loss of land.</p> <p>Opportunity exists in the next stages to mitigate risks through the routing process and therefore the presence of National Trust Land is not considered a large constraint to the option. There may be a risk to setting and from temporary construction disturbance depending upon the location of the route, which should be carefully considered.</p> <p>As a result of the low-density distribution and potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	G
RYA sailing and racing areas	-	<p>There are four Sailing/Yacht Clubs locations in the north and west sections of the study area.</p> <ul style="list-style-type: none"> <li>- Southwold Sailing Club</li> <li>- Harwich Area Sailing Association</li> <li>- Aldeburgh Yacht Club</li> <li>- Slaughden Sailing Club</li> </ul> <p>The AIS Intensity is low/medium through study area.</p>	G	<p>Construction activities may temporarily affect sailing activities, particularly in coastal areas near cable landing points (e.g. higher intensity inshore recreational/local club sailing and racing) but also offshore installation areas where there may be lower density sailing and racing. Limited access to certain areas may affect the community, sailing activities and associated tourism.</p> <p>Construction and operational maintenance activities should be conducted with the aim of avoiding RYA sailing and racing areas and also providing appropriate notice to mariners and exclusion zones. The RYA's Coastal Atlas would need to be used to inform the detailed routing.</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.</p>	G

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	Ranking with Mitigation
Bathing waters	-	Southwold The Pier and Southwold The Denes bathing waters are within the northern part of the study area.	A	Construction activities may temporarily disrupt the daily life of local communities, particularly in coastal areas near cable landing points. Limited access to certain areas and potential public perception of changes to bathing water appearance (e.g., through suspension of sediments and appearance of surface foams/scum rather than affecting bathing water quality through release of faecal indicator organisms) during construction may reduce bathing activities and tourism. Bathing waters may be avoided during the detailed routing stage and mitigation measures implemented through reducing sediment disturbance. As a result of the distribution and potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.	A
Shellfish waters	-	There are no shellfish areas within the study area.	N/A	N/A	N/A
Fishing activity	UK Fishing activity – Areas of high intensity fishing effort	The Fishing Effort within the study area: <ul style="list-style-type: none"> <li>- demersal species – Low,</li> <li>- pelagic species – Lowest/Low,</li> <li>- shrimp trawlers – none,</li> <li>- static gears – High/Highest,</li> <li>- beam trawl – Low.</li> </ul> International Fishing Effort of North Sea beam trawl (1995) within the study area is Medium.	G	Consideration should be given to engage with local fishing communities and relevant stakeholders during the planning and design phases to understand their concerns and identify measures to minimise impacts. Compensation measures to mitigate economic losses should be provided. There is a need to establish communication channels to coordinate with fishers and ensure their safety and access to fishing areas during maintenance operations. As a result of these best practice mitigation measures, a green BRAG rating has been applied.	G

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	Ranking with Mitigation
Marine Fish Farms	UK Seawater Finfish Farms	UK marine finfish farms are located primarily in Scotland and the west coast.	N/A	N/A	N/A

## 3.2. EACN Landfall Study Area

### 3.2.1. Reinforcement Details

Reinforcement type (if known)	Reinforcement Length (if known)
Landfall infrastructure	N/A
Technology assumptions	
This reinforcement includes landfall infrastructure, to a proposed site named EACN.	

### 3.2.2. Environmental Summary

BRAG rating  
with mitigation G  
measures:

The study area includes several environmental constraints, including international and national designations.

The main area of constraint where several environmental designations are densely located, or overlap is within the north-east section of the study area. In these areas there are several designations including:

- SPA,
- SAC,
- SSSIs,
- Ramsar site,
- NNR
- IBA.

To the north-east, considering that there are a number of environmental constraints around the Hamford water coastline and there are a variety of habitats and species designated, there are some relatively limited potential landfall points. There is potential however to avoid these environmental constraints, by landfalling at a location to the south of Hamford Water. Those locations which are least constrained are in Walton-on-the-Naze and Frinton-on-Sea, which are located in the south-eastern part of the study area as shown on the constraints plan.

As explained in Section 1.2.2 (Study Area Environmental and Community Summary BRAG Ratings), the following factors have been considered in determining an overall Environmental BRAG rating for this Study Area.

Table 2.2.2: Overall Environmental BRAG rating for the EACN Landfall Study Area.

<b>Scope of works</b>	This reinforcement includes landfall infrastructure, to a proposed site named EACN that will require some physical changes to the environment and as such, will therefore be affected by the constraints described in the constraints table in Section 2.2.4. This is reflected in the BRAG ratings.
<b>Number and area of constraints</b>	Within the study area there are 9 different environmental constraint types present. As noted above, the most constrained area is within the

	north-east section of the study area, where environmental constraints are densely located, or overlap.
<b>BRAG ratings of constraints</b>	<p>Within the study area there are 9 environmental constraint types present. Of these, zero have a rating of red under the HND methodology after mitigation, zero have a rating of amber after mitigation and nine have a rating of green after mitigation.</p> <p>The nine green rated constraints include:</p> <ul style="list-style-type: none"> <li>• SACs</li> <li>• SPAs</li> <li>• Ramsar Sites</li> <li>• SSSIs</li> <li>• NNRs</li> <li>• Ancient Woodland</li> <li>• IBAs</li> <li>• UK Harbour Seals</li> <li>• SCANS 3</li> </ul>

As shown on the constraints plan, the most constrained area is within the north-eastern section of the study area. However, all of the constraints can be avoided through detailed design and rerouting.

An overall green BRAG rating has been assigned after mitigation measures as although the cumulation of the environmental receptors means that the north-east of the study area is moderately constrained, there are opportunities to mitigate risks through the selective placement of the cable landfall points to avoid or minimise impacts on sensitive habitats, taking into account ecological connectivity (the ability for species to move freely) and the preservation of important biodiversity areas.

### 3.2.3. Community Summary

BRAG rating  
with mitigation G  
measures:

There are several community constraints in the study area, particularly relating to landscape, historic assets, and fishing areas.

There is one National Landscape within the study area. The small northern sector of the study area is moderately constrained by Suffolk Coast and Heaths, although the extent does not severely constrain the project and there is the opportunity for avoidance through the siting process.

There are several constraints in the north-east section of the study area, including registered parks and gardens, listed buildings, scheduled monuments and an area designated as shellfish waters: Walton Backwaters in the north-east of the study area. Therefore, these are likely to affect the potential landfall point locations.

Also, additional offshore community constraints such as RYA sailing and racing areas, bathing waters and fishing activity (areas of high intensity fishing effort) would need selective placement and compensation measures. The construction may temporarily disrupt the daily

life of local communities and maritime activities. Consideration should be given to engage with local communities/ fishing communities and relevant stakeholders during the planning and design phases to understand their concerns and identify measures to minimise impacts. Compensation measures to mitigate economic losses may be considered.

The study area is mostly natural/rural and less densely populated. The urban settlements of Walton-On-The-Naze and Frinton-On-Sea are located in the eastern section of the study area. Overall, landfall points around these urban areas appear to have the least constraints if mitigation can be applied and existing infrastructure utilised.

As explained in Section 1.2.2 (Study Area Environmental and Community Summary BRAG Ratings), the following factors have been considered in determining an overall Community BRAG rating for this Study Area.

Table 2.2.3: Overall Community BRAG rating for the EACN Landfall Study Area.

