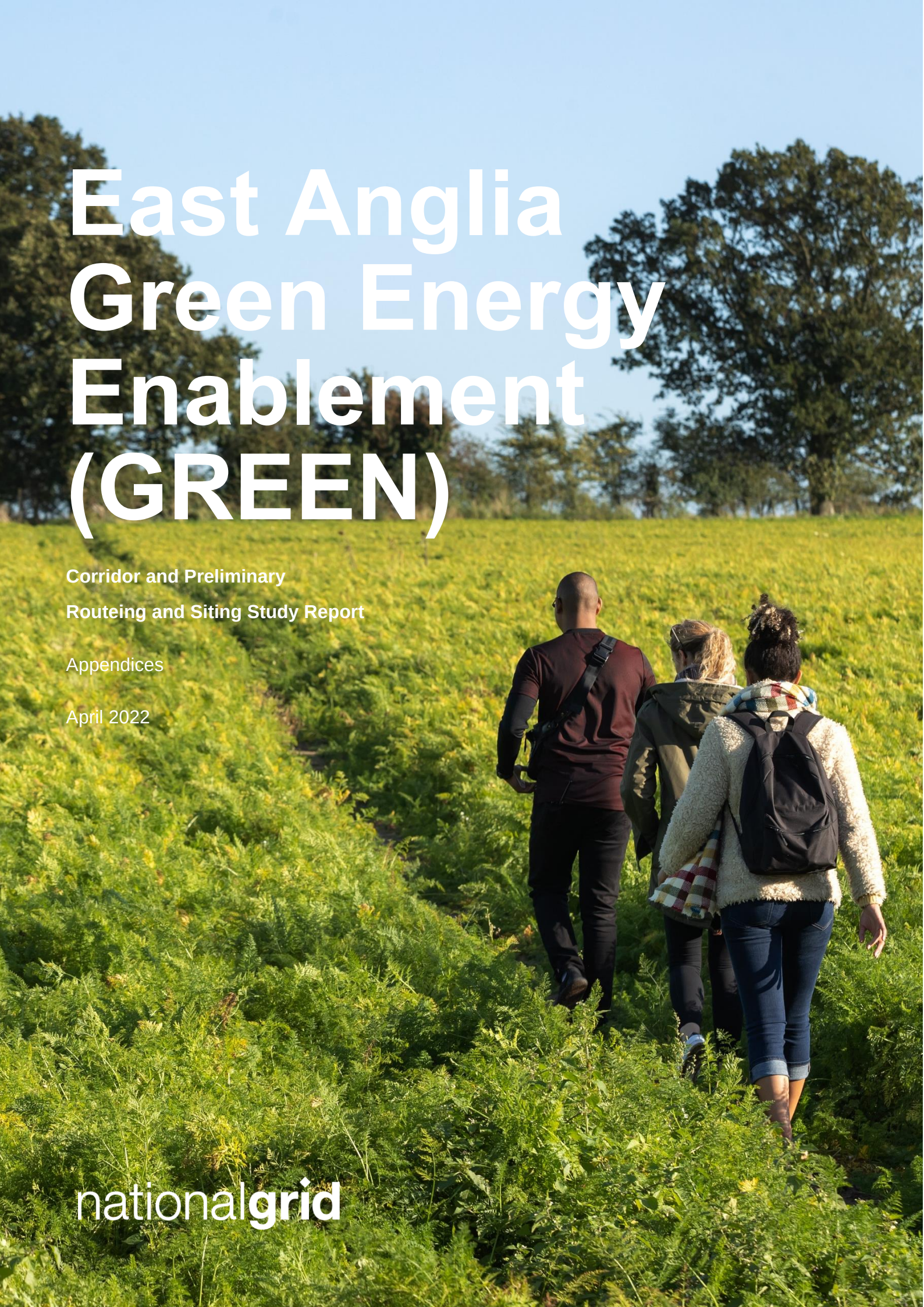
East Anglia Green Energy Enablement (GREEN)

Corridor and Preliminary Routeing and Siting Study Report

Appendices

April 2022



nationalgrid

Contents

Appendix A
Norwich to Bramford -Topic Baseline Overviews

These overviews (appendices A, B, C and D present baseline data for the appraisal topics relevant to each of the corridor sections being appraised. A topic specific judgement based on professional judgement is also provided to aid understanding of the likely acceptability of the corridor and as appropriate noting its relative topic preference or not over other corridors.

The main CPRSS draws these potentially competing perspectives together to make a balanced selection of a preferred connection corridor.

Topic Baseline Overview For Option NB1 – 4km West Blue Corridor

Sub Topics	Main risks, constraints and opportunities
Environment	
Ecology/biodiversity	The main risks and constraints in this corridor arise from international and national designated sites: Norfolk Valley Fens SAC/Flordon Common SSSI in Section A (qualifying/notifying features are botanical – wet and dry heath, alluvial woodland, species rich alkaline/calcareous fen, unimproved calcareous grassland, flushes - also narrow mouthed whorl snail). Shelfanger Meadows SSSI (Section B) - notifying features are botanical – unimproved grassland, traditionally managed, herb-rich, hay meadows; Aslacton Parish Land SSSI. Wortham Ling SSSI is located immediately adjacent to the corridor boundary in Section C. Gipping Great Wood SSSI in Section D is located immediately adjacent to the corridor boundary (in buffer[1]). The Barking Woods' SSSI (Section E) (incorporating Barn Grove, Priestley, Bonny/Round, Swingen's, Titley Hill, and Ditch Ancient Woodland (AW)); Middle Wood, Offton SSSI (Section E) (incorporating Tollemache Hall Grove and Middle wood Ancient Woods), which have component units that are named ancient woodlands. These are located immediately adjacent to and in the vicinity of the corridor boundary. Notifying features are botanical – Ancient Semi Natural Woodland (ASNW), Ancient Woodland oak-ash standards with field maple and hazel coppice. Hascot Hill Pit SSSI is also present though the notifying features are geological. Six blocks of Ancient woodland are present in Section E corridor and adjacent to the corridor. Priority habitats are present across all sections. *Construction* There would be no direct effects on the SAC/SSSI or the AW as they are outside the corridor, although there could be potential temporary/permanent indirect effects on the SAC/SSSI qualifying habitat features (e.g. through changes to hydrology or pollution). Given the importance and weighting in planning and legal terms of such designated biodiversity and to AW, they thus remain a potentially significant material constraint to development. There is potential for permanent/temporary direct effects on Priority Habitats including loss of habitat, fragmentation and disturbance during construction. *In Operation* there is potential for temporary indirect effects during operation from maintenance visits, and some, albeit limited risk of bird collision (though not for designated sites) given wetland habitats/rivers in the vicinity. The corridor crosses floodplain associated with the River Dove/Waveney (and tributaries) which may increase risk of bird collision with OHL. In conclusion for ecology and biodiversity and on the basis of an assumed adoption of lattice pylon supported OHL and subject to normal routeing and siting practices to reduce effects, the corridor is considered likely to achieve an acceptable solution for the connection, though until further surveys and consultation are undertaken, there remains potential for a negative impact on the International / National Site designations. There would be a requirement for HRA process to be undertaken (in the absence of mitigation and subject to stakeholder consultation). In relation to the Norfolk Valley Fens SAC, at this stage of assessment, and in the absence of detailed survey data, it is expected that the implementation of design process incorporating best practice, would ensure no resultant Likely Significant Effects (LSEs).

[1] In relation to Biodiversity, an initial scoping buffer of ~200m was applied in reference to indirect impacts. This was considered the distance within which potential for significant effects to designated sites could occur to the extent that could discernibly affect the conclusion for that option. Biodiversity receptors beyond that initial buffer were also considered where they had mobile features, or where sufficient pathways exist for effects to occur that could discernibly affect the conclusion for that option. These are named and discussed where applicable.

Sub Topics	Main risks, constraints and opportunities
Historic Environment	The principal risks in this section arise from the dispersed late-medieval settlement pattern which has resulted in the survival of substantial numbers of listed buildings, including highly graded churches which are widely scattered across the landscape rather than concentrated in historic village cores. The weighting given to harm to designated heritage assets is such that these present a significant constraint to development. In Section A and B adverse effects appear capable of being reduced through sensitive routeing. In Section C the corridor is more constrained, primarily as a result of its proximity to the conservation area at Mellis and to a cluster of listed buildings further north in this section, including the Grade I listed Church of St Mary the Virgin, Wortham. Measures such as amending route alignments or micrositing of overhead line infrastructure may be effective with other measures such as provision of screening planting. In Section D the corridor has the potential to give rise to effects such as: groups of listed buildings at Creeting St Peter, including the Grade I listed Church of St Peter, a group of Grade II listed buildings at Saxham Street, Stowupland and further isolated listed buildings in the north of this section though it is noted that the setting of many appears curtailed by existing vegetation but nonetheless careful consideration would need to be given to routeing and mitigation in this area to minimise adverse effects. In Section E while the corridor offers more flexibility to avoid effects because of its width, it is unlikely that these effects could be avoided entirely. The potential presence of archaeological remains is not considered to be a differentiating factor. This potential will be more fully considered during subsequent phases of design to ensure that effects on archaeological remains and constraint to design, consent and delivery can be better understood and managed. In conclusion through careful location and siting of overhead line towers and infrastructure to avoid disturbing or oversailing area designations (in this case scheduled monuments and conservation areas) and minimise visibility of OHL infrastructure in views of and from designated heritage assets with other measures the potential for Negative effects could be reduced and effects be considered acceptable as part of a balanced decision.
Landscape and Visual	**Landscape** Section A An additional line entry to Norwich Main substation may have the potential to give rise to cumulative wirescape effects in relation to South Norfolk Landscape Character Areas B1(Tas Tributary Farmland – within which the substation is located) and D1(Wymondham Settled Plateau Farmland). However, both these LCAs are assessed as being of medium sensitivity to the introduction of 400kV OHL and given the limited number of lines that currently converge at Norwich main, it is not considered likely that these effects would be significant. The new OHL could be visible from within LCA A1 (Tas Rural River Valley) to the east, which is afforded special protection in the South Norfolk Local Plan (Policy DM4.5). Section B This section of the corridor would pass through South Norfolk LCAs B1 (Tas Tributary Farmland), B4 (Waveney Tributary Farmland), E1 (Ashwellthorpe Plateau Farmland) and E2 (Great Moulton Plateau Farmland). All these LCAs are assessed as having a medium sensitivity to the introduction of a 400kV OHL, though the Plateau Farmland LCAs are assessed as borderline high, while the Tributary Farmland LCAs are assessed as borderline low. The corridor skirts the eastern flanks of LCA E1, which may limit adverse effects on the character of this area. However, the corridor directly crosses the plateau of LCA E2 and may be particularly prominent in this area Section C This section of the corridor would pass through South Norfolk LCA B4 (Waveney Tributary Farmland), which is assessed as having a medium (borderline low) sensitivity to the introduction of a 400kV OHL. The corridor would also cross South Norfolk LCA A5 (Waveney Rural River Valley), which is afforded special protection in the South Norfolk Local Plan. LCA A5 is a narrow, linear LCA with an east/ west alignment, that must be crossed by all options. The length of any route associated with this option within LCA A5 would be approximately 0.8km. To the south of the River Waveney, the corridor would pass through Suffolk Landscape Character Types

Sub Topics	Main risks, constraints and opportunities
	(LCTs) Wooded valley meadowlands and fens, Rolling valley farmlands and furze and Ancient plateau claylands. All three of these Suffolk LCTS are assessed as having a medium sensitivity to the introduction of a 400kV OHL Section D This section of the corridor would pass through Suffolk Landscape Character Types (LCTs) Ancient plateau claylands, Plateau claylands, Rolling valley claylands, Rolling valley farmlands and furze and Valley meadowlands. Ancient plateau claylands and Rolling valley farmlands and furze are assessed as having a medium sensitivity to the introduction of a 400kV OHL, while the Rolling valley claylands LCT is assessed as low sensitivity, the Valley meadowlands LCT is assessed as medium (borderline high) sensitivity and the Plateau claylands LCT is assessed as high (borderline medium) sensitivity. Section E This section of the corridor would pass through Suffolk Landscape Character Types (LCTs) Valley meadowlands, Rolling valley claylands, Ancient plateau claylands and Rolling valley farmlands. Ancient plateau claylands and Rolling valley farmlands are assessed as having a medium sensitivity to the introduction of a 400kV OHL, while the Rolling valley claylands LCT is assessed as low sensitivity and the Valley meadowlands LCT is assessed as medium (borderline high) sensitivity. Both the Ancient plateau claylands and, to a lesser extent, the Rolling valley farmlands LCTs could be subject to significant adverse effects due to the increased density and extent of wirescape, which, in combination with the proposed solar farm, could alter their key characteristics. **Visual** Section A Visual effects are likely to be experienced by residents on the southern and eastern edges of Mulbarton and of the smaller settlements and farmsteads within and close to the corridor. There are few recreational visual receptors other than users of the local PRoW network. Section B Visual effects are likely to be experienced by residents of Tacolneston/ Forncett End and of the smaller settlements and farmsteads within and close to the corridor. Recreational visual receptors who may experience effects are mainly restricted to users of the local PRoW network Section C Visual effects are likely to be experienced by residents of Bressingham Common, Snow Street, Wortham and of the smaller settlements and farmsteads within and close to the corridor. Between Bressingham Common and Snow Street the corridor is restricted to a width of ~250m, meaning that the line would have to pass within ~125m of residences. Recreational visual receptors who may experience effects are mainly restricted to users of the local PRoW network, users of the Angles Way and visitors to Wortham Ling SSSI, which has a dense network of footpaths Section D Visual effects are likely to be experienced by residents of Gislingham, Saxham Street, Stowupland, Creeting St. Peter and of the smaller settlements and farmsteads within and close to the corridor. In the vicinity of Saxham Street the corridor is restricted to a width of ~350m between residences, meaning that the line would have to pass within ~175m of residences. Recreational visual receptors who may experience effects are mainly restricted to users of the local PRoW network and users of National Cycle Network National Route 51. Section E Visual effects are likely to be experienced by residents of the north-western edge of Needham Market, Barking, Ringshall Stocks, Willisham, Offton, Flowton the smaller settlements and farmsteads within and close to the corridor. To the south of Flowton the corridor is restricted to a width of ~250m between residences, meaning that the line would have to pass within ~125m of residences. Recreational visual receptors who may experience effects are mainly restricted to users of the local PRoW network, users of the Gipping Valley River Path and users of National Cycle Network National Route 51 and Regional Route 48. Overall with careful routeing and siting an OHL route is considered likely to be acceptable in landscape and visual terms. Some areas present the potential for a greater level of effects and may necessitate a greater level of mitigation to achieve an acceptable balance with a particular focus being the line entries to Norwich Main and Bramford substations.

Sub Topics	Main risks, constraints and opportunities
Planning	The majority of this Option passes through open countryside. The exceptions to this are as follows. In the South Norfolk area, there are two parcels of land immediately to the west and south of the Norwich main substation which are allocated for sand and gravel extraction (Policy MIN 80 and MIN 79). Separately, on the border of Section B & C part of the corridor passes through an area designated as a "Hazardous Installation Consultation Zones" north of Diss and Roydon. These areas are used for handling hazardous substances including high pressure gas and oil pipelines. Development would only be authorised in these areas if the development would not give rise to additional public risk. In the Mid-Suffolk area it should be noted that on the eastern edge of Stowmarket the emerging plan has identified a mixed use development of 52 hectares. This appears to fall just outside the corridor. In terms of the Holford Rules, this option avoids major areas of highest amenity value (Holford Rule 1) and also avoids smaller areas of highest amenity value and scientific interest (Holford Rule 2). It offers the potential for a direct alignment and fewer changes of direction (Holford Rule 3). It is considered that alignments in this option could be defined to meet the requirements of Holford Rule 4 (choose tree and hill backgrounds). This option avoids ancient woodlands (Holford Rule 5). In terms of Holford Rule 6 (avoiding a concentration of wirescape) this option has the potential to result in a concentration of wirescape due to the intervisibility with existing 400kV and 132kV high voltage lines. Holford Rule 7 (approach urban areas through industrial zones) does not apply to this option as it does not pass close to industrial areas. In terms of the Supplementary Notes to the Holford Rules, this section has been designed to avoid routeing close to residential areas as far as possible (Supplementary Note 1). In addition, this option (alongside Option NB4) is further from the existing 4YM route and is therefore assessed to be more compliant with this rule than the other options as it has less potential to effect general residential amenity. In terms of Supplementary Note 2 (avoiding designations of County, District and Local Value) this option avoids the locally protected Landscape Character Area A1 (Rural River Valley), south of Norwich, and as a result this is considered to weigh marginally in its favour compared to other options. The consideration of alternative pylon designs (Supplementary Note 3 to the Holford Rules) follows later in the mitigation hierarchy and can be considered once an alignment has been established and an assessment undertaken to establish whether alternative pylon designs are needed. Overall with careful route alignment and siting of pylons, it should be possible with this corridor option to minimise negative impacts on the gravel extraction allocation and the Hazardous Installation Consultation Zone and avoid effects for the proposed eastern expansion of Stowmarket.
Overall Environmental and Planning risk: The summary environmental implications of this option are that effects on landscape and visual receptors are likely to be acceptable subject to careful routeing and siting of the connection. There are not expected to be any planning policy matters that would preclude routeing within this corridor. However, the corridor would pass in sufficiently close proximity to Norfolk Valley Fens SAC where a potential functionally linked pathway (hydrological linkages) would require careful consideration and thus the requirement for HRA albeit an assumed adoption of lattice pylon supported OHL and subject to normal routeing and siting practices to reduce effects, the corridor is considered likely to achieve an acceptable solution for the connection. The potential impacts on a number of high value historic environment receptors also present a constraint to routeing in this corridor and may require consideration of mitigation such as undergrounding.	
Socio-economics	
Economic activity	There is a solar farm at Mulburton. Part of the Wortham Airstrip runway is within the corridor.
Overall Socio-economic impact: There is potential for the proposed infrastructure within the route corridor to interact with various existing, or proposed, commercial land-uses (for example solar generation, golf courses, wind turbines, airfields etc) within or in proximity to the corridor. Whether or not there is a material effect on such activities or land-uses depends on detailed routeing and siting, and will also include consideration of potential mitigation and engagement with relevant	

Sub Topics	Main risks, constraints and opportunities
parties. Affected parties may also be entitled to compensation, assessed in line with the Compensation Code. On this basis, at this route corridor stage, the presence of such land-uses is not in itself considered to be a barrier to or determinative for route corridor selection.	
Technical	**Main risks, constraints and opportunities**
Technical	There are challenges to routeing in Sections A – E due to various constraints within the corridor, predominantly residential properties, listed buildings and built-up areas. A solar farm is also present. Electrified railways and multiple Distribution Network Operator assets also need to be crossed, the latter will need to be moved prior to 400kC construction. There is the opportunity in one instance for an existing 132kV overhead line route to be utilised for the proposed new 400kV overhead line.
Overall Technical impact: The use of an overhead line is envisaged for all sections of this corridor, which is deemed low risk in terms of technical complexity. Option NB1 offers some moderate technical challenges, largely in the form of Distribution Network Operator asset mitigation and the potential need for additional angle pylons to avoid residential properties & developed areas as well as the crossing of existing rail and road infrastructure.	
Cost	
Capital Cost	£157m

Topic Baseline Overview For Option NB2 – 1km West Green Corridor

Sub Topics	Main risks, constraints and opportunities
Environment	
Ecology/biodiversity	Aslacton Parish Land SSSI (Section B) – notifying features are botanical - unimproved spring line meadows, species rich fen grassland and calcareous grassland; Forncett Meadows SSSI (Section B) – notifying features unimproved meadows. the Barking Woods' SSSI (Section E, Option NB1) (incorporating Barn Grove, Priestley, Bonny/Round, Swingen's, Titley Hill, and Ditch Ancient woods); one further Ancient woodland block is in Section E. CWS (three) and priority habitats are also present. *Construction* There would be no direct effects on the SSSI or the AW as they are outside the corridor, although there could be potential temporary/permanent indirect effects on the SSSI/AW habitat. Given the importance and weighting in planning and legal terms of such designated biodiversity and to AW, they thus remain a potentially significant material constraint to development. There is potential for permanent/temporary direct effects on Priority Habitats including loss of habitat, fragmentation and disturbance during construction. *In Operation* there is potential for temporary indirect effects during operation from maintenance visits, and some, albeit limited risk of bird collision (though not for designated sites) given wetland habitats/rivers in the vicinity. The floodplain associated with the River Dove/Waveney (and tributaries) may increase risk of bird collision. *Opportunities:* To support partnerships for Environmental Gain In conclusion for ecology and biodiversity and on the basis of an assumed adoption of lattice pylon supported OHL and subject to normal routeing and siting practices to reduce effects, the corridor is considered likely to achieve an acceptable solution for the connection,
Historic Environment	The principal risks in this section arise from the dispersed historic settlement pattern that has resulted in the survival of substantial numbers of listed buildings, including highly graded churches which are widely scattered across the landscape rather than concentrated in historic village cores. This means that it would be difficult to avoid all significant adverse effects, although design could be used in most cases to minimise the number of assets affected. The weighting given to harm to designated heritage assets is such that these present a significant constraint to development. The potential presence of archaeological remains is not considered to be a differentiating factor. This potential will be more fully considered during subsequent phases of design to ensure that effects on archaeological remains and constraint to design, consent and delivery can be better understood and managed. In sections A and E careful location and siting of overhead line towers and infrastructure to avoid disturbing or oversailing area designations (in this case scheduled monuments and conservation areas) and minimising visibility of OHL infrastructure in views of and from designated heritage assets along with other measures, the potential for Negative effects could be reduced and effects be considered acceptable as part of a balanced decision. In section B there are numerous designated heritage assets at Wacton and Forncett St Peter and around the Gissing conservation where the level of constraint appears more challenging. In Section C the route contains a large number of listed buildings such as at Frenze; and in Section D groups of listed buildings at Earl Stonham, Thornham Magna and the conservation area and associated listed buildings at Wickham Skeith are present. That said the more concentrated nature of these groups may mean that overall this route is preferable to the Option NB1 corridor after careful routeing and siting and other mitigation is applied.

Sub Topics	Main risks, constraints and opportunities
Landscape and Visual	**Landscape** **Section A** The potential landscape effects would be similar to those described in relation to Option NB1, except that Option NB2 would pass through the locally protected LCA A1 to the south of Flordon. With regard to LCA A1, adverse effects on this locally designated landscape would not comply with South Norfolk Local Plan Policy DM4.5. Whilst a route within this section of the corridor may be acceptable if significant adverse effects on LCA A1 could be avoided, the potential for mitigation is limited by the railway and the wooded nature of parts of the LCA **Section B** This section of the corridor would pass through South Norfolk LCAs B1 (Tas Tributary Farmland), B4 (Waveney Tributary Farmland) and E2 (Great Moulton Plateau Farmland). All these LCAs are assessed as having a medium sensitivity to the introduction of a 400kV OHL, though the Plateau Farmland LCA is assessed as borderline high, while the Tributary Farmland LCAs are assessed as borderline low. The corridor skirts the eastern edge of LCA A1to the north of Forncett St. Mary and the western branch of the corridor passes through a short, peripheral section of that locally protected landscape to the south and east of the village. **Section C**. This section of the corridor would pass through South Norfolk LCA B4 (Waveney Tributary Farmland), which is assessed as having a medium (borderline low) sensitivity to the introduction of a 400kV OHL. The corridor would also cross South Norfolk LCA A5 (Waveney Rural River Valley), which is afforded special protection in the South Norfolk Local Plan. LCA A5 is a narrow, linear LCA with an east/ west alignment, that must be crossed by all options. The length of any route associated with this option within LCA A5 would be approximately 1.1km. To the south of the River Waveney, the corridor would pass through Suffolk Landscape Character Types (LCTs) Wooded valley meadowlands and fens, Rolling valley farmlands and furze, Rolling valley claylands and Ancient plateau claylands. Three of these Suffolk LCTS are assessed as having a medium sensitivity to the introduction of a 400kV OHL, with the Rolling valley claylands LCT being assessed as low sensitivity. **Section D**. This section of the corridor would pass through Suffolk Landscape Character Types (LCTs) Ancient plateau claylands, Plateau claylands, Rolling valley claylands, Rolling valley farmlands and furze and Ancient estate claylands. Ancient plateau claylands, Ancient estate claylands and Rolling valley farmlands and furze are assessed as having a medium sensitivity to the introduction of a 400kV OHL, while the Rolling valley claylands LCT is assessed as low sensitivity and the Plateau claylands LCT is assessed as high (borderline medium) sensitivity **Section E**. This section of the corridor would pass through Suffolk Landscape Character Types (LCTs) Rolling valley farmlands and furze, Valley meadowlands, Ancient plateau claylands and Rolling valley farmlands. Ancient plateau claylands, Rolling valley farmlands and furze and Rolling valley farmlands are assessed as having a medium sensitivity to the introduction of a 400kV OHL, while Valley meadowlands LCT is assessed as medium (borderline high) sensitivity. The Ancient plateau claylands LCT could be subject to significant adverse effects due to the increased density and extent of wirescape, which, in combination with the proposed solar farm, could alter its key characteristics. **Visual** **Section A** Visual effects would also be similar to Option NB1, but with the addition of potential significant effects for residents of Flordon, where the line would have to pass in close proximity. **Section B** Visual effects are likely to be experienced by residents in Great Moulton, Sneath Common, Gissing and Burston and of the smaller settlements and farmsteads within and close to the corridor. There is potential for this section to give rise to unacceptable levels of effect on the residential visual amenity of some residents in Bustard's Green unless the western branch was favoured noting this would though increase effects on LCA1. Recreational visual receptors who may experience effects are mainly restricted to users of the local PRoW network. **Section C** Visual effects are likely to be experienced by residents on the eastern edge of Diss, Stuston, Mellis/ The Common, Yaxley and of the smaller settlements and farmsteads within and close to the corridor. Between Mellis/ The Common and Yaxley the corridor is restricted to a width of ~150m between residences, meaning that the line would have to pass within ~75m of residences. There is potential

Sub Topics	Main risks, constraints and opportunities
	for this section to give rise to unacceptable levels of effect on the residential visual amenity of some residents between Suston and the 4YM route. Recreational visual receptors who may experience effects are mainly restricted to users if Diss Golf Club, users of the local PRoW network, users of the Boudica Way, Angles Way and users of National Cycle Network Regional Route 30. **Section D** Visual effects are likely to be experienced by residents of Thornham Magna, Wickham Skeith, Mendlesham Green, Forward Green, Creeting St. Mary and of the smaller settlements and farmsteads within and close to the corridor. In the vicinity of Creeting St. Mary the corridor is restricted to a width of ~200m between residences, meaning that the line would have to pass within ~100m of residences. Recreational visual receptors who may experience effects are mainly restricted to users of the local PRoW network and visitors to Thornham Hall and park. A route in this section of this corridor is considered to be problematic due to the presence of Thornham Hall and park and the pinch point at Creeting St. Mary **Section E** Visual effects are likely to be experienced by residents of the south-eastern edge of Needham Market, Somersham, Flowton and the smaller settlements and farmsteads within and close to the corridor. To the east of Somersham the corridor is restricted to a width of ~250m between residences, meaning that the line would have to pass within ~125m of residences. Recreational visual receptors who may experience effects are mainly restricted to users of the local PRoW network, users of the Gipping Valley River Path and users of National Cycle Network National Route 51 and Regional Route 48 Overall with careful routeing and siting an OHL route is considered potentially acceptable in landscape and visual terms. Some areas present the potential for a greater level of effects and may necessitate a greater level of mitigation to achieve an acceptable balance. Particular focus being the line entries to Norwich Main and Bramford substations, the routeing through LCA1 as well as a number of properties where limited space for parallel alignments may lead to some properties being positioned between the new and existing line.
Planning	The majority of this option passes through open countryside. It should be noted that in the South Norfolk area, there are two parcels of land immediately to the west and south of the Norwich main substation which are allocated for sand and gravel extraction (Policy MIN 80 and MIN 79. Also in the South Norfolk Area in Section A and Section B the route passes through a River Valleys Landscape Character Area where all development should respect, conserve and where possible, enhance the landscape character of its immediate and wider environment. In terms of the Holford Rules, this option avoids major areas of highest amenity value (Holford Rule 1) and also avoids smaller areas of highest amenity value and scientific interest (Holford Rule 2). This option has higher potential for deviation (Holford Rule 3) to avoid constraints compared to option NB1 and NB4. This option could be defined to meet the requirements of Holford Rule 4 (choose tree and hill backgrounds). This option avoids ancient woodlands (Holford Rule 5). In terms of Holford Rule 6 (avoiding a concentration of wirescape) this option has the potential to result in a concentration of wirescape due to the intervisibility with existing 400kV and 132kV high voltage lines. Holford Rule 7 (approach urban areas through industrial zones) does not apply to this option as it does not pass close to industrial areas. In terms of the Supplementary Notes to the Holford Rules, this option has been designed to avoid routeing close to residential areas as far as possible (Supplementary Note 1). However, due to its convergence and divergence with the existing 4YM route, it has the greater potential to result in higher levels of effect on general residential amenity than Options NB1 and NB4. In terms of Supplementary Note 2 (avoiding designations of County, District and Local Value) this option does pass through locally protected landscape character areas. The consideration of alternative pylon designs (Supplementary Note 3 to the Holford Rules) follows later in the mitigation hierarchy and can be

Sub Topics	Main risks, constraints and opportunities
	considered once an alignment has been established and an assessment undertaken to establish whether alternative pylon designs are needed. Overall, with careful route alignment and siting of towers, it should be possible with this corridor option to minimise negative impacts on the gravel extraction allocation south of the Norwich main substation.
Overall Environmental and Planning risk: The summary environmental implications of this option are that effects on ecology would be neutral subject to mitigation. There are not expected to be any planning policy matters that would preclude routeing within this corridor. There is a risk that from a landscape and visual perspective adverse effects could arise particularly in Section A, C and D. However, the provision of screening and the use of undergrounding should assist in minimising effects. The potential impacts on a number of high value historic environment receptors also present a constraint to routeing in this corridor and may require consideration of more substantive mitigation.	
Socio-economics	
Economic activity	The corridor creates the potential for a route to affect High Oaks Residential Care Home, Diss Golf Club, Melis Primary School (part of school grounds within corridor), Thornham and Park (country park, tourist attraction) The Faith Mission. And potential interaction with golf courses such as at Stuston
Overall Socio-economic impact: There is potential for the proposed infrastructure within the route corridor to interact with various existing, or proposed, commercial land-uses (e.g golf courses) as well as social care and educational establishments within or in proximity to the corridor. Whether or not there is a material effect on such activities or land-uses depends on detailed routeing and siting, and will also include consideration of potential mitigation and engagement with relevant parties. Affected parties may also be entitled to compensation, assessed in line with the Compensation Code. On this basis, at this route corridor stage, the presence of such land-uses is not in itself considered to be a barrier to or determinative for route corridor selection.	
Technical	**Main risks, constraints and opportunities**
Technical	Challenging routeing in Sections A – E due to various constraints within the corridor, residential properties, listed buildings and built-up areas. Narrow sections of corridor are present, which restrict room for routeing. Routeing is considered very challenging in parts of Sections A – E, particularly near Flordon, Stuston, Earl Stonham and Darmsden at the A1. Multiple Distribution Network Operator assets and electrified railways are to be crossed.
Overall Technical impact: The use of an overhead line is envisaged for all sections of this corridor, which is deemed low risk in terms of technical complexity. Option NB2 offers moderate to significant technical challenges due to several highly constrained sections of corridor influenced by constraints such as residential properties and existing infrastructure at Flordon, Earl Stoneham and Darmsden. Routeing becomes very challenging at Stuston Golf Course, including areas of no routeing flexibility and increased construction, delivery and future maintenance complexity. Multiple Distribution Network Operator assets require mitigation, and the construction of additional angle pylons is likely to avoid various constraints. Opportunities exist to parallel the existing 4YM 400kV National Grid overhead line for a section of the corridor which provides advantages for access and maintenance of infrastructure albeit placing some properties between the lines, avoidance of which would require the introduction of multiple angle pylons to divert the existing line and require a level of outages that may not be compatible with programme	
Cost	
Capital Cost	£313m