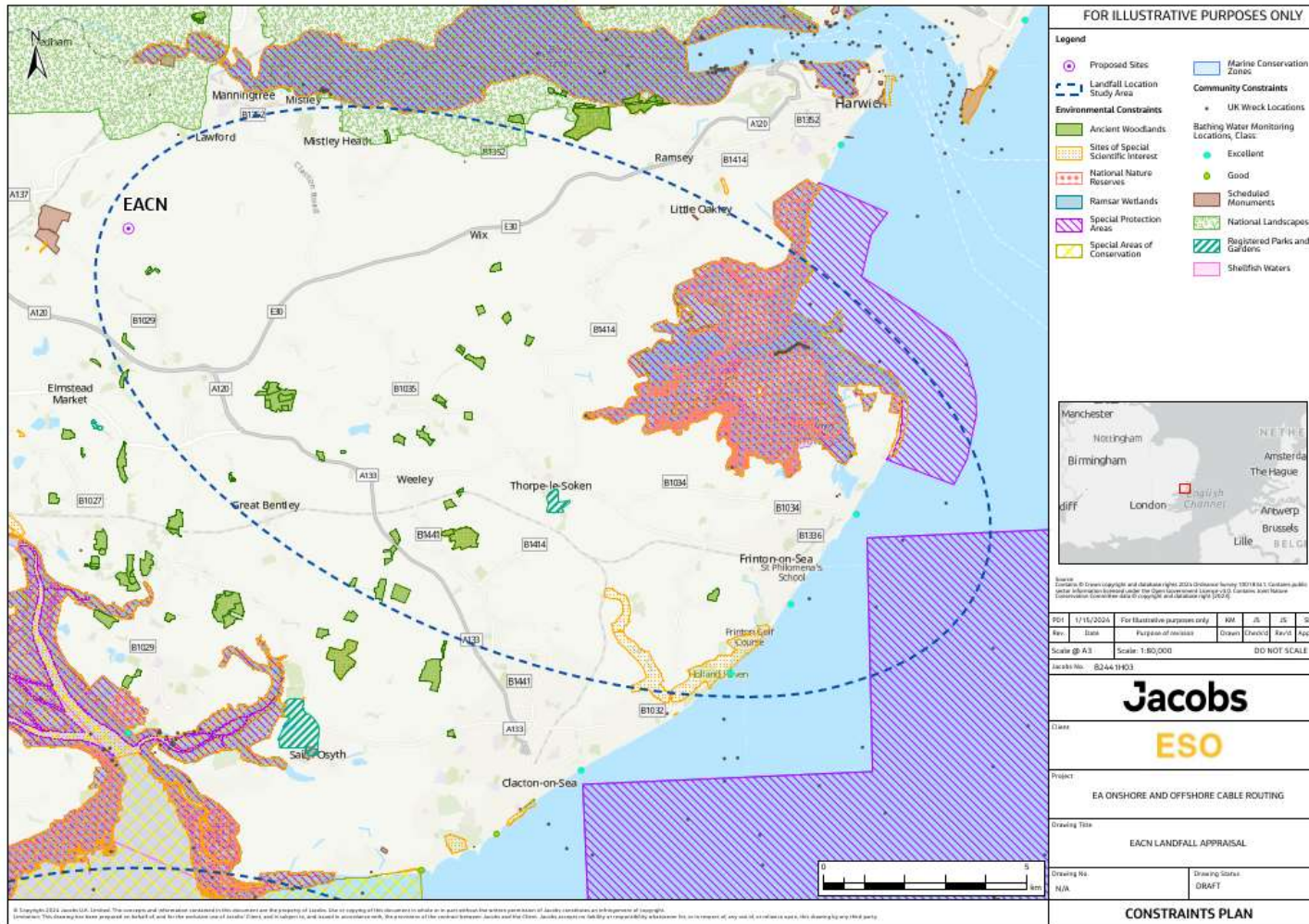
<b>Scope of works</b>	This reinforcement includes landfall infrastructure, to a proposed site named EACN that will require some physical changes to the environment and as such, will therefore be affected by the constraints described in the constraints table in Section 2.2.4. This is reflected in the BRAG ratings.
<b>Number and area of constraints</b>	Within the study area there are 11 different community constraint types present. As noted above, the most constrained area is within the north-east section of the study area, where constraints are more densely located, or overlap.
<b>BRAG ratings of constraints</b>	<p>Within the study area there are 11 community constraint types present. Of these, zero have a rating of red under the HND methodology after mitigation, zero has a rating of amber after mitigation and eleven have a rating of green after mitigation.</p> <p>The eleven green rated constraints include:</p> <ul style="list-style-type: none"> <li>• Wreck Locations</li> <li>• National Landscapes</li> <li>• Scheduled Monuments</li> <li>• Listed Buildings</li> <li>• Registered Parks and Gardens</li> <li>• Small Scale Settlements (Noise)</li> <li>• Small Scale Settlements (Socio-Economics)</li> <li>• RYA Sailing and Racing Areas</li> <li>• Bathing Waters</li> <li>• Shellfish Waters</li> <li>• Fishing Activity</li> </ul>

A green BRAG rating has been assigned after mitigation measures. The northeast section of this study is the most constrained, however there are opportunities for avoidance through detailed route design and construction methodology to reduce the overall impacts.

## 3.2.4. Constraints Table

The following table details the environmental and community constraints for Study Area EACN Landfall. It describes the constraints present within the study area, the potential mitigation measures to avoid or reduce risks, and a BRAG rating before and after mitigation measures have been applied.

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Constraints Plan 14: EACN Landfall Study Area, showing Nationally and Internationally Designated Sites



Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	Ranking with Mitigation
<b>Ecology (Environmental)</b>					
SACs	Onshore and offshore UK SACs	There is one SAC within the study area. Hamford Water SAC is located east of the EACN proposed substation and occupies the north-east part of the study area and is composed of individual areas.	A	<p>Due to the limited size and distribution of this SAC in the north-east part of study area, only small areas are moderately constrained. There are opportunities to avoid direct risk through the selective location of the cable landfall points.</p> <p>Consideration should be given to the location of the cable landfall points to avoid negative impacts such as habitat loss and fragmentation, soil erosion and sedimentation. Planning of landward construction activities and access routes would need to be undertaken, including the implementation of buffer zones as appropriate to avoid associated impacts e.g., relating to access roads and stockpiles. In terms of offshore/coastal effects, consideration should be given to avoiding where possible or minimising impacts on sensitive habitats where ploughs or sledges are used and during operation (e.g., through scour or repair activities requiring sections of cable to be raised if faults occur). A HRA Screening would need to be conducted in the first instance as the route may have a significant effect on the SAC.</p> <p>Owing to the limited extent of this constraint within the study area, the main mitigation would be avoidance and implementation of buffer zones, as appropriate. Due to this, a green BRAG rating has been assigned.</p>	G
cSAC	England and Scotland cSACs	There are no cSACs located within the study area.	N/A	N/A	N/A

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	Ranking with Mitigation
SPAs	Onshore and offshore UK SPAs	There are three SPAs within the study area. Outer Thames Estuary SPA occupies a small area in the eastern part of the study area. Hamford Water SPA is located east of the EACN proposed substation and occupies the north-east part of the study area. Stour and Orwell Estuaries SPA is located in a very peripheral section of the north-western part of study area; the vast majority of it is located outside the proposed study area.	A	<p>Within a small eastern section and larger north-eastern part of the study area there are SPAs which cover areas on land, bays and offshore, which are likely to moderately constrain placement of cable landfall points.</p> <p>Construction mitigation in terms of reducing noise and visual disturbance will be required if the route passes close to this constraint (up to 1 km, depending on designated bird species). Consideration should be given to wider impacts such as bird migratory routes and proximity to these. There will be opportunities to mitigate risks through various measures, such as using buffer zones, screening during construction and timing of works to avoid sensitive times such as nesting or overwintering periods.</p> <p>There may also be opportunities to mitigate risks to these SPAs through selective placement of the cable landfall points.</p> <p>Owing to the limited extent of this constraint within the study area, the main mitigation would be avoidance and implementation of buffer zones. Due to this, a green BRAG rating has been assigned.</p>	G
pSPA	England pSPAs	There are no pSPAs located in the study area.	N/A	N/A	N/A
SCIs	SCIs	There are no SCIs located within the study area.	N/A	N/A	N/A
Ramsar sites	UK Ramsar sites	There are two Ramsar sites within the study area. Hamford Water Ramsar site is located east of the EACN	A	The Hamford Water Ramsar site is located in the north-eastern section of the study area. There are opportunities to avoid any direct risk through the location of the cable landfall points to the south-west of this constraint.	G