Topic Baseline Overview For Option NB4 – 4km East Yellow corridor

Sub Topics	Main risks, constraints and opportunities
Environment	
Ecology/biodiversity	The main risks and constraints in this section arise from nationally designated sites; Pulham Market Big Wood AW (Section B), Mickfield Meadow, Gosbeck Wood SSSIs (Section D), notified for AW coppice with standards oak alder / ash maple woodland and meadow habitats. Hoxne Brick Pit and Sandy Lane Pit SSSI (geological) are also present. Ten blocks of Ancient Woodland (ASNW and PAWS): The Grove, Olivers, Thorpe and Highfield Woods, Popes Wood, Borleys Wood, Bulls Wood, Oak Wood/Broomwalk Covert, Nursery Wood, Millers Wood. One Local Nature Reserve (LNR) Smockhill Common (woodland) (Section A) in the corridor and adjacent. Rede Wood LNR (Ancient Woodland) Section E. One CWS (Somersham Road) Section E is present. Priority habitats are present in all sections. *Construction* There would be no direct effects on the SSSI or the AW as they are outside the corridor, although there could be potential temporary/permanent indirect effects on the SSSI/AW habitat. Given the importance and weighting in planning and legal terms of such designated biodiversity and to AW, they thus remain a potentially significant material constraint to development..There is potential for permanent/temporary direct effects on CWS/Priority Habitats including loss of habitat, fragmentation and disturbance during construction. *In Operation* there is potential for temporary indirect effects during operation from maintenance visits, and some, albeit limited risk of bird collision (though not for designated sites) given wetland habitats/rivers in the vicinity. The floodplain associated with the River Dove/Waveney (and tributaries) may increase risk of bird collision. *Opportunities:* To support partnerships for Environmental Gain In conclusion for ecology and biodiversity and on the basis of an assumed adoption of lattice pylon supported OHL and subject to normal routeing and siting practices to reduce effects, the corridor is considered likely to achieve an acceptable solution for the connection, It may be marginally preferred to NB1 given it is downstream of the SAC potentially affected by NB1 noting however that standard mitigation may remove this as even a minor differentiating factor.
Historic Environment	The principal risks in this section arise from the dispersed historic settlement pattern that has resulted in the survival of substantial numbers of listed buildings, including highly graded churches which are widely scattered across the landscape rather than concentrated in historic village cores; conservation areas, such as that at Shotesham include areas of open space or planting which contribute to the distinctive historic character of those areas. This means that it would be difficult to avoid all significant adverse effects, although design could be used in most cases to minimise the number of assets affected. The weighting given to harm to designated heritage assets is such that these present a significant constraint to development. The potential presence of archaeological remains is not considered to be a differentiating factor. This potential will be more fully considered during subsequent phases of design to ensure that effects on archaeological remains and constraint to design, consent and delivery can be better understood and managed. Normal routeing and siting practices and some appropriate mitigation is likely to achieve an acceptable balance with an OHL solution for sections B, C and E. The balance will be more challenging insection D due to the dispersed nature of features and is considered particularly challenging in Section A as a result of the unavoidability of a core area of the Shotesham Conservation Area leading to a clear

Sub Topics	Main risks, constraints and opportunities
	favouring of other corridors in place of NB4as it may be difficult to achieve an acceptable planning balance against the adverse effects at Shotesham Conservation Area
Landscape and Visual	**Landscape** Section A. An additional line entry to Norwich Main substation may have the potential to give rise to cumulative wirescape effects in relation to South Norfolk Landscape Character Area B1(Tas Tributary Farmland – within which the substation is located). However, this LCA is assessed as being of medium sensitivity to the introduction of 400kV OHL and given the limited number of lines that currently converge at Norwich main, it is not considered likely that these effects would be significant. This option would pass through a substantial part of the locally protected LCA A1 to the south-east of Norwich Main and would recross the same LCA in the vicinity of Tasburgh. Section B. This section of the corridor would pass through South Norfolk LCAs B1 (Tas Tributary Farmland), B4 (Waveney Tributary Farmland) and E2 (Great Moulton Plateau Farmland). All these LCAs are assessed as having a medium sensitivity to the introduction of a 400kV OHL, though the Plateau Farmland LCA is assessed as borderline high, while the Tributary Farmland LCAs are assessed as borderline low. Section C. This section of the corridor would pass through South Norfolk LCA B4 (Waveney Tributary Farmland), which is assessed as having a medium (borderline low) sensitivity to the introduction of a 400kV OHL. The corridor would also cross South Norfolk LCA A5 (Waveney Rural River Valley), which is afforded special protection in the South Norfolk Local Plan. LCA A5 is a narrow, linear LCA with an east/ west alignment, that must be crossed by all options. The length of any route associated with this option within LCA A5 would be between approximately 0.4km and 1km. To the south of the River Waveney, the corridor would pass through Suffolk Landscape Character Types (LCTs) Wooded valley meadowlands and fens, Rolling valley farmlands and furze and Rolling valley claylands. Two of these Suffolk LCTS are assessed as having a medium sensitivity to the introduction of a 400kV OHL, with the Rolling valley claylands LCT being assessed as low sensitivity. Section D. This section of the corridor would pass through Suffolk Landscape Character Types (LCTs) Rolling valley claylands, Plateau claylands, Ancient estate claylands and Rolling estate farmlands. Ancient plateau claylands, The Ancient estate claylands LCT is assessed as having a medium sensitivity to the introduction of a 400kV OHL, while the Rolling valley claylands and Rolling estate farmlands LCTs are assessed as low sensitivity and the Plateau claylands LCT is assessed as high (borderline medium) sensitivity. Approximately 15km of this 22km long section is located in the Plateau claylands LCT. Section E. This section of the corridor would pass through Suffolk Landscape Character Types (LCTs) Rolling estate farmlands, Ancient estate claylands, Ancient rolling farmlands, Valley meadowlands, Ancient plateau claylands and Rolling valley farmlands. Ancient estate claylands, Rolling valley farmlands, Ancient plateau claylands and Ancient rolling farmlands are assessed as having a medium sensitivity to the introduction of a 400kV OHL, while Rolling estate farmlands LCT is assessed as low sensitivity and Valley meadowlands LCT is assessed as medium (borderline high) sensitivity. The Ancient plateau claylands LCT could be subject to significant adverse effects due to the increased density and extent of wirescape, which, in combination with the proposed solar farm, could alter its key characteristics. The corridor passes to the east of Shrubland Hall Registered Park and Garden. **Visual** Section A. Visual effects are likely to be experienced by residents Saxlingham Nethergate and of the smaller settlements and farmsteads within and close to the corridor. Recreational visual receptors who may experience effects include visitors to Dunston Hall hotel and golf course and potentially users of a section of the Boudica Way. Section B. Visual effects are likely to be experienced by residents of Long Stratton, Pulham Market, Pulham St. Mary and of the smaller settlements and farmsteads within and close to the corridor. Between Pulham Market and Pulham St. Mary the corridor is restricted to a

Sub Topics	Main risks, constraints and opportunities
	width of ~500m, meaning that the line would have to pass within ~250m of residences. Recreational visual receptors who may experience effects are mainly restricted to users of the local PRoW network and users of a substantial section of the Boudica Way Section C Visual effects are likely to be experienced by residents of Upper Street, Thorpe Abbotts, Hoxne, Cross Street and of the smaller settlements and farmsteads within and close to the corridor. Recreational visual receptors who may experience effects are mainly restricted to users of the local PRoW network, users of the Angles Way and users of National Cycle Network Regional Route 30 Section D Visual effects are likely to be experienced by residents in the west of Debenham, Crowfield and of the smaller settlements and farmsteads within and close to the corridor. Recreational visual receptors who may experience effects are mainly restricted to users of the local PRoW network, users of the Heart of Suffolk Regional Cycle Route and National Cycle Network Regional Route 30 Section E. Visual effects are likely to be experienced by residents of Hemingstone, Henley, Great Blakenham, Claydon, Bramford and Little Blakenham and the smaller settlements and farmsteads within and close to the corridor. Between Claydon and Great Blakenham the corridor is restricted to a width of ~150m between residences and the A14, meaning that the line would have to pass within ~150m of residences. Recreational visual receptors who may experience effects are mainly restricted to users of the local PRoW network, users of the Gipping Valley River Path and users of National Cycle Network National Route 51 and Regional Route 48 and visitors to Suffolk Water Park Overall with careful routeing and siting an OHL route is considered potentially acceptable in landscape and visual terms. Some areas present the potential for a greater level of effects and may necessitate a greater level of mitigation to achieve an acceptable balance. Particular focus being the line entries to Norwich Main and Bramford substations and the routeing through LCA1.
Planning	The majority of this corridor option passes through open countryside. It should be noted that in the South Norfolk area, there are two parcels of land immediately to the west and south of the Norwich main substation which are allocated for sand and gravel extraction (Policy MIN 80 and MIN 79. Also in the South Norfolk Area in Section A the route passes through a River Valleys Landscape Character Area where all development should respect, conserve and where possible, enhance the landscape character of its immediate and wider environment. In the South Norfolk Area there is an allocation for a mixed-use development on the east and south-east edge of Long Stratton which the Option NB4 corridor passes over. This allocation will accommodate approximately 1,200 dwellings and 8 hectares of employment land. In the Mid-Suffolk area there three allocations for residential development north of Barham which the Option NB4 corridor passes over. Also in Barham there is a proposal for a modest extension to the existing longstanding sand and gravel quarrying operations at Sandy Lane, Barham. In terms of the Holford Rules, this option avoids major areas of highest amenity value (Holford Rule 1). However, in terms of Holford Rule 2 (avoid smaller areas of highest amenity value and scientific interest) it would directly affect the Shotesham Conservation Area and contains scheduled monuments within the corridor south east of Eye. It offers the potential for a direct alignment and fewer changes of direction (Holford Rule 3). It is considered that alignments in this option could be defined to meet the requirements of Holford Rule 4 (choose tree and hill backgrounds). This option avoids ancient woodlands (Holford Rule 5). In terms of Holford Rule 6 (avoiding a concentration of wirescape) it is considered that this option has the greatest potential to comply with this rule (alongside Option NB1)

Sub Topics	Main risks, constraints and opportunities
	compared to the other options due to having less potential for intervisibility with the existing 400kV and 132kV high voltage lines. In terms of Holford Rule 7 (approach urban areas through industrial zones), unlike the other options, this option has the opportunity to pass through industrial (retail/commercial) areas north of Ipswich. In terms of the Supplementary Notes to the Holford Rules, this section has been designed to avoid routeing close to residential areas as far as possible (Supplementary Note 1). In addition, as this option (alongside Option NB1) is further from the existing 4YM route, it is assessed to be more compliant with this rule than the other options as it has less potential to effect general residential amenity. In terms of Supplementary Note 2 (avoiding designations of County, District and Local Value) this option does pass through locally protected landscape character areas. The consideration of alternative pylon designs (Supplementary Note 3 to the Holford Rules) follows later in the mitigation hierarchy and can be considered once an alignment has been established and an assessment undertaken to establish whether alternative pylon designs are needed. Overall with careful route alignment and siting of pylons, it should be possible with this corridor option to minimise negative impacts on the gravel extraction allocation south of the Norwich main substation, and at Barham in Mid Suffolk and avoid negative impacts on the housing allocations at Long Stratton and Barham.
Overall Environmental and Planning risk: The summary environmental implications of this option are that effects on ecology and Landscape and Visual would be acceptable subject to mitigation. There are not expected to be any planning policy matters that would preclude routeing within this corridor. However, from an historic environment perspective the corridor unavoidably crosses a core area of the Shotesham Conservation Area. This constraint means that all technologies other than the use of HDD would be difficult to support in a planning balance. In addition, in Section D the corridor affects listed buildings, some associated with scheduled monuments, meaning that it would be difficult to avoid numerous significant adverse effects.	
Socio-economics	**Main risks, constraints and opportunities**
Economic activity	The corridor contains the following socio-economic receptors: Dunston Hall Golf Club, The Hollies Care Home, Stonham Barn: holiday accommodation / 9 hole golf course / footgolf course, Bramford Golf Course.
Overall Socio-economic impact: There is potential for the proposed infrastructure within the route corridor to interact with various existing, or proposed, commercial land-uses (e.g golf courses) as well as social care establishments within or in proximity to the corridor. Whether or not there is a material effect on such activities or land-uses depends on detailed routeing and siting, and will also include consideration of potential mitigation and engagement with relevant parties. Affected parties may also be entitled to compensation, assessed in line with the Compensation Code. On this basis, at this route corridor stage, the presence of such land-uses is not in itself considered to be a barrier to or determinative for route corridor selection.	
Technical	**Main risks, constraints and opportunities**
Technical	The direction of corridor approach requires underground cable entries into Norwich Main Substation Extension and Bramford Substation to cross beneath existing assets (the extent of some 3rd party underground assets is unknown. Challenging routeing in Sections B – D due to various constraints within the corridor, predominantly residential properties, and listed buildings. In Section E, the western leg of the corridor between Claydon and Bramford is considered probably to be undeliverable without complex engineering designs. This is due to narrow corridor width and proximity to multiple constraints including, the A14 dual carriageway, the

Sub Topics	Main risks, constraints and opportunities
	River Gipping and associated watercourses / waterbodies, edge of settlement residential & industrial areas, and the existing 3rd party 220kV underground cables positioned in one viable gap between other constraints. The Eastern Leg between Claydon and Bramford comprises various constraints making routeing very challenging in relation to Suffolk Water Park, existing distribution network operator assets and proposed plan allocations and planning application developments in addition to existing residential properties. Electrified railways and multiple Distribution Network Operator assets to be overcome. There is the opportunity in one instance for an existing 132kV overhead line route to be utilised for the proposed new 400kV overhead line.
Overall Technical impact: Use of Overhead line envisaged for most sections of this corridor, with the requirement for underground cable to be used for line entries at Norwich Main and Bramford Substations. Option NB4 includes significant technical challenges in Section E due to several highly constrained areas of corridor between Claydon and Bramford including: the A14 dual carriageway, the River Gipping and associated watercourses / waterbodies, edge of settlement residential & industrial areas, Suffolk Water Park, and the crossing of the existing railway and road infrastructure. All which create areas of no flexibility for routeing and significantly increase engineering complexity at additional cost. Multiple Distribution Network Operator assets require mitigation. The combinations are such that a 400kV connection is considered to be probably undeliverable in this corridor. An opportunity exists to route via the southern section of Option NB3 (Pink: 1km East), to avoid the most constrained areas at the south of Option NB4. Despite this, based on the constraints present, Bramford Substation entries from either Option NB3 or NB4 are not deemed preferable from a technical perspective in comparison to Option NB1 or Option NB2 due to the need for underground cable line entries.	
Cost	
Capital Cost	£276m

Topic Baseline Overview For Hybrid Option NB5 – Green into Blue

Sub Topics	Main risks, constraints and opportunities
Environment	
Ecology/biodiversity	Aslacton Parish Land SSSI (Section B) – notifying features are botanical - unimproved spring line meadows, species rich fen grassland and calcareous grassland; Forncett Meadows SSSI (Section B) – notifying features unimproved meadows. Gipping Great Wood SSSI in Section D is located immediately adjacent to the corridor boundary. The Barking Woods' SSSI (Section E) (incorporating Barn Grove, Priestley, Bonny/Round, Swingen's, Titley Hill, and Ditch Ancient woods); Middle Wood, Offton SSSI (Section E) (incorporating Tollemache Hall Grove and Middle wood Ancient Woods), which have component units that are named ancient woodlands. These are located immediately adjacent to the corridor boundary and adjacent. Notifying features are botanical – ASNW, Ancient Woodland oak-ash standards with field maple and hazel coppice. Hascot Hill Pit SSSI is also present. notifying features are geological. Six blocks of Ancient woodland are present in Section E corridor adjacent. Priority habitats are present across all sections. CWS are also present. Construction There would be no direct effects on the SSSIs or the AW as they are outside the corridor, although there could be potential temporary/permanent indirect effects on the SSSI/AW habitat. Given the importance and weighting in planning and legal terms of such designated biodiversity and to AW, they thus remain a potentially significant material constraint to development. There is potential for permanent/temporary direct effects on Priority Habitats including loss of habitat, fragmentation and disturbance during construction. In Operation there is potential for temporary indirect effects during operation from maintenance visits, and some, albeit limited risk of bird collision (though not for designated sites) given wetland habitats/rivers in the vicinity. The floodplain associated with the River Dove/Waveney (and tributaries) may increase risk of bird collision. Opportunities: To support partnerships for Environmental Gain. Overall effects on ecology and biodiversity assuming normal routeing and siting practices are expected to be acceptable
Historic Environment	The principal risks in this section arise from the dispersed historic settlement pattern that has resulted in the survival of substantial numbers of listed buildings, including highly graded churches which are widely scattered across the landscape rather than concentrated in historic village cores. This means that it would be difficult to avoid all significant adverse effects, although design could be used in most cases to minimise the number of assets affected. The weighting given to harm to designated heritage assets is such that these present a significant constraint to development. The potential presence of archaeological remains is not considered to be a differentiating factor. This potential will be more fully considered during subsequent phases of design to ensure that effects on archaeological remains and constraint to design, consent and delivery can be better understood and managed. In sections A and E careful location and siting of overhead line towers and infrastructure to avoid disturbing or oversailing area designations (in this case scheduled monuments and conservation areas) and minimising visibility of OHL infrastructure in views of and from designated heritage assets along with other measures, the potential for Negative effects could be reduced and effects be considered acceptable as part of a balanced decision. In section B there are numerous designated heritage assets at Wacton and Forncett St Peter and around the Gissing conservation where the level of constraint appears more challenging. In Section C the route contains a large number of listed

Sub Topics	Main risks, constraints and opportunities
	buildings such as at Frenze. In Section D the corridor has the potential to give rise to multiple significant effects. Key issues in this section are: groups of listed buildings at Thornham Magna, Creeting St Peter, including the Grade I listed Church of St Peter, a group of Grade II listed buildings at Saxham Street, Stowupland and further isolated listed buildings throughout this section, in addition to the conservation area and associated listed buildings at Wickham Skeith. Careful consideration would need to be given to routeing in this area to minimise adverse effects. The overall assessment of the effect of this route section on the historic environment is that it has the potential to be acceptable in the overall planning balance though considered to be more challenging and thus less favoured than NB1.
Landscape and Visual	**Landscape** **Section A.** The potential landscape effects would be similar to those described in relation to Option NB1, except that this option would pass through the locally protected LCA A1 to the south of Flordon. Section B. This section of the corridor would pass through South Norfolk LCAs B1 (Tas Tributary Farmland), B4 (Waveney Tributary Farmland) and E2 (Great Moulton Plateau Farmland). All these LCAs are assessed as having a medium sensitivity to the introduction of a 400kV OHL, though the Plateau Farmland LCA is assessed as borderline high, while the Tributary Farmland LCAs are assessed as borderline low. The corridor skirts the eastern edge of LCA A1to the north of Forcnett St. Mary and the western branch of the corridor passes through a short, peripheral section of that locally protected landscape to the south and east of the village. Section C. This section of the corridor would pass through South Norfolk LCA B4 (Waveney Tributary Farmland), which is assessed as having a medium (borderline low) sensitivity to the introduction of a 400kV OHL. The corridor would also cross South Norfolk LCA A5 (Waveney Rural River Valley), which is afforded special protection in the South Norfolk Local Plan. LCA A5 is a narrow, linear LCA with an east/ west alignment, that must be crossed by all options. The length of any route associated with this option within LCA A5 would be approximately 1.1km. To the south of the River Waveney, the corridor would pass through Suffolk Landscape Character Types (LCTs) Wooded valley meadowlands and fens, Rolling valley farmlands and furze, Rolling valley claylands and Ancient plateau claylands. Three of these Suffolk LCTS are assessed as having a medium sensitivity to the introduction of a 400kV OHL, with the Rolling valley claylands LCT being assessed as low sensitivity. Section D. This section of the corridor would pass through Suffolk Landscape Character Types (LCTs) Ancient plateau claylands, Plateau claylands, Rolling valley claylands, Rolling valley farmlands and furze and Valley meadowlands. Ancient plateau claylands and Rolling valley farmlands and furze are assessed as having a medium sensitivity to the introduction of a 400kV OHL, while the Rolling valley claylands LCT is assessed as low sensitivity, the Valley meadowlands LCT is assessed as medium (borderline high) sensitivity and the Plateau claylands LCT is assessed as high (borderline medium) sensitivity. Section E. This section of the corridor would pass through Suffolk Landscape Character Types (LCTs) Valley meadowlands, Rolling valley claylands, Ancient plateau claylands and Rolling valley farmlands. Ancient plateau claylands and Rolling valley farmlands are assessed as having a medium sensitivity to the introduction of a 400kV OHL, while the Rolling valley claylands LCT is assessed as low sensitivity and the Valley meadowlands LCT is assessed as medium (borderline high) sensitivity. Both the Ancient plateau claylands and, to a lesser extent, the Rolling valley farmlands LCTs could be subject to significant adverse effects due to the increased density and extent of wirescape, which, in combination with the proposed solar farm, could alter their key characteristics **Visual** Section A. Visual effects would be similar to Option NB1, but with the addition of potential significant effects for residents of Flordon, where the line would have to pass in close proximity. Section B. Visual effects are likely to be experienced by residents Great Moulton, Sneath Common, Gissing and Burston and of the smaller settlements and farmsteads within and close to the corridor. There is potential for this section to give rise to unacceptable levels of effect

Sub Topics	Main risks, constraints and opportunities
	on the residential visual amenity of some residents in Bustard's Green. Recreational visual receptors who may experience effects are mainly restricted to users of the local PRoW network. Section C. Visual effects are likely to be experienced by residents on the eastern edge of Diss, Stuston, Mellis/ The Common, Yaxley and of the smaller settlements and farmsteads within and close to the corridor. Between Mellis/ The Common and Yaxley the corridor is restricted to a width of ~150m between residences, meaning that the line would have to pass within ~75m of residences. There is potential for this section to give rise to unacceptable levels of effect on the residential visual amenity of some residents between Suston and the 4YM route. Recreational visual receptors who may experience effects are mainly restricted to users if Diss Golf Club, users of the local ProW network, users of the Boudica Way, Angles Way and users of National Cycle Network Regional Route 30 Section D. Visual effects are likely to be experienced by residents of Thornham Magna, Wickham Skeith, Saxham Street, Stowupland, Creeting St. Peter and of the smaller settlements and farmsteads within and close to the corridor. In the vicinity of Saxham Street the corridor is restricted to a width of ~350m between residences, meaning that the line would have to pass within ~175m of residences. Recreational visual receptors who may experience effects are mainly restricted to users of the local ProW network and National Cycle Network National Route 51 and visitors to Thornham Hall and park Section E. Visual effects are likely to be experienced by residents of the north-western edge of Needham Market, Barking, Ringshall Stocks, Willisham, Offton, Flowton the smaller settlements and farmsteads within and close to the corridor. To the south of Flowton the corridor is restricted to a width of ~250m between residences, meaning that the line would have to pass within ~125m of residences. Recreational visual receptors who may experience effects are mainly restricted to users of the local PRoW network, users of the Gipping Valley River Path and users of National Cycle Network National Route 51 and Regional Route 48. Overall with careful routeing and siting an OHL route is considered potentially acceptable in landscape and visual terms. Some areas present the potential for a greater level of effects and may necessitate a greater level of mitigation to achieve an acceptable balance. Particular focus being the line entries to Norwich Main and Bramford substations, the routeing through LCA1 as well as a number of properties where limited space for parallel alignments may lead to some properties being positioned between the new and existing line. Routeing may also be challenging near Thornham Hall and Park
Planning	The majority of this option passes through open countryside. The exceptions to this are as follows. In the South Norfolk area, there are two parcels of land immediately to the west and south of the Norwich main substation which are allocated for sand and gravel extraction (Policy MIN 80 and MIN 79). Also in the South Norfolk Area in Section A and Section B the route passes through a River Valleys Landscape Character Area where all development should respect, conserve and where possible, enhance the landscape character of its immediate and wider environment. In the Mid-Suffolk area it should be noted that on the eastern edge of Stowmarket the emerging plan has identified a mixed use development of 52 hectares. This appears to fall just outside the corridor. In terms of the Holford Rules, this option avoids major areas of highest amenity value (Holford Rule 1) and also avoids smaller areas of highest amenity value and scientific interest (Holford Rule 2). This option has higher potential for deviation (Holford Rule 3) to avoid constraints compared to Option NB1 and NB4. This option could be defined to meet the requirements of Holford Rule 4 (choose tree and hill backgrounds). This option avoids ancient woodlands (Holford Rule 5). In terms of Holford Rule 6 (avoiding a concentration of wirescape) this option has the potential to result in a concentration of wirescape due to the intervisibility with existing 400kV and 132kV high voltage lines. Holford Rule 7 (approach urban areas through industrial zones) does not apply to this option as it does not pass close to industrial areas.

Sub Topics	Main risks, constraints and opportunities
	In terms of the Supplementary Notes to the Holford Rules, this option has been designed to avoid routeing close to residential areas as far as possible (Supplementary Note 1). However, due to its convergence and divergence with the existing 4YM route, it has the greater potential to result in higher levels of effect on general residential amenity than Options NB1 and NB4. In terms of Supplementary Note 2 (avoiding designations of County, District and Local Value) this option does pass through locally protected landscape character areas. The consideration of alternative pylon designs (Supplementary Note 3 to the Holford Rules) follows later in the mitigation hierarchy and can be considered once an alignment has been established and an assessment undertaken to establish whether alternative pylon designs are needed. With careful route alignment and siting of pylons, it should be possible with this corridor option to minimise negative impacts on the gravel extraction allocation south of the Norwich main substation and avoid altogether the proposed eastern expansion of Stowmarket. The overall assessment is that an acceptable solution in terms of planning can be accommodated
Overall Environmental and Planning risk: The summary environmental implications of this option are that effects on ecology would be neutral subject to mitigation. There is a risk that from a landscape and visual perspective adverse effects could arise particularly in Section A, C and D with potential for a number of residential properties to be between (with limited separation) new and existing line. Normal routeing and siting is expected to be able to achieve an acceptable solution in many cases though this becomes more challenging in section D.. There are not expected to be any planning policy matters that would preclude routeing within this corridor. The potential impacts on a number of high value historic environment receptors also present a constraint to routeing in this corridor and may require measures beyond normal routeing and siting. Overall this corridor is less preferred to NB1.	

Socio-economics	**Main risks, constraints and opportunities**
Economic activity	The corridor would affect High Oaks Residential Care Home, Diss Golf Club, Melis Primary School (part of school grounds within corridor), Thornham Park (country park, tourist attraction).
Overall Socio-economic impact: There is potential for the proposed infrastructure within the route corridor to interact with various existing, or proposed, commercial land-uses (e.g golf courses) as well as social care and education establishments within or in proximity to the corridor. Whether or not there is a material effect on such activities or land-uses depends on detailed routeing and siting, and will also include consideration of potential mitigation and engagement with relevant parties. Affected parties may also be entitled to compensation, assessed in line with the Compensation Code. On this basis, at this route corridor stage, the presence of such land-uses is not in itself considered to be a barrier to or determinative for route corridor selection.	

Technical	**Main risks, constraints and opportunities**
Technical	Challenging routeing in Sections A – E due to various constraints within the corridor, predominantly residential properties, listed buildings and built-up areas. Narrow and constrained sections of corridor that are very challenging for routeing are present in Sections A – C, particularly near Flordon and Stuston. Electrified railways and multiple Distribution Network Operator assets to be overcome. There is the opportunity in one instance for an existing 132kV overhead line route to be utilised for the proposed new 400kV overhead line.
Overall Technical impact: The use of an overhead line is envisaged for all sections of this corridor, which is deemed low risk in terms of technical complexity. Option NB5 generally offers moderate technical challenges due to residential properties, listed buildings, farm complexes and the crossing of existing rail and road	

Sub Topics	Main risks, constraints and opportunities
infrastructure. Routeing becomes very challenging at Flordon and Stuston Golf Course, which offer areas of no routeing flexibility and increased construction, delivery and future maintenance complexity. Multiple Distribution Network Operator assets require mitigation.	
Cost	
Capital Cost	£261m

Topic Baseline Overview For Hybrid Option NB6 – Yellow into Pink into Green

Sub Topics	Main risks, constraints and opportunities
Environment	
Ecology/biodiversity	The main risks and constraints in this section arise from nationally designated sites; Pulham Market Big Wood AW SSSI (Section B), notified for AW coppice with standards oak alder / ash maple woodland and meadow habitats. Hoxne Brick Pit (geological) is also present (Section C). Lingwood Meadows/Earl Stonham SSSI (Section D), the Barking Woods' SSSI (Section E, Option NB1) (incorporating Barn Grove, Priestley, Bonny/Round, Swingen's, Titley Hill, and Ditch Ancient woods); Several blocks of ancient woodland are present. One Local Nature Reserve (LNR) Smockhill Common (woodland) (Section A) in the corridor and adjacent. CWS and Priority Habitats are also present. *Construction* There would be no direct effects on the SSSI or the AW as they are outside the corridor, although there could be potential temporary/permanent indirect effects on the SSSI/AW habitat. Given the importance and weighting in planning and legal terms of such designated biodiversity and to AW, they thus remain a potentially significant material constraint to development. There is potential for permanent/temporary direct effects on CWS/Priority Habitats including loss of habitat, fragmentation and disturbance during construction. *In Operation* there is potential for temporary indirect effects during operation from maintenance visits, and some, albeit limited risk of bird collision (though not for designated sites) given wetland habitats/rivers in the vicinity. The floodplain associated with the River Dove/Waveney (and tributaries) may increase risk of bird collision. *Opportunities:* To support partnerships for Environmental Gain Overall it is considered that for ecology / biodiversity Scheme elements can be located in the area being appraised, and with normal routeing and siting practices applied are considered likely to be acceptable with standard construction mitigation measures
Historic Environment	The principal risks in this section arise from the dispersed historic settlement pattern that has resulted in the survival of substantial numbers of listed buildings, including highly graded churches which are widely scattered across the landscape rather than concentrated in historic village cores. This means that it would be difficult to avoid all significant adverse effects, although design could be used in most cases to minimise the number of assets affected. The weighting given to harm to designated heritage assets is such that these present a significant constraint to development. The potential presence of archaeological remains is not considered to be a differentiating factor. This potential will be more fully considered during subsequent phases of design to ensure that effects on archaeological remains and constraint to design, consent and delivery can be better understood and managed. A particular focus of constraint are sections A and D. In Section A it is likely that routeing (except the use of cables installed by HDD) would be difficult to justify in the planning balance as a result of the need to unavoidably cross a core area of the Shotesham Conservation Area. In Section D the corridor is highly constrained as a result of the large number and dispersed pattern of listed buildings, some associated with scheduled monuments. But an acceptable balance may be possible through routing and siting and mitigation in this area to minimise adverse effects.

Sub Topics	Main risks, constraints and opportunities
	The overall assessment of the effect of this route section on the historic environment is that it is less preferred than options which don't use this northern corridor due to the potential constraint presented by the unavoidable (without diversion inconsistent with Holford Rules) Shotesham Conservation Area.
Landscape and Visual	**Landscape** Section A. An additional line entry to Norwich Main substation may have the potential to give rise to cumulative wirescape effects in relation to South Norfolk Landscape Character Area B1(Tas Tributary Farmland – within which the substation is located). However, this LCA is assessed as being of medium sensitivity to the introduction of 400kV OHL and, given the limited number of lines that currently converge at Norwich main, it is not considered likely that these effects would be significant. This option would pass through a substantial part of the locally protected LCA A1 to the south-east of Norwich Main and would recross the same LCA in the vicinity of Tasburgh. Whilst a route within this section of the corridor may be acceptable if significant adverse effects on LCA A1 could be avoided, the potential for mitigation is limited by the narrow, linear nature of the LCA and the wooded nature of parts of the LCA (where the loss of valued landscape elements could also be considered significant). Section B. This section of the corridor would pass through South Norfolk LCAs B1 (Tas Tributary Farmland), B4 (Waveney Tributary Farmland) and E2 (Great Moulton Plateau Farmland). All these LCAs are assessed as having a medium sensitivity to the introduction of a 400kV OHL, though the Plateau Farmland LCA is assessed as borderline high, while the Tributary Farmland LCAs are assessed as borderline low. Section C. This section of the corridor would pass through South Norfolk LCA B4 (Waveney Tributary Farmland), which is assessed as having a medium (borderline low) sensitivity to the introduction of a 400kV OHL. The corridor would also cross South Norfolk LCA A5 (Waveney Rural River Valley), which is afforded special protection in the South Norfolk Local Plan. LCA A5 is a narrow, linear LCA with an east/ west alignment, that must be crossed by all options. The length of any route associated with this option within LCA A5 would be between approximately 0.4km and 1km. To the south of the River Waveney, the corridor would pass through Suffolk Landscape Character Types (LCTs) Wooded valley meadowlands and fens, Rolling valley farmlands and furze and Rolling valley claylands. Two of these Suffolk LCTS are assessed as having a medium sensitivity to the introduction of a 400kV OHL, with the Rolling valley claylands LCT being assessed as low sensitivity. Section D. This section of the corridor would pass through Suffolk Landscape Character Types (LCTs) Ancient plateau claylands, Plateau claylands, Rolling valley claylands, Rolling valley farmlands and furze, Ancient estate claylands and Rolling estate farmlands. Ancient plateau claylands, Ancient estate claylands and Rolling valley farmlands and furze are assessed as having a medium sensitivity to the introduction of a 400kV OHL, while the Rolling valley claylands and Rolling estate farmlands LCTs are assessed as low sensitivity and the Plateau claylands LCT is assessed as high (borderline medium) sensitivity. Section E. This section of the corridor would pass through Suffolk Landscape Character Types (LCTs) Rolling valley farmlands and furze, Valley meadowlands, Ancient plateau claylands and Rolling valley farmlands. Ancient plateau claylands, Rolling valley farmlands and furze and Rolling valley farmlands are assessed as having a medium sensitivity to the introduction of a 400kV OHL, while Valley meadowlands LCT is assessed as medium (borderline high) sensitivity. The Ancient plateau claylands LCT could be subject to significant adverse effects due to the increased density and extent of wirescape, which, in combination with the proposed solar farm, could alter its key characteristics. **Visual** Section A. Visual effects are likely to be experienced by residents of Saxlingham, Nethergate and of the smaller settlements and farmsteads within and close to the corridor. Recreational visual receptors who may experience effects include visitors to Dunston Hall hotel and golf course and potentially users of a section of the Boudica Way

Sub Topics	Main risks, constraints and opportunities
	Section B. Visual effects are likely to be experienced by residents of Long Stratton, Pulham Market, Pulham St. Mary and of the smaller settlements and farmsteads within and close to the corridor. Between Pulham Market and Pulham St. Mary the corridor is restricted to a width of ~500m, meaning that the line would have to pass within ~250m of residences. Recreational visual receptors who may experience effects are mainly restricted to users of the local PRoW network and users of a substantial section of the Boudica Way. Section C. Visual effects are likely to be experienced by residents of Upper Street, Thorpe Abbotts, Hoxne, Cross Street and of the smaller settlements and farmsteads within and close to the corridor. Recreational visual receptors who may experience effects are mainly restricted to users of the local PRoW network, users of the Angles Way and users of National Cycle Network Regional Route 30 Section D. Visual effects are likely to be experienced by residents of Stoke Ash, Thwaite, Mendlesham, little Stoneham, Earl Stoneham and of the smaller settlements and farmsteads within and close to the corridor. To the east of Earl Stoneham the corridor is restricted to a width of ~200m between residences, meaning that the line would have to pass within ~100m of residences. Recreational visual receptors who may experience effects are mainly restricted to users of the local PRoW network, users of the Mid Suffolk Footpath and users of the Heart of Suffolk Regional Cycle Route and National Cycle Network Regional Route 30 Section E. Visual effects are likely to be experienced by residents of the south-eastern edge of Needham Market, Somersham, Flowton and the smaller settlements and farmsteads within and close to the corridor. To the east of Somersham the corridor is restricted to a width of ~250m between residences, meaning that the line would have to pass within ~125m of residences. Recreational visual receptors who may experience effects are mainly restricted to users of the local PRoW network, users of the Gipping Valley River Path and users of National Cycle Network National Route 51 and Regional Route 48 Overall with careful routeing and siting an OHL route is considered potentially acceptable in landscape and visual terms. Some areas present the potential for a greater level of effects and may necessitate a greater level of mitigation to achieve an acceptable balance. Particular focus being the line entries to Norwich Main and Bramford substations and the routeing through LCA1 and potentially LCA5.
Planning	The majority of this corridor option passes through open countryside. It should be noted that in the South Norfolk area, there are two parcels of land immediately to the west and south of the Norwich main substation which are allocated for sand and gravel extraction (Policy MIN 80 and MIN 79. Also in the South Norfolk Area in Section A the route passes through a River Valleys Landscape Character Area where all development should respect, conserve and where possible, enhance the landscape character of its immediate and wider environment. In the South Norfolk Area there is an allocation for a mixed-use development on the east and south-east edge of Long Stratton which the Option NB4 corridor passes over. This allocation will accommodate approximately 1,200 dwellings and 8 hectares of employment land. With normal routeing and siting principles applied, it should be possible with this corridor option to minimise negative impacts on the gravel extraction allocation south of the Norwich main substation, and at Barham in Mid Suffolk and avoid the housing allocation at Long Stratton In terms of the Holford Rules, this option avoids major areas of highest amenity value (Holford Rule 1) and also avoids smaller areas of highest amenity value and scientific interest (Holford Rule 2). This Option has higher potential for deviation (Holford Rule 3) to avoid constraints compared to Option NB1 and NB4. This option could be defined to meet the requirements of Holford Rule 4 (choose tree and hill backgrounds). This option avoids ancient woodlands (Holford Rule 5). In terms of Holford Rule 6 (avoiding a concentration of wirescape) this option has the potential to result in a concentration of wirescape due to the intervisibility with existing 400kV and 132kV high voltage lines. Holford Rule 7 (approach urban areas through industrial zones) does not apply to this option as it does not pass close to industrial areas.

Sub Topics	Main risks, constraints and opportunities
	In terms of the Supplementary Notes to the Holford Rules, this option has been designed to avoid routeing close to residential areas as far as possible (Supplementary Note 1). In terms of Supplementary Note 2 (avoiding designations of County, District and Local Value) this option does pass through locally protected landscape character areas. The consideration of alternative pylon designs (Supplementary Note 3 to the Holford Rules) follows later in the mitigation hierarchy and can be considered once an alignment has been established and an assessment undertaken to establish whether alternative pylon designs are needed. Overall it is expected that an acceptable route alignment complying with the Holford Rules can be achieved.
Overall Environmental and Planning risk: The summary environmental implications of this option are that effects on ecology would be acceptable subject to mitigation. There are not expected to be any planning policy matters that would preclude routeing within this corridor. However, from an historic environment perspective the corridor crosses a core area of the Shotesham Conservation Area presenting substantive challenge albeit potentially addressed through the adoption of HDD technology. In addition, in Section D the corridor affects listed buildings, some associated with scheduled monuments, meaning that it would be difficult to avoid numerous significant adverse effects. In landscape and visual terms the route through Section A is likely to have effects on the LCA and due to the narrow width of the corridor, the opportunity for mitigation is limited. Whether a route in this section could be consentable even if significant effects are sustained by LCA A1 is likely to be strongly influenced by whether it is possible to demonstrate that no alternative route is available.	
Socio-economics	**Main risks, constraints and opportunities**
Economic activity	The corridor contains the following socio-economic receptors: Dunston Hall Golf Club, The Hollies Care Home,
Overall Socio-economic impact There is potential for the proposed infrastructure within the route corridor to interact with various existing, or proposed, commercial land-uses (e.g golf courses) as well as social care establishments within or in proximity to the corridor. Whether or not there is a material effect on such activities or land-uses depends on detailed routeing and siting, and will also include consideration of potential mitigation and engagement with relevant parties. Affected parties may also be entitled to compensation, assessed in line with the Compensation Code. On this basis, at this route corridor stage, the presence of such land-uses is not in itself considered to be a barrier to or determinative for route corridor selection.	
Technical	**Main risks, constraints and opportunities**
Technical	Underground cable to overcome National Grid & Distribution Network Operator assets is required into Norwich Main Substation with utility search needed to confirm extent of existing underground assets. Short section of underground cable required to cross the existing 4YM 400kV National Grid overhead line somewhere in the vicinity of Mendlesham and Earl Stoneham requiring terminal towers & cable sealing end compounds. Multiple Distribution Network Operator assets to be isolated, removed, diverted, or undergrounded in advance of National Grid works and electrified railways to be crossed. Challenging routeing in Sections B – D due to various constraints within the corridor, predominantly residential properties, and listed buildings. Narrow and constrained areas of corridor requiring very challenging routeing in Section E near Darmsden (A14).

Sub Topics	Main risks, constraints and opportunities
Overall Technical impact: Use of an overhead line is envisaged for the majority of the Option NB6; however underground cable is required for line entries to Norwich Main Substation and to cross the existing 4YM 400kV National Grid overhead line in the Mendlesham and Earl Stoneham area. These technologies are deemed low risk in terms of technical complexity. However, the requirement for additional above ground infrastructure (terminal towers and cable sealing end compounds) in addition to the underground cable sections adds technical complexity in the construction and delivery phase.	
Cost	
Capital Cost	£215m

Topic Baseline Overview For Hybrid Option NB7 – Blue-Green-Blue-Green-Blue

Sub Topics	Main risks, constraints and opportunities
Environment	
Ecology/biodiversity	**Section E**: The main risks and constraints in this section arise from national designated sites - the Barking Woods' SSSI (to east) (incorporating Parkwood/Causeway Grove Ancient woods); Middle Wood, Offton SSSI (blue) (incorporating Tollemache Hall Grove and Middle wood Ancient Woods), which have component units that are named ancient woodlands. These are located immediately adjacent and close to the corridor boundary. Notifying features are botanical – ASNW, Ancient Woodland oak-ash standards with field maple and hazel coppice. Hascot Hill Pit SSSI (within 200m of the corridor, ia a geological SSSI only. Other Ancient Woodlands are in the corridor (surrounded by it) adjacent. Priority habitats are also identified across the corridor and adjacent. All Sections have WFD/Main watercourses. **For all Sections**: *Construction* There would be no direct effects on the SAC, SSSI or the AW as they are all outside the corridor, although there could be potential temporary/permanent *indirect effects on the SAC* (Section A) qualifying habitat features (e.g. through changes to hydrology/pathway for effects). However, given the importance and weighting in both planning and legal terms of such designated biodiversity and to AW (in respect of potential indirect effects), they thus remain a potentially significant material constraint to development. There is potential for permanent/temporary direct effects on Priority Habitats including loss of habitat, fragmentation and disturbance during construction. *Operation* there is potential for temporary indirect effects during operation from maintenance visits, and some, albeit limited risk of bird collision (though not for designated sites) given wetland habitats/rivers in the vicinity. *Opportunities*: To support partnerships for Environmental Gain **For All Sections:** Overall the corridor is expected to be capable of supporting an acceptable alignment subject to normal routeing and siting practices being adopted. There would be a requirement for HRA process to be undertaken in relation to the SAC *in Section A* – given that there is a direct pathway for effects to occur via the River Tas. This is conducted in the absence of mitigation, though it should be noted that such mitigation would be best practice and standard CoCP. N.B: In relation to the Norfolk Valley Fens SAC, at this stage of assessment, and in the absence of detailed consultation or survey data, it is expected that the design process – and subsequent embedded best practice, have the potential to eliminate such LSEs. In this circumstance, and the absence of better alternatives, a NSER would be expected to be completed .
Historic Environment	The principal consent risks in this hybrid arise from the dispersed historic settlement pattern that has resulted in the survival of substantial numbers of listed buildings, including highly graded churches which are widely scattered across the landscape rather than concentrated in historic village cores.

Sub Topics	Main risks, constraints and opportunities
	Between Bramford and the A14, there are numerous individual Grade II listed buildings within the hybrid option. These will present a degree of constraint. Similarly, design will need to be sensitive to the listed buildings close to the hybrid option to ensure that significant adverse effects are avoided, with priority given to particularly sensitive heritage assets including more highly graded assets. There is a large group of listed buildings at and around Earl Stonham and Little Stonham, including the Grade I listed Churches of St Mary the Virgin, Earl Stonham, and a number of more sparsely scattered Grade II listed Buildings. The route is likely to be heavily constrained in this area. There are a small number of listed buildings in this option area between the Stonhams and Mellis; mostly listed at Grade II but including the Grade I listed Church of St Andrew, Whickham Skeith. Taken with further listed buildings to either side of the hybrid option and the Whickham Skeith Conservation Area, these buildings would constrain design. The Mellis Conservation area and the listed buildings within it present a significant constraint, but it appears likely that there is sufficient room within the identified corridor to identify a consentable design. There are groups of listed buildings at Wortham, including the Grade I listed Church of St Mary the Virgin Wortham, and at Tivetshall St Margaret (including the Grade I listed Church at Tivetshall St Margaret) and around the Grade II* listed Flordon Hall, which appear likely to constrain design, although it appears unlikely that these would present significant risks to consent. The potential presence of archaeological remains is not considered to be a differentiating factor between routes. This potential will be more fully considered during subsequent phases of design to ensure that effects on archaeological remains and constraint to design, consent and delivery can be better understood and managed. Overall it would be difficult to avoid all significant adverse effects, although design could be used in most cases to minimise the number of assets affected. The weighting given to harm in planning and legal terms to designated heritage assets is such that these present a significant constraint to development to be judged in the planning balance but which with appropriate routeing, siting and mitigation could be acceptable.
Landscape and Visual	**Landscape** Section A (including link to Section B). An additional line entry to Norwich Main substation may have the potential to give rise to cumulative wirescape effects in relation to South Norfolk Landscape Character Areas B1(Tas Tributary Farmland – within which the substation is located) and D1(Wymondham Settled Plateau Farmland). However, both these LCAs are assessed as being of medium sensitivity to the introduction of 400kV OHL and, given the limited number of lines that currently converge at Norwich main, it is not considered likely that these effects would be significant. The linking section to Section B would traverse a small section of LCA A1 (Tas Rural River Valley), which is afforded special protection in the South Norfolk Local Plan (Policy DM4.5). Section B. This section of the corridor would pass through South Norfolk LCAs B1 (Tas Tributary Farmland), B4 (Waveney Tributary Farmland) and E2 (Great Moulton Plateau Farmland). All these LCAs are assessed as having a medium sensitivity to the introduction of a 400kV OHL, though the Plateau Farmland LCA is assessed as borderline high, while the Tributary Farmland LCAs are assessed as borderline low. The corridor skirts the eastern edge of the locally protected LCA A1to the north of Forncett St. Mary. Section C. This section of the corridor would pass through South Norfolk LCA B4 (Waveney Tributary Farmland), which is assessed as having a medium (borderline low) sensitivity to the introduction of a 400kV OHL. The corridor would also cross South Norfolk LCA A5 (Waveney Rural River Valley), which is afforded special protection in the South Norfolk Local Plan. LCA A5 is a narrow, linear LCA with an east/ west alignment, that must be crossed by all options. The length of any route associated with this option within LCA A5 would be approximately 0.8km. To the south of the River Waveney, the corridor would pass through Suffolk Landscape Character Types (LCTs) Wooded valley meadowlands and fens, Rolling valley farmlands and furze and Ancient plateau claylands. All three of these Suffolk LCTS are assessed as having a medium sensitivity to the introduction of a 400kV OHL

Sub Topics	Main risks, constraints and opportunities
	Section D (including link from Section C and link to Section E). This section of the corridor would pass through Suffolk Landscape Character Types (LCTs) Ancient plateau claylands, Plateau claylands, Rolling valley claylands, Rolling valley farmlands and furze and Ancient estate claylands. Ancient plateau claylands, Ancient estate claylands and Rolling valley farmlands and furze are assessed as having a medium sensitivity to the introduction of a 400kV OHL, while the Rolling valley claylands LCT is assessed as low sensitivity and the Plateau claylands LCT is assessed as high (borderline medium) sensitivity Section E. This section of the corridor would pass through Suffolk Landscape Character Types (LCTs) Valley meadowlands, Rolling valley claylands, Ancient plateau claylands and Rolling valley farmlands. Ancient plateau claylands and Rolling valley farmlands are assessed as having a medium sensitivity to the introduction of a 400kV OHL, while the Rolling valley claylands LCT is assessed as low sensitivity and the Valley meadowlands LCT is assessed as medium (borderline high) sensitivity. Both the Ancient plateau claylands and, to a lesser extent, the Rolling valley farmlands LCTs could be subject to significant adverse effects due to the increased density and extent of wirescape, which, in combination with the proposed solar farm, could alter their key characteristics **Visual** Section A. Visual effects are likely to be experienced by residents of Hapton and of the smaller settlements and farmsteads within and close to the corridor. There are few recreational visual receptors other than users of the local PRoW network. The linking section to Section B would not result in any residents being surrounded in close proximity by OHL. Section B. Visual effects are likely to be experienced by residents of Bustard's Green, although the proposed realignment of 4YM to the west of this settlement will avoid the potential for residents to be surrounded by OHL. The proposed transposition of the new line and 4YM between Great Moulton and Bridge Green will minimise impacts for residents of Great Moulton, Sneath Common and Hall Green. The linking section to Section C will result in potentially significant adverse visual effects for residents of Bridge Green and Burston, but it is noted that both of these settlements benefit from a strong resource of mature trees. The linking section to Section C would not result in any residents being surrounded in close proximity by OHL. Recreational visual receptors who may experience effects are mainly restricted to users of the local PRoW network. Section C. Visual effects are likely to be experienced by residents Bressingham Common, Snow Street, Wortham and of the smaller settlements and farmsteads within and close to the corridor. Between Bressingham Common and Snow Street the corridor is restricted to a width of ~250m, meaning that the line would have to pass within ~125m of residences. Recreational visual receptors who may experience effects are mainly restricted to users of the local PRoW network, users of the Angles Way and visitors to Wortham Ling SSSI, which has a dense network of footpaths Section D (including link from Section C and link to Section E). Visual effects are likely to be experienced by residents of Thornham Magna, Wickham Skeith, Mendlesham Green, Forward Green, Creeting St. Mary and of the smaller settlements and farmsteads within and close to the corridor. In the vicinity of Creeting St. Mary the corridor is restricted to a width of ~200m between residences, meaning that the line would have to pass within ~100m of residences. The proposed transposition of 4YM between Mendlesham Green and Creeting St. Mary avoids the potential for several properties to be surrounded in close proximity by OHL, albeit that they would still be in close proximity to two lines. Where the linking sections approach 4YM, in the vicinity of Thornham Magna in the north and between Creeting St. Mary and Earl Stonham in the south, there is the potential for residential properties to be in relatively close proximity to OHLs in two directions. At Thornham Magna, whilst significant adverse visual effects are likely to be experienced, all properties would be at least 400m from one of the lines and it is therefore considered that no residents would experience a sense of being surrounded by OHL to the extent that it would affect their residential amenity. Between Creeting St. Mary and Earl Stonham, there are several properties where both lines would be between 250m and 300m away, and others where 4YM would be within 100m and the new line within 300m. As a result, there is a low potential for some of these residents to experience adverse effects on their residential amenity.

Sub Topics	Main risks, constraints and opportunities
	Recreational visual receptors who may experience effects are mainly restricted to users of the local PRoW network, whilst visitors to nearby Thornham Hall and park are likely to benefit from the dense tree cover in that area. Section E. Visual effects are likely to be experienced by residents of the north-western edge of Needham Market, Barking, Ringshall Stocks, Willisham, Flowton the smaller settlements and farmsteads within and close to the corridor. To the south of Flowton the corridor is restricted to a width of ~250m between residences, meaning that the line would have to pass within ~125m of residences. There is a high potential for residents in the vicinity of Flowton to experience significant adverse cumulative visual effects due to the number of OHL visible in that area. Recreational visual receptors who may experience effects are mainly restricted to users of the local PRoW network, users of the Gipping Valley River Path and users of National Cycle Network National Rout e 51 and Regional Route 48. Overall with careful routeing and siting much of this corridor is considered potentially acceptable in landscape and visual terms for an OHL route. Some areas present the potential for a greater level of effects and may necessitate a greater level of mitigation to achieve an acceptable balance. Particular focus being the line entries to Norwich Main and Bramford substations and the routeing through LCA1. The linking sections between Blue and Green corridors present areas of constraint where there is some potential, subject to alignment, for properties to be positioned with lines closely to each side where the lines converge. Additionally as noted for corridor NB 2 some locations of close paralleling present the potential for a number of properties being positioned between the new and existing line where there is limited space for parallel alignments and transpositions with multiple angles and outage requirements maybe less preferred or unavailable.
Planning	The majority of this option passes through open countryside. The exceptions to this are as follows. In the South Norfolk area, there are two parcels of land immediately to the west and south of the Norwich main substation which are allocated for sand and gravel extraction (Policy MIN 80 and MIN 79). Separately, on the border of Section B & C part of the corridor passes through an area designated as a “Hazardous Installation Consultation Zones” north of Diss and Roydon. These areas are used for handling hazardous substances including high pressure gas and oil pipelines. Development would only be authorised in these areas if the development would not give rise to additional public risk. In terms of the Holford Rules, this option avoids major areas of highest amenity value (Holford Rule 1) and also avoids smaller areas of highest amenity value and scientific interest (Holford Rule 2). This option has higher potential for deviation (Holford Rule 3) to avoid constraints compared to Option NB1 and NB4. This option could be defined to meet the requirements of Holford Rule 4 (choose tree and hill backgrounds). This option avoids ancient woodlands (Holford Rule 5). In terms of Holford Rule 6 (avoiding a concentration of wirescape) this option has the potential to result in a concentration of wirescape due to the intervisibility with existing 400kV and 132kV high voltage lines. Holford Rule 7 (approach urban areas through industrial zones) does not apply to this option as it does not pass close to industrial areas. In terms of the Supplementary Notes to the Holford Rules, this option has been designed to avoid routeing close to residential areas as far as possible (Supplementary Note 1). However, due to its convergence and divergence with the existing 4YM route, it has the greater potential to result in higher levels of effect on general residential amenity than Options NB1 and NB4. In terms of Supplementary Note 2 (avoiding designations of County, District and Local Value) this option does pass through locally protected landscape character areas. The consideration of alternative pylon designs (Supplementary Note 3 to the Holford Rules) follows later in the mitigation hierarchy and can be considered once an alignment has been established and an assessment undertaken to establish whether alternative pylon designs are an appropriate consideration.

Sub Topics	Main risks, constraints and opportunities
	With normal routeing and siting practices adopted an acceptable route should be capable of development including reducing or avoiding negative impacts on the gravel extraction allocation and the Hazardous Installation Consultation Zone. Attention would similarly be expected to consider the potential interactions with the extant 132kV network and potential for wirescape effects. Nonetheless due to the greater changes in direction in the corridor it is somewhat longer and less direct and therefore is considered less compliant with Holford Rules than other options.
Overall Environmental and Planning risk:	
In terms of Ecology, the summary environmental implications of this option are that the corridor would pass in sufficiently close proximity to Norfolk Valley Fens SAC where a potential functionally linked pathway (hydrological linkages) would require careful consideration and introduces the requirement for HRA albeit it is noted that the relevant mitigation is well established and proven to be generally effective. The potential impacts on a number of high value historic environment receptors also present a constraint to routeing in this corridor and may require consideration of mitigation over and above normal routeing and siting. There is a risk that from a landscape and visual perspective adverse effects could arise particularly in Section A, C, D and E. From a planning perspective, due to the multiple changes in direction in the corridor, it is considered less compliant with Holford Rule 3 than other options. Whilst this does provide a degree of differentiation compared to other options, it is not considered to be a factor which would preclude this corridor.	
Socio-economics	**Main risks, constraints and opportunities**
Economic activity	There is a solar farm at Mulburton. Part of the Wortham Airstrip runway is within the corridor. The corridor would also interact with The Faith Mission and Swattesfield Campsite.
Overall Socio-economic impact There is potential for the proposed infrastructure within the route corridor to interact with various existing, or proposed, commercial land-uses (for example solar generation, airfields, campsites etc) within or in proximity to the corridor. Whether or not there is a material effect on such activities or land-uses depends on detailed routeing and siting, and will also include consideration of potential mitigation and engagement with relevant parties. Affected parties may also be entitled to compensation, assessed in line with the Compensation Code. On this basis, at this route corridor stage, the presence of such land-uses is not in itself considered to be a barrier to or determinative for route corridor selection.	
Technical	**Main risks, constraints and opportunities**
Technical	Challenging routeing in Sections A – E due to various constraints within the corridor, predominantly residential properties, listed buildings and built-up areas. A solar farm is also present. Four crossings of the existing 4YM 400kV National Grid overhead line are required to facilitate the sections of close parallel. Necessitating multiple short sections of underground cable (with associated above ground infrastructure) or complex overhead line swap overs (where the existing overhead line swaps over from one side of the existing line to the other). Electrified railways and multiple Distribution Network Operator assets to be overcome.
Overall Technical impact: Option NB7 was developed to facilitate sections of close parallel alignment (where this was potentially least constrained) with the existing 4YM 400kV overhead line. Use of an overhead line is envisaged for majority of the hybrid corridor, which is deemed low risk in terms of technical complexity. However, to facilitate the close parallel sections four crossings of the existing 4YM 400kV overhead line are required. These crossings may be achieved by short sections of underground cable (and associated above ground infrastructure). Or through overhead line swap overs which significantly increase the technical	

Sub Topics	Main risks, constraints and opportunities
design, programme length & risk and construction & delivery complexity. Both options for the four crossings of the existing 4YM overhead line significantly increase the technical design complexity and construction & delivery complexity when compared to all other options. Aside from the four crossings of the existing 4YM overhead line Option NB7 offers moderate technical challenges due to residential properties, listed buildings, farm complexes and the crossing of existing rail and road infrastructure. Multiple Distribution Network Operator assets require mitigation. Due to the nature of the constrained area and the required design to facilitate the four crossings of the existing 4YM overhead line it is likely that a higher proportion of angle pylons would be required. Overall, from a technical perspective, the benefits of this close parallel option were deemed to have been outweighed by the added technical complexity involved in implementing the crossings of the existing 4YM overhead line required to facilitate this option.	
Cost	
Capital Cost	£188m

Appendix B
Bramford to East Anglia Connection Topic Baseline Overviews

These overviews (appendices A, B, C and D present baseline data for the appraisal topics relevant to each of the corridor sections being appraised. A topic specific judgement based on professional judgement is also provided to aid understanding of the likely acceptability of the corridor and as appropriate noting its relative topic preference or not over other corridors.

The main CPRSS draws these potentially competing perspectives together to make a balanced selection of a preferred connection corridor.

Topic Baseline Overview For Section A

Sub Topics	Main risks, constraints and opportunities
Environment	
Ecology/biodiversity	The main risks and constraints in this section arise from international and national designated sites – Special Protection Area (SPA) / Ramsar – the Stour and Orwell Estuaries: Cattawade Marshes SSSI (part of above SPA); Five blocks of Ancient Woodland (ASNW & PAWS) (Bullen, Round, Burstall, Brimlin and unnamed wood at Wenham Road.). The area also contains One County Wildlife Site (CWS) marshes on the Washbrook at Pigeons Lane. Several priority habitats are also identified across the sections and adjacent, including lowland broadleaved woodland, traditional orchard, floodplain grazing marsh, semi-improved grassland, lowland meadow, lowland dry acid grassland, and wet species rich grassland. Several WFD watercourses/ Rivers are crossed – Stour, Dedham Old River, Washbrook, Spring Brook, plus unnamed watercourse and ponds. *Construction*: The SPA (and its supporting SSSIs) is in, and immediately adjacent to the section, and mobile species and the designations could be subject to both direct and indirect effects. There would be no direct effects on the AW as they are outside the section. However, given the importance and weighting in both planning and legal terms of such designated biodiversity and to AW (in respect of potential indirect effects), they remain a potentially significant material constraint to development. There is potential for permanent/temporary direct effects on Priority Habitats including loss of habitat, fragmentation and disturbance during construction. In *Operation* there is potential for temporary indirect effects during operation from maintenance visits, and risk of bird collision (connected with designated site populations) given wetland habitats/rivers in the vicinity. Opportunities: To support partnerships for Environmental Gain Overall based on a scheme comprised of OHL with underground cable through the AONB it is concluded that the scheme has the potential to be located in the area being appraised, and acceptable though, until further surveys and consultation are undertaken, there remains potential for a negative impact on the International / National Site designations and on a CWS. There is expected to be a requirement for HRA process to be undertaken (conducted in the absence of mitigation). In the absence of the data that would be required to establish a firm conclusion in respect of AEoSI beyond scientific doubt, and of stakeholder opinion on that data, this is assessed as one of the most constrained sections (alongside B) of all connection options for biodiversity (B, C, D, E, F & H) in the Bramford to Colchester North area. On that basis, if better (the more western sections) alternatives are available, they should be preferred.
Historic Environment	The corridor contains generally scattered listed buildings, including the Grade II* listed Church of St Mary, Little Bromley. There are numerous listed buildings and a scheduled monument SW of Lawford and the section contains part of the Lawford Conservation Area. Dedham conservation area – historic landscape character likely to be very highly valued here due to historical associations with Constable (though not formally designated). This section passes close to the highly graded and very sensitive group of buildings at Flatford Mill that are the centrepiece of many John Constable paintings. There is a concentration of Grade II listed buildings at Wenham Place, Great Wenham, Little Wenham and more highly graded structures at Little Wenham Hall, including the Grade I listed and SM Wenham Castle, Grade I listed Church of St Lawrence, Grade II* listed barn. Fairly clear N of Wenham.