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	Ranking with Mitigation
		<p>proposed substation and occupies the north-east part of the study area.</p> <p>Stour and Orwell Estuaries Ramsar site is located in a very peripheral section of the north-western part of study area; the vast majority of it is located outside the proposed study area.</p>		<p>Consideration should be given to the location of the cable landfall points to avoid negative impacts during construction in terms of reduction of noise and visual disturbance (e.g., through screening) if the route passes close to this constraint (up to 1 km, dependent on bird species) or associated bird migratory and foraging routes.</p> <p>Planning of construction activities and access routes would need to be undertaken, including the implementation of buffer zones as appropriate to avoid associated impacts e.g., relating to access roads and stockpiles.</p> <p>Owing to the limited extent of this constraint within the study area, the main mitigation would be avoidance and implementation of buffer zones, as appropriate. Due to this, a green BRAG rating has been assigned.</p>	
Proposed Ramsar sites	UK Proposed Ramsar sites	There are no Proposed Ramsar sites located within the study area.	N/A	N/A	N/A
SSSIs	UK SSSIs	There are six SSSIs located within the study area. Hamford Water SSSI is located east of the EACN proposed substation and occupies the north-east part of the study area. Weeleyhall Wood SSSI, Holland Haven Marshes SSSI and Holland On Sea Cliff SSSI are located in the southern section of the study area. The Naze SSSI is located in a very small part of	A	<p>There are six SSSIs distributed throughout the study area, with the most constrained area being the north-eastern section where Hamford Water SSSI covers large areas of land, bays and offshore. There are opportunities to avoid direct risk through the selective location of the cable landfall points to the south-west of Hamford Water SSSI and north of the Holland's SSSIs.</p> <p>Mitigation for these SSSIs must consider selective placement and buffer zones to minimise any disruption to these sensitive areas.</p>	G

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	Ranking with Mitigation
		the eastern edge of study area and Stour Estuary SSSI is located in a very peripheral section of the north-western part of study area.		As there are potential opportunities for avoidance of this constraint through selective placement, a green BRAG rating has been applied.	
NNRs	UK NNRs	There is one NNR within the study area. Hamford Water NNR is located east of the EACN proposed substation and occupies the north-east part of the study area.	A	The only NNR, Hamford Water NNR, is located within the north-east section of the study area and covers a large area of land and bays. Therefore, it is necessary to mitigate risks through detailed routing and siting. Planning of construction activities and access routes should be undertaken, including the implementation of buffer zones as appropriate to avoid impacts relating to access roads. As a result of the potential opportunities for avoidance of this constraint through selective placement, a green BRAG rating has been applied.	G
Biosphere Reserves	UK Biosphere Reserves	There are no Biosphere Reserves within the study area.	N/A	N/A	N/A
MCZs	UK MCZs	There are no Marine Conservation Zones within the study area.	N/A	N/A	N/A
HPMA	Digitised from HPMA consultation documents	There are no HPMA within the study area.	N/A	N/A	N/A
Ancient Woodlands	UK Ancient Woodlands	There are several areas of ancient woodland located mostly in the west half of the study area. Hollandhall Wood	A	There are limited sections of the study area that are constrained by Ancient Woodland, as these are located inland from the coast. Opportunity exists in the next stage to mitigate risks through the routing process so that the	G

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	Ranking with Mitigation
		ancient woodland is the only one located in the eastern section of study area close to the coastline.		<p>cable landfall points do not cross areas of Ancient Woodland.</p> <p>Any risks during construction may be controlled through appropriate construction environmental management practices, for example in relation to the siting of access routes and implementing buffer zones around ancient woodland areas.</p> <p>A green BRAG has been assigned as there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	
Important Bird Areas	UK Important Bird Areas	<p>There are two IBAs within the study area. Hamford Water IBA is located east of the EACN proposed substation and occupies the north-east part of the study area.</p> <p>Stour and Orwell Estuaries IBA is located in a very peripheral section of the north-western part of study area. The vast majority of the IBA is located outside the study area.</p>	G	<p>There is one large part (Hamford Water IBA) of this study area that will need to be avoided and therefore represents a constraint to the north-east section of the study area. Consideration should be given to wider impacts such as during construction of the cable landfall points in terms of interaction risk with landfall infrastructure or vessels (implement interaction risk mitigation measures, such as effective deterrent systems, monitoring, and operational procedures, to minimise the potential for bird interactions).</p> <p>Construction activities may result in the direct removal or destruction of bird nests. Displacement from nesting sites can disrupt breeding patterns and affect reproductive success. Consideration should be given to conducting nesting surveys prior to construction to identify active nests and breeding sites. Measures would need to be implemented to avoid and create buffer zones around active nests, ensuring that appropriate timing and methods are used to minimise disturbance. Alternative</p>	G

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	Ranking with Mitigation
				<p>nesting structures or nearby suitable habitats should be installed or created to compensate for any loss of nesting sites.</p> <p>Construction activities should be scheduled to avoid critical periods for breeding, nesting and migration of sensitive species. Foraging areas would need to also be avoided through the detailed routing process.</p> <p>A green BRAG has been assigned as although this is considered to be a highly constrained area, there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	
Royal Society for the Protection of Birds (RSPB) Reserves	UK RSPB Reserves	There are no RSPB Reserves within the study area.	N/A	N/A	N/A
Annex 1 Reefs outside designated areas	UK Annex 1 Reefs	There are no Annex 1 Reefs polygon or point records outside the designated areas.	N/A	N/A	N/A
Annex 1 Sandbanks outside designated areas	UK Annex 1 Sandbanks	There are Annex 1 Sandbanks which are slightly covered by seawater all of the time polygon or point records outside the designated areas.	N/A	N/A	N/A
Annex 1 Submarine Structures outside	UK Annex 1 Submarine Structures	There are no Annex 1 Submarine structures made by leaking gas polygon or	N/A	N/A	N/A

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	Ranking with Mitigation
designated areas		point records outside the designated areas.			
Annex 1 Saltmarsh outside designated areas	UK Annex 1 Saltmarsh	There are no Annex 1 Saltmarsh polygon or point records outside the designated areas.	N/A	N/A	N/A
UK Grey Seals	UK Grey Seal -High density	There are no Grey Seal Breeding Colonies within the study area. There are no identified locations of grey seal occurrence within the study area.	N/A	N/A	N/A
UK Harbour Seals	UK Harbour Seal – High density	<p>Within the study area there are:</p> <ul style="list-style-type: none"> <li>- 3 locations with between 1-10 harbour seal count</li> <li>- 1 location with between 11 – 20 harbour seal count</li> </ul>	G	<p>Consideration should be given to the location of the cable landfall points to avoid negative impacts such as noise and visual disturbance, alteration of foraging and haul out habitat, displacement of individuals and interaction risk. For noise and vibration impacts this would need to include implementing best practice such as the use of marine mammal observers and noise reduction measures. Interaction risk mitigation measures, such as effective deterrent systems, monitoring and operational procedures will reduce the potential for effects on seals. A green BRAG has been assigned, as there may be opportunities to mitigate risks through selective placement of the cable landfall points to avoid or mitigate the risks associated with this constraint and detailed routing and construction best practices.</p>	G

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	Ranking with Mitigation
SCANS 3 (marine mammal densities)	Marine mammal densities	Pilot whale – Low density (0.0-0.1 animals per km <sup>2</sup> ) Minke whale – Low density (0.0-0.01 animals per km <sup>2</sup> ) Harbour porpoise – Medium/High density (0.25-0.5 animals per km <sup>2</sup> ) Fin whale – Low density (0.0-0.025 animals per km <sup>2</sup> ) Common dolphin – Low density (0.0-0.07 animals per km <sup>2</sup> ) Common and or striped dolphin – Low density (0.0-0.04 animals per km <sup>2</sup> ) Bottlenose dolphin – Low density (0.0-0.025 animals per km <sup>2</sup> ) Beaked whales – Low density (0.0-0.1 animals per km <sup>2</sup> ) Striped dolphin – – Low density (0.0-0.05 animals per km <sup>2</sup> ) White beaked dolphin – Low density (0.0-0.05 animals per km <sup>2</sup> )	G	Consideration should be given to the location of the cable landfall points to avoid negative impacts on foraging areas such as seabed disturbance, alteration of substrate cover and composition, hydrodynamic changes, as well as disturbance, displacement and interaction risk for cetaceans. For noise and vibration impacts this would need to include implementing construction and operational maintenance best practice such as the use of marine mammal observers and noise reduction measures. Interaction risk mitigation measures, such as effective deterrent systems, monitoring and operational procedures will reduce the potential for effects on cetaceans. A green BRAG has therefore been assigned as there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.	G
<b>Geology and Soils (Environmental)</b>					



Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	Ranking with Mitigation
Geoparks	UK Geoparks	There are no UNESCO Global Geoparks within the study area.	N/A	N/A	N/A
<b>Landscape and Visual (Community)</b>					
National Parks	UK National Parks	There are no National Parks within this study area.	N/A	N/A	N/A
National Landscapes	England National Landscapes	There is one National Landscape within the study area. Suffolk Coast and Heaths is located in a small northern section of the study area.	A	<p>The small northern sector of this study area is moderately constrained by Suffolk Coast and Heaths.</p> <p>While underground cables are less visually prominent compared to overhead lines, the construction and maintenance landfall infrastructure can still have visual impacts on the surrounding area.</p> <p>The most suitable location for landfall infrastructure will consider existing land use and environmental sensitivities, and opportunities to co-locate cables with existing infrastructure corridors, such as roadways and utility corridors, to minimise the need for additional land acquisition or disruption.</p> <p>There should be implementation of appropriate landscaping strategies, such as the planting of trees, shrubs, or other vegetation, to visually integrate infrastructure elements, such landfall installations, into the surrounding environment.</p> <p>A green BRAG has been assigned as this is considered to be a small moderately constrained area and there are many opportunities to mitigate the risks associated with this constraint, with detailed selective placement and construction best practices.</p>	G

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	Ranking with Mitigation
Heritage Coasts	England Heritage Coasts	There are no Heritage Coasts within the study area.	N/A	N/A	N/A
National Trails	England National Trails	There are no National Trails within the study area.	N/A	N/A	N/A
<b>Historic Environment (Community)</b>					
World Heritage Sites	UK World Heritage Sites	There are no World Heritage Sites within the study area.	N/A	N/A	N/A
Scheduled Monuments	UK Scheduled Monuments	Within the study area there are several Scheduled Monuments located throughout the study area.	A	<p>Cable landfall points development has the potential to be constrained by Scheduled Monuments due to the risk construction works may have upon the feature and/or associated archaeological features.</p> <p>It is considered that there are opportunities to mitigate risks to the individual Scheduled Monuments in the study area through the siting process, including buffer zones.</p> <p>The areas surrounding the Scheduled Monuments may also need mitigation applying when carrying out groundworks, as undiscovered associated features (i.e., archaeological remains) may also be present.</p> <p>Consultation with Historic England might be required to determine the most appropriate mitigation.</p> <p>As a result of the opportunities for avoidance of this constraint in the study area, a green BRAG rating has been applied.</p>	G
Listed Buildings	UK listed buildings (Grade I, II* and II listed buildings)	There are numerous Listed Buildings throughout entire study area, including Grade I, Grade II*, and Grade II.	A	<p>Cable landfall points may be moderately constrained by listed buildings due to the risk of physical loss or damage to the building, or indirectly via disturbance to the listed building's setting. There may also be risks to the curtilage</p>	G

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	Ranking with Mitigation
				<p>(the area around, or any other building that is around and associated with the listed building).</p> <p>Whilst there is a large number of Listed Buildings within the entire study area, in the coastal sector, within the settlements of Walton-on-the-Naze and Frinton-on-Sea, there are only a dozen Listed Buildings identified. Opportunity therefore exists in the next stages to reduce direct risks through the siting process.</p> <p>Works and transport routes need to be considered in terms of their proximity to listed buildings near the highway (e.g., accidental damage risk from HGVs in narrow lanes or other restricted areas) or groundworks (i.e., if any vibration generating works are close enough to cause damage to buildings).</p> <p>A green BRAG has been assigned as although this is considered to be a moderately constrained area, there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	
Registered Parks and Gardens	Registered Parks and Gardens	Within the study area there is one Registered Park and Garden located in the central sector. Thorpe Hall, Grade II, is a small area located near Thorpe-le-Soken.	G	<p>Given the limited small area covered by this individual Registered Park and Garden, through careful design and construction planning, avoiding/ mitigating direct and indirect adverse risks the site would be possible and is not therefore considered to constrain the development of the option.</p> <p>As a result of the small areas covered and the potential opportunities for avoidance of this constraint through routing, a green BRAG rating has been applied.</p>	G

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	Ranking with Mitigation
Wreck locations	UK wreck locations	There are several wreck locations in the east section of the study area.	A	It is important that the proposed route avoids disturbing known or suspected wrecks, especially where there might be caches of unexploded ordnance. There are some wrecks within the study area and requirement for avoidance of this constraint through routing and potential further investigations should be possible, a green BRAG rating has been applied.	G
Protected wrecks	England protected wrecks	There are no protected wreck sites within the study area.	N/A	N/A	N/A
Ship Hulk	Other obstructions (ship hulk)	There are no ship hulks recorded within the study area	N/A	N/A	N/A
Registered Battlefields	England Registered Battlefields	There are no Registered Battlefields within the study area.	N/A	N/A	N/A
<b>Noise (Community)</b>					
Major Settlements	UK Major Urban Settlements	There are no major urban settlements located within the study area. The small eastern part of the study area is offshore. The land within the western and central sections of study area is rural. There are the settlements of Walton-On-The-Naze and Frinton-On-Sea located within the study area, along the coast in the eastern sector.	N/A	N/A	N/A

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	Ranking with Mitigation
Small Scale Settlements	UK Small Scale Urban Settlements	There are many small-scale settlements within the study area.	A	<p>There is potential for the construction of cable landfall points to generate noise during construction, and operation that would affect residents, including within several Noise Important Areas (NIA).</p> <p>As the settlements only cover a small area of the coastal part of the study area, it is considered that any potential construction and noise impacts could be effectively controlled through appropriate routing and the use of best practice mitigation measures such as a CEMP during construction. Operational noise would also require further consideration at the next stage of the option development process.</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.</p>	G
<b>Socio-Economics (Community)</b>					
Major Settlements	UK Major Urban Settlements (Socio-Economics)	<p>There are no major urban settlements located within the study area.</p> <p>The small eastern part of the study area is offshore. The land within the western and central sections of study area is rural. There are the settlements of Walton-On-The-Naze and Frinton-On-Sea located within the study area, along the coast in the eastern sector.</p>	N/A	N/A	N/A

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	Ranking with Mitigation
Small Scale Settlements	UK Small Scale Urban Settlements	There are many small-scale settlements within the study area.	A	<p>There is potential for the construction of cable landfall points to impact residents as a result of changes to visual amenity. Constraints to the positioning of landfall infrastructure are associated with the socio-economic aspects of these settlements.</p> <p>Mitigation should carefully consider the tourism and recreation socio-economic sensitivities of the study area. This will be applicable in the construction and operational stages.</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.</p>	G
National Trust Land	National Trust Open Land and Limited Access Land	There are no areas of National Trust Land within this study area.	N/A	N/A	N/A
RYA sailing and racing areas	RYA sailing and racing areas	There are 3 Sailing/Yacht Clubs in the east section of the study area. The AIS Intensity is low/medium throughout study area.	G	<p>Construction activities may temporarily affect sailing activities, particularly in coastal areas near cable landing points (e.g. higher intensity inshore local club sailing and racing). Limited access to certain areas may affect the community, sailing activities and associated tourism. Construction and operational maintenance activities should be conducted with the aim of avoiding RYA sailing and racing areas and also by providing appropriate notice to mariners and exclusion zones. The RYA's Coastal Atlas would need to be used to inform the detailed routing.</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.</p>	G