Sub Topics	Main risks, constraints and opportunities
	The potential presence of archaeological remains is not considered to be a differentiating factor between overhead line sections between corridors. This potential will be more fully considered during subsequent phases of design to ensure that effects on archaeological remains and constraint to design, consent and delivery can be better understood and managed, particularly in areas where an overriding consent requirement for cabling is identified (such as if a route through the AONB is preferred. There is a high potential for multiple significant adverse effects in the very sensitive landscape between Dedham and Lawford. This suggests that this presents significant consent risks for an overhead line solution and policy guides to the adoption underground cables if such routes are taken forward. An underground solution is likely to give rise to significant adverse effects through change to setting during construction, although with careful design, these effects would be of limited duration and largely reversible. Disturbance of archaeological remains would be greater, however, and it is likely that a significant requirement for survey to support consenting and post-consent mitigation would arise. There is a potential for significant adverse effects on the Flatford Mill group of Grade II* and Grade I listed buildings arising through change to setting, which would present a consent risk. The section may provide sufficient flexibility to minimise some significant adverse effects, but in practice any route would be at least significantly constrained as a result of the sensitivity and distribution of heritage assets in this area. It appears unlikely that significant adverse effects on the group of grade II listed buildings and scheduled monument west of Lawford could be avoided, and significant adverse effects may also arise on Lawford Conservation Area and the listed buildings south of Little Bromley. Interface with existing and proposed overhead line infrastructure would need to be carefully managed, particularly to the west of Lawford and near Chattisham in order to minimise the potential for significant adverse cumulative effects. The overall assessment of the effect of this route section on the historic environment is that it has potential to be acceptable with the use of underground cable within the AONB though is expected to be substantially constrained and may be less preferred than corridors further from the Flatford Mill group of assets.
Landscape and Visual	**Landscape** **Section A North (common to corridors A & B)** There is high potential for the development of a 400kV OHL within this section to give rise to significant adverse effects on local landscape character in combination with the existing NG and DNO assets that converge at Bramford substation. This is because it is possible that this landscape has reached its capacity to accommodate such infrastructure. Development of a 400kV OHL within this section would be in conflict with saved policies CR04 and CR05 (Special Landscape Areas) of the Babergh Local Plan 2006 as approximately the northernmost 3.5km of this section within Babergh District is within an area identified as an SLA. **Section A Central (to southern boundary of the Dedham Vale AONB)** There is a low potential for the development of a 400kV OHL to the north of the Dedham Vale AONB to give rise to significant adverse effects on local landscape character in combination with the existing 132kV OHL located between approximately 0.25km and 2km to the east. Any sealing end compounds required to the north or south of the Dedham Vale AONB must be located sufficiently far from the plateau edge so as to avoid significant adverse effects on the special qualities and key characteristics of the AONB. This section passes in close proximity to some of the most popular areas of the AONB (e.g. Dedham riverside, which straddles the south-western boundary of the section, and Flatford Mill, which is located approximately 125m to the north-east) and there is potential that construction activities associated with the introduction of a UGC may, notwithstanding their temporary nature, give rise to significant adverse effects on the

Sub Topics	Main risks, constraints and opportunities
	special qualities and key characteristics of the AONB identified in the Dedham Vale AONB Management Plan (e.g. by intruding upon views associated with the paintings of John Constable). **Section A South (from the southern boundary of the Dedham Vale AONB to the EAC substation** Any sealing end compounds required to the south of the Dedham Vale AONB must be located sufficiently far from the boundary of the AONB so as to avoid significant adverse effects on the special qualities and key characteristics of the AONB. As the southern boundary of the AONB in this vicinity is itself located to the south of the plateau edge, this distance is unlikely to be in excess of 1km. It is noted that a connection to EAC Zone B may pass between approximately 2km and 3km of the southern boundary of the Suffolk Coast and Heaths AONB. However, the location of EAC Zone B approximately 2km from the northern plateau edge should result in a connection to this zone benefitting from reduced intervisibility with the coastal areas within the AONB. If the connection is to be made to EAC Zones A or B, there is potential for a 400kV OHL to give rise to significant adverse effects on local landscape character in combination with the two 132kV OHLs that converge on Lawford 132kV substation from the north in this area. If the connection is to be made to EAC Zones B or C, there is potential for a 400kV OHL to give rise to significant adverse effects on local landscape character in combination with the north-western section of the 132kV OHL that traverses the Tendring peninsula between Lawford and Holland Road 132kV substations. **Visual** **Section A North (common to corridors A & B)** Potential significant cumulative effects in combination with 4YL and BTNO for residents of Burstall and in combination with 132kV OHL for scattered properties within the section. **Section A Central (to southern boundary of the Dedham Vale AONB)** Potential significant visual effects in combination with 132kV OHL for residents of Capel St Mary and East Bergholt. Potential significant non-cumulative visual effects for residents of numerous scattered properties within and adjacent to the section. Potential significant adverse construction period visual effects for recreational receptors within the Dedham Vale AONB **Section A South (from the southern boundary of the Dedham Vale AONB to the EAC substation** Potential significant adverse non-cumulative and cumulative (in combination with 132kV OHL) visual effects for residents of Little Bromley and a small number of scattered properties within and adjacent to the section. Fewer residents would be affected if connecting to EAC Zone A than to EAC Zones B or C. Overall with careful routeing and siting and assuming the use of cable through the AONB, a connection by this corridor route is considered capable of being acceptable in landscape and visual terms, though is less preferred than the most westerly cable section alignment through the AONB. Some areas present the potential for greater level of effects and may necessitate a greater level of mitigation to achieve an acceptable balance. Areas for particular focus being the line entries to Bramford, the siting of CSE's for the cable section through the AONB being appropriate to reduce effects on setting to acceptable level, and subject to EAC substation siting the potential for cumulative effects with existing 132kV infrastructure and potentially also associated with effects on the setting of the /Suffolk Coast and Heaths AONB.
Planning	The majority of this section passes through open countryside, with a limited number of scattered residential properties and farmsteads/agricultural buildings located within the section, all of which could be avoided through detailed routeing in accordance with the Supplementary Notes of the Holford Rules.

Sub Topics	Main risks, constraints and opportunities
	Approximately a 6 kilometre stretch of the section, between East Bergholt and Lawford is located within the Dedham Vale AONB. Routeing of the OHL through the AONB would be in conflict with Holford Rule 1, however, it is assumed that the use of underground cabling could minimise effects. There are no significant local plan allocations directly affecting the section, which aligns with the Supplementary Notes of the Holford Rules which state that where possible alignment should seek to minimise effects on areas of county, district or local value. However, it should be noted that in the Babergh area, under the emerging local plan there is a 26 hectare mixed use allocation (550 dwellings and 5,000m2 of employment space) extending from the southern boundary of Capel St Mary approximately 0.8 kilometres east of the section. However, it is not anticipated that there would be any effects from the development on this allocation. On the northern edge of East Bergholt, there is an allocation under the emerging local plan for 9ha of housing which would be directly adjacent to the eastern edge of the section at this location. There is also an allocation for 10.6 hectares of housing extending from the north west edge of Sproughton west towards the section (approximately 0.5 kilometres east of the section). Within the Tendring Area, the section would cut across a site to the west of Lawford, which is allocated as a local green gap in the Local Plan. The Local Plan states that such sites should be kept open and free of development. This site is also safeguarded under the emerging Core Strategy. Much of the section would fall within areas of minerals safeguarding (sand and gravel) under the Essex Minerals Local Plan (for the areas of the section falling within Colchester and Tendring) and the Minerals Consultation Area designated under the Suffolk Minerals and Waste Local Plan (section of the section within Babergh area). Safeguarding ensures protection of mineral resources from risk of sterilisation as the result of development. Where areas fall within the Minerals Consultation Area, the district council would need to consult with the county council on the acceptability of any proposed development in this area from a minerals safeguarding perspective. In terms of the Holford Rules, this section would pass through a major area of amenity (Holford Rule 1) the Dedham Vale AONB. This section would also pass through smaller areas of high amenity (Holford Rule 2) at the eastern edge of the Dedham Conservation Area. This section offers the potential for a relatively direct alignment and fewer changes of direction (Holford Rule 3). It is considered that alignments in this section could be defined to meet the requirements of Holford Rule 4 (choose tree and hill backgrounds). This section avoids ancient woodlands (Holford Rule 5). This section has the potential to result in a concentration of wirescape due to the intervisibility with the existing 400kV and 132kV overhead lines that are present in the landscape (Holford Rule 6). Holford Rule 7 (approach urban areas through industrial zones) does not apply to this section due to its rural nature. In terms of the Supplementary Notes to the Holford Rules, this section has been designed to avoid routeing close to residential areas as far as possible (Supplementary Note 1). It is assumed that where the section crosses the AONB, underground cabling would be used to avoid significant effects on the character and special qualities of the AONB, thereby ensuring compliance with Holford Rule 1. The section is considered to be sufficiently wide in the area where it partially crosses the local green gap near Lawford, such that careful routeing and siting of pylons should avoid impacts on this area. In terms of Supplementary Note 2 (avoiding designations of County, District and Local Value) this section avoids local landscape designations but does pass through an area of mineral safeguarding. The consideration of

Sub Topics	Main risks, constraints and opportunities
	alternative pylon designs (Supplementary Note 3 to the Holford Rules) follows later in the mitigation hierarchy and can be considered once an alignment has been established and an assessment undertaken to establish whether alternative pylon designs are needed. It is not considered that siting of pylons would cause significant sterilisation of any mineral resources due to the small pylon footprint, however, careful routeing and siting, and consultation with the relevant minerals planning authorities should help to avoid significant effects. In terms of the allocations at East Bergholt and Sproughton, whilst these would not be a constraint to routeing,
Overall Environmental and Planning risk: The summary environmental implications of this section are that in terms of Ecology this is the most constrained of all sections for this section of the connection. There would be a requirement for HRA process to be undertaken (conducted in the absence of mitigation) and as such, more western sections avoiding such negative effects are preferred. In terms of the historic environment, the potential impacts on a number of high value historic environment receptors also present a constraint to routeing in this corridor. In terms of Landscape and Visual, all sections would be consentable subject to mitigation including undergrounding through the AONB and careful siting of cable sealing end compounds. Subject to undergrounding through the AONB, there are not expected to be any planning policy matters that would preclude routeing in this section.	
Socio-economics	**Main risks, constraints and opportunities**
Economic activity	Bumblebee Children's Charity, Burstall Lane, National Trust Dedham Hall Farm and a Solar farm near Wood Barn Lane are all present within the corridor.
Overall Socio-economic impact: There is potential for the proposed infrastructure within the route corridor to interact with various existing, or proposed, commercial land-uses (for example solar generation, social and educational facilities and similar etc) within or in proximity to the corridor. Whether or not there is a material effect on such activities or land-uses depends on detailed routeing and siting, and will also include consideration of potential mitigation and engagement with relevant parties. Affected parties may also be entitled to compensation, assessed in line with the Compensation Code. On this basis, at this route corridor stage, the presence of such land-uses is not in itself considered to be a barrier to or determinative for route corridor selection.	
Technical	**Main risks, constraints and opportunities**
Technical	Challenging routeing in the Northern Leg due to various constraints within the section, predominantly residential properties, listed buildings and ancient woodlands. Challenging routeing in Southern Leg due to residential properties, listed buildings, farm complexes, woodland blocks, Dedham Vale AONB, A12 dual carriageway, River Stour, electrified railway, large hill south of railway, A137 and a large flood zone. Underground cable technology assumed through the AONB. Horizontal directional drill crossings of the River Stour and electrified railway required Challenging routeing in Southern East Anglia Connection Node Leg due to residential properties, farm complexes, listed buildings, waterbodies, proposed excavation and formation of irrigation reservoir local plan allocation, a meteorological mast, and a wind turbine. Multiple Distribution Network Operator assets to be overcome.
Overall Technical impact: The use of overhead line and underground cable are envisaged for this section, which is considered low risk in terms of technical complexity. The section is moderately constrained by residential properties and similar developed areas in certain places, where flexibility is reduced. Existing rail and road infrastructure is to be crossed and distribution network operator assets are to be mitigated. Local plan allocations, watercourses and flood zones also act to reduce	

Sub Topics	Main risks, constraints and opportunities
flexibility and make routeing challenging. The large, protected area of Dedham Vale (ANOB) requires an extensive cable section (including additional above ground infrastructure), which increases technical complexity, however the directness of this section in routeing to the East Anglia Connection Node is of significant benefit.	
Cost	
End to end options were pieced together from combinations of various sections. The costs for these end to end options are discussed in each chapter under the subtitle "Engineering, system and cost performance of options".	

Topic Baseline Overview For Section B

Sub Topics	Main risks, constraints and opportunities
Environment	
Ecology/biodiversity	The main risks and constraints in this section arise from international and national designated sites – Special Protection Area (SPA) / Ramsar – the Stour and Orwell Estuaries: Cattawade Marshes SSSI (part of above SPA); Three named blocks of Ancient Woodland (ASNW & PAWS) (Bentley Long Wood, Tave/Pedlars Grove, Engry). Several priority habitats are also identified across the section and adjacent to the section boundaries, including floodplain grazing marsh, broadleaved woodland, open water, as well as several WFD watercourses/Rivers crossed – Stour, plus unnamed watercourses. *Construction*: The SPA (and its supporting SSSIs) **is in the section**, and mobile species could be subject to both direct and indirect effects. There would be no direct effects on AW as they are outside the section. Given the importance and weighting in planning and legal terms of such designated biodiversity and to AW in respect of potential indirect effects, they thus remain a potentially significant material constraint to development There is potential for permanent/temporary direct effects on Priority Habitats including loss of habitat, fragmentation and disturbance during construction. In Operation there is potential for temporary indirect effects during operation from maintenance visits, and some, albeit limited risk of bird collision connected with designated site populations and wetland habitats/rivers in the vicinity. Opportunities: To support partnerships for Environmental Gain Overall based on a scheme comprised of OHL with underground cable through the AONB it is concluded that the scheme has the potential to be located in the area being appraised, and acceptable though, until further surveys and consultation are undertaken, there remains potential for a negative impact on the International / National Site designations. There is expected to be a requirement for HRA process to be undertaken (conducted in the absence of mitigation). In the absence of the data that would be required to establish a firm conclusion in respect of AeoSI beyond scientific doubt, and of stakeholder opinion on that data, this is assessed as one of the most constrained sections (alongside A) of all connection options for biodiversity. On that basis, if better alternatives (more western options, further from the international designations) are available, they should be preferred.
Historic Environment	This route generally contains relatively well-dispersed listed buildings, primarily at Grade II. The south end of the section between Lawford CA, which contains Grade I listed Lawford Hall and scheduled monuments (ring ditches SW of Reed Island and Round Barrow W of Lawford Hall. The potential presence of archaeological remains is not considered to be a differentiating factor between overhead line elements of sections. This potential will be more fully considered during subsequent phases of design to ensure that effects on archaeological remains and constraint to design, consent and delivery can be better understood and managed, particularly in areas where an overriding consent requirement for cabling is identified.

Sub Topics	Main risks, constraints and opportunities
	This route generally appears likely to give rise to a limited number of significant adverse effects on mostly Grade II listed buildings where routeing can be used to avoid key constraints. Particular attention should be paid to the treatment of the route at its southern extremity to avoid significant adverse effects on the scheduled monuments and Lawford Conservation Area. Consideration of cumulative effects with existing overhead line infrastructure between Capel and East Bergholt will be necessary to minimise the potential for significant adverse cumulative effects. The overall effect of this route on the historic environment is considered to be capable of being considered acceptable subject to normal routeing and siting practices and adoption of appropriate mitigation.
Landscape and Visual	**Landscape** There is a low potential for the development of a 400kV OHL within the part of this section outside the Dedham Vale or Suffolk Coast and Heaths AONBs to give rise to significant adverse effects on local landscape character in combination with the existing 132kV OHL located within this section. Any sealing end compounds required to the north or south of the Dedham Vale or Suffolk Coast and Heaths AONBs must be located sufficiently far from the plateau edge so as to avoid significant adverse effects on the special qualities and key characteristics of the AONBs. This section passes through the Dedham Vale AONB and the Suffolk Coast and Heaths AONB. Given that the non-designated gap between the two AONBs is less than 500m where it would be impractical to adopt OHL (siting CSEs outside the setting of each with OHL between will be impractical and likely to have greater adverse environmental effects than continued cable between the AONBs), it is assumed that this area would also be made via UGC However, it passes through relatively peripheral areas of both AONBs and does not pass in as close proximity to some of the 'honeypot' areas of the Dedham Vale AONB as does Section A. As a result, it is considered that the temporary construction period effects associated with the introduction of 400kV UGC are likely to be acceptable. **Visual** Potential significant adverse non-cumulative and cumulative (in combination with 132kV OHL) visual effects for residents of Capel St Mary and a small number of scattered properties within and adjacent to the section. Overall with careful routeing and siting and assuming the use of cable through the AONB, a connection by this corridor route is considered capable of being acceptable in landscape and visual terms, and is considered more preferred than cable section A through the AONB due to its greater distance from particularly highly valued parts of the Dedham Vale AONB. Some areas present the potential for greater level of effects and may necessitate a greater level of mitigation to achieve an acceptable balance. Areas for particular focus (in combination with the element sof section A making the connection through to Bramford) being the line entries to Bramford, the siting of CSE's for the cable section through the AONB being appropriate to reduce effects on setting to acceptable level, and, subject to EAC substation siting, the potential for cumulative effects with existing 132kV infrastructure and potentially also associated with effects on the setting of the /Suffolk Coast and Heaths AONB.
Planning	The majority of this section passes through open countryside, with a limited number of scattered residential properties and farmsteads/agricultural buildings located within the section, all of which could be avoided through detailed routeing in accordance with the Supplementary Notes of the Holford Rules. However, the southern end of the section passes through two AONBs (Suffolk Coast and

Sub Topics	Main risks, constraints and opportunities
	Heaths, and Dedham Vale). To avoid significant impacts and to avoid conflict with Holford Rule 1, it is expected that undergrounding of cables would be adopted between appropriately sited CSEs where the section passes through these areas. In the Babergh area, under the emerging local plan there is a 26 hectare mixed use allocation (550 dwellings and 5,000m2 of employment space) extending from the southern boundary of Capel St Mary to approximately 0.2 kilometres west of the section. Whilst this allocation would not be a constraint to routeing, if this site was brought forward there could be effects on views as a result of any routing through this section. The entire part of the section which falls within the Babergh area is located within a Minerals Consultation Area, designated under the Suffolk Minerals and Waste Local Plan (the part of the section within Babergh area), meaning that the district council would need to consult with the county council on the acceptability of any proposed development in this area from a minerals safeguarding perspective. The remaining part of the section (located with the Tendring area) is located within an area of minerals safeguarding (sand and gravel) under the Essex Minerals Local Plan. Safeguarding ensures protection of mineral resources from risk of sterilisation as the result of development, though it is not considered that siting of pylons would cause sterilisation of any mineral resources due to the small footprint of individual pylons, however, careful routeing and siting, and consultation with the relevant minerals planning authorities should help to avoid significant effects. In terms of the Holford Rules, this section would pass through a major area of amenity (Holford Rule 1) the Dedham Vale AONB and the Suffolk Coast and Heaths AONB. It avoids smaller areas of highest amenity value and scientific interest (Holford Rule 2). This section offers the potential for a relatively direct alignment and fewer changes of direction (Holford Rule 3). It is considered that alignments in this section could be defined to meet the requirements of Holford Rule 4 (choose tree and hill backgrounds). This section avoids ancient woodlands (Holford Rule 5). This section has the potential to result in a concentration of wirescape due to the intervisibility with the existing 400kV and 132kV overhead lines that are present in the landscape (Holford Rule 6). Holford Rule 7 (approach urban areas through industrial zones) does not apply to this section due to its rural nature. In terms of the Supplementary Notes to the Holford Rules, this section has been designed to avoid routeing close to residential areas as far as possible (Supplementary Note 1). In terms of Supplementary Note 2 (avoiding designations of County, District and Local Value) this section avoids local landscape designations but does pass through an area of mineral safeguarding. The consideration of alternative pylon designs (Supplementary Note 3 to the Holford Rules) follows later in the mitigation hierarchy and can be considered once an alignment has been established and an assessment undertaken to establish whether alternative pylon designs are needed. Overall it is expected to be possible to minimise any other negative planning impacts through careful route alignment and siting of pylons.
Overall Environmental and Planning risk: The summary environmental implications of this section are that in terms of Ecology, the effects of selecting this section would be negative. There would be a requirement for HRA process to be undertaken (conducted in the absence of mitigation) and as such more western sections are preferred. From a historic environment perspective careful routing in this section should avoid a risk to consent. In terms of Landscape and Visual, this section is considered preferrable to the central section of Section A due to its greater distance from particularly highly valued parts of the Dedham Vale AONB and subject to undergrounding and careful siting of cable sealing end compounds, it is considered that this section is likely to be consentable. Subject to undergrounding through the AONB, there are not expected to be any planning policy matters that would preclude routeing in this section.	

Sub Topics	Main risks, constraints and opportunities
Socio-economics	
Economic activity	Nothing substantial identified.
Overall Socio-economic impact: There are unlikely to be any issues which would present a risk to consent and this route is therefore considered to be acceptable in terms of potential socio-economic effects.	
Technical	**Main risks, constraints and opportunities**
Technical	Challenging routeing in the Northern Leg due to residential properties, farm complexes, industrial areas and the A12 dual carriageway. Reduced flexibility for routeing with increased construction and access volumes. Perpendicular crossing of A12 may limit width of available section Challenging routeing in the Southern Leg due to residential properties, listed buildings, farm complexes, woodland blocks Suffolk Coast and Heaths ANOB, Dedham Vale ANOB and Stour and Orwell Estuaries SSSI and Ramsar, as well as two crossings of the River Stour. Underground cable technology assumed through the AONBs. Horizontal directional drill required for the River Stour crossings. Additional infrastructure (terminal towers and cable sealing end compounds) required for transition from overhead line to underground cable at locations just north and south of the AONB (note southern additional infrastructure located in Section A). Perpendicular crossings confined to within flood zone to the east due to other constraints (horizontal directional drill circa 700-900m required to cross 2x river crossings in tidal area). Unknown constraints could require additional cables to meet rating requirements. Underground cable rating will also be required to match overhead lines. Alternative construction methods to overcome constraints may be required. Increased complexity and construction and access volumes for underground cable section within AONB, SSSI, RAMSAR and Flood Zone. Multiple Distribution Network Operator assets to be overcome.
Overall Technical impact: The use of overhead line and underground cable are envisaged for this section, which is considered low risk in terms of technical complexity. The section is moderately constrained by residential properties and similar developed areas in certain places, where flexibility is reduced. Existing road infrastructure is to be crossed and distribution network operator assets are to be mitigated. The section is more significantly impacted by the River Stour compared to Section A, requiring a longer horizontal directional drill to cross the river twice at a tidal location. The large, protected areas of Dedham Vale and Suffolk Coast and Heaths AONB's require an extensive cable section (including additional above ground infrastructure), which adds technical complexity, with a longer cable route required here than in Section A.	
Cost	
End to end options were pieced together from combination of various sections. The costs for these end to end options are discussed in each chapter under the subtitle "Engineering, system and cost performance of options".	

Topic Baseline Overview For Section AB

Sub Topics	Main risks, constraints and opportunities
Environment	
Ecology/biodiversity	The main risks and constraints in this section arise from international and national designated sites – Special Protection Area (SPA) / Ramsar – the Stour and Orwell Estuaries: Cattawade Marshes SSSI (part of above SPA). There is one County Wildlife Site (CWS) marshes at Sandpits Lane; Several areas of Priority Habitats (Semi improved (SI) grassland, floodplain grazing marsh, purple moor grass and rush pastures, and Dry acid grassland in Higher Level Stewardship (HLS), traditional orchard, deciduous woodland, & ponds/water courses (in section and adjacent) Several WFD watercourses/ Rivers are crossed – Black Brook, River Stour plus others unnamed. Construction: There would be no direct effects on the SPA, SSSI as they at some distance, ~3.5km). Given the importance and weighting in planning and legal terms of such designated biodiversity and to AW in respect of indirect effects, they thus remain a potentially material constraint to development. There is potential for permanent/temporary direct effects on Priority Habitats including loss of habitat, fragmentation and disturbance during construction. In Operation there is potential for temporary indirect effects during operation from maintenance visits, and some, albeit limited risk of bird collision connected to designated sites and given wetland habitats/rivers in the vicinity, particularly in the south. Opportunities: To support partnerships for Environmental Gain Overall in respect of this topic it is concluded that scheme elements can be located in the area being appraised, and are capable of being acceptable subject to normal routeing and siting practices locating them away from specific constraints / receptors. Whilst it is considered likely that effects on downstream designations can be avoided, until further surveys and consultation are undertaken, there remains potential for a negative impact on the International / National Site designations and on a CWS. As a result there would be a requirement for HRA process to be undertaken (conducted in the absence of mitigation). It is however, expected that effects would be notably lower than the eastern sections (A and B) as the land is highly settled, with notable amounts of woodland, and thus likely that only pathway considerations remain since HDD (under watercourses) is applied given location in respect of the AoNB. Subject to the gathering of additional data and consultation with Natural England, it is considered that the implementation of design process incorporating best practice, would ensure no LSEs. In this circumstance a NSER would be expected to be completed .
Historic Environment	There is a dispersed group of listed buildings in the northern part of the section at Holton St Mary and to the west. These are mostly listed at Grade II but include the Grade II* listed Church of St Mary at Holton St Mary. There are relatively few designated heritage assets within this section between crossings of the B1088 and A12, comprising a scheduled cropmark site at King's Wood and a group of Grade II listed buildings at Glebe Farmhouse and Ewens Farmhouse, Langham. There are, however numerous listed buildings immediately adjacent to east and west of this section, including the Grade II* Weavers House, Le Talbooth, St Mary's Church, Higham, and Langham Hall and the Grade I Church of St Mary, Langham as well as the Stratford St Mary Conservation Area.

Sub Topics	Main risks, constraints and opportunities
	To the south-east of the A12, there are two Grade II listed buildings within the section, Boxhouse Farm and Maltings Farm. Listed buildings close to the section are Grade II and relatively well separated. The principal concern in this section is at Holton St Mary, where it appears likely that significant adverse effects would be difficult to avoid, although the number and severity of these effects could be managed through design and routing/siting of any CSEC and overhead line infrastructure. While it is anticipated that lasting change to setting in the most sensitive area between the B1068 and A12 would be avoided in the main by undergrounding within the AONB, care would need to be taken to ensure that any hedgerow and woodland loss (that may be important for the historic environment) is minimised (this should be assisted by the use of HDD in a number of locations) and that any restoration was effective, in particular that planting could be effectively and rapidly restored. The potential presence of archaeological remains is not considered to be a differentiating factor. While undergrounding would present likely significant effects on below-ground archaeological remains, the nature and extent of such remains cannot be accurately predicted in the scope of this study. This potential presence will be more fully considered during subsequent phases of design to ensure that effects on archaeological remains and constraint to design, consent and delivery can be better understood and managed, particularly in areas where an overriding consent requirement for cabling. It is considered that effects could be effectively mitigated though careful routing and an agreed scheme of investigative mitigation. It is anticipated that careful routing and siting of any CSEC and OHL infrastructure would allow any adverse effects in the section to the south-east of the A12 to be effectively minimised. The assessment of the effect of this route section on the historic environment is **that** could be made acceptable with appropriate mitigation.
Landscape and Visual	**Landscape** An existing 132kV OHL is located between ~2.5km and ~4km to the east and the 4YL and BTNO 400kV OHL are located ~4km to the north-west of the northern part of this section. However, there is little potential for the development of a 400kV OHL within the part of this section outside the Dedham Vale or AONB to give rise to significant adverse effects on local landscape character in combination with these other OHL due to the separation distances between them, Any sealing end compounds required to the north or south of the Dedham Vale AONB must be located sufficiently far from the plateau edge so as to avoid significant adverse effects on the special qualities and key characteristics of the AONBs. In practice, this is likely to require the sealing end compounds to be located outside this section, within Section A to the north and within Section F to the south. Any connection within Section AB is therefore most likely to be made entirely via UGC. This section passes through the Dedham Vale AONB and the Suffolk Coast and Heaths AONB. However, it does not pass in as close proximity to some of the 'honeypot' areas of the Dedham Vale AONB as does Section A. As a result, it is considered that the temporary construction period effects associated with the introduction of 400kV UGC are likely to be acceptable. The separation provided by the A12 between this section and the particularly highly valued areas associated with John Constable to the east (e.g. Dedham and Flatford) has the potential to be an influential mitigating factor. **Visual** The development of a 400kV OHL or the introduction of SECs in the parts of this section outside the Dedham Vale AONB has the potential to give rise to significant adverse effects for residents in the vicinity of Holton St. Mary in the north and Langham in the south.

Sub Topics	Main risks, constraints and opportunities
	Further analysis is needed to understand if sealing end compounds could be located within this section or whether they would need to be located to the north and/or south. Similarly, further analysis is needed to predict the level of effect that may be experienced by residents of properties in the vicinity of Holton St. Mary and Langham. Overall in landscape and visual terms, as potential mitigation is available if required for both of these sets of effects, it is considered that this section is likely to be acceptable. This section is considered preferrable to the central section of Section A and to Section B due to its greater distance from particularly highly valued parts of the Dedham Vale AONB.
Planning	The majority of this section passes through open countryside, with a limited number of scattered residential properties and farmsteads/agricultural buildings located within the section, all of which could be avoided through detailed routeing in accordance with the Supplementary Notes of the Holford Rules. Approximately a 3.4 kilometre stretch of the section and another 0.75 kilometre stretch of the section are located within the Dedham Vale AONB. Routeing of the OHL through the AONB would be in conflict with Holford Rule 1, however, it is assumed that the use of underground cabling could minimise effects. Furthermore, the section has been designed to avoid other areas of high amenity value and areas of architectural, historic and archaeological interest, in line with Holford Rule 2 (and the accompanying guidance note). There are no significant local plan allocations directly affecting the section, which aligns with the Supplementary Notes of the Holford Rules which state that where possible alignment should seek to minimise effects on areas of county, district or local value. There are also no significant planning permissions directly affecting the section. Much of the section would fall within areas of minerals safeguarding (sand and gravel) under the Essex Minerals Local Plan (for the areas of the section falling within Colchester and Tendring) and the Minerals Consultation Area designated under the Suffolk Minerals and Waste Local Plan (part of the section within Babergh area). Safeguarding ensures protection of mineral resources from risk of sterilisation as the result of development. Where areas fall within the Minerals Consultation Area, the district council would need to consult with the county council on the acceptability of any proposed development in this area from a minerals safeguarding perspective. In terms of the Holford Rules, this section would pass through a major area of amenity (Holford Rule 1) the Dedham Vale AONB, though iIt is assumed that where the section crosses the AONB, underground cabling would be used to avoid significant effects on the character and special qualities of the AONB, thereby ensuring compliance with Holford Rule 1.. It avoids smaller areas of highest amenity value and scientific interest (Holford Rule 2). This section offers the potential for a relatively direct alignment and fewer changes of direction (Holford Rule 3). It is considered that alignments in this section could be defined to meet the requirements of Holford Rule 4 (choose tree and hill backgrounds). This section avoids ancient woodlands (Holford Rule 5). This section has the potential to result in a concentration of wirescape due to the intervisibility with the existing 400kV and 132kV overhead lines that are present in the landscape (Holford Rule 6). Holford Rule 7 (approach urban areas through industrial zones) does not apply to this section due to its rural nature. In terms of the Supplementary Notes to the Holford Rules, this section has been designed to avoid routeing close to residential areas as far as possible (Supplementary Note 1). In terms of Supplementary Note 2 (avoiding designations of County, District and Local Value) this section avoids local landscape designations but does pass through an area of mineral safeguarding though it is not considered that siting of

Sub Topics	Main risks, constraints and opportunities
	pylons, if required within this section, would cause significant sterilisation of any mineral resources due to the small pylon footprint, however, careful routeing and siting, and consultation with the relevant minerals planning authorities should help to avoid significant effects The consideration of alternative pylon designs (Supplementary Note 3 to the Holford Rules) follows later in the mitigation hierarchy and can be considered once an alignment has been established and an assessment undertaken to establish whether alternative pylon designs are needed. Overall it should be possible to minimise any other negative planning impacts through careful route alignment and siting of pylons and the 15pprox.15nt of this route section it has potential to be acceptable in terms of planning.
Overall Environmental and Planning risk: The summary environmental implications of this section are that in terms of Ecology there would be a requirement for HRA process to be undertaken (conducted in the absence of mitigation). It is however, expected that effect may be low and potentially manageable with appropriate mitigation (given location in relation to designations). In terms of the historic environment, is anticipated that lasting change to setting would be avoided in the main by undergrounding within the AONB, although care would need to be taken to ensure that any hedgerow and woodland loss is minimised and restoration was effective, in particular that planting could be effectively and rapidly restored. In terms of Landscape and Visual, this section is considered preferrable to the central section of Section A and to Section B due to its greater distance from particularly highly valued parts of the Dedham Vale AONB. Subject to undergrounding through the AONB, there are not expected to be any planning policy matters that would preclude routing in this section.	
Socio-economics	**Main risks, constraints and opportunities**
Economic activity	Nothing substantial identified.
Overall Socio-economic impact: There are unlikely to be any issues which would endanger a consent and this route is considered to be acceptable in this regard**.**	
Technical	**Main risks, constraints and opportunities**
Technical	Challenging routeing due to residential properties, listed buildings, farm complexes, woodland blocks, commercial units, an industrial estate, Dedham Vale AONB, the River Stour and Black Brook (including associated flood zones) and the A12 dual carriageway. Underground cable technology assumed through the AONB. Horizontal Directional Drill (HDD) required for the River Stour and Black Brook crossings (x3 separate HDD sections). Reduced flexibility for routeing with increased construction and access volumes. Perpendicular crossing of A12 may limit width of available section. Additional infrastructure (terminal towers and cable sealing end compounds) required for transition from overhead line to underground cable at locations just north and south of the AONB. In order to facilitate the perpendicular crossings of Black Brook and the A12, approximately 800m of HDD will be required. An approximate requirement of 10km of underground cable length (0.5 – 0.8km within flood zone). Unknown constraints could require additional cables to meet rating requirements. Underground cable rating will also be required to match overhead lines. Alternative construction methods to overcome constraints may be required. Increased construction and access volumes

Sub Topics	Main risks, constraints and opportunities
Overall Technical impact: The use of underground cable is envisaged for this section with overhead line possible in the north and south of the corridor outside of the AONB pending the final positioning of the cable sealing end compounds. This is considered low risk in terms of technical complexity. The majority of the section will consist of underground cable due to Dedham Vale (AONB), which encompasses much of the corridor. This is estimated at approximately km in length, which is comparable with Section A. Horizontal Directional Drilling (HDD) will be required to overcome the River Stour, Black Brook and the A12 dual carriageway crossings. These cable sections increase technical complexity and will require additional above ground infrastructure, however the directness of this section in routeing to the East Anglia Connection Node is of significant benefit. The section is moderately constrained by residential properties and similar developed areas in certain places, where flexibility is reduced. Existing road infrastructure is to be crossed. Watercourses and flood zones also act to reduce flexibility and make routeing challenging. For this section there is no HDD cable crossing of the railway required (overhead line crossing in Section F instead) which is of benefit when compared to Sections A and B.	
Cost	
End to end options were pieced together from combination of various sections. The costs for these end to end options are discussed in each chapter under the subtitle “Engineering, system and cost performance of options”.	