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	Ranking with Mitigation
Bathing waters	Bathing waters	There are 3 Bathing water locations within the study area. Concentrated in the eastern coastal part of the study area.	G	Construction activities may temporarily disrupt the daily life of local communities, particularly in coastal areas near cable landing points. Limited access to certain areas and potential public perception of changes to bathing water appearance (e.g., through suspension of sediments and appearance of surface foams/scum rather than affecting bathing water quality through release of faecal indicator organisms) during construction may reduce bathing activities and tourism. Bathing waters may be avoided during the detailed routing stage and mitigation measures implemented through reducing sediment disturbance. As a result of the distribution and potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.	G
Shellfish waters	Shellfish waters	There is one shellfish water location within the study area: Walton Backwaters.	G	The east of the study area has the greatest constraint, owing to the location of the Walton Backwaters Shellfish Water. Landfall construction may damage shellfish beds, reduce water quality through suspended sediment release and interfere with harvesting activities. As a result of the distribution and potential opportunities for avoidance of this constraint through sitting to the south and best practice mitigation measures implemented to reduce the footprint and sediment disturbance, a green BRAG rating has been applied.	G
Fishing activity	UK Fishing activity – Areas of high intensity fishing effort	The Fishing Effort within the study area comprises the following:	G	Consideration should be given to engaging with local fishing communities and relevant stakeholders during the planning and design phases to understand their concerns and identify measures to minimise impacts.	G

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	Ranking with Mitigation
		<ul style="list-style-type: none"> <li>- demersal species – Medium,</li> <li>- pelagic species – Low,</li> <li>- shrimp trawlers – none,</li> <li>- static gears – High,</li> <li>- beam trawl – Low.</li> </ul> <p>International Fishing Effort of North Sea beam trawl (1995) within the study area is Low/Medium.</p>		<p>Compensation measures to mitigate economic losses should be provided.</p> <p>There is a need to establish communication channels to coordinate with fishers and ensure their safety and access to fishing areas during maintenance operations.</p> <p>As a result of potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.</p>	
Marine Fish Farms	UK Seawater Finfish Farms	UK marine finfish farms are located primarily in Scotland and the west coast.	N/A	N/A	N/A



### 3.3. Bradwell Landfall Study Area

#### 3.3.1. Reinforcement Details

Reinforcement type (if known)	Reinforcement Length (if known)
Landfall infrastructure	N/A
Technology assumptions	
This reinforcement includes landfall infrastructure, to an existing site at Bradwell.	

#### 3.3.2. Environmental Summary

BRAG rating  
with  
mitigation:

R

The study area includes multiple environmental constraints, including national and international designations.

Key constraints include the presence of:

- SAC,
- SPAs,
- Ramsar Sites,
- SSSIs,
- NNRs
- Marine Conservation Zone (MCZ).

The main area of constraint is across the central part of the study area along the landfall section. Here, a MCZ presents a substantial constraint and in addition, an SAC and a number of SPAs, Ramsar Sites, SSSIs and NNRs present moderate constraints to the development of this option after mitigation measures have been considered. Consideration should be given to the location of the cable landfall points to avoid negative impacts such as habitat loss and fragmentation, soil erosion and sedimentation.

There is also a large stretch of coastal IBA associated with this study area that would need to be considered and therefore represents a constraint to the majority of the study area's landfall section.

Owing to the number of environmental constraints around the coastline and the variety of the habitats and species designated, there are only limited opportunities for potential landfall points.

During construction it would be necessary to implement:

- Best practice construction measures with considerably planned access routes
- Buffer zones.

However, the broad distribution of these constraints means that opportunities for avoidance through selective placement planning may be limited and therefore subsequent design stages should consider the mitigation hierarchy further to mitigate risk.

As explained in Section 1.2.2 (Study Area Environmental and Community Summary BRAG Ratings), the following factors have been considered in determining an overall Environmental BRAG rating for this Study Area.

Table 2.3.2: Overall Environmental BRAG rating for the Bradwell Landfall Study Area.

<b>Scope of works</b>	This reinforcement includes landfall infrastructure, to an existing site at Bradwell that will require some physical changes to the environment and as such, will therefore be affected by the constraints described in the constraints table in Section 2.3.4. This is reflected in the BRAG ratings.
<b>Number and area of constraints</b>	Within the study area there are 9 different environmental constraint types present. As noted above, the most constrained area is across the central part of the study area along the landfall section.
<b>BRAG ratings of constraints</b>	<p>Within the study area there are 9 environmental constraint types present. Of these, one has a rating of red under the HND methodology after mitigation, five have a rating of amber after mitigation and three, a rating of green after mitigation.</p> <p>The one red rated constraints include:</p> <ul style="list-style-type: none"> <li>• MCZ</li> </ul> <p>The five amber rated constraints include:</p> <ul style="list-style-type: none"> <li>• SAC</li> <li>• SPAs</li> <li>• Ramsar Sites</li> <li>• SSSIs</li> <li>• NNRs</li> </ul> <p>The three green rated constraints include:</p> <ul style="list-style-type: none"> <li>• IBAs</li> <li>• UK Harbour Seals</li> <li>• SCANS 3</li> </ul>

As shown on the constraint plan, there are no possible opportunities to avoid all above constraints through construction design and routing. The landfall and offshore part of this study area contains multiple constraints that are densely located or overlap and making them unavoidable.

A red BRAG rating has been assigned after mitigation measures, as the cumulation of all the environmental receptors means that many sections of the study area are highly or moderately constrained, with only limited opportunity to reduce the overall impacts.

### 3.3.3. Community Summary

BRAG Rating with Mitigation measures:

A

There are several community constraints in the study area, particularly in relation to historic assets and fishing areas. These constraints include listed buildings, scheduled monuments and in addition, most of the central section of the study area is constrained by four shellfish water areas; these are likely to affect potential landfall points.

Additional offshore community constraints such as RYA sailing and racing areas and fishing activity (areas of high intensity fishing effort) would need selective placement and compensation measures. The construction may temporarily disrupt the daily life of local communities and maritime activities. Consideration should be given to engaging with local communities/ fishing communities and relevant stakeholders during the planning and design phases to understand their concerns and identify measures to minimise impacts. Compensation measures to mitigate economic losses may be considered.

As explained in Section 1.2.2 (Study Area Environmental and Community Summary BRAG Ratings), the following factors have been considered in determining an overall Community BRAG rating for this Study Area.

Table 2.3.3: Overall Community BRAG rating for the Bradwell Landfall Study Area.

<b>Scope of works</b>	This reinforcement includes landfall infrastructure, to an existing site at Bradwell that will require some physical changes to the environment and as such, will therefore be affected by the constraints described in the constraints table in Section 2.3.4. This is reflected in the BRAG ratings.
<b>Number and area of constraints</b>	Within the study area there are 8 different community constraint types present. As noted above, the most constrained area is across the central part of the study area, along the landfall section and the offshore part as seen on the constraints plan below.
<b>BRAG ratings of constraints</b>	<p>Within the study area there are 8 community constraint types present. Of these, zero have a rating of red under the HND methodology after mitigation, zero have a rating of amber after mitigation and ten have a rating of green after mitigation.</p> <p>The eight green rated constraints include:</p> <ul style="list-style-type: none"> <li>• Wreck Locations</li> <li>• Scheduled Monuments</li> <li>• Listed Buildings</li> <li>• Small Scale Settlements (Noise)</li> <li>• Small Scale Settlements (Socio-Economics)</li> <li>• RYA Sailing and Racing Areas</li> <li>• Shellfish Water</li> <li>• Fishing Activity</li> </ul>

An amber BRAG rating has been assigned after mitigation measures have been considered, due to the number and spatial distribution of these constraints across the majority of the

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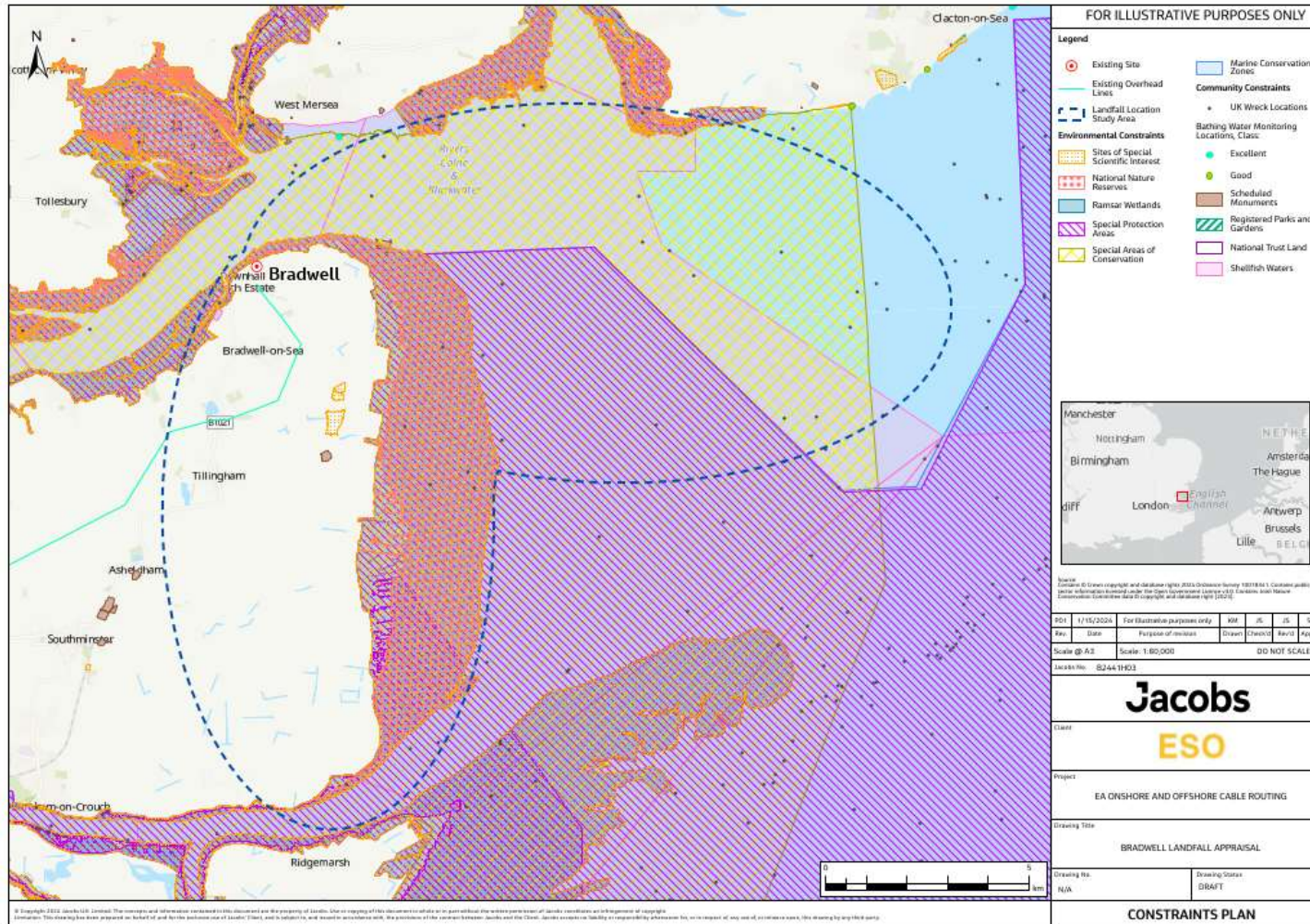
study area. Although the constraints are rated green, their cumulation together moderately constrain the landfall and offshore sections of the study area, meaning avoidance of all of them will be difficult to achieve. Although challenging however, there are opportunities for detailed route design and construction methodology to reduce the overall impacts.

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### 3.3.4. Constraints Table

The following table details the environmental and community constraints for Bradwell Landfall Study Area. It describes the constraints present within the study area, the potential mitigation measures to avoid or reduce risks, and a BRAG rating before and after mitigation has been applied.

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**Constraints Plan 15: Bradwell Landfall Study Area, showing Nationally and Internationally Designated Sites**

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
<b>Ecology (Environmental)</b>					
Special Area of Conservation (SAC)	Onshore and offshore UK SACs	Essex Estuaries SAC is located along all coastal areas of the study area.	A	<p>Essex Estuaries SAC occupy most of the study area. There are no opportunities to avoid this constraint.</p> <p>Consideration should be given to the location of the cable landfall points to avoid negative impacts such as habitat loss and fragmentation, soil erosion and sedimentation. Planning of landward construction activities and access routes would need to be undertaken, including the implementation of buffer zones as appropriate to avoid associated impacts e.g., relating to access roads and stockpiles. In terms of offshore/coastal effects, consideration should be given to avoiding or minimising impacts on sensitive seabed habitats such as chalk reefs and sandbanks from the cable installation where ploughs or sledges are used and during operation (e.g., through scour or repair activities requiring sections of cable to be raised if faults occur). A HRA Screening would need to be conducted in the first instance as the route may have a significant effect on the SAC.</p> <p>As a result of the linear nature of cables and no opportunities for avoidance of this constraint, an amber BRAG rating has been applied as this is considered to be a moderately constrained area where detailed route design and construction methodology is required.</p>	A
cSAC	England and Scotland cSACs	There are no cSACs within the study area.	N/A		N/A

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
SPAs	Onshore and offshore UK SPAs	<p>There are four SPAs located within the study area, within the coastal region.</p> <ul style="list-style-type: none"> <li>- Dengie (Mid-Essex Coast Phase 1)</li> <li>- Blackwater Estuary (Mid-Essex Coast Phase 4)</li> <li>- Colne Estuary (Mid-Essex Coast Phase 2)</li> <li>- Crouch &amp; Roach Estuaries (Mid-Essex Coast Phase 3)</li> </ul> <p>There is in addition the Outer Thames Estuary SPA (Marine Components GB).</p>	A	<p>Within most sections of the study area there are SPAs which cover areas on land, bays and offshore, which are likely to moderately constrain potential landfall points.</p> <p>Construction mitigation in terms of reducing noise and visual disturbance will be required if the route passes close to this constraint (up to 1 km, depending on designated bird species). Consideration should be given to wider impacts such as bird migratory routes and proximity to these. There will be opportunities to mitigate risks through various measures, such as using buffer zones, screening during construction and timing of works to avoid sensitive times such as nesting or overwintering periods.</p> <p>There may also be opportunities to mitigate risks to these SPAs through selective placement of the cable landfall points.</p> <p>As a result of the linear nature and limited opportunities for avoidance of this constraint, an amber BRAG rating has been applied as this is considered to be a moderately constrained area where detailed route design and construction methodology is likely to be required.</p>	A
pSPA	England and Scotland pSPAs	There are no pSPAs located in the study area.	N/A	N/A	N/A
SCIs	SCIs	There are no SCIs located within the study area.	N/A	N/A	N/A
Ramsar sites	UK Ramsar sites	<p>There are four Ramsar sites within the study area.</p> <ul style="list-style-type: none"> <li>- Dengie (Mid-Essex Coast Phase 1),</li> </ul>	A	<p>The Ramsar sites are located across an area of the northern edge and central sections of the study area.</p> <p>There are limited opportunities to mitigate risks via avoidance measures during subsequent routing stages, and as designated</p>	A