Sub Topics	Main risks, constraints and opportunities
Environment	
Ecology/biodiversity	The main risks and constraints in this section arise from national designated sites – Hintlesham Woods SSSI; 12 blocks of Ancient Woodland (ASNW & PAWS) (Flowtonhall grove, Wolves, Toms Broadoak, Valley Farm, Layham grove, Stack, Mumfords/Lords Woods, Assington Thicks and 4 x unnamed AW). There are two County Wildlife Site (CWS) marshes on the Stone Street and at Assington. Several priority habitats are also identified across the sections and adjacent, including broadleaved woodland, floodplain grazing marsh, Semi-improved grassland, traditional orchard, open water and several WFD / Main watercourses are crossed – Rivers Box and Brett (other unnamed watercourses are in the section). *Construction*: There would be no direct effects on the SSSI or the AW as they are outside the section. Given the importance and weighting in planning and legal terms of such designated biodiversity and to AW in respect of potential indirect effects, they thus remain a potentially material constraint to development. There is potential for permanent/temporary direct effects on CWS and Priority Habitats including loss of habitat, fragmentation and disturbance during construction. In Operation there is potential for temporary indirect effects during operation from maintenance visits, and some, albeit limited risk of bird collision (though not for designated sites) given wetland habitats/rivers in the vicinity. Opportunities: To support partnerships for Environmental Gain Overall the section is considered likely to be acceptable subject to normal routeing and siting practices for an OHL connection –
Historic Environment	There are some well-dispersed Grade II listed buildings East of Hadleigh, including the Grade I listed Hintlesham Hall where there is a potential for some adverse effects, possibly mostly avoidable, though attention may need to be given to avoiding cumulative adverse effects when taken with more westerly options for the Bramford-Norwich route around Flowton. This route section contains the Grade II* listed Benton End House and its Grade II listed outbuildings. It appears unlikely that significant adverse effects on Benton End House could be avoided, and the high grading and constrained nature of the route in this area suggests that this may be a significant consent risk. Careful consideration should be given to routing in order to avoid significant cumulative effects from the combination of any proposed overhead line with the existing 4YL overhead line to the south. There is a pinch point south of Hadleigh which brings this route section within 25m of the Hadleigh Conservation Area and listed buildings within it. The Boxford Conservation Area extends approximately half-way across the route section, which also contains a large group of Grade II listed buildings. Oversail of the Boxford Conservation area appears unlikely to be acceptable, particularly given the importance of the mature tree planting to the character of the area of the CA that would be affected, and the large cluster of Grade II listed buildings in the south of the Conservation Area that could also be affected. Routing to the south of the conservation area would present substantially reduced adverse effects.

Sub Topics	Main risks, constraints and opportunities
	The potential presence of archaeological remains is not considered to be a differentiating factor. This potential will be more fully considered during subsequent phases of design to ensure that effects on archaeological remains and constraint to design, consent and delivery can be better understood and managed, particularly in areas where an overriding consent requirement for cabling is identified. In overall terms this route presents some challenges in terms of the historic environment that may necessitate more than the adoption of normal routeing and siting to be considered to be acceptable. .
Landscape and Visual	**Landscape** This section presents some challenges to routeing as an OHL. Particular areas of concern are as follows. In the vicinity of Bramford substation (potential cumulative effects on local landscape character in combination with the existing NG and DNO assets that converge in this area). Conflict with saved policies CR04 and CR05 (Special Landscape Areas) of the Babergh Local Plan 2006 as the section would pass through four areas identified as SLAs. The westernmost end of the section would fall partly within the Stour Valley Project Area. **Visual** Likewise challenge is presented for cumulative visual effects in combination with 4YL, BTNO and 132kV OHLs in the vicinity of Bramford substation for scattered properties within and adjacent to the section. Likewise for properties in close proximity to the section in the vicinity of Hadleigh and Polstead Heath and scattered properties between these settlements. Concerns would occur where properties have an existing view of two 400kV OHLs (4YL and BTNO) in relatively close proximity to the south, which would become a view of three 400kV OHLs in even closer proximity. Some properties have the potential to be located between the new line and 4YL with at least potential effects on their residential, as well as visual, amenity. Some of the cumulative effects on landscape character and the visual amenity of residents and effects on the Babergh SLA may not be mitigated through normal routeing and siting practices and may require mitigation through the rationalisation of 132kV assets or by the undergrounding of part the proposed connection. Overall effects within this corridor section are likely to require quite extensive mitigation to be considered acceptable. This section is considered less preferrable than Section D because of its greater proximity to the Dedham Vale AONB.
Planning	The majority of this section passes through open countryside, with a limited number of scattered residential properties and farmsteads/agricultural buildings located within the section, all of which could be avoided through detailed routeing in accordance with the Supplementary Notes of the Holford Rules. Approximately 270 metres west of the section, where the section runs past the eastern boundary of the town of Hadleigh, there is a strategic allocation under the Babergh Core Strategy, for approximately 250 dwellings and 5.5 hectares of employment land (on an overall site of approximately 29ha) extending out from the eastern boundary of Hadleigh. Immediately north of this allocation, (approximately 400 metres west of the section at its closest point) there is another area approximately 16.7ha in size that is allocated under the extant Local Plan for a mixed use development (comprising housing, employment and open space), however, this appears to be largely built out. Under the emerging Local Plan an area combining both of these sites (approximately 25ha) will be allocated for 600 dwellings and 5.5ha of employment land. The exceptions to this are: to the west of Layham, where the section crosses through the Foxhall non-hazardous landfill site, which is safeguarded under the Minerals and Waste Local Plan. The Minerals and Waste Local Plan states that development would not be authorised in this area if it would prevent or prejudice the use of the site for its use as a non-hazardous landfill site, unless a suitable

Sub Topics	Main risks, constraints and opportunities
	alternative provision was to be made. However, as the Minerals and Waste Local Plan is a material consideration for the decision making process, consent unlikely to be refused if not in accordance with this policy. Immediately adjacent to the south of this site is Rands Hall Pit, which is an existing sand and gravel quarry, safeguarded under the Minerals and Waste Local Plan. Under this plan, a circa 17ha extension is proposed to the quarry site, however, this extension would be situated to the south of the existing site and as such, outside of the section. It is also noted that to the south of Boxford, the section partially passes through the waste safeguarding zone surrounding the Hill Farm anaerobic digestion plant, as designated under the Minerals and Waste Local Plan. Development in this area would require consultation between the District Council and County Council if development within this zone was considered to conflict with this use. However, as the plant itself is outside of the section, it is not considered that it would be affected. A number of parts of the section would also fall within the Minerals Consultation Area, meaning that the district council would need to consult with the county council on any proposed development in this area. With careful route alignment and siting of pylons, it should be possible with this section to minimise negative impacts on the safeguarded non-hazardous landfill site, the sand and gravel quarry, the anaerobic digestion plant and the AONB. It is not considered that siting of pylons would cause sterilisation of any mineral resources due to the small footprint of individual pylons, however, careful routeing and siting, and consultation with the relevant minerals planning authorities should help to avoid significant effects. In terms of the allocation at Hadleigh this would not be a constraint to routeing but effects on views will need to be considered if the site is brought forward In terms of the Holford Rules, this section would pass through a major area of amenity (Holford Rule 1) the Dedham Vale AONB. It would also pass through smaller areas of highest amenity value and scientific interest (Holford Rule 2) at the southern edge of the Boxford Conservation Area. It also contains the western edge of the Hintlesham Great Wood SSSI. This section offers the potential for a relatively direct alignment and fewer changes of direction (Holford Rule 3). It is considered that alignments in this section could be defined to meet the requirements of Holford Rule 4 (choose tree and hill backgrounds). It contains the western edge of the Hintlesham Great Wood, albeit a connection could avoid routing through this ancient woodland (Holford Rule 5). This section has the potential to result in a concentration of wirescape due to the intervisibility with the existing 400kV and 132kV overhead lines that are present in the landscape (Holford Rule 6). Holford Rule 7 (approach urban areas through industrial zones) does not apply to this section due to its rural nature. In terms of the Supplementary Notes to the Holford Rules, this section has been designed to avoid routeing close to residential areas as far as possible (Supplementary Note 1). In terms of Supplementary Note 2 (avoiding designations of County, District and Local Value) this section would pass through the locally designated parts of Stour Valley Project Area whilst not afforded the same level of protection as an AONB, the Stour Valley Project Area is covered by the Dedham Vale AONB Management Plan. The consideration of alternative pylon designs (Supplementary Note 3 to the Holford Rules) follows later in the mitigation hierarchy and can be considered once an alignment has been established and an assessment undertaken to establish whether alternative pylon designs are needed No significant implications from a planning perspective, subject to careful route alignment.

Sub Topics	Main risks, constraints and opportunities		
Overall Environmental and Planning risk: The summary environmental implications of this section are that effects on ecology is likely to be acceptable subject to careful routeing and siting of the connection. From a historic environment perspective careful routing in this section should avoid a risk to gaining consent. From a Landscape and Visual perspective it is considered that this section is relatively challenging and may require quite extensive mitigation to be adopted to be consentable and is therefore less favoured than Section D. There are not expected to be any planning policy matters that would preclude routeing within this section.			
Socio-economics			
Economic activity	Nothing substantial identified.		
Overall Socio-economic impact: There are unlikely to be any issues which would endanger a consent			
Technical	**Main risks, constraints and opportunities**	**Mitigation and assumptions**	**Implications and conclusion**
Technical	Underground cable entries required into Bramford Substation to cross proposed 400kV BTNO overhead line and existing 4YL 400kV National Grid overhead line. Unknown extent of existing underground assets, including SSE 220kV windfarm UGCs. Underground cable required to cross existing 400kV 4YL National Grid overhead line and proposed BTNO assets near Section E (including 132kV if not mitigated). The majority of constraints and assumptions are covered in Section E. Positioning of underground cable route potentially restricted – mitigation of National Grid and Distribution Network Operator assets required in advance. Terminal Towers and cable sealing end compounds required for underground cable line entries to Bramford and to cross the existing 4YL and proposed BTNO overhead lines. Unknown constraints around could require additional cables to meet rating requirements. Underground cable rating will also be required to match overhead lines. Alternative construction methods to overcome constraints may be required. Construction and access volumes are likely to be increased. Challenging routeing due to residential properties, listed buildings, farm complexes, holiday lets, industrial areas, proposed BTNO assets, ancient woodlands, the A1071, A134 and Dedham Vale AONB. Multiple Distribution Network Operator assets to be overcome.		
Overall Technical impact: The use of overhead line is envisaged for the majority of the section, however underground cable line entries at Bramford Substation and to cross the existing 4YL and proposed BTNO overhead lines are required (including additional above ground infrastructure. Additionally, a section of underground cable may also be required in areas which bypass Dedham Vale AONB depending on detailed routeing and siting any potential effects on setting. The section is moderately constrained by residential properties and similar developed areas in certain places, as well as a narrow section, where flexibility significantly is reduced. Existing road infrastructure to be crossed and Distribution Network Operator and National Grid assets are to be mitigated. This section sees increased technical complexity through the additional infrastructure required to facilitate a transition from overhead line to underground cable for the existing 4YL and proposed BTNO overhead line crossings. An opportunity exists to expand the section where ancient woodland restricts routeing options at Hadleigh Heath.			
Cost			
End to end options were pieced together from combination of various sections. The costs for these end to end options are discussed in each chapter under the subtitle “Engineering, system and cost performance of options”.			

Topic Baseline Overview For Section D

Sub Topics	Main risks, constraints and opportunities
Environment	
Ecology/biodiversity	The main risks and constraints in this section arise from national designated sites – 3 SSSI – Hintlesham Woods, Groton Wood and Edwardstone Woods (Broadleaved woodland, Mixed and yew ASNW – adjacent to the section); 11 blocks of Ancient Semi-natural Woodland (ASNW & PAW). Aldham Park, Assington Thicks Howe, Flowtonhall grove, Wolves, Mumfords/Lords Woods, Groton, Cowpers, Edwardstone, Hintlesham, and unnamed at Upper Road. Several priority habitats are also identified across the sections and adjacent, including semi-improved grassland, broadleaved woodland, floodplain grazing marsh and open water, as well as several WFD / Main watercourses crossed – Rivers Box and Brett and other smaller unnamed watercourses. *Construction*: There would be no direct effects on the SSSI or the AW as they are outside the section. However, given the importance and weighting in both planning and legal terms of such designated biodiversity and to AW (in respect of potential indirect effects), they thus remain a potentially material constraint to development. There is potential for permanent/temporary direct effects on Priority Habitats including loss of habitat, fragmentation and disturbance during construction. In Operation there is potential for temporary indirect effects during operation from maintenance visits, and some, albeit limited risk of bird collision (though not for designated sites) given wetland habitats/rivers in the vicinity. Opportunities: To support partnerships for Environmental Gain Overall Scheme element can be located in the area being appraised, and is acceptable provided mitigation is implemented / element is located away from specific constraints / receptors
Historic Environment	This section generally appears relatively unconstrained, with a relatively small number of Grade II listed buildings within or close to the section. The key constraint is to the north and north-west of Kersey Conservation Area. Kersey contains a group of significant designated heritage assets listed at Grade II, Grade II* and Grade I and including scheduled monuments. Its location across the valley allows for clear views to the route section. There is a group of SMs at Lindsey Castle immediately to the north of the section and a group of listed buildings between Parliament Heath and Groton. While it is possible that significant adverse effects would arise on listed buildings between Parliament Heath and Groton, it appears likely that these could be effectively reduced through application of normal routeing and siting practices. It may be more difficult to avoid significant adverse effects on the Kersey Conservation Area without more extensive mitigation, and the proposed section occupies a key element of the background to set-piece views of the Conservation Area from the church The potential presence of archaeological remains is not considered to be a differentiating factor. This potential will be more fully considered during subsequent phases of design to ensure that effects on archaeological remains and constraint to design, consent and delivery can be better understood and managed, particularly in areas where an overriding consent requirement for cabling is identified.

Sub Topics	Main risks, constraints and opportunities
	Overall for historic environment it is considered that routeing within the section presents some challenges but may become acceptable with application of normal routeing and siting practices but potentially requiring more extensive mitigation**.**
Landscape and Visual	**Landscape** This section (as with section D) presents some challenges to routeing as an OHL. Particular areas of concern are as follows: In the vicinity of Bramford substation (potential cumulative effects on local landscape character in combination with the existing NG and DNO assets that converge in this area). Conflict with saved policies CR04 and CR05 (Special Landscape Areas) of the Babergh Local Plan 2006 as the section would pass through four areas identified as SLAs. The westernmost end of the section would fall partly within the Stour Valley Project Area. **Visual** Likewise challenge is presented for cumulative visual effects in combination with 4YL, BTNO and 132kV OHLs in the vicinity of Bramford substation for scattered properties within and adjacent to the section. Likewise for properties in Aldham and a property to the south of Aldham, to the north-east of Hadleigh, where the line would have to pass close to residential property. Some properties have the potential to be located between the new line and 4YL with at least potential effects on their visual amenity. Further analysis is needed to understand whether the proposed 400kV connection in the vicinity of Bramford substation would need to be undergrounded to avoid significant adverse cumulative effects. Similarly, further analysis is needed to predict the level of effect that may be experienced by residents of properties in the vicinity of Aldham. As potential mitigation is considered available if required for both of these sets of effects, it is considered that this section is likely to be acceptable. Section **D is preferred to** section **C** because it is less likely to result in significant adverse effects on the visual and residential amenity of those living in close proximity to the line.
Planning	The majority of this section passes through open countryside, with only a few scattered residential properties and farmsteads within close proximity to the section, all of which could be avoided through detailed routeing in accordance with the Supplementary Notes of the Holford Rules. There are a no significant local plan allocations directly affecting the section, which aligns with the Supplementary Notes of the Holford Rules which state that where possible alignment should seek to minimise effects on areas of county, district or local value. Several parts of this section would also fall within the Minerals Consultation Area. A small part of this section would cross the 250-metre safeguarding zone surrounding the Peyton Hall Quarry mineral extraction site and inert landfill site, near Hadleigh, which are protected under policies MP10 and WP18 of the Minerals and Waste Local Plan respectively. These policies state that the County Council will advise the Local Planning Authority as to whether any proposed development might prejudice future extraction of minerals/use as an inert landfill, and should be refused, or whether any development itself might be prejudiced by proposed mineral working/waste management at these sites. It is not considered that siting of pylons would cause sterilisation of any mineral resources due to the small footprint of individual pylons, however, careful routeing and siting, and consultation with the relevant minerals planning authorities should help to avoid significant effects. In terms of the Holford Rules, this section would avoid passing through a major area of amenity (Holford Rule 1). It would also avoid passing through smaller areas of highest amenity value and scientific interest (Holford Rule 2). This section offers the potential for a relatively direct alignment and fewer changes of direction (Holford Rule 3). It is considered that alignments in this section could be

Sub Topics	Main risks, constraints and opportunities
	defined to meet the requirements of Holford Rule 4 (choose tree and hill backgrounds). This section avoids ancient woodlands (Holford Rule 5). This section has the potential to result in a concentration of wirescape due to the intervisibility with the existing 400kV and 132kV overhead lines that are present in the landscape (Holford Rule 6). Holford Rule 7 (approach urban areas through industrial zones) does not apply to this section due to its rural nature. In terms of the Supplementary Notes to the Holford Rules, this section has been designed to avoid routeing close to residential areas as far as possible (Supplementary Note 1). In terms of Supplementary Note 2 (avoiding designations of County, District and Local Value) this section would pass through the locally designated parts of Stour Valley Project Area whilst not afforded the same level of protection as an AONB, the Stour Valley Project Area is covered by the Dedham Vale AONB Management Plan. The consideration of alternative pylon designs (Supplementary Note 3 to the Holford Rules) follows later in the mitigation hierarchy and can be considered once an alignment has been established and an assessment undertaken to establish whether alternative pylon designs are needed. Overalll there are not considered to be any significant planning implications subject to careful route alignment and siting of pylons.
Overall Environmental and Planning risk: The summary environmental implications of this section are that effects on ecology are likely to be acceptable subject to careful routing and siting of the connection. From a historic environment the effect on set-piece views on the conservation Kersey Conservation Area from the church will need careful consideration to minimise effects to be considered acceptable in the planning balance. From a Landscape and Visual perspective it is considered that this section D is likely to be consentable subject to normal routeing and siting but with enhanced consideration to respond to potential cumulative effects. Section D is preferred to Section C because it is less likely to result in significant adverse effects on the visual and residential amenity of those living in close proximity to the line. There are not expected to be any planning policy matters that would preclude routeing within this section.	

Socio-economics	**Main risks, constraints and opportunities**
Economic activity	Dove Barn Wedding Venue
Overall Socio-economic impact: Normal routeing and siting processes are expected to be capable of addressing effects on this venue such that route of an OHL alignment in this section is not considered to be a material risk to consent.	

Technical	**Main risks, constraints and opportunities**
Technical	Underground cable entries required into Bramford Substation to cross proposed 400kV BTNO overhead line and existing 4YL 400kV National Grid overhead line. Unknown extent of existing underground assets, including SSE 220kV windfarm UGCs. Underground cable required to cross existing 400kV 4YL National Grid overhead line and BTNO asset near Section E (including 132kV if not mitigated). Majority of constraints and assumptions covered in Section E . Unknown constraints could require additional cables to meet rating requirements. Underground cable rating will also be required to match overhead lines. Alternative construction methods to overcome constraints may be required. Construction and access volumes are likely to be increased. Challenging routeing due to residential properties, listed buildings, farm complexes, Hunters Park and a scheduled monument. Reduced flexibility for routeing, avoidance of ancient woodlands limits available section width, increased construction and access volumes. Multiple Distribution Network Operator assets to be overcome.)

Sub Topics	Main risks, constraints and opportunities
Overall Technical impact: The use of overhead line is envisaged for the majority of the section however underground cable line entries at Bramford Substation and to cross the existing 4YL and proposed BTNO overhead lines are required (including additional above ground infrastructure. This technology is considered low risk in terms of technical complexity. The section is moderately constrained by residential properties, a recreational area (Hunters Park) and similar developed areas in certain places, which creates challenging routeing with reduced flexibility. Constraints around Bramford Substation are identical to those of Section C, namely the increased technical complexity through the additional infrastructure required facilitate a transition from overhead line to underground cable for the Bramford Substation line entries and the existing 4YL and proposed BTNO overhead line crossings. Multiple Distribution Network Operator assets are to be mitigated also. Overall, this Section sees fewer constrained areas than Section C, and therefore has greater flexibility for routeing and is technically less complex.	
Cost	
End to end options were pieced together from combinations of various sections. The costs for these end to end options are discussed in each chapter under the subtitle “Engineering, system and cost performance of options”.	

Topic Baseline Overview For Section E

Sub Topics	Main risks, constraints and opportunities
Environment	
Ecology/biodiversity	The main risks and constraints in this section arise from priority habitats and SSSI IRZs. Several priority habitats are also identified across the section and adjacent, including broadleaved woodland, semi-improved grassland, floodplain grazing marsh, lowland fen, open water, and several WFD / Main watercourses are crossed – Rivers Stour, plus an unnamed watercourse. *Construction*: There would be no direct effects on the SSSI IRZs. However, given the importance and weighting in both planning and legal terms of such designated biodiversity, (in respect of potential indirect effects), they thus remain a potentially material constraint to development. There is potential for permanent/temporary direct effects on Priority Habitats including loss of habitat, fragmentation and disturbance during *construction*. In Operation there is potential for temporary indirect effects during operation from maintenance visits, and some, albeit limited risk of bird collision (though not for designated sites) given wetland habitats/rivers in the vicinity. Opportunities: To support partnerships for Environmental Gain Overall from ecology / biodiversity perspective scheme element can be located in the area being appraised, and is acceptable normal routeing and siting practices. .
Historic Environment	This section contains or is close to relatively few designated heritage assets. The Bures Conservation area occupies almost the whole width of the section and there is a significant pinch point north of Fordham, with a large number of listed buildings to either side of it. It is unlikely that an oversail of the Bures Conservation Area would be considered acceptable, and this could significantly constrain design into the very narrow section to the north of the conservation area, which may not offer sufficient separation to avoid significant adverse effects and brings the section closer to listed buildings immediately north of the section. At Fordham it may be possible to minimise adverse effects through careful placement of infrastructure, but some residual significant adverse effects may remain. Interface with existing overhead line infrastructure at the northern end of the section would need consideration in design to minimise potential effects on the listed buildings at Dorking Tye. The potential presence of archaeological remains is not considered to be a differentiating factor. This potential will be more fully considered during subsequent phases of design to ensure that effects on archaeological remains and constraint to design, consent and delivery can be better understood and managed, particularly in areas where an overriding consent requirement for cabling is identified. Overall this section is challenging in respect of potential effects on the historic environment for an OHL based solution.

Sub Topics	Main risks, constraints and opportunities
Landscape and Visual	**Landscape** The section runs to the west and south of the western part of the Dedham Vale AONB at separation distances between approximately 0.7km and 3.7km. As a result, there is potential for an OHL to give rise to significant adverse effects on the special qualities or key characteristics of the AONB (e.g. its freedom from the intrusion of modern development), particularly in relation to its north-western part, where land in the section is relatively elevated and is in closest proximity to the AONB. However, it is noted that the eastern slopes of the part of the AONB closest to the section (i.e. the part of the AONB with the greatest theoretical potential for intervisibility with the proposed line) are heavily wooded and that a visual effects pathway may be absent or very weak. To the west and south, the section is further away and, particularly to the south, located at some distance from the plateau edge. The section crosses the Stour Valley and much of the northern half of the section lies within the Stour Valley Project Area. Whilst not afforded the same level of protection as an AONB, the Stour Valley Project Area is covered by the Dedham Vale AONB Management Plan, which considers it to be a 'valued landscape' in terms of the NPPF. This is reflected in the designation of the part of this area within Babergh as a Special Landscape Area and by the high sensitivity of the landscape character areas in the part of this area within Braintree. As such, the section has high potential to give rise to significant adverse effects on local landscape designations and local landscape character in this area. **Visual** There is the potential for significant adverse cumulative visual effects in combination with 4YL and BTNO for a small number of properties in the vicinity of the northern end of the section. There is the potential for significant adverse visual effects to the north-west of Bures and in relation to several other residential properties within or in close proximity to the section. There is a pinch-point in the vicinity of Plummers Road, to the north of Fordham, where the line would have to pass close to at least one residential property. Normal routeing and siting practices may be sufficient to address visual effects but may be insufficient for the landscape effects to be mitigated without consideration of 400kV cable technology, to address setting effects for the AONB and within the SVPA noting the adoption of this for the BTNO project. Overall an acceptable corridor and connection seems achievable but potentially may require the adoption of cable technology. Without this technology an OHL only option may be challenging to achieve given the potential landscape effects. With the technology it is noted that this option will require a much longer overall connection with potentially similar cable lengths than more direct options incorporating A, B or AB sections through the AONB.
Planning	The majority of this section passes through open countryside/farmland, with a limited number of scattered residential properties and farmsteads/agricultural buildings located within the section, all of which could be avoided through detailed routeing. No significant planning local plan land use allocations would be affected by this section, which aligns with the Supplementary Notes of the Holford Rules which state that where possible alignment should seek to minimise effects on areas of county, district or local value. Much of the section would fall within areas of minerals safeguarding (sand and gravel) under the Essex Minerals Local Plan (for the areas of the section falling within Braintree and Colchester) and the Minerals Consultation Area designated under the Suffolk Minerals and Waste Local Plan (all of the part of the section which falls within Babergh). Safeguarding ensures protection of mineral resources from risk of sterilisation. It is not considered that siting of pylons would cause sterilisation of any mineral resources due to the small footprint of individual pylons, however, careful routeing and siting, and consultation with the relevant minerals planning authorities would be expected to avoid significant effects.

Sub Topics	Main risks, constraints and opportunities
	In accordance with the Supplementary Notes to the Holford Rules, any alignment should seek to minimise effects on these county designations. In terms of the Holford Rules, this section would avoid passing through a major area of amenity (Holford Rule 1). It would pass through smaller areas of highest amenity value and scientific interest (Holford Rule 2) at the northern edge of the Bures St Mary Conservation Area. This section is not as direct (Holford Rule 3) as other sections as it has been designed to route around the western end of the Dedham Vale AONB. It is considered that alignments in this section could be defined to meet the requirements of Holford Rule 4 (choose tree and hill backgrounds). This section avoids ancient woodlands (Holford Rule 5). This section has the potential to result in a concentration of wirescape due to the intervisibility with the existing 400kV and 132kV overhead lines that are present in the landscape (Holford Rule 6). Holford Rule 7 (approach urban areas through industrial zones) does not apply to this section due to its rural nature. In terms of the Supplementary Notes to the Holford Rules, this section has been designed to avoid routeing close to residential areas as far as possible (Supplementary Note 1). In terms of Supplementary Note 2 (avoiding designations of County, District and Local Value) this section avoids local landscape designations but does pass through an area of mineral safeguarding. The consideration of alternative pylon designs (Supplementary Note 3 to the Holford Rules) follows later in the mitigation hierarchy and can be considered once an alignment has been established and an assessment undertaken to establish whether alternative pylon designs are needed. The overall assessment of the effect of this route section is that there are no significant planning implications subject to careful route alignment and siting of pylons.
Overall Environmental and Planning risk: The summary environmental implications of this section are that effects on ecology are likely to be acceptable subject to careful routing and siting of the connection. From a historic environment perspective, the effects on the Bures Conservation Area would bring risk into the consenting process and the narrow part of the section at Fordham will need careful consideration. From a Landscape and Visual perspective it is considered that this section is likely to be consentable subject to mitigation measures, but this may require the undergrounding of the line through a non-nationally designated landscape (the Stour Valley Project Area) depending on the level of effects remaining after careful routeing and siting. There are not expected to be any planning policy matters that would preclude routeing within this section.	
Socio-economics	**Main risks, constraints and opportunities**
Economic activity	Nothing substantial identified though noted to be within proximity to Clees Hall private airstrip, and Essex and Suffolk Gliding Club.
Overall Socio-economic impact: There is potential for the proposed infrastructure within the route corridor to interact with various existing, or proposed, commercial land-uses (for example private airstrips etc) within or in proximity to the corridor. Whether or not there is a material effect on such activities or land-uses depends on detailed routeing and siting, and will also include consideration of potential mitigation and engagement with relevant parties. Affected parties may also be entitled to compensation, assessed in line with the Compensation Code. On this basis, at this route corridor stage, the presence of such land-uses is not in itself considered to be a barrier to or determinative for route corridor selection.	

Sub Topics	Main risks, constraints and opportunities
Technical	**Main risks, constraints and opportunities**
Technical	Proposed 400kV BTNO assets, existing National Grid 4YL 400kV and 132kV Distribution Network Operator overhead lines (132kV to be dismantled as part of BTNO proposals) Challenging routeing, with reduced flexibility for routeing in some locations due to residential properties, a farm complex, Bures Pit recreational site, Bures St Mary Conservation Area and Ferriers Scheduled Monument. Crossing of Railway, River Stour and Large Flood Zone required. Proximity to Clees Hall private airstrip, and Essex and Suffolk Gliding Club. .
Overall Technical impact: The use of overhead line is envisaged for most of the section however underground cable is required to cross the existing 4YL and proposed BTNO overhead lines (including additional above ground infrastructure. This technology is considered low risk in terms of technical complexity. The section is moderately constrained by residential properties, recreational sites, a conservation area, the River Stour and a large associated flood zone. Existing rail infrastructure is to be crossed and the proximity of Clees Hall and Essex and Suffolk Gliding Club airstrips may need to be mitigated. These constraints act to make routeing more challenging and reduce flexibility in certain areas.	
Cost	
End to end options were pieced together from combinations of various sections. The costs for these end to end options are discussed in each chapter under the subtitle “Engineering, system and cost performance of options”.	