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
		<ul style="list-style-type: none"> <li>- Blackwater Estuary (Mid-Essex Coast Phase 4)</li> <li>- Colne Estuary (Mid-Essex Coast Phase 2)</li> <li>- Crouch &amp; Roach Estuaries (Mid-Essex Coast Phase 3)</li> </ul>		<p>species are mobile, effects outside of the site may also require mitigation dependent on whether they interact with associated habitats. Consideration should be given to wider impacts such as during construction in terms of reduction of noise and visual disturbance (e.g., through screening) if the route passes close to this constraint (up to 1 km, dependent on bird species) or associated bird migratory and foraging routes.</p> <p>As a result of the linear nature and limited opportunities for avoidance of this constraint, an amber BRAG rating has been applied as this is considered to be a moderately constrained area where detailed route design and construction methodology is likely to be required.</p>	
Proposed Ramsar sites	UK Proposed Ramsar sites	There are no proposed Ramsar sites within the study area.	N/A	N/A	N/A
SSSIs	UK SSSIs	<p>There are five SSSIs within the study area.</p> <ul style="list-style-type: none"> <li>- Dengie SSSI,</li> <li>- Sandbeach Meadows SSSI</li> <li>- Blackwater Estuary SSSI</li> <li>- Colne Estuary SSSI</li> <li>- Crouch and Roach Estuaries SSSI</li> </ul>	A	<p>There are five SSSIs distributed throughout the study area along the northern edge and in the central section, with the most constrained area being the central section where Dengie SSSI covers a large area of bays.</p> <p>Mitigation for the SSSIs identified must consider routing, including locations of access tracks and buffer zones more acutely to minimise disruption to sensitive areas.</p> <p>As a result of the linear nature and limited opportunities for avoidance of this constraint, an amber BRAG rating has been applied as this is considered to be a moderately constrained area where detailed route design and construction methodology is likely required.</p>	A



Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
NNRs	UK NNRs	Dengie NNR is located along the coastal sections of the study area. Small sections of Colne Estuary NNR are within the northern perimeters of the study area.	A	The majority of this study area is not constrained by an NNR, but Dengie NNR is located in the central part of the study area occupying almost the entire coastline and in addition there are small coastal sections occupied by Colne Estuary NNR in the northern perimeters of the study area. Therefore, it is necessary to mitigate risks through detailed routing and siting. Planning of construction activities and access routes would need to be undertaken, including the implementation of buffer zones as appropriate to avoid impacts relating to access roads. As a result of the dense distribution and limited opportunities for avoidance of this constraint through routing, an amber BRAG rating has been applied.	A
Biosphere Reserves	UK Biosphere Reserves	There are no Biosphere Reserves within the study area.	N/A	N/A	N/A
MCZs	UK MCZs	Blackwater, Crouch, Roach and Colne Estuaries MCZ is within the study area.	R	Blackwater, Crouch, Roach and Colne Estuaries MCZ occupies most of the study area in the central, north and east sections. There are limited opportunities for potential cable landfall locations, considering that this is a highly constrained area. Consideration should be given to the routing/location of the cable landfall points to avoid negative impacts such as seabed sedimentation, habitat disturbance, sediment suspension, alteration of substrate cover and composition and hydrodynamic changes. There may also be opportunities to mitigate risks to this MCZ through very selective placement of the cable landfall points to avoid or minimise impacts on sensitive habitats, taking into	R

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				<p>account ecological connectivity and the preservation of important biodiversity areas.</p> <p>As a result of the distribution and nature of effects, avoidance of this constraint will require considerable planning, design iterations and assessment in the following stages, nevertheless, some major settlements might still be affected by this reinforcement, therefore a red BRAG rating has been applied.</p>	
Highly Protected Marine Areas (HPMA)	Digitised from HPMA consultation documents	There are no HPMA within the study area.	N/A	N/A	N/A
Ancient Woodlands	UK Ancient Woodlands	There are no ancient woodlands located within the study area.	N/A	N/A	N/A
IBAs	UK IBAs	Mid-Essex Coast (Central Section) and Mid-Essex Coast (Northern Section) important bird areas are located within the study area.	G	<p>There is a large stretch of coastal IBA associated with this study area that will need to be avoided and therefore represents a constraint to the majority the study area's coastal infrastructure. Consideration should be given to wider impacts such as during construction of the cable landfall points in terms of interaction risk with landfall infrastructure or vessels (implement interaction risk mitigation measures, such as effective deterrent systems, monitoring, and operational procedures to minimise the potential for bird interactions).</p> <p>Construction activities may result in the direct removal or destruction of bird nests. Displacement from nesting sites can disrupt breeding patterns and affect reproductive success. Consideration should be given to conducting nesting surveys prior to construction to identify active nests and breeding sites. Measures</p>	G

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				<p>would need to be implemented to avoid and create buffer zones around active nests, ensuring that appropriate timing and methods are used to minimise disturbance. Alternative nesting structures or nearby suitable habitats should be installed or created to compensate for any loss of nesting sites.</p> <p>Construction activities should be scheduled to avoid critical periods for breeding, nesting and migration of sensitive species. Foraging areas would need to also be avoided through the detailed routing process.</p> <p>A green BRAG has been assigned as although this is considered to be a highly constrained area, there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	
RSPB Reserves	UK RSPB Reserves	There are no UK RSPB Reserves within the study area.	N/A	N/A	N/A
Annex 1 Reefs outside designated areas	UK Annex 1 Reefs	There are no Annex 1 Reefs polygon or point records outside the designated areas.	N/A	N/A	N/A
Annex 1 Sandbanks outside designated areas	UK Annex 1 Sandbanks	There are Annex 1 Sandbanks which are slightly covered by seawater all of the time polygon or point records outside the designated areas.	N/A	N/A	N/A
Annex 1 Submarine Structures outside	UK Annex 1 Submarine Structures	There are no Annex 1 Submarine structures made by leaking gas polygon or point	N/A	N/A	N/A

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
designated areas		records outside the designated areas.			
Annex 1 Saltmarsh outside designated areas	UK Annex 1 Saltmarsh	There are no Annex 1 Saltmarsh polygon or point records outside the designated areas.	N/A	N/A	N/A
UK Grey Seals	UK Grey Seal - High density	There are no Grey Seal Breeding Colonies within the study area. There are no identified locations of grey seal occurrence within the study area.	N/A	N/A	N/A
UK Harbour Seals	UK Harbour Seal – High density	<p>Within the study area, harbour seals are present in the following densities per location:</p> <ul style="list-style-type: none"> <li>- 3 locations with between 1- 10 harbour seal count</li> <li>- 1 location with between 11 – 20 harbour seal count</li> <li>- 1 location with between 21 – 40 harbour seal count</li> </ul>	G	<p>Consideration should be given to the location of the cable landfall points to avoid negative impacts such as noise and visual disturbance, alteration of foraging and haul out habitat, displacement of individuals and interaction risk.</p> <p>For noise and vibration impacts this should include implementing best practice such as the use of marine mammal observers and noise reduction measures. Interaction risk mitigation measures, such as effective deterrent systems, monitoring and operational procedures will reduce the potential for effects on seals.</p> <p>As there may be opportunities to mitigate risks through selective routing/placement of the cable landfall points to avoid or minimise impacts on associated habitats and breeding areas, a green BRAG has been assigned.</p>	G
SCANS 3 (marine)		Pilot whale – Low density (0.0-0.1 animals per km <sup>2</sup> )	G	Consideration should be given to the location of the cable landfall points to avoid negative impacts on foraging areas such as seabed	G

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
mammal densities)		<p>Minke whale – Low density (0.0-0.01 animals per km<sup>2</sup>)</p> <p>Harbour porpoise – Low density (0.25-0.5 animals per km<sup>2</sup>)</p> <p>Fin whale – Low density (0.0-0.025 animals per km<sup>2</sup>)</p> <p>Common dolphin – Low density (0.0-0.07 animals per km<sup>2</sup>)</p> <p>Common and or striped dolphin – Low density (0.0-0.04 animals per km<sup>2</sup>)</p> <p>Bottlenose dolphin – Low density (0.0-0.025 animals per km<sup>2</sup>)</p> <p>Beaked whales – Low density (0.0-0.1 animals per km<sup>2</sup>)</p> <p>Striped dolphin – – Low density (0.0-0.05 animals per km<sup>2</sup>)</p> <p>White beaked dolphin – Low density (0.0-0.05 animals per km<sup>2</sup>)</p>		<p>disturbance, alteration of substrate cover and composition, hydrodynamic changes, as well as disturbance, displacement, and interaction risk for cetaceans.</p> <p>For noise and vibration impacts this should include implementing construction and operational maintenance best practice such as the use of marine mammal observers and noise reduction measures. Interaction risk mitigation measures, such as effective deterrent systems, monitoring and operational procedures will reduce the potential for effects on cetaceans.</p> <p>A green BRAG has therefore been assigned as there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	
<b>Geology and Soils (Environmental)</b>					
Geoparks	UK Geoparks	There are no UNESCO Global Geoparks within the study area.	N/A	N/A	N/A