Sub Topics	Main risks, constraints and opportunities
Environment	
Ecology/biodiversity	The main risks and constraints in this section arise from priority habitats and SSSI IRZs and designated habitat. Three blocks of Ancient Woodland (ASNW & PAWS) (Slough Grove, Pitchbury Wood and 1x unnamed wood to the south of the potential substation site A. Several priority habitats are also identified across the section and adjacent to the section boundaries, including broadleaved woodland and traditional orchard, open water and several WFD / Main watercourses are crossed – Salar Brook, plus an unnamed watercourse. Ardleigh Reservoir also present. *Construction*: There would be no direct effects on the SSSI IRZ. However, given the importance and weighting in both planning and legal terms of such designated biodiversity and to AW (in respect of potential indirect effects), they remain a potential material constraint to development. There is potential for permanent/temporary direct effects on Priority Habitats including loss of habitat, fragmentation and disturbance during *construction*. In Operation there is potential for temporary indirect effects during operation from maintenance visits, and some, albeit limited risk of bird collision (though not for designated sites) given wetland habitats/rivers in the vicinity. Opportunities: To support partnerships for Environmental Gain Overall. Scheme element can be located in the area being appraised, and is considered **acceptable** assuming normal routeing and siting practices.
Historic Environment	There is a large, but dispersed group of listed buildings at and close to Great Horkesley, primarily listed at Grade II but including the Grade II* listed Chapel Cottage. The southern branch of this section also passes very close to the scheduled hill fort at Pitchbury Ramparts. Within the rest of the section, there are a limited number of Grade II listed buildings, with a distinct group south of Langham and a more dispersed group south of Great Bromley, including the Grade II* listed St Mary's church. The section passes close to the Ardleigh conservation area and scheduled cropmark sites south of Ardleigh. The potential presence of archaeological remains is not considered to be a differentiating factor. This potential will be more fully considered during subsequent phases of design to ensure that effects on archaeological remains and constraint to design, consent and delivery can be better understood and managed, particularly in areas where an overriding consent requirement for cabling is identified. There is a high potential for significant adverse effects at the western end of this section, and the western end of the southern branch appears likely to give rise to significant adverse effects on the hill fort at Pitchbury Ramparts which may present a significant consent risk. The route north of the concentrated group of listed buildings at Great Horkesley is very constrained, restricting the potential for design mitigation. There is a potential for significant adverse effects to arise south of Langham and these may be difficult to avoid. There is a preference for the northern option at the east end of this section to maximise the separation form the Ardleigh Conservation Area and scheduled monuments and to minimise the number of potentially affected designated heritage assets. Whilst challenging, subject to the application of normal routeing and siting practices and consideration of appropriate mitigation a connection by OHL within this section is considered capable of being acceptable within the planning balance.

Sub Topics	Main risks, constraints and opportunities
Landscape and Visual	**Landscape** The section runs to the south of the Dedham Vale AONB. To the east of Great Horkesley separation distances are between approximately 1km and 2km, but distances are smaller at the section's western end, being adjacent to the AONB boundary for approximately 250m at one point. As a result, there is potential for the Project to give rise to significant adverse effects on the special qualities or key characteristics of the AONB (e.g. its freedom from the intrusion of modern development), particularly in the vicinity of Little Hokesley, where the section is in closest proximity to the AONB and approaches the plateau edge. However, it is noted that these effects may be minimised or avoided by employing the branch of the section that runs to the east of Horkesley Heath. It is also noted that the relatively elevated and wooded nature of the nearest part of the AONB in this vicinity may limit the susceptibility of the AONB in this area. Further east, the section is further away and at some distance from the plateau edge. At the eastern end of the section there is potential for a 400kV OHL to give rise to significant adverse effects on local landscape character in combination with the 132kV OHLs that converge on Lawford 132kV substation and/or the new 400kV line in Section A or AB if the connection between Bramford and the EAC is being made via OHL within the southernmost parts of either of those sections. If the connection is to be made to EAC Zones B or C, there is potential for a 400kV OHL to give rise to significant adverse effects on local landscape character in combination with the north-western section of the 132kV OHL that traverses the Tendring peninsula between Lawford and Holland Road 132kV substations. **Visual** There is the potential for significant adverse visual effects to the west of Great Horkesley, in the vicinity of Breewood Hall, where the connection would have to pass close to at least one residential property if using the north-west branch of the section, with separation slightly increased if using the south-east branch. There is also the potential for significant adverse visual effects as the connection traverses the pinch-point on the A134 at Great Horkesley and as it crosses Straight Road, to the west of Bapton (where it would pass close to residential properties). To the east of where the section splits into northern and southern branches, the northern branch would have the potential to give rise to significant adverse visual effects as it crosses the B1029/Dedham Road to the north of and the southern branch as it crosses the A137/Colchester Road to the south-west of Ardleigh (where both sections would pass close to residential properties). At the eastern end of the section, there is potential for significant adverse non-cumulative and cumulative (in combination with 132kV OHL and/or development within Section A) visual effects for residents of Little Bromley if connecting to EAC Zone B, and Burnt Heath and Bromley Cross if connecting to EAC A via the southern branch or to EAC C. Fewer residents would be affected if connecting to the EAC zones via the northern branch than via the southern branch. There is potential for significant effects on the special qualities or key characteristics of the Dedham Vale to remain after routeing and siting principles have been applied that may necessitate consideration of further mitigation measures including tower types or the use of underground cable, noting however that the benefits of cable may be affected/ offset to some degree by the effects arising from the CSE compounds required at each end of the cable section to transition to OHL. Careful attention will also need to be made paid to the potential effects arising from different EAC locations particularly in combination ant existing 132kV OHL and the potential need for two broadly parallel connections to the EAC (one from Bramford and one from Tilbury). Overall in landscape and visual terms this section is considered challenging with the potential for significant effects remaining after normal routeing and siting practices are applied. These may necessitate additional mitigation to be considered to achieve an acceptable solution . In landscape and visual terms 30ppr section is considered less preferrable than Section H due to the potential for this section to give rise to significant adverse effects on the special qualities of the Dedham Vale AONB.

Sub Topics	Main risks, constraints and opportunities
Planning	The majority of this section passes through open countryside/farmland, with a limited number of scattered residential properties, farmsteads/agricultural buildings and industrial buildings located within the section, all of which could be avoided through detailed routeing in accordance with the Supplementary Notes of the Holford Rules. Just beyond where the section splits to the west of Ardleigh, the southern arm of the section runs along the edge of the existing Martells Pit/Slough Farm quarry. An 11.7 hectare extension to this quarry is allocated as a preferred site for sand and gravel extraction under the Essex Minerals Local Plan. This allocation extends out from the western edge of the existing quarry site and cuts across the majority of the section at this location. To minimise negative impacts on the minerals/waste site allocations at Martells Pit near Ardleigh, careful route alignment and siting of the pylons would be needed. An alignment which utilises the branch of the section to the north of Ardleigh would avoid this allocation. However, this would bring the alignment closer to the AONB. If the northern branch is taken forward as the preferred option, it is not considered that siting of pylons would cause sterilisation of any mineral resources due to the small footprint of individual pylons. Overall the section is considered to be sufficiently wide with alternative options to mean that careful routeing and siting, and consultation with the relevant minerals planning authorities should avoid significant effects This site is also identified as a strategic site allocation for inert waste recycling/inert waste landfilling under the waste local plan. The existing Martells Industrial Estate site adjacent to the section and north east of the allocation, is also identified as an area of search for waste management development. The section also appears to cross a minerals consultation zone surrounding the existing Crown Quarry at Ardleigh. This means that consultation with the relevant Minerals Planning Authority, on applications for non-mineral development in that area would be required, to avoid sterilisation of potential future mineral resources. The majority of the section is also located within an area of minerals safeguarding (sand and gravel) as designated under the Essex Minerals Local Plan. In accordance with the Supplementary Notes to the Holford Rules, an alignment should seek to minimise effects on these county designations. In terms of the Holford Rules, this section, by avoiding routeing through the AONB) would avoid passing through a major area of amenity (Holford Rule 1). It would avoid passing through smaller areas of highest amenity value and scientific interest (Holford Rule 2). This section offers the potential for a relatively direct alignment and fewer changes of direction (Holford Rule 3). It is considered that alignments in this section could be defined to meet the requirements of Holford Rule 4 (choose tree and hill backgrounds). This section avoids ancient woodlands (Holford Rule 5). This section has the potential to result in a concentration of wirescape due to the intervisibility with the existing 400kV and 132kV overhead lines that are present in the landscape (Holford Rule 6). In terms of Holford Rule 7 (approach urban areas through industrial zones), unlike the other sections, this section has the opportunity to pass through industrial (retail/commercial) areas north of Colchester. In terms of the Supplementary Notes to the Holford Rules, this section has been designed to avoid routeing close to residential areas as far as possible (Supplementary Note 1). In terms of Supplementary Note 2 (avoiding designations of County, District and Local Value) this section avoids local landscape designations but does pass through an area of mineral safeguarding. The consideration of alternative pylon designs (Supplementary Note 3 to the Holford Rules) follows later in the mitigation hierarchy and can be considered once an alignment has been established and an assessment undertaken to establish whether alternative pylon designs are needed Overall it is considered possible to avoid negative planning impacts through careful route alignment and siting of towers whilst also complying with the Holford Rules. Whilst the northern branch of Section F would be close to the AONB, the overall assessment of the effect of this route section in terms of planning is Neutral**.**

Sub Topics	Main risks, constraints and opportunities
Overall Environmental and Planning risk: The summary environmental implications of this section are that effects on ecology are likely to be acceptable subject to careful routeing and siting of the connection. From an historic environment perspective, there is a distinct preference for the northern option at the east end of this section to maximise the separation form the Ardleigh Conservation Area and scheduled monuments and to minimise the number of potentially affected designated heritage assets. From a Landscape and Visual perspective it is considered that this section is likely to be challenging but potentially consentable with (subject to routeing) a possible need to consider more extensive mitigation measures at some locations. There are not expected to be any planning policy matters that would preclude routeing within this section.	
Socio-economics	**Main risks, constraints and opportunities**
Economic activity	Solar Farms at Langham Moor and Little Bromley Road.
Overall Socio-economic impact: There is potential for the proposed infrastructure within the route corridor to interact with various existing, or proposed, commercial land-uses (for example solar generation sites etc) within or in proximity to the corridor. Whether or not there is a material effect on such activities or land-uses depends on detailed routeing and siting, and will also include consideration of potential mitigation and engagement with relevant parties. Affected parties may also be entitled to compensation, assessed in line with the Compensation Code. On this basis, at this route corridor stage, the presence of such land-uses is not in itself considered to be a barrier to or determinative for route corridor selection.	
Technical	**Main risks, constraints and opportunities**
Technical	Electrified railways and multiple Distribution Network Operator assets to be overcome. Challenging routeing due to residential properties, listed buildings, farm complexes, equestrian facilities, electrified railway, Ardleigh Caravan and Camping Park, Oakview Nurseries, industrial areas, existing Distribution Network Operator substation, water and treatment works, Local plan allocation for a mineral extraction site and quarry expansion (east of Fox Street near the A120), the A137, the A134, the A120 dual carriageway, a meteorological mast, ancient woodland and drive in cinema. Various areas of restricted section width throughout the section There is only space for one new overhead line in the most constrained part of Section F between Great Horksley and Dedham Road north of Ardleigh, which if utilised as a preferred section between Bramford to the EAC Substation, would then prevent its utilisation as the preferred section from the EAC Substation to Tilbury Substation.
Overall Technical impact: The use of overhead line is envisaged for routeing both into and out of the new East Anglia Connection Substation, which is considered low risk in terms of technical complexity. Section F is moderately constrained, with some areas of significant constraint which greatly reduce flexibility and make routeing challenging in certain areas. The primary constraints include residential and listed buildings, farm complexes, industrial and recreational areas, ancient woodland and Local plan allocations. Extensive urban areas also greatly restrict the section, creating very narrow sections where flexibility is significantly reduced. Existing rail and road infrastructure is to be crossed and distribution network operator assets are to be mitigated. There is only space for one new overhead line in the most constrained part of Section F between Great Horksley and Dedham Road north of Ardleigh.	
Cost	
End to end options were pieced together from combinations of various sections. The costs for these end to end options are discussed in each chapter under the subtitle “Engineering, system and cost performance of options”.	

Appendix C
East Anglia Connection Topic Baseline Overviews

These overviews (appendices A, B, C and D present baseline data for the appraisal topics relevant to each of the corridor sections being appraised. A topic specific judgement based on professional judgement is also provided to aid understanding of the likely acceptability of the corridor and as appropriate noting its relative topic preference or not over other corridors.

The main CPRSS draws these potentially competing perspectives together to make a balanced selection of a preferred connection corridor.

Topic Baseline Overview For Zone A

Sub Topics	Main risks, constraints and opportunities
Environment	
Ecology/biodiversity (includes a 200m buffer)	The main risks and constraints in this zone, arise from one priority habitat (deciduous woodland) located in the Zone, but outwith any proposed substation Areas. There is an unidentified area of open water on the edge of the buffer zone to the north west, and an area of Ancient Woodland in the buffer zone to the south (~110m) alongside a streamcourse. *Construction*: There could be potential temporary/permanent indirect effects on the priority habitat on the boundary of substation Area 2, including loss of habitat, fragmentation and disturbance during construction. Any impacts to Ancient Woodland would be limited, and indirect (pollution) given that they are ~>100m away. N.B: The weighting given to harm in planning and legal terms to Ancient Woodland, means they present a material and potentially significant constraint to routeing. In *Operation* there is potential for limited temporary indirect effects from maintenance visits. N.B: When the more detailed, wider EIA and/ or HRA process is undertaken, Special Protection Areas (sites based on their ornithological interest) (SPAs) would normally be considered up to 10km and Special Areas of Conservation (SACs) typically up to 5km. All the substation study zones are, at their closest point within ~10km of the nearest SPA/5km of SAC. As the potential for an effect to be realised is driven by the presence of an identifiable effect pathway, and not simply distance, these international sites are not a key determining factor in distinguishing a clear preference of one over another for siting purposes. During the assessment the key features of these international sites have been considered (e.g. dark-bellied brent geese) to determine the likelihood of an identifiable effect pathway. These judgements have informed the assessment provided. When considering distance alone a buffer of ~200m was used to consider likely impacts on fixed statutory site constraints (where a likely pathway for effects exists from the works to the site through e.g. a watercourse, as opposed to mobile features such as birds that will be distributed based mainly on habitat characteristics as opposed to distance) has subsequently been assessed where they could pose a significant and discernible risk to consent because of proximity and a linked pathway. Those impacts and resultant effects are considered above Opportunities: To support partnerships for Environmental Gain. Overall it is considered that the scheme element can be located in the Zone being appraised, provided appropriate mitigation is implemented / element is located away from specific identified constraints / receptors. Negligible impacts on the Ancient Woodland units to the south are expected; in that circumstance this Zone is comparable to B, C and D in terms of potential consent risks/ challenges
Historic Environment	The zone contains or is close to a small number of Grade II listed buildings, the Ardleigh Conservation Area and a substantial scheduled site to the South of Ardleigh. Areas 2 and 3 are adjacent to Grade II listed Buildings. Careful attention to siting will be required but has the potential to reduce the likelihood of significant adverse effects as a result of change to setting by maximising separation from designated heritage assets and making use of terrain and existing planting to provide carefully designed screening, along with bunding and new planting (careful design being needed because of the open nature of the landscape).

Sub Topics	Main risks, constraints and opportunities
	The potential presence of archaeological remains is not considered to be a differentiating factor between potential sites but will be more fully considered during subsequent phases of design to ensure that effects on archaeological remains and constraint to design, consent and delivery can be better understood and managed. Overall an acceptable planning balance is considered capable of being achieved by this option in terms of effects on the historic environment .
Landscape and Visual	**Landscape** Zone A is located within Tendring District Landscape Character Area (LCA) 7A, which is assessed in the Tendring District Landscape Character Assessment as being visual sensitive due to the open nature of the landscape. Zone A is located in a particularly open part of this extensive LCA and could have the potential to exert a significant adverse characterising influence on LCA 7A given the long-distance nature of some of the available views, although this would be offset to some extent by the presence of the existing 132kV substation within this Zone. The Tendring District Landscape Character Assessment notes the importance of historic lanes to this LCA and recommends that road improvements and widening should be resisted. All four of the Areas within this Zone are given over to arable cultivation with tree cover restricted to shelterbelts and some remnant hedgerow trees. Hedgerows and hedgerow trees are most prevalent in the southern part of the Zone (Area 4) and other than in that Area, development would be unlikely to result in significant loss of landscape elements. Four existing 132kV OHLs converge at the substation near the centre of this Zone and there is an extensive solar farm located approximately 800m to the south-west of Area 4. **Visual** The presence of existing screening vegetation varies considerably within this Zone, with the north-central part (Area 2) benefitting most from mature shelter belts at its boundaries and the north-eastern part (Area 3) being the most exposed. All four Areas within Zone A benefit from the highly dispersed local settlement pattern, with no Area adjacent to more than three or four residences. All four Areas also have ample space to accommodate substantial screening, with trees likely to be favoured above bunds in this flat, open landscape. There are no long-distance footpaths or national or regional cycleways in the vicinity of this Zone. It is assumed that development within this Zone could avoid the loss of landscape elements that could occur within Area 4 and that a focus of the NG development would be within Area 2, which benefits from the highest level of existing screening (albeit this would typically be reinforced further). Note that other TBOs and the main CPRSS text consider other elements of the overall scheme and cumulative effects. With normal construction measures, the development of the infrastructure within this Zone is considered to be acceptable. This would be dependent upon development within Area 2 and the successful implementation of mitigation in the form of screen planting. Development within Areas 1 and 4 may be acceptable (depending on the parts of the sites utilised and form of any screening / planting),

Sub Topics	Main risks, constraints and opportunities
	but may also have the potential to result in adverse visual effects being experienced by a greater number of receptors due to the denser pattern of settlement to the south and west of this Zone. Area 3 may be less acceptable due to its more exposed nature and its heightened potential to give rise to significant landscape effects. Residual effects may include significant visual effects on the residents of Badely Hall and two properties adjacent to the northern part of Area 2 on Hungerdown Lane. These effects are most likely to be temporary as a result of construction activities prior to screening being available, but could be permanent if the loss of existing open views were deemed significant. There may also be significant adverse effects on the character of LCA 7A if development were to be sited in the more exposed parts of this Zone, but this should be able to be avoided if development is located within the more enclosed Area 2. Whether effects on LCA 7A would be significant or not would depend upon the extent of effects across the LCA, which would require more detailed assessment to establish. It is noted that this site is relatively remote from the A road network. If substantial lengths of permanent new road or the widening/improvement of existing minor roads were to be required, it is possible that this could result in significant adverse effects on local landscape character. Overall this zone is considered capable of being acceptable in terms of effects on landscape and views. .
Planning	There are no planning allocations that directly affect the Zone or the proposed substation Areas. In terms of constraints, in the centre of the Zone (surrounded by Areas 2, 3 and 4) is an existing substation (Lawford Grid Substation). Throughout the Zone there are Areas of both residential properties and agricultural buildings. In the west of the Zone (adjacent to the western edge of substation Area 2) there is a cluster of residential properties and agricultural buildings (residential properties are approximately 30 metres west of the boundary of Area 2). However, they benefit from some existing hedge/tree screening. In the south of the Zone at the end of Lilleys Lane, there is another small cluster of residential and agricultural buildings, the closest of which is approximately 20 metres south of the boundary of substation Area 4. And in the east of the Zone there are three areas, adjacent to south east corner and north east corner of substation Area 3, containing agricultural and/or residential buildings. It is also worth noting that in the farmland around the zone (but not within any of the proposed substation Areas), there are agricultural polytunnels. The Zone is within an area of Grade 1 and 2 agricultural land, i.e. best and most versatile. The Zone is within in a Sand and Gravel Minerals Safeguarding Area (Essex Minerals Local Plan). In terms of the Holford Rules, Zone A is furthest from the windfarm landing points on the coast and closest to the currently proposed SEA corridors. As a result, there would be less requirement for additional National Grid 400kV overhead lines if this Zone was taken forward as a substation location. In terms of the Horlock Rules, it is considered this area would comply with the Rules, although in relation to Rule 4 (keeping visual, noise and environmental effects to a minimum) further consideration would be required to minimise effects, and in relation to Rule 5 (considering land use effects) a substation in this Zone would likely result in the loss of Grade 1 and 2 agricultural land (Best and Most Versatile (BMV).

Sub Topics	Main risks, constraints and opportunities
	Given the proximity to residential properties additional tree planting around the edge of the substation Areas might help to screen the proposed substation. It is likely that if Area 4 was taken forward existing agricultural buildings on site would have to be removed. From a planning perspective a substation in this Zone should be consentable subject to implementing normal siting practices and construction mitigation measures.
Overall Environmental and Planning risk: The summary environmental implications of this Zone are that effects on ecology are likely to be consentable. It is comparable to Zones B, C and D in terms of potential consent risks/challenges for ecology. In addition, there are not expected to be any planning policy matters that would preclude a substation in this zone. From an historic environment perspective, Areas 2 and 3 are adjacent to Grade II listed Buildings, and it is possible that significant adverse effects as a result of change to setting could not be avoided. As a result, careful siting of infrastructure within the identified Areas would be necessary to reduce any adverse effects. From a landscape and visual perspective, development of a substation within this Zone is most likely to be consentable if focused in Area 2. Development within Areas 1 and 4 may be consentable, but subject to siting, may also have the potential to result in adverse visual effects being experienced by a greater number of receptors due to the denser pattern of settlement to the south and west of this Zone. Area 3 is expected to be most challenging due to its highly exposed nature. It should also be noted that if substantial lengths of widening/improvement of existing minor roads were to be required, it is possible that this could result in significant adverse effects on local landscape character that would weigh against consentability. New roads would need to be carefully designed and sited to be sympathetic to character.	
Overall Environmental and Planning risk – Corridors: The summary environmental implications of a National Grid corridor to this Zone, from an ecology perspective are that all corridors are assessed as capable of supporting it subject to normal routeing and siting practices and construction measures. Westernmost entry and exit corridors are marginally preferred, as the shorter routes would minimise necessary infrastructure and thus associated effects on both habitats, and potentially mobile receptors. From a Historic Environment perspective line entries / exits from the north and west are strongly preferred to minimise potential effects on heritage assets, careful design will be required to minimise the potential for significant adverse effects on the scheduled cropmark sites south of Ardleigh, and the Ardleigh Conservation Area and associated listed buildings. Landscape and Visual: The shortest potential line entry routes are to the north and west via Sections A (approximately 3.1km) or F (approximately 0.6km). The shortest potential line exit route is also via Section F. Inward connections via Sections A or F and an outward connection via Section F would have the potential to give rise to significant adverse effects in relation to residents of Lawford (Section A) and Ardleigh (Section F), though these should be acceptable with careful siting and measures focsussed locally on reducing visual effects. Outward connections via Sections H or N would be considerably longer (approximately 4.8km and 4.9km respectively), potentially affecting a greater number of receptors, particularly in the vicinities of Burnt Heath, Bromley Cross, but also those at Crockleford and Elmstead and, potentially, Elmstead Market. From a planning perspective all corridors are assessed as neutral and could support a route, subject to careful alignment and siting of pylons. In relation to inward connections, there is no preference to corridors as they all come in from the north and west. In relation to outward connections there is a preference for Options that utilise Section F (i.e. Options ET1, ET3, ET4 and ET5).	
Socio-economics	**Main risks, constraints and opportunities**
Economic activity	6 no. PROW that may require some diversion depending on exact siting and OHL entry from corridor A crosses some PROWs
Overall Socio-economic impact: From a socio-economic perspective a substation in this zone should be consentable. PROW diversions may be necessary but unlikely to be an issue which may bring risk into the consenting process.	
Overall Socio-economic impact – Corridors: There are not expected to be any socio-economic factors that would preclude routeing in any of the corridors to this Zone.	

Sub Topics	Main risks, constraints and opportunities
Technical	**Main risks, constraints and opportunities**
Technical	Site is constrained by existing watercourses and OHL. AIL access expected to require upgrade to Little Bromley Road. Opportunity to store spoil on site.
Overall Technical impact: Neutral. AIL access requires upgrade to Little Bromley Road. Neutral implication overall.	
Cost	
Capital Cost	This is the baseline, costs associated with other sites expressed as a change from this baseline.

Topic Baseline Overview For Zone B

Sub Topics	Main risks, constraints and opportunities
Environment	
Ecology/biodiversity (includes a 200m buffer)	The risks and constraints in this zone, arise from one priority habitat (deciduous woodland) located in the Zone, but outside and to the north of any of the proposed substation Areas. The risks and constraints in this zone, arise from one priority habitat (deciduous woodland) located in the Zone, but outside and to the north of any of the proposed substation Areas. N.B: When the more detailed, wider EIA and/ or HRA process is started, Special Protection Areas (sites based on their ornithological interest) (SPAs) would normally be considered up to 10km and Special Areas of Conservation (SACs) typically up to 5km. All the substation study zones are, at their closest point within ~10km of the nearest SPA/5km of SAC. As the potential for an effect to be realised is driven by the presence of an identifiable effect pathway, and not simply distance, these international sites are not a key determining factor in distinguishing a clear preference of one over another for siting purposes. During the assessment the key features of these international sites have been considered (e.g. dark-bellied brent geese) to determine the likelihood of an identifiable effect pathway. These judgements have informed the assessment provided. When considering distance alone a buffer of ~200m was used to consider likely impacts on fixed statutory site constraints (where a likely pathway for effects exists from the works to the site through e.g. a watercourse, as opposed to mobile features such as birds that will be distributed based mainly on habitat characteristics as opposed to distance) has subsequently been assessed where they could pose a reasonable risk to consent because of proximity and a linked pathway. Those impacts and resultant effects are considered above Opportunities: To support partnerships for Environmental Gain Overall the scheme element can be located in the Zone being appraised, provided mitigation is implemented / element is located away from specific identified constraints / receptors. No impacts on the priority woodland habitat units to the north are expected; in that circumstance this Zone is comparable to A C and D in terms of potential consent risks/ challenges. .
Historic Environment	The zone is close to a small number of Grade II listed buildings. The potential presence of archaeological remains is not considered to be a differentiating factor between potential sites but will be more fully considered during subsequent phases of design to ensure that effects on archaeological remains and constraint to design, consent and delivery can be better understood and managed. Area 19 would be visible from and potentially in views of some Grade II listed Buildings, and there is a potential, albeit limited, for significant adverse effects to arise as a result of change to setting. Careful siting of infrastructure within the identified Area would be necessary to reduce any adverse effects. Reduction of effects on setting would be best provided by siting to maximise separation from designated heritage assets and making use of terrain and existing planting to provide screening, along with bunding and new planting however the open nature of the landscape, however, means that any additional screening would require careful design. Overall The effect of this option on the historic environment is assessed as being capable of being acceptable

Sub Topics	Main risks, constraints and opportunities
Landscape and Visual	**Landscape** Zone B is located within Tendring District Landscape Character Area (LCA) 7A, which is assessed in the Tendring District Landscape Character Assessment as being visually sensitive due to the open nature of the landscape. The Zone is relatively elevated (~32m AOD), although this reduces to ~30m AOD on the north-eastern boundary as it descends toward Holland Brook. The Tendring District Landscape Character Assessment notes the importance of historic lanes to this LCA and recommends that road improvements and widening should be resisted. Zone B is located on the edge of Tendring District LCA 6D, the Holland Brook valley, in an area identified by the Landscape Character Assessment as being particularly sensitive to new built-development. The existing 132kV OHL passes through the southern part of the zone. The majority of this Zone is given over arable cultivation with tree cover present on the north-western boundary and also in the form of riparian vegetation along the small tributary of Holland Brook that bisects the zone. As a result, development would result in the loss of some potentially valued landscape elements. **Visual** Zone B is extremely open visually, with only the trees along its north-western boundary and a small block of woodland at its north-western corner providing screening of views in and out of the zone. This planting, together with additional tree belts and small woodlands to the north-west of the zone, reduces the visual connection between the Zone and the scattered properties in the vicinity of Mulley's Farm and Braham Hall. Additional vegetation on the outskirts of Little Bromley, approximately 1km to the north-west, effectively severs the visual connection between the zone and that settlement. To the east, the cluster of properties at Horsley Cross may have some clear views into the zone, but it is noted that most of these properties benefit from a relatively high degree of local screening from adjacent trees. The majority of residential properties in close proximity to the zone boundary are located to the south, in the vicinity of Bentley Road near its junction with the A120. Other than where screened by garden vegetation, many of these properties are likely to have clear views into the zone. Relatively unobstructed views into the zone are also likely to be available to residents of New Hall, located close to Holland Brook, to the north of the zone. All of these properties in close proximity to the site may have the potential to experience significant adverse visual effects. The zone has ample space to accommodate substantial screening. Trees are likely to be favoured above bunds in this flat, open landscape. A single public footpath traverses a small section of the north-west corner of the zone.

Sub Topics	Main risks, constraints and opportunities
	The development of a substation within Zone B is considered to be acceptable assuming normal routeing and siting principles are applied. Residual effects may include potentially significant adverse visual effects on the residents of properties to the immediate south, east and north. These effects are most likely to be temporary as a result of construction activities prior to screening being available, but could be permanent if the loss of existing open views were deemed significant. The location of the zone on the boundary of LCA 7A and the more sensitive LCA 6D to the north-east, could result in significant adverse effects on the character of LCA 6D. However, the zone is adjacent to the northernmost part of LCA 6D, near the source of Holland Brook, where the characteristics of the LCA are less pronounced and may be considered less sensitive. .
Planning	There are no planning allocations that affect the Zone or the proposed substation Areas. The Zone contains two farms Welham's Farm and Red House Farm and is within an area of Grade 1 and 2 agricultural land i.e. best and most versatile. The northern edge of the Zone falls is within a Sand and Gravel Minerals Safeguarding Area (Essex Minerals Local Plan), but the substation Area itself is outside of this allocation. In terms of the Holford Rules, Zone B is closer to the potential windfarm landing points on the coast than Zone A and D and further from the currently proposed SEA corridors than Zone A and D. As a result, there would be an increased need for additional overhead lines in the landscape if this Zone was taken forward as a substation location. In terms of the Horlock Rules, it is considered this area would comply with the Rules, although in relation to Rule 4 (keeping visual, noise and environmental effects to a minimum) further consideration would be required to minimise effects, and in relation to Rule 5 (considering land use effects) a substation in this Zone would result in the loss of Grade 1 and Grade 2 agricultural land (Best and Most Versatile (BMV). From a planning perspective a substation in this Zone should be consentable subject to normal siting processes and construction measures but noting it would potentially result in the loss of BMV agricultural land.
Overall Environmental and Planning risk: The summary environmental implications of this Zone are effects on ecology are such that the proposed infrastructure is likely to be consentable and considered as neutral overall. It is comparable to Zone A and C in terms of potential consent risks/challenges for ecology. From an historic environment perspective, there is a potential, albeit limited, for significant adverse effects to arise as a result of change to setting of some Grade II listed buildings. As a result, careful siting of infrastructure within the identified Areas would be necessary to minimise any adverse effects. From a landscape and visual perspective, the development of infrastructure within Zone B is considered to be acceptable, dependent upon careful siting of infrastructure and locally focussed measures to reduce potential visual effects. From a planning perspective, there are not expected to be any planning policy matters that would preclude a substation in this zone.	
Overall Environmental and Planning risk – Corridors: From an ecology perspective all corridors are assessed as capable of supporting a route alignment, subject to normal routeing and siting processes and construction measures. Westernmost entry and exit corridors are marginally preferred, as shorter routes would reduce necessary infrastructure and thus associated effects on both habitats, and potentially mobile receptors. From an historic environment perspective line entries from the north-west, passing north of little Bromley and entering the option area from the north are preferred to minimise potential effects on listed buildings and conservation areas at Lawford, Great and Little Bromley and Ardleigh. Line exits to the south of the option areas, joining the OHL options around Elmstead Heath are preferred to minimise effects on listed buildings around Elmstead. Landscape and Visual: The potential length of inward connections to Zone B is approximately 4.2km in relation	

Sub Topics	Main risks, constraints and opportunities
to Section A and approximately 5km in relation to Section F, whilst outward connections could potentially vary between approximately 5km in relation to Sections F and N and approximately 7km in relation to Section H. Connection via Section A is relatively unconstrained to the south and east of Lawford, though it may have the potential to give rise to significant adverse visual effects in relation to residents of Little Bromley. A connection via Section F would be more constrained due to the clusters of properties at Little Bromley Hall and Mulley's Farm, in addition to Little Bromley. An outward connection via Section N would have the potential to cause significant adverse visual effects for the residents of Great Bromley or Bromley Cross. Section A is therefore considered preferable for the inward connection, whilst either Section F or Section N may be preferred for the outward connection. From a planning perspective all corridors area assessed as capable of supporting a route, subject to careful alignment and siting of pylons. In relation to inward connections, there is no overall preference although it is noted that from a landscape and visual perspective, there is a slight preference for Corridors that utilise Section A (i.e. Option BE1 and BE2). In relation to outward connections there is no preference.	
Socio-economics	**Main risks, constraints and opportunities**
Economic activity	1 no. PROW within Zone B, although it lies adjacent, but not within, identified Area 19. OHL entry from Corridor A could bring the line into proximity of some businesses at Horsley Cross, and cross some PROWs, but considered unlikely to bring risk into the consenting process. OHL entry from Corridor F would bring the OHL into proximity to businesses around little Bromley and cross some PROWs. There is unlikely to be anything which would bring risk into the consenting process, but effects are judged to be greater than those associated with corridor A.
Overall Socio-economic impact: From a socio-economic perspective this Zone is considered to be consentable. There is potential for the proposed infrastructure to interact with this and various existing, or proposed, commercial land-uses. Whether or not there is a material effect on such activities or land-uses depends on detailed siting, and will also include consideration of potential mitigation and engagement with relevant parties. Affected parties may also be entitled to compensation, assessed in line with the Compensation Code. On this basis, at this route corridor stage, the presence of such land-uses is not in itself considered to be a barrier or determinative.	
Overall Socio-economic impact – Corridors: There is a slight preference for a route from Corridor A but neither corridor should bring risk to the consenting process.	
Technical	**Main risks, constraints and opportunities**
Technical	Good road connectivity via A120. For permanent AIL access, road improvement works are required to Bentley Road. Potential issues include Mulberry Lane though zone B, adjacent woodland, water and OHL crossings. Opportunity to store spoil on site. No key constraints identified for Zone B.
Overall Technical impact: Good road connectivity via A120. Opportunity to store spoil on site and use roundabout. No particular constraints.	
Cost	
Capital Cost	Baseline plus estimated £16m extra OHL

Topic Baseline Overview For Zone C

Sub Topics	Main risks, constraints and opportunities
Environment	
Ecology/biodiversity (includes a 200m buffer)	The main risks and constraints in this Zone arise from two priority habitats overlapping the south west boundary of the Zone on the A120 (associated with the highway) and Harwich Road, but outwith proposed substation Areas. Open water / fishing lakes exist along the north west boundary. *Construction*: There could be potential temporary/permanent indirect/direct effects on priority habitat on the boundary of the Zone including loss of habitat, fragmentation and disturbance during construction. In *Operation* there is potential for some limited temporary indirect effects during operation from maintenance visits. N.B: When the more detailed, wider EIA and/ or HRA process is undertaken, Special Protection Areas (sites based on their ornithological interest) (SPAs) would normally be considered up to 10km and Special Areas of Conservation (SACs) typically up to 5km. All the substation study zones are, at their closest point within ~10km of the nearest SPA/5km of SAC. As the potential for an effect to be realised is driven by the presence of an identifiable effect pathway, and not simply distance, these international sites are not a key determining factor in distinguishing a clear preference of one over another for siting purposes. During the assessment the key features of these international sites have been considered (e.g. dark-bellied brent geese) to determine the likelihood of an identifiable effect pathway. These judgements have informed the assessment provided. When considering distance alone a buffer of ~200m was used to consider likely impacts on fixed statutory site constraints (where a likely pathway for effects exists from the works to the site through e.g. a watercourse, as opposed to mobile features such as birds that will be distributed based mainly on habitat characteristics as opposed to distance) has subsequently been assessed where they could pose a reasonable risk to consent because of proximity and a linked pathway. Those impacts and resultant effects are considered. Opportunities: To support partnerships for Environmental Gain Overall from the ecology / biodiversity perspective the scheme element can be acceptably located in the Zone being appraised , subject to normal siting practices and construction measures.. This Zone is comparable to A, B and D in terms of potential consent risks.
Historic Environment	The Zone contains 3 Grade II listed buildings, all closest to Area 21. It is unlikely that significant adverse effects arising through change to setting could be avoided in all cases. Careful siting within this Area to maximise separation from listed buildings and maximise use of existing screening has the potential to reduce any adverse effects. Area 22 is less constrained although a location in the southern part of this Area would be preferred to reduce effects on the Grade II listed Park Farmhouse The potential presence of archaeological remains is not considered to be a differentiating factor between potential sites but will be more fully considered during subsequent phases of design to ensure that effects on archaeological remains and constraint to design, consent and delivery can be better understood and managed.

Sub Topics	Main risks, constraints and opportunities
	Overall the effect of this Zone option on the historic environment is assessed as being capable of being acceptable in the planning balance. .
Landscape and Visual	**Landscape** Zone C is located within Tendring District Landscape Character Area (LCA) 7A, which is assessed in the Tendring District Landscape Character Assessment as being visually sensitive due to the open nature of the landscape. The Zone is relatively elevated (~35m AOD). However, the crest of a small ridge located to the north-west, and the presence of the A120 to the south and east, effectively sever this Zone's connection with other parts of the LCA except to the north. The existing 132kV OHL passes approximately 600m to the north of the more northerly of the two areas within this Zone (Area 21). A tall communications mast is located approximately 300m to the west of Area 21. The Tendring District Landscape Character Assessment notes the importance of historic lanes to this LCA and recommends that road improvements and widening should be resisted. Both of the Areas within this Zone are given over arable cultivation with tree cover largely restricted to the outer boundaries. Development would therefore result in no significant loss of landscape elements. **Visual** With the exception of the south-west corner of Area 22, the Zone's boundary with the A120 is extremely open visually. Area 22 benefits from the dense screen planting associated with the junction of the A120 and A133 to the immediate south-west. This planting effectively severs the visual connection between the Zone and the settlement of Hare Green to the south-west. Dense tree cover also provides effective screening between Area 22 and the small number of residential properties in the vicinity of Wright Kings Farm. The northern corner of Area 22 is less well screened and views into the Area are available from Park farm and two adjacent properties. Park farm is more effectively screened from Area 21 and from the residential property close to its north-eastern boundary. Residents on the far side of the A120 generally benefit from mature tree cover between the properties and the road. Both areas have ample space to accommodate substantial screening. Trees likely to be favoured above bunds in this flat, open landscape, but bunds may be appropriate along the south-eastern boundary with the A120. There are no public rights of way within the Zone. There are no long-distance footpaths in the vicinity of this Zone. National Cycle Network National Route 51 passes in relatively close proximity on the far side of the A120, but is generally well screened. In Landscape and visual terms, subject to detailed siting and local construction measures, the development of a substation within either of the areas in this Zone is considered to be acceptable, with a slight preference for Area 22 as it has less visual connection to other parts of LCA 7A. Residual effects may include potentially significant adverse visual effects on the residents of properties to the immediate south-west of Park Farm. These effects are most likely to be temporary as a result of construction activities prior to screening being available, but could be permanent if the loss of existing open views were deemed significant. It is not considered that the development of this Zone would result in significant adverse effects on landscape character due to the restricted visual relationship between this Zone and most of the surrounding parts of LCA 7A. Zone C, and Area 22 in particular, is a preferred site in landscape and visual terms

Sub Topics	Main risks, constraints and opportunities
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Planning	There are no planning allocations that affect the Zone or proposed substation Areas. The eastern edge of Area 21 and the south eastern/southern edge of area 22 are bordered by the A120. There are a small number of residential properties along this road, but these are largely set back from the road. Located near the centre of the Zone is a cluster of agricultural buildings/light industrial buildings and residential properties. The south western corner of substation Area 21 and the north western corner of substation Area 22 wrap around this cluster buildings, however, it should be noted that the area these buildings are situated in largely benefit from screening from hedges/trees on all sides adjacent to the substation Areas. There are two residential properties which are located adjacent to Area 22 (approximately 30 metres from the boundary of the Area) at the intersection of Chase Road East, Hilliards Road Park Road and Honeypot Lane/Stone Road (on the western side of Chase Road East) which maintain views across Area 22. Down the western side of Zone C there are three smaller clusters of agricultural and residential properties. The most southerly of the three sites includes residential properties along Chase Road East whose gardens back on to Area 22, however, they benefit from screening from existing hedges/trees. In the north west of the Zone is a collection of irrigation lakes and additional agricultural buildings, as well as a small number (<5) of residential properties just outside of the Zone. Additionally, there is a small number of residential properties in the north east of the Zone, however, these benefit from existing screening from trees/hedges. The Zone is primarily located within an area of Grade 2 agricultural land, however, some parts are anticipated to be Grade 1 (Best and Most Versatile). The Zone largely overlaps with a Sand and Gravel Minerals Safeguarding Area (Essex Minerals Local Plan). In terms of the Holford Rules, Zone C is closer to the potential windfarm landing points on the coast than Zone A and D and further from the currently proposed SEA corridors. As a result there would be an increased need for additional overhead lines in the landscape if this Zone was taken forward as a substation location. In terms of the Horlock Rules, it is considered this area would comply with the Rules, although in relation to Rule 4 (keeping visual, noise and environmental effects to a minimum) further consideration would be required to minimise effects, and in relation to Rule 5 (considering land use effects) a substation in this Zone would likely result in the loss of Grade 2 and potentially some grade 1 agricultural land (Best and Most Versatile (BMV). Overall from a planning perspective a substation in this Zone should be consentable subject to implementing normal routeing and siting practices and locally focussed measures, though would potentially result in the loss of BMV agricultural land.
Overall Environmental and Planning risk: The summary environmental implications of this Zone are that effects on ecology receptors are likely to be consentable. In addition, there are not expected to be any planning policy matters that would preclude a substation in this zone. It is comparable to Zone A, B and D in terms of potential consent risks/challenges for ecology. From an historic environment perspective, both Areas are adjacent to Grade II listed Buildings, and it is possible that significant adverse effects as a result of change to setting could not be avoided. As a result, careful siting of infrastructure within the identified Areas would be necessary to reduce any adverse effects. Area 22 would be preferred to reduce effects on the Grade II listed Park Farmhouse. From a landscape and visual perspective, Zone C, and Area 22 in particular, is a preferred site in landscape and visual terms. From a planning perspective, there are not expected to be any planning policy matters that would preclude a substation in this zone.	

Sub Topics	Main risks, constraints and opportunities
Overall Environmental and Plannning risk - Corridors: The summary environmental implications of a National Grid corridor to this Zone from an ecology perspective all corridors are assessed as being able to support a route alignment, subject to normal routeing and siting and construction measures. Westernmost entry and exit corridors are marginally preferred, as the shorter routes would reduce necessary infrastructure and thus associated effects on both habitats, and potentially mobile receptors. From a historic environment perspective line entries from the north-west, passing north of little Bromley and entering the option area from the north are preferred to reduce potential effects on listed buildings and conservation areas at Lawford, Great and Little Bromley and Ardleigh. Line exits to the south of the option areas, joining the OHL options around Elmstead Heath are preferred to reduce effects on listed buildings around Elmstead. From a landscape and visual perspective, the potential length of inward connections to Zone C is approximately 5.5km in relation to both Sections A and F, whilst outward connections could potentially vary between approximately 3.5km in relation to Section N and approximately 7km in relation to Section H. Connections via Sections A or F are relatively unconstrained to the south and east of Lawford and Ardleigh, though both may have the potential to give rise to significant adverse visual effects in relation to residents of Little Bromley. Whilst shorter, an outward connection via Section N would have the potential to cause significant adverse visual effects for the residents of Great Bromley, Hare Green and Balls Green and an outward connection via Section F is therefore likely to be preferable. From a planning perspective all corridors area assessed as neutral and could support a route, subject to careful alignment and siting of pylons. In relation to inward and outward connections, there is no clear preference for one corridor over another.	
Socio-economics	**Main risks, constraints and opportunities**
Economic activity	NCR 51 can be avoided by siting north of the A120. A PROW is present within Zone C but outside areas 21 and 22 and can be avoided (on western edge of Zone). OHL entry from Corridor A could bring the line into proximity of some businesses at Horsley Cross, and cross some PROWs, but unlikely to an issue which would bring risk into the consenting process. OHL entry from Corridor F would bring the OHL into proximity to businesses around little Bromley and cross some PROWs. There is unlikely to be anything which would bring risk into the consenting process, but with slightly greater effects than from Corridor A
Overall Socio-economic impact: From a socio-economic perspective this Zone is considered to be consentable, There is potential for the proposed infrastructure to interact with this and various existing, or proposed, commercial land-uses. Whether or not there is a material effect on such activities or land-uses depends on detailed siting, and will also include consideration of potential mitigation and engagement with relevant parties. Affected parties may also be entitled to compensation, assessed in line with the Compensation Code. On this basis, at this route corridor stage, the presence of such land-uses is not in itself considered to be a barrier or determinative.	
Overall Socio-economic impact – Corridors: There are not expected to be any socio-economic factors that would preclude routeing in any of the corridors to this Zone. OHL routeing from the western extent of Corridor N is considered to increase risk to the consenting process due to the receptors at Elmstead Market Woodland. There are not expected to be any socio-economic factors that would preclude routeing in any of the other corridor options to this Zone. The other options (A, F, H and from the eastern extent of N) are therefore considered to be consentable.	
Technical	**Main risks, constraints and opportunities**
Technical	Site located adjacent to A120 with an established Park Lane bellmouth and decelerating lane available. Good road connectivity via A120. Potential obstacles include Source Protection Zone 3. Opportunity to store spoil on site.
Overall Technical impact: Favourable in technical terms for the reasons stated	

Sub Topics	Main risks, constraints and opportunities
Cost	
Capital Cost	Baseline plus estimated £20m OHL

Topic Baseline Overview For Zone D

Sub Topics	Main risks, constraints and opportunities
Environment	
Ecology/biodiversity (includes 200m biodiversity buffer)	The main risks and constraints in this zone, arise from priority habitat (deciduous woodland and open water) located in the search Zone, but outside any of the proposed substation Areas. There is an unidentified area of open water to the west of Area D8, and an area of Ancient Woodland (Money Wood) immediately adjacent to Area D7, to the south. Construction: There could be potential temporary/permanent indirect effects on the priority habitat and Ancient Woodland on the boundary of the substation Areas, including damage of habitat, fragmentation and disturbance during construction. Any impacts to Ancient Woodland would be limited, and indirect (pollution), however, given its importance, and the weighting given to harm in planning and legal terms to Ancient Woodland, means they remain as a material and potentially significant constraint to development. In Operation there is potential for temporary indirect effects during operation from maintenance visits. N.B: When the more detailed, wider EIA and/ or HRA process is undertaken, Special Protection Areas (sites based on their ornithological interest) (SPAs) would normally be considered up to 10km and Special Areas of Conservation (SACs) typically up to 5km. All the substation study zones are, at their closest point within ~10km of the nearest SPA/5km of SAC. As the potential for an effect to be realised is driven by the presence of an identifiable effect pathway, and not simply distance, these international sites are not a key determining factor in distinguishing a clear preference of one over another for siting purposes. During the assessment the key features of these international sites have been considered (e.g. dark-bellied brent geese) to determine the likelihood of an identifiable effect pathway. These judgements have informed the assessment provided. When considering distance alone a buffer of ~200m was used to consider likely impacts on fixed statutory site constraints (where a likely pathway for effects exists from the works to the site through e.g. a watercourse, as opposed to mobile features such as birds that will be distributed based mainly on habitat characteristics as opposed to distance) has subsequently been assessed where they could pose a reasonable risk to consent because of proximity and a linked pathway. Those impacts and resultant effects are considered. Opportunities: To expand / improve habitats for enhancementn Overall in respect of ecology / biodiversity it is concluded that the scheme element can be located in the Zone being appraised subject to normal siting practices and construction measure. Of all three Areas, Area D6 has the least potential for ecological effects to occur. Negligible impacts on the Ancient Woodland units to the south, and adjacent priority habitats are expected; in that circumstance this Zone is comparable to A, B and C in terms of potential consent risks/ challenges.

Sub Topics	Main risks, constraints and opportunities
Historic Environment	The zone contains or is close to a small number of Grade II listed buildings, the Grade II* listed Elmstead Hall and the Grade I listed Church of St Anne and St Lawrence. The potential presence of archaeological remains is not considered to be a differentiating factor between potential sites but will be more fully considered during subsequent phases of design to ensure that effects on archaeological remains and constraint to design, consent and delivery can be better understood and managed All areas are close to the highly graded listed buildings at Elmstead Hall and significant adverse effects may arise. Area 6 appears sufficiently large to allow flexibility in siting to effectively reduce effects here. Area 7 is relatively well-screened in views from both St the church and Elmstead Hall. Area 8 appears to have a greater separation, but there are clear views from the south front of Elmstead Hall into this area, and given this is seems unlikely that significant adverse effects as a result of change to setting could be avoided. Careful siting of infrastructure within the identified Areas would be necessary to reduce any adverse effects. Overall effects in terms of the historic environment are assessed to be capable of being acceptable in the planning balance on parts of the Zone though the use of areas 7 and 8 is less favoured and may depend on the combination of very careful siting and relatively extensive measures to avoid a significant adverse effect and be acceptable in the planning balance.
Landscape and Visual	**Landscape** Zone D consists of three separate areas: Area 6, to the north-west; Area 7, to the east; and Area 8 to the south-west. Zone D is located within Tendring District Landscape Character Area (LCA) 7A, which is assessed in the Tendring District Landscape Character Assessment as being visual sensitive due to the open nature of the landscape. Zone D is relatively elevated (between ~30m and ~34m AOD) and located in a particularly open part of this extensive LCA. As such, it could have the potential to exert a significant adverse characterising influence on LCA 7A given the long-distance nature of some of the available views. Zone D is located on the edge of Tendring District LCA 6C, the Tenpenny Brook valley, in an area identified by the Landscape Character Assessment as being particularly sensitive to new built-development. The Tendring District Landscape Character Assessment notes the importance of historic lanes to this LCA and recommends that road improvements and widening should be resisted. All three of the Areas within this Zone are given over to arable cultivation. Development would be unlikely to result in significant loss of landscape elements. The existing 132kV OHL between the 132kV substation at Little Bromley and Colchester passes within 350m to the north-west of Area 6. An area of minerals working lies between Areas 6 and 8 and there is an anaerobic digester at Allen's Farm to the west. The A120 forms the northern boundaries of Areas 6 and 7. **Visual** Substantial tree cover is present along a proportion of the boundary of Area 7 in the form of a shelterbelt to the east of Elmstead in the

Sub Topics	Main risks, constraints and opportunities
	north and a small woodland to the south. Elsewhere, screening is restricted to hedgerows and hedgerow trees, which are most prevalent along the southern and western boundaries of Areas 6 and 8. Residential settlement in close proximity to this zone consists of Lodge Farm on the south-eastern corner of Area 7, Parsonage Farm, located between Areas 7 and 8, the cluster of properties at Elmstead, located between Areas 6 and 7 and Allen's Farm, located approximately 450m to the west of Areas 6 and 8. All of these properties in close proximity to the site may have the potential to experience significant adverse visual effects. The large village of Elmstead Market is located approximately 200m to the south of Area 8 and approximately 350m to the south-west of Area 7. Much of the northern edge of the settlement benefits from a substantial degree of screening in the form of mature trees, though clear views into the zone are likely to be available from some locations, including the northernmost properties on Church Road. These properties may also have the potential to experience significant adverse visual effects. Public footpaths are present along the southern and eastern boundaries of Are 6, along and within the eastern boundary of Area 7 and traversing the southernmost part of Area 8. , the development of a substation within this Zone is considered to be acceptable if local residents surrounding the southern parts of the Zone can be provided with adequate screening, though it is noted that the provision of bunding may be problematic in relation to local landscape character. Residual effects may include significant adverse visual effects on the residents of Brookmead Cottages, Warren's Farm and adjacent property, Ellington and, to a lesser extent, Paynes Farm. These effects are most likely to be temporary as a result of construction activities prior to screening being available, but could be permanent if the loss of existing open views were deemed significant. There would be adverse effects on the character of LCA 7A and 7B and potentially significant effects on the character of adjacent LCA 6D, though the relatively well wooded nature of LCA 6D at this point makes this less likely than would otherwise be the case. Whether effects on LCA 6D would be significant or not would depend upon the extent of effects across the LCA following careful siting, Overall in landscape and visual terms the development of infrastructure within this Zone is considered to be acceptable but with some challenges. This would be dependent upon the adoption of normal routeing and siting practices and construction measures noting there is ample space to strengthen existing boundary planting. Development would preferably be limited to two areas (i.e. Area 7 and Area 6) given the proximity of area 8 to Elmstead Market. Residual effects may include significant visual effects on the residents of of Lodge Farm, Parsonage Farm, Elmstead, Allen's Farm and a small number of residents on the northern edge of Elmstead Market. These effects are most likely to be temporary as a result of construction activities prior to planting being available, but could be permanent if the loss of existing open views were deemed significant. There may also be significant adverse effects on the character of LCA 7A. Whether effects on LCA 7A would be significant or not would depend upon the extent of effects across the LCA, which would require more detailed assessment to establish. The location of the zone on the boundary of LCA 7A and the more sensitive LCA 6C to the east and north-east, could result in significant adverse effects on the character of LCA 6C, particularly in relation to the part of the LCA to the south of the A120, to the immediate east of Area 7.

Sub Topics	Main risks, constraints and opportunities
Planning	The western part of Area 6 falls within the Tendring and Colchester Borders Garden Community allocation. Area 8 is directly adjacent to this allocation but does not fall within in. This allocation seeks to deliver a new settlement to the north east of Colchester on the Tendring and Colchester border. In terms of applications, planning permission was granted on 7th February 2022 to extend site operations until 2025 at an irrigation reservoir between Areas 6 and 8. The Zone contains Elmstead Hall, Parsonage Farm and Lodge Farm. The southern extent of the Zone adjoins the northern edge of Elmstead Market. The majority of the Zone is within an area of Grade 1 agricultural land, with northern part of Area 7 falling within Grade 2 agricultural land. In both cases these classifications relate to the best and most versatile agricultural land. The Zone is within in a Sand and Gravel Minerals Safeguarding Area (Essex Minerals Local Plan). In terms of the Holford Rules, Zone D is more inland than the Zones B and C and closest to the currently proposed SEA corridors. As a result, there would be less requirement for additional National Grid 400kV overhead lines if this Zone was taken forward as a substation location. In terms of the Horlock Rules, it is considered this area would comply with the Rules, although in relation to Rule 4 (keeping visual, noise and environmental effects to a minimum) further consideration would be required to minimise effects, and in relation to Rule 5 (considering land use effects) a substation in this Zone would result in the loss of Grade 1 and Grade 2 agricultural land (Best and Most Versatile (BMV). Overall from a planning perspective a substation in this Zone should be consentable subject to implementing normal routeing and siting principles and construction measures.
Overall Environmental and Planning risk: The summary environmental implications of this Zone are that whilst it should be consentable, the Ancient Woodland in the immediate proximity to the substation Area may pose a consenting risk/challenge due to potential residual effects on ecology. From a planning perspective there are not expected to be any planning policy matters that would preclude a substation in this Zone. From an historic environment perspective, the Zone is adjacent to Grade II listed Building, and it is possible that significant adverse effects as a result of change to setting may occur. As a result, careful siting of infrastructure and use existing screening where possible would be necessary to minimise any adverse effects. From a landscape and visual perspective, the development of a substation within this Zone is considered to be consentable if local residents surrounding the southern parts of the Zone can be provided with adequate screening, though it is noted that the provision of bunding may be problematic in relation to local landscape character. In addition, there would be adverse effects on the character of LCAs. Whether these effects would be significant or not would depend upon the extent of effects across the LCA assessed following the conclusion of siting studies. The summary environmental implications of this Zone are that effects on ecology are such that the proposed infrastructure is likely to be consentable. It is comparable to Zones A, B and C in terms of potential consent risks/challenges for ecology. Marginally higher risks may be associated with mobile ecological receptors associated the open water area immediately to the west of Area 8, and thus at this stage, Areas 6 or 7 would be preferred. However standard best practice would be expected to mitigate any likely effects to a negligible level. From an historic environment perspective, substation development in this zone is assessed as capable of being acceptable, although use of Areas 7 and 8 may require a combination of careful siting and relatively extensive measures to avoid a negative effect. This is	

Sub Topics	Main risks, constraints and opportunities
particularly the case for Area 8 as there are clear views from the south front of Elmstead Hall (a Grade II* Listed Building) into this area, and it is likely that significant adverse effects as a result of change to setting would be difficult to avoid. From a landscape and views perspective development would preferably be limited to two areas (i.e. Area 7 and Area 6), rather than Area 8 because of its proximity to Elmstead Market and require careful routeing and siting and normal construction measures with a focus on localised measures to reduce visual effects. From a planning perspective, there are not expected to be any planning policy matters that would preclude a substation in this zone.	
Overall Environmental and Planning risk – Corridors: The summary environmental implications of a National Grid corridor to this Zone from an ecology perspective are that none of the corridors prevent a route alignment subject to mitigation which would avoid tower placement within priority habitats wherever possible, as well as best practice mitigation and reinstatement. From a Landscape and Visual perspective all corridors to this Zone would be consentable, assuming careful route alignment. From a Historic Environment perspective an overhead line solution could be achieved to this Zone, subject to appropriate mitigation and controls. There are not expected to be any planning policy matters that would preclude routeing in any of the corridors to this Zone. From an ecology perspective all corridors are assessed as capable of b eing acceptable, and could support a route alignment, subject to normal routeing and siting and construction measures. Westernmost entry and exit corridors are marginally preferred, as the shorter routes would reducenecessary infrastructure and thus associated effects on both habitats, and potentially mobile receptors. However standard best practice would be expected to mitigate any likely effects to a negligible level. From a historic environment perspective, consideration of line entries from the north suggests a potential for significant adverse effects on the scheduled cropmark sites south of Ardleigh, the Ardleigh Conservation Area and Grade II listed buildings between Ardleigh and Elmstead. Line exits to the south from all options in this zone would likely give rise to significant adverse effects on the Grade II* listed Elmstead Hall which would be difficult to mitigate. There is therefore a strong preference for line entries and exits to the west, meaning that there is a strong preference for utilising Section F or H. From a landscape and visual perspective, the shortest potential line entry route is to the West via Section F (south), which would require approximately 1km of line within the EAC areas of search. Should Section F (south) not be viable, inward connections from the north would be a minimum of approximately 4.8km if using Section F (north) and 5.5km if using Section A. The length of outward connections would vary between 0km for Section H, 0.4km if using Section N, 1.1km for Section F (south) and 4.8km for Section F (north). Inward connections via Sections A or F (north) and an outward connection via Section F (north) would have the potential to give rise to significant adverse effects in relation to residents of Lawford (Section A) and Ardleigh (Section F), Bromley Cross and several scattered properties between Zones A and D, though these should be acceptable with careful siting and perhaps the provision of additional screening. Outward connections via Sections F (south), H or N would be considerably shorter, affecting a lesser number of receptors and should be acceptable with careful siting. From a planning perspective all corridors area assessed as likely not to present consent risk and could support a route, subject to careful alignment and siting of pylons. In relation to inward connections, there is a preference for an inward connection utilising Section F south. In relation to outward connections there is no overall preference.	
Socio-economics	**Main risks, constraints and opportunities**
Economic activity	5 no. PROW are located within Zone D although they are mostly outside of the identified Areas 6, 7 and 8. A sand and gravel quarry also exists within the Zone, between (but outside of) Areas 6 and 8. OHL entry from the eastern extent of Corridor N could see the OHL routed through a local nature reserve with open access rights (Elmstead Market Woodland), cross NCR 51 and a PROW and close to a caravan site at Mill Farm to reach Area D. OHL entry from Corridors F, H or N (western extent) may all have to cross PROWs but this is unlikely to an issue which would bring risk into the consenting process.

Sub Topics	Main risks, constraints and opportunities
	Routeing the OHL entry from the western extent of Corridor N (rather than the eastern extent) would be the preferred option though any impacts along the along the OHL entries from F, H or the eastern extent of N corridors route could be minimised by normal routeing and siting practices. .
Overall Socio-economic impact: Subject to careful siting and implementation of PROW diversions, a substation in this Zone should be consentable from a socio-economic perspective.	
Overall Socio-economic impact – Corridors: There are not expected to be any socio-economic factors that would preclude routeing in any of the corridors to this Zone.. OHL routeing from the eastern extent of Corridor N is considered to increase risk to the consenting process due to the receptors at Elmstead Market Woodland. This option is considered to be less favoured. There are not expected to be any socio-economic factors that would preclude routeing in any of the other corridor options to this Zone. The other options (F, H and from the western extent of N) are therefore considered to be capable of being acceptable.	
Technical	**Main risks, constraints and opportunities**
Technical	The main technical issue is that the site is located near A120, but there is no existing access. Potential options require upgrades to bridge and access from A120 or route through Elmstead Market. Zone D is located north of Elmstead Market, which poses a concern for permanent AIL access via residential areas and school. Zone D is located around Elmstead with adjacent properties (farm, listed building) and school present south of area 8. There is variable superficial geology across area 7. Site area sufficient to provide opportunity to store spoil on site. Areas 6 and 8 shares boundaries with a possible sand extraction terminal.
Overall Technical impact: Less favoured than zones A or C Due access limitations.	
Cost	
Capital Cost	Baseline plus estimated £16m OHL

Appendix D
East Anglia Connection to Tilbury Topic Baseline Overviews

These overviews (appendices A, B, C and D present baseline data for the appraisal topics relevant to each of the corridor sections being appraised. A topic specific judgement based on professional judgement is also provided to aid understanding of the likely acceptability of the corridor and as appropriate noting its relative topic preference or not over other corridors.

The main CPRSS draws these potentially competing perspectives together to make a balanced selection of a preferred connection corridor.

Topic Baseline Overview For Section G

Sub Topics	Main risks, constraints and opportunities
Environment	
Ecology/biodiversity	The main risks and constraints in this section arise from nationally important habitat – 2 blocks of Ancient Semi-natural Woodland (ASNW). Hillhouse Wood and Stitching Wood ; Several priority habitats are also identified across the section and adjacent, including broadleaved woodland and floodplain grazing marsh, open water, as well as WFD / Main watercourses crossed– River Colne, plus an unnamed watercourse. *Construction*: There would be no direct effects on the AW as they are outside the section. However, given the importance and weighting in both planning and legal terms of such designated biodiversity, AW (in respect of potential indirect effects), they thus remain a potentially significant material constraint to development. . There is potential for permanent/temporary direct effects on Priority Habitats including loss of habitat, fragmentation and disturbance during construction. In Operation there is potential for temporary indirect effects during operation from maintenance visits, and some, albeit limited risk of bird collision (though not for designated sites) given wetland habitats/rivers in the vicinity. a Opportunities: To support partnerships for Environmental Gain Overll in ecology and biodiversity terms the scheme element can be located in the area being appraised, and is acceptable provided mitigation is implemented / element is located away from specific constraints / receptors.
Historic Environment	There are a small number of listed buildings within or close to this section. The potential presence of archaeological remains is not considered to be a differentiating factor. This potential will be more fully considered during subsequent phases of design to ensure that effects on archaeological remains and constraint to design, consent and delivery can be better understood and managed. Overall there are no significant historic environment consenting or delivery concerns arising from this section as design can be used to maximise separation from designated heritage assets close to the section.
Landscape and Visual	This section would only be used if connecting from the EAC to Tilbury via Section F. There would therefore be no development within nearby Sections E and H if this section is used. Together with the absence of 132kV DNO assets in this area, this negates the potential for significant adverse cumulative effects. **Landscape** Development within this section would not affect any nationally or locally designated landscapes. It is not anticipated that the introduction of a 400kV OHL in this section would give rise to any significant adverse effects on local landscape character.