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
<b>Landscape and Visual (Community)</b>					
National Parks	UK National Parks	There are no National Parks within this study area.	N/A	N/A	N/A
National Landscapes	England National Landscapes	There are no National Landscape within the study area.	N/A	N/A	N/A
Heritage Coasts	England Heritage Coasts	There are no Heritage Coasts within the study area.	N/A	N/A	N/A
National Trails	England National Trails	There are no National Trails within the study area.	N/A	N/A	N/A
<b>Historic Environment (Community)</b>					
World Heritage Sites	UK World Heritage Sites	There are no World Heritage Sites within the study area.	N/A	N/A	N/A
Scheduled Monuments	UK Scheduled Monuments	Within the study area there are four Scheduled Monuments.	A	<p>Cable landfall points have the potential to be constrained by Scheduled Monuments due to the risk construction works may have upon the feature and/or associated archaeological features. It is considered that there are opportunities to mitigate risks to the individual Scheduled Monuments in the study area through the siting process, including buffer zones.</p> <p>The area surrounding the Scheduled Monuments may also need mitigation applying when carrying out groundworks, as undiscovered associated features (i.e., archaeological remains) may also be present. Consultation with Historic England might be required to determine the most appropriate mitigation.</p> <p>As a result of the opportunities for avoidance of this constraint in the study area and the possibility of mitigating any risks, a green BRAG rating has been applied.</p>	G

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
Listed Buildings	UK listed buildings (Grade I, II* and II listed buildings)	There are multiple listed buildings throughout the western section of study area, including Grade I, Grade II*, and Grade II.	A	<p>Cable landfall points may be moderately constrained by listed buildings due to the risk of physical loss or damage to the building, or indirectly via disturbance to the listed building's setting. There may also be risks to the curtilage (the area around, or any other building that is around and associated with a listed building).</p> <p>Whilst there is a large number of Listed Buildings within the coastal sector of the study area, opportunity exists in the next stages to reduce direct risks through the routing and siting process.</p> <p>Works and transport routes need to be considered in terms of their proximity to listed buildings near the highway (e.g., accidental damage risk from HGVs in narrow lanes or other restricted areas) or groundworks (i.e., if any vibration generating works are close enough to cause damage to buildings).</p> <p>A green BRAG has been assigned as although this is considered to be a moderately constrained area, there are many opportunities to mitigate the risks associated with this constraint, with detailed routing and construction best practices.</p>	G
Registered Parks and Gardens	Registered Parks and Gardens	There are no Registered Parks and Gardens within the study area.	N/A	N/A	N/A
Wreck locations	UK wreck locations	There are multiple wreck locations mostly in the eastern section of the study area.	A	<p>It is important that the proposed route avoids disturbing known or suspected wrecks, especially where there might be caches of unexploded ordnance.</p> <p>There are some wrecks within the study area and requirement for avoidance of this constraint through routing and potential further investigations should be possible, a green BRAG rating has been applied.</p>	G

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
Protected wrecks	England protected wrecks	There are no protected wrecks sites within the study area.	N/A	N/A	N/A
Ship Hulk	Other obstructions (ship hulk)	There are no ship hulks recorded within the study area	N/A	N/A	N/A
Registered Battlefields	England Registered Battlefields	There are no Registered Battlefields within the study area.	N/A	N/A	N/A
<b>Noise (Community)</b>					
Major Settlements	UK Major Urban Settlements	There are no major urban settlements located within the study area. Tillingham settlement is the only built up area identified within the study area.	N/A	N/A	N/A
Small Scale Settlements	UK Small Scale Urban Settlements	There are many small-scale settlements within the study area.	A	<p>There is potential for the construction of cable landfall points to generate noise during construction, which could affect the small settlements.</p> <p>It is considered that any potential construction and noise impacts could be effectively controlled through appropriate routing and the use of best practice mitigation measures such as a CEMP. Operational noise would also require further consideration at the next stage of the option development process.</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.</p>	G
<b>Socio-Economics (Community)</b>					



Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
Major Settlements	UK Major Urban Settlements (Socio-Economics)	Much of the study area is offshore and the coastline is mainly rural. There are no Major Urban Settlements located within the study area. Tillingham settlement is the only built up area identified within the study area.	N/A	N/A	N/A
Small Scale Settlements	UK Small Scale Urban Settlements	There are many small-scale settlements within the study area.	A	<p>There is potential for the construction of cable landfall points to impact residents as a result of changes to visual amenity.</p> <p>Mitigation should carefully consider the tourism and recreation socio-economic sensitivities of the study area and seek to mitigate risks to key receptors associated with the settlements. This will be applicable in the construction and operational stages.</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.</p>	G
National Trust Land	National Trust Open Land and Limited Access Land	There is no National Trust Land within the study area.	N/A	N/A	N/A
RYA sailing and racing areas	RYA sailing and racing areas	There are 3 Yacht Clubs/Training center locations in the north-west section of the study area. The AIS Intensity is low/medium through the study area.	G	<p>Construction activities may temporarily affect sailing activities, particularly in coastal areas near cable landing points (e.g. higher intensity inshore recreational/local club sailing and racing).</p> <p>Limited access to certain areas may affect the community, sailing activities and associated tourism.</p> <p>Construction and operational maintenance activities should be conducted with the aim of avoiding RYA sailing and racing areas and also by providing appropriate notice to mariners and exclusion</p>	G

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
				<p>zones. The RYA's Coastal Atlas would need to be used to inform the detailed routing.</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.</p>	
Bathing waters	UK Bathing Waters	There are no Bathing water locations within the study area.	N/A	N/A	N/A
Shellfish waters	Shellfish waters	<p>There are four shellfish water locations within the study area:</p> <ul style="list-style-type: none"> <li>- Dengie</li> <li>- Blackwater</li> <li>- Roach and Lower Crouch</li> <li>- Colne_E</li> </ul>	G	<p>Most of central section of the study area is constrained by shellfish water areas.</p> <p>Landfall construction may damage shellfish beds, reduce water quality through suspended sediment release and interfere with harvesting activities.</p> <p>As a result of the distribution and potential opportunities for avoidance of this constraint through routing to the west and best practice mitigation measures implemented to reduce the footprint and sediment disturbance, a green BRAG rating has been applied.</p>	G
Fishing activity	UK Fishing activity – Areas of high intensity fishing effort	<p>The fishing effort within the study area comprises the following:</p> <ul style="list-style-type: none"> <li>- demersal species – Medium,</li> <li>- pelagic species – Low,</li> <li>- shrimp trawlers – none,</li> <li>- static gears – Medium/High,</li> <li>- beam trawl – Low.</li> </ul> <p>International Fishing Effort of North Sea beam trawl (1995) within the study area is Low.</p>	G	<p>Consideration should be given to engaging with local fishing communities and relevant stakeholders during the planning and design phases to understand their concerns and identify measures to minimise impacts.</p> <p>Compensation measures to mitigate economic losses should be considered.</p> <p>There is a need to establish communication channels to coordinate with fishers and ensure their safety and access to fishing areas during maintenance operations.</p> <p>As a result of potential opportunities for avoidance of this constraint through routing and best practice mitigation measures, a green BRAG rating has been applied.</p>	G

Constraint Type	Name	Description/Features	Landfall	Mitigation Identified/Residual Risk	BRAG Rating with Mitigation measures
Marine Fish Farms	UK Seawater Finfish Farms	UK marine finfish farms are located primarily in Scotland and the west coast.	N/A	N/A	N/A

## 3.4. Summary

The table below presents a summary of the BRAG ratings for each of the study areas after mitigation measures have been applied.

Study Area	Environmental BRAG rating after mitigation measures	Community BRAG rating after mitigation measures
Friston Landfall Point Study Area	A	A
EACN Landfall Point Study Area	G	G
Bradwell Landfall Point Study Area	R	A