Sub Topics	Main risks, constraints and opportunities
	Visual There is potential for a 400kV OHL within this section to give rise to significant adverse visual effects in relation to a small number of residential properties within and within close proximity to the section, although the line would not e expected to be more than 150m from a property. Overall in terms of landscape and visual effects and subject to normal routeing and siting practices and construction measures, it is considered that this section is likely to be acceptable. .
Planning	The majority of this section passes through open countryside/farmland, with a limited number of scattered residential properties and farmsteads/agricultural buildings located within the section, all of which could be avoided through detailed routeing in accordance with the Supplementary Notes of the Holford Rules. No significant planning local plan land use allocations would be affected by this section, which aligns with the Supplementary Notes of the Holford Rules which state that where possible alignment should seek to minimise effects on areas of county, district or local value. The section does however, pass through some small areas of minerals (sand and gravel) safeguarding as designated under the Essex Minerals Local Plan, however, it is not considered that siting of pylons would cause significant sterilisation of any potential future mineral extraction, due to the small pylon footprint and limited areas of safeguarding affected, however, in accordance with the Supplementary Notes to the Holford Rules, an alignment should seek to minimise effects on these county designations. In terms of the Holford Rules, this section avoids major areas of highest amenity value (Holford Rule 1) and also avoids smaller areas of highest amenity value and scientific interest (Holford Rule 2). It offers the potential for a direct alignment and fewer changes of direction (Holford Rule 3). It is considered that alignments in this section could be defined to meet the requirements of Holford Rule 4 (choose tree and hill backgrounds). This section avoids ancient woodlands (Holford Rule 5). In terms of Holford Rule 6 (avoiding a concentration of wirescape) this section is unlikely to result in a concentration of wirescape (Holford Rule 6). Holford Rule 7 (approach urban areas through industrial zones) does not apply to this section due to its rural nature. In terms of the Supplementary Notes to the Holford Rules, this section has been designed to avoid routeing close to residential areas as far as possible (Supplementary Note 1). In terms of Supplementary Note 2 (avoiding designations of County, District and Local Value) this section does pass through an area safeguarded for minerals development. The consideration of alternative pylon designs (Supplementary Note 3 to the Holford Rules) follows later in the mitigation hierarchy and can be considered once an alignment has been established and an assessment undertaken to establish whether alternative pylon designs are needed. Overll there are no significant concerns from a planning perspective, subject to normal routeing and siting practices.
Overall Environmental and Planning risk: The summary environmental implications of this section are that effects on ecology is likely to be acceptable subject to careful routeing and siting of the connection. From an historic environment perspective, there are no significant consenting or delivery concerns arising from this section where design can be used to maximise separation from designated heritage assets close to the section. From a Landscape and Visual perspective it is considered that this section is likely to be consentable subject to normal routeing and siting measures. There are not expected to be any planning policy matters that would preclude routeing within this section.	

Sub Topics	Main risks, constraints and opportunities
Socio-economics	
Economic activity	Nothing substantial identified.
Overall Socio-economic impact: Not expected to be any issues which would endanger a consent.	
Technical	**Main risks, constraints and opportunities**
Technical	Nothing of note from a technical constraint perspective.
Overall Technical impact: This section is considered technically feasible. The use of overhead line is envisaged for the entire section, which is considered low risk in terms of technical complexity. Section G is required to facilitate a route from north to south, connecting Sections E and F to Sections K and J. There are no constraints that have been identified in this section that would impede the routeing of an overhead line.	
Cost	
With routeing alternatives to each side of a number of substantive constraints identified (e.g. around Colchester), End to end options were pieced together from combinations of various sections. The costs for these end to end options are discussed in each chapter under the subtitle “Engineering, system and cost performance of options”.	

Topic Baseline Overview For Section H

Sub Topics	Main risks, constraints and opportunities
Environment	
Ecology/biodiversity	The main risks and constraints in this section arise from national designated sites - SSSI - Bullock Woods, (Broadleaved woodland, ASNW - adjacent to section); 4 blocks of Ancient Semi-natural Woodland (ASNW & PAW).). Bullock, Walls, Churn and Kiln Woods. Several priority habitats are also identified across the section and adjacent, including deciduous woodland, open water and several WFD / Main watercourses are crossed – River Colne & Black Brook, plus unnamed river. Construction: There would be no direct effects on the SSSI or the AW as they are outside the section. However, given the importance and weighting in both planning and legal terms of such designated biodiversity and to AW (in respect of potential indirect effects), they thus remain a potentially significant material constraint to development. There is potential for permanent/temporary direct effects on Priority Habitats including loss of habitat, fragmentation and disturbance during construction. In Operation there is potential for temporary indirect effects during operation from maintenance visits, and some, albeit limited risk of bird collision (though not for designated sites) given wetland habitats/rivers in the vicinity. Opportunities: To support partnerships for Environmental Gain Overall subject to normal routeing and siting practices and construction measures from an ecology / biodiversity perspective it is considered that scheme element can be located in the area being appraised and is capable of being acceptable.
Historic Environment	There are a small number of Grade II listed buildings within or close to this section, which also largely follows the line of the existing A12/A120 major roads. The potential presence of archaeological remains is not considered to be a differentiating factor. This potential will be more fully considered during subsequent phases of design to ensure that effects on archaeological remains and constraint to design, consent and delivery can be better understood and managed. There are no significant consenting or delivery concerns arising from this section where design can be used to maximise separation from designated heritage assets close to or within the section. Overall the effect of this section on the historic environment is assessed as capable of being acceptable.
Landscape and Visual	**Landscape** Development within this section would not affect any nationally or locally designated landscapes. It is not anticipated that the introduction of a 400kV OHL in this section would, on its own, give rise to any significant adverse effects on local landscape character. However, given that this section would be used in conjunction with Section F, there is potential for development within this section to give rise to significant adverse cumulative effects on local landscape character where it is in close proximity to Section F i.e. in the vicinity of the EAC zones (where 132kV OHLs are also present) and to the north of Colchester.

Sub Topics	Main risks, constraints and opportunities
	Visual At the eastern end of the section, there is potential for significant adverse non-cumulative and cumulative (in combination with 132kV OHL and/or development within Section F) visual effects for residents of Burnt Heath and Bromley Cross in relation to all EAC zones and for residents of Little Bromley in relation to EAC Zone B only. Residents of Bromley Cross would be located between this section to the south-east and the 132kV OHL between Lawford and Colchester to the north-west, though no residents would be less than approximately 200m from both lines. Potential significant adverse visual effects may be experienced by residents at several locations, including on Bromley Road in the vicinity of Crockleford Heath, Harwich Road to the south of Fox Street, near the junction of the A12 and A120, Boxted Road and the B1508 (where it would pass close to residential properties). Because of the technical difficulties associated with this section, the most likely scenario in which this section would be employed would be as part of a connection from the EAC to Tilbury, where Section F was not available due to being used as part of the connection from Bramford to the EAC. It is therefore assumed that a 400kV OHL would be present in Section F to the north. It is also assumed that Section F would connect to the EAC zones via its northern branch, thus leaving the southern branch available to link with Section H. If connecting to EAC Zones B or C, the potential for cumulative effects on local landscape character or effects on views may be able to be mitigated by close paralleling of the incoming Section F connections between the EACs and the southern branch of Section F. This area is sparsely populated and, as such, close paralleling should be achievable without bringing both lines into close proximity with, or surrounding, residential properties. In this scenario, it would be appropriate to consider if the northern part of the 132kV OHL between Lawford and Holland Road could be justifiably removed as mitigation for Section F. Similarly whether removal of the 132kv OHL in the vicinity of Bromley Cross had potential to mitigate potential significant adverse cumulative visual effects. Subject to the outcome of routeing and siting and consideration of potential mitigation for the predicted effects, it is considered that this section is capable of being acceptable in landscape and visual terms. In a scenario in which both Sections H and F are being considered as parts of a connection between the EAC and Tilbury (i.e. where the connection between Bramford and the EAC is being made via Sections A/B), Section H is considered preferable to Section F because it reduces the potential for significant effects on the Dedham Vale AONB.
Planning	Whilst the majority of this section passes through open fields, it follows a path between existing settlements on the periphery town of Colchester (e.g. Eight Ash Green, West Bergholt, Horkesley Heath, Fox Street) and the edge of Colchester town itself, largely following the curved route of the A12 around the north of Colchester for the majority of the section. There are a few scattered residential and commercial/industrial buildings within the section itself, particularly in the northernmost section of the section, in the area between Boxted Road, Severalls Lane and United Way/Axial Way, which should be possible to avoid through detailed routeing in accordance with the Supplementary Notes of the Holford Rules. In terms of local plan allocations, in the Colchester LPA, the section crosses through the North Growth Area/North Strategic Employment Zone, as allocated under the Core Strategy/Site Allocations DPD/North Growth Area SPD, which is made up of a number of sites for redevelopment, existing sites and greenfield allocations for a mix of uses, including industrial/employment, and residential. Of particular relevance are two greenfield sites, known as the North Growth Area Urban Extension (NGAUE) which are allocated for a

Sub Topics	Main risks, constraints and opportunities
	combined minimum of 2200 dwellings in addition to a number of community facilities, on land off Nayland Road and land off Mile End Road, both in the area between Mile End, Braiswick and the A12. The Land off Nayland Road site in the NGAUE is partially crossed, where the section comes south of the A12 at this location. The North Strategic Employment Zone, includes land south of the A12 (within the Growth Area) as well as the Severalls Industrial Park area. This area is reserved for employment uses. The area south of the A12 is largely within the section. Under the emerging Local Plan, the North Strategic employment Zone is extended north of the A12 (covering an area that is also included in the North Growth Area as described above). Under the new local plan this area is referred to as the North Colchester and Severalls Strategic Economic Area. The section of this area south of the A12 (highlighted above) is again reserved for employment uses and a leisure/community hub under the emerging Local Plan and the area north of the A12 is safeguarded/allocated for sport and recreational uses, this site is wholly within the section at this location, however, the section does stretch further north of the allocation allowing a possible alignment to be routed to the north. It should also be noted that to the west of this allocation there is a car park (Park and ride facility) and a collection of polytunnels, which make this part of the section quite restricted in terms of a way through, however, it may be possible to plot an alignment over the top of/through these areas, with careful micro siting of pylons. In the Tendring LPA area, the western end of the section passes through the northern section of the broad location for the “Tendring Colchester Border Garden Community” allocated for housing and employment located between Elmstead Market and Colchester, under the North Essex Authorities’ Shared Strategic Section 1 Plan. To the north east of Highwoods, the section partially crosses the existing Crown Quarry at Ardleigh. Whilst the section is wide enough at this location to allow an alignment that would avoid this site, any alignment here would still likely cross the minerals consultation zone surrounding the quarry. This means that consultation with the relevant Minerals Planning Authority, on applications for non-mineral development in that area would be required, to avoid sterilisation of potential future mineral resources. The section also appears to fall within the minerals consultation zone surrounding the Martells Pit quarry, where the same principles would apply. Indeed much of the section is located within areas of minerals safeguarding (sand and gravel) as designated under the Essex Minerals Local Plan. Additionally, in the north of Colchester, the area between the A12 and Axial Way is identified as an area of search for waste management development. In accordance with the Supplementary Notes to the Holford Rules, an alignment should seek to minimise effects on these county designations. In terms of the Holford Rules, this section avoids major areas of highest amenity value (Holford Rule 1) and also avoids smaller areas of highest amenity value and scientific interest (Holford Rule 2). It offers the potential for a direct alignment and fewer changes of direction (Holford Rule 3). It is considered that alignments in this section could be defined to meet the requirements of Holford Rule 4 (choose tree and hill backgrounds). This section avoids ancient woodlands (Holford Rule 5). This section has the potential to result in a concentration of wirescape due to the intervisibility with the existing 400kV and 132kV overhead lines that are present in the landscape (Holford Rule 6). In terms of Holford Rule 7 (approach urban areas through industrial zones), this section has the opportunity to pass through industrial (retail/commercial) areas north of Colchester

Sub Topics	Main risks, constraints and opportunities
	In terms of the Supplementary Notes to the Holford Rules, this section has been designed to avoid routeing close to residential areas as far as possible (Supplementary Note 1). In terms of Supplementary Note 2 (avoiding designations of County, District and Local Value) this section does pass through an area safeguarded for minerals development. The consideration of alternative pylon designs (Supplementary Note 3 to the Holford Rules) follows later in the mitigation hierarchy and can be considered once an alignment has been established and an assessment undertaken to establish whether alternative pylon designs are needed. Overall it should be possible to avoid planning impacts through careful route alignment and siting of towers whilst also complying with the Holford Rules 1,2 and 3. However, for Holford Rule 6 closer investigation would be needed to ensure compliance and avoid a concentration of wirescape. The overall assessment of the effect of this route section in terms of planning is that it is capable of being acceptable though is challenging with close attention needed to routeing and siting in a corridor relatively constrained by various forms of development.
Overall Environmental risk: The summary environmental implications of this section are that effects on ecology is likely to be acceptable subject to careful routeing and siting of the connection. From an historic environment perspective, there are no significant consenting or delivery concerns arising from this section where design can be used to maximise separation from designated heritage assets close to the section. From a Landscape and Visual perspective it is considered that this section is likely to be consentable subject to mitigation measures. In a scenario in which both Sections H and F are being considered as parts of a connection between the EAC and Tilbury (i.e. where the connection between Bramford and the EAC is being made via Sections A/B), Section H is considered preferable to Section F because of the avoidance of potential significant effects on the Dedham Vale AONB. There are not expected to be any planning policy matters that would preclude routeing within this section.	
Socio-economics	**Main risks, constraints and opportunities**
Economic activity	Colchester Golf Club and Playgolf Colchester
Overall Socio-economic impact: There is potential for the proposed infrastructure within the route corridor to interact with various existing, or proposed, commercial land-uses (for example golf courses etc) within or in proximity to the corridor. Whether or not there is a material effect on such activities or land-uses depends on detailed routeing and siting, and will also include consideration of potential mitigation and engagement with relevant parties. Affected parties may also be entitled to compensation, assessed in line with the Compensation Code. On this basis, at this route corridor stage, the presence of such land-uses is not in itself considered to be a barrier to or determinative for route corridor selection.	
Technical	**Main risks, constraints and opportunities**
Technical	Challenging routeing in the Eastern part of the section due to residential properties, a Housing Development South of the A12 (near Mile End), listed buildings, farm complexes, Playgolf and Colchester Golf Club, A120 dual carriageway, A137, BP fuel station, Ardleigh Truck Stop and café, and an electrified railway and multiple Distribution Network Operator assets to be mitigated Towards the centre of the section, routeing is very challenging due to various commercial, industrial, and recreational facilities including Colchester Park and Ride, roadside services, Colchester United Football Club, Northern Gateway Sports Park, a hotel, A12 dual carriageway (including A1314 intersection and A1232 fly-over), attenuation pond, Martell's Quarry, Ardleigh Reservoir and greenhouses.

Sub Topics	Main risks, constraints and opportunities
	Towards the west of the section, routeing is also very challenging due to a row of residential properties (East to West), proximity of St. Botolph's Brook, the A12 and Colchester Road. There is reduced, or no flexibility for routeing in places across the section. Complex crossing protection required for construction/delivery due to the location of the existing road networks. Potential access and construction limitations as well as increased construction and access volumes. Golf courses to be avoided where possible. The housing development is a particular constraint and occupies majority of section near the A12 where it is crossed by the A134 (Nayland Road). No flexibility to route elsewhere and avoid this development. Section considered unlikely to be feasible due to housing development.
Overall Technical impact: The use of overhead line is envisaged for the entire section, which is considered low risk in terms of technical complexity. The section is moderately constrained throughout, with certain areas of significant constraint. Residential properties (including a new housing development) and similar urban areas, extensive commercial and recreational sites, industrial areas and major road infrastructure act to reduce flexibility, providing in some areas, no alternative routeing options. Additionally, the complex crossing protection required to protect the road network in this area would lead to increased technical construction/delivery complexity. The condensed nature of these constraints, coupled with the restrictions applied by external urban development, greatly reduce the technical feasibility of the development of an overhead line or underground cable route in this Section. Existing rail infrastructure would also need to be crossed and distribution network operator assets would require mitigation. For the above reasons, the utilisation of Sections H was deemed undeliverable without complex engineering designs at substantial additional cost.	
Cost	
With routeing alternatives to each side of a number of substantive constraints identified (e.g. around Colchester), End to end options were pieced together from combinations of various sections. The costs for these end to end options are discussed in each chapter under the subtitle "Engineering, system and cost performance of options".	

Topic Baseline Overview For Section J

Sub Topics	Main risks, constraints and opportunities
Environment	
Ecology/biodiversity	The main risks and constraints in this section arise from nationally important habitat – 1 block of Ancient Semi-natural Woodland (ASNW). Fiddlers Wood. Several priority habitats are also identified across the section and adjacent, including lowland heath, broadleaved woodland, semi-improved grassland, traditional orchard, open water, as well as several –WFD / several watercourses are crossed –unnamed. *Construction*: There would be no direct effects on the AW as they are outside the section. However, given the importance and weighting in both planning and legal terms of such designated biodiversity to AW (in respect of potential indirect effects), they thus remain a potentially significant material constraint to development. . There is potential for permanent/temporary direct effects on Priority Habitats including loss of habitat, fragmentation and disturbance during construction. In Operation there is potential for temporary indirect effects during operation from maintenance visits, and some, albeit limited risk of bird collision (though not for designated sites) given wetland habitats/rivers in the vicinity. Opportunities: To support partnerships for Environmental Gain Overall it is considered that the scheme element can be located in the area being appraised, and subject to normal routeing and siting processes and construction measures would be acceptable.
Historic Environment	There two Grade II listed buildings within this section, and a small number of Grade II listed buildings immediately outwith. The potential presence of archaeological remains is not considered to be a differentiating factor. This potential will be more fully considered during subsequent phases of design to ensure that effects on archaeological remains and constraint to design, consent and delivery can be better understood and managed. There are no significant consenting or delivery concerns arising from this section where normal routeing and siting processes can be used to maximise separation from designated heritage assets close to or within the section to achieve an acceptable planning balance.
Landscape and Visual	The absence of 132kV DNO assets in this area negates the potential for significant adverse cumulative effects to arise in relation to this section. **Landscape** Development within this section would not affect any nationally or locally designated landscapes. It is not anticipated that the introduction of a 400kV OHL in this section would give rise to any significant adverse effects on local landscape character. **Visual** There is potential for a line in the west of the Section (e.g. linking Section G with Section M) to result in significant adverse visual effects

Sub Topics	Main risks, constraints and opportunities
	being experienced by residents on the northern and western edges of the settlement centred on Wood Lane to the north of Halstead Road. At the southern end of this settlement, the line would pass within 60m of properties on the edge of the settlement, or those located just beyond the western boundary of the section. There is potential for a line in the east of the Section (e.g. linking Sections F/G or H with Sections K or M) to result in significant adverse visual effects being experienced by residents on the western edge of Eight Ash Green and those located in Seven Star Green. In practice this section would form part of a connection between the EAC and Tilbury. It is assumed that it would be most likely to be used to link Section G with Section M, or Section H with Sections K or M, but could also be used to link Section G with Section K. The application of normal routeing and siting processes and construction measures would in overall landscape and visual terms mean that this section is likely to be considered acceptable. .
Planning	The majority of this option passes through open countryside/farmland, however, the hamlet of Fordham Heath is located within the north/centre of the section, as well as a number of other residential properties and farmsteads/agricultural buildings, all of which could be avoided through detailed routeing in accordance with the Supplementary Notes of the Holford Rules. The section does not directly affect any significant planning local plan land use allocations, which aligns with the Supplementary Notes of the Holford Rules which state that where possible alignment should seek to minimise effects on areas of county, district or local value. It is worth noting however, that the south eastern part of this section is located approximately 250 metres north of the Stanway Growth Area, as allocated under the extant Core Strategy and the Site Allocations DPD. The Growth Area is made up of a number of smaller sites allocated for a mix of uses, including residential (a minimum of 1800 dwellings); employment (36,500sqm), industry and warehousing (up to 45,100sqm) and open space. Under the emerging Local Plan these areas will be retained/safeguarded and additional areas will be allocated for residential development. Most notably approximately 250 metres south of the southern end of the section, the area between the A12 and London Road (B1408) between Stanway and Copford is allocated for 630 dwellings, a new school, green/open space and ancillary/supporting infrastructure. The section would also pass through some small areas of minerals safeguarding (Sand and Gravel and Brick Clay) as designated under the Essex Minerals Local Plan. The south west part of this section would also fall within the Minerals Consultation Area associated with an existing mineral extraction site (brick clay extraction at Marks Tey Brickworks). This means the county council would need to be consulted on the proposed development. The brick clay extraction at Marks Tey is protected under Policy S7 of the Minerals Local Plan which highlights that a landbank of at least 25 years of brick-making clay will be maintained at Marks Tey through the extraction of remaining permitted reserves. In accordance with the Supplementary Notes to the Holford Rules, any alignment should seek to minimise effects on these county designations. In terms of the Holford Rules, this section avoids major areas of highest amenity value (Holford Rule 1) and also avoids smaller areas of highest amenity value and scientific interest (Holford Rule 2). It offers the potential for a direct alignment and fewer changes of direction (Holford Rule 3). It is considered that alignments in this section could be defined to meet the requirements of Holford Rule 4 (choose tree and hill backgrounds). This section avoids ancient woodlands (Holford Rule 5). In terms of Holford Rule 6 (avoiding a concentration of wirescape) this section is unlikely to result in a concentration of wirescape (Holford Rule 6). Holford Rule 7 (approach urban areas through industrial zones) does not apply to this section due to its rural nature. In terms of the Supplementary Notes to the Holford Rules, this section has been designed to avoid routeing close to residential areas as far as possible (Supplementary Note 1). In terms of Supplementary Note 2 (avoiding designations of County, District and Local Value) this section does pass through an area safeguarded for minerals development. The consideration of alternative pylon designs

Sub Topics	Main risks, constraints and opportunities
	(Supplementary Note 3 to the Holford Rules) follows later in the mitigation hierarchy and can be considered once an alignment has been established and an assessment undertaken to establish whether alternative pylon designs are needed. It is not considered that siting of pylons would cause sterilisation of any mineral resources due to the small footprint of individual pylons, however, careful routeing and siting, and consultation with the relevant minerals planning authorities should help to avoid significant effects. The overall assessment of the effect of this route section is that it is expected to be acceptable in terms of planning**.** In terms of the Stanway Growth Area allocations, this would not be a constraint to routeing but effects on views will need to be considered if the site is brought forward.
Overall Environmental and Planning risk: The summary environmental implications of this section are that effects on ecology is likely to be acceptable subject to careful routeing and siting of the connection. From an historic environment perspective, there are no significant consenting or delivery concerns arising from this section where design can be used to maximise separation from designated heritage assets close to the section. From a Landscape and Visual perspective it is considered that this section is likely to be consentable subject to mitigation measures. There are not expected to be any planning policy matters that would preclude routeing within this section.	
Socio-economics	**Main risks, constraints and opportunities**
Economic activity	Holy Trinity Primary School, Eight Ash Green
Overall Socio-economic impact: Normal routeing and siting would be expected to overcome any potential effects which could bring risk into the consenting process.	
Technical	**Main risks, constraints and opportunities**
Technical	Very challenging routeing due to residential properties, listed building, farm complexes and a housing development site with little flexibility for routeing. Section J is restricted to the east of Fordham Heath and between residential properties on Halstead Road and may not be feasible as a 'connecting' section due to narrow areas of restricted section width and the new housing development. A connection from Section H from the east would need to be routed through Section G to the north (east to west) to Section K.
Overall Technical impact: The use of overhead line would have been envisaged for the entire section, however due to significant constraining factors including Fordham and Lexden Heath and a new housing development, this section is unlikely to accommodate a feasible route from Section G or H. Utilisation of a small section of this section may be possible from Section G if routeing via Section K, however a number of additional angle pylons would be required to overcome a concentration of residential properties and listed buildings.	
Cost	
With routeing alternatives to each side of a number of substantive constraints identified (e.g. around Colchester), End to end options were pieced together from combinations of various sections. The costs for these end to end options are discussed in each chapter under the subtitle "Engineering, system and cost performance of options.	

Topic Baseline Overview For Section K

Sub Topics	Main risks, constraints and opportunities
Environment	
Ecology/biodiversity	The main risks and constraints in this section arise from national designated sites - 1 SSSI – River Ter (distinctive streamcourse); 26 blocks of Ancient Semi-natural Woodland (ASNW & PAW).). Fiddlers, Aldamhall, Tarecroft, Troys, Ivy, Stockley, Brickhouse, Hookley, Manns/Parsons, Lyonshall, Sheepcotes, Sparrowhawk, Bushy, Lady Grove, South, Chapel, Writtlepark, Bushey, Osbournes, and 7 further unnamed Woods. Several priority habitats are also identified across the section and adjacent, including floodplain grazing marsh, broadleaved woodland, traditional woodland, open water, as well as several WFD / Main watercourses are crossed – River Ter, Roman River, River Blackwater, Roxwell Brook, River Brain, plus unnamed river. Construction: There would be no direct effects on the SSSI or the AW as they are outside the section. However, given the importance and weighting in both planning and legal terms of such designated biodiversity and to AW (in respect of potential indirect effects), they thus remain a potentially material constraint to development. There is potential for permanent/temporary direct effects on Priority Habitats including loss of habitat, fragmentation and disturbance during construction. In Operation there is potential for temporary indirect effects during operation from maintenance visits, and some, albeit limited risk of bird collision (though not for designated sites) given wetland habitats/rivers in the vicinity. Opportunities: To support partnerships for Environmental Gain Overall for ecology and biodiversity it is considered that scheme element can be located in the area being appraised, and subject to normal routeing and siting practices would be considered acceptable**.**
Historic Environment	There is a large and scattered group of listed buildings between Aldham and Little Tey, mostly listed at Grade II but also including three Grade II* buildings and the Grade I listed Church of St James, Little Tey. There is a similar dispersed pattern of listed buildings between Coggeshall and Feering, both of which are also conservation areas, including the Grade II* listed structures at Feeringbury Manor, and between Silver End conservation area and Rivenhall End, where there is a substantial scheduled Roman and early medieval site. There are denser clusters of listed buildings within the section at Faulkbourne, where the route passes close to the White Notley Conservation Area, Cressing temple scheduled monument and gropup of listed buildings, including the Grade I listed Wheat and Barley Barns, and the Grade II registered park at Faulkbourne Hall, and at Fairstead, where the section contains the Grade II* Troys Hall and Grade I Church of St Mary the Virgin. The scheduled Great Loys Moated site is close to the southern edge of the section and the Garde II* listed Newney's Farmhouse is to the north. There are a small number of Grade II listed buildings between Fairstead and the Walthams and between the Walthams and Ingatestone. The location of the Great Waltham and Little Waltham conservation areas create a pinch point that also contains the scheduled Settlement Site at Ash Corner.

Sub Topics	Main risks, constraints and opportunities
	There are fewer designated heritage assets within the section west of Chelmsford, though Margaretting conservation area is close to the southern end of this section. The potential presence of archaeological remains is not considered to be a differentiating factor. This potential will be more fully considered during subsequent phases of design to ensure that effects on archaeological remains and constraint to design, consent and delivery can be better understood and managed. It is possible that multiple significant adverse effects would arise as a result of change to setting of listed buildings between Aldham and Little Tey from an OHL. Normal routeing and siting practices can be expected to afford some mitigation potentially along with additional reinforcement of planting to strengthen screening, though some consent risk to an overhead line solution may remain that may warrant consideration of further measures. While it is unlikely that significant adverse effects on designated heritage assets within and/or immediately adjacent to the section between Little Tey and Rivenhall could be entirely avoided, careful routing, siting and other measures may reduce the number and severity of such effects. Routeing and siting to avoid significant effects will also be challenging between Faulkbourne and Fairstead and there remains potential for significant adverse effects on designated heritage assets of the highest significance as a result of change to setting. Alignments to the west of Fairstead would also need to consider the existing overhead line infrastructure in order to minimise the potential for adverse cumulative effects noting that the crossing is likely to be through the use of a short section of cable between CSE compounds to either side of the existing alignment. It is likely that significant adverse effects on listed buildings between Fairstead and between the Walthams and Ingatestone could be avoided with careful routing and design. Challenging routeing and siting is also likely to occur for the corridor in the vicinity of the Great Waltham and Little Waltham conservation areas and listed buildings within them, as well as the scheduled settlement at Ash Corner as a result of change to setting. Existing settlement areas are set back somewhat from the corridor with the bypass of little Waltham and existing tree stands providing some beneficial screening though the potential for consent risks is clear. There is no apparent significant consent risk within the route option west of Chelmsford and it appears unlikely that the Margaretting conservation area would present a significant consent risk. Overall the spread of heritage features creates a number of challenges to normal routeing and siting practices though these would be expected to address many potential effects. An acceptable planning balance is considered potentially achievable for the historic environment but may require additional measures to be considered in some of the areas highlighted.
Landscape and Visual	**Landscape** Development within this section would not affect any nationally or locally designated landscapes. It is not anticipated that the introduction of a 400kV OHL in this section would give rise to any significant adverse effects on local landscape character. The section generally

Sub Topics	Main risks, constraints and opportunities
	runs with the grain of the landscape, being mostly located on the gentle or moderate slopes that rise from the valleys of the Rivers Chelmer and Blackwater to the south-east. **Visual** The greatest potential for significant adverse visual effects to arise is likely to be in more densely populated north of the section in the vicinity of Aldham and Gallows Green and also to the west of Little Waltham. The southern half of the section passes adjacent to, or in close proximity to the registered parks and gardens at Faulkbourne Hall, Terling Place, Langleys and Hylands Park. The section crosses the Essex Way, Saffron Trail and Centenary Circle long-distance paths at several points. There may be potential for significant adverse cumulative visual effects to arise in the vicinity of Fairstead and Fuller Street, where the section is crossed by the 4VB 400kV route between Braintree and Rayleigh and by the nearby 132kV OHL, although it is noted that this area is sparsely populated and includes several medium-sized woodlands that could be used to provide screening to reduce effects. Overall with normal routeing and siting practices and construction measures it is considered that this section is likely to be considered acceptable from a landscape and visual perspective.
Planning	The majority of this section passes through open countryside/farmland. The southern section of the route cannot avoid passing through the Green Belt for a connection to Tilbury. In terms of local plan allocations in the Colchester, Braintree and Brentwood LPA areas there are no local plan allocations directly affecting the section. However in the Chelmsford LPA area, there is an allocation for 450 houses north of Broomfield which extends into the southern edge of this section though with careful route alignment and siting of towers, it should be possible with this Section to reduce the interaction with on the allocation. In terms of minerals and waste, an extension to Bradwell Quarry and Rivenhall is proposed that would partially extend into the section south of Coggeshall Hamlet. In accordance with the Supplementary Notes to the Holford Rules, an alignment should seek to minimise effects on these county designations. It is not considered that siting of pylons would cause sterilisation of any mineral resources due to the small footprint of individual pylons, however, careful routeing and siting, and consultation with the relevant minerals planning authorities should help to avoid significant effects. In terms of the Holford Rules, this section avoids major areas of highest amenity value (Holford Rule 1) and also avoids smaller areas of highest amenity value and scientific interest (Holford Rule 2). It offers the potential for a direct alignment and fewer changes of direction (Holford Rule 3). It is considered that alignments in this section could be defined to meet the requirements of Holford Rule 4 (choose tree and hill backgrounds). Whilst this section does contain ancient woodland, it is considered that there is ample space to ensure that these woodlands are avoided as part of the detailed routeing process, thus ensuring compliance with Holford Rule 5. This section has the potential to result in a concentration of wirescape due to the intervisibility with the existing 400kV and 132kV overhead lines that are present in the landscape (Holford Rule 6). Holford Rule 7 (approach urban areas through industrial zones) does not apply to this section due to its rural nature. In terms of the Supplementary Notes to the Holford Rules, this section has been designed to avoid routeing close to residential areas as far as possible (Supplementary Note 1). In terms of Supplementary Note 2 (avoiding designations of County, District and Local Value) this section does pass through an area safeguarded for minerals development. The consideration of alternative pylon designs

Sub Topics	Main risks, constraints and opportunities
	(Supplementary Note 3 to the Holford Rules) follows later in the mitigation hierarchy and can be considered once an alignment has been established and an assessment undertaken to establish whether alternative pylon designs are needed. The overall assessment of the effect of this route section in terms of planning is that it could be considered acceptable with no substantive consent risks
Overall Environmental and Planning risk: The summary environmental implications of this section are that effects on ecology is likely to be acceptable subject to careful routeing and siting of the connection. From an historic environment perspective, there are a number of areas of particular challenge in this section due to potential effects on designated heritage assets between Aldham and Little Tey, Faulkbourne and Fairstead and Great Waltham and Little Waltham. In these cases normal routeing and siting practices may need to be supplemented with enhanced measures to achieve an acceptable planning balance. From a Landscape and Visual perspective it is considered that this section is likely to be consentable subject to mitigation measures. There are not expected to be any planning policy matters that would preclude routeing within this section. Whilst the southern part of the section passes through the Green Belt it would not be able to avoid this designation to achieve a connection to Tilbury given that the Green Belt extends from the River Thames in the south all the way to Chelmsford in the north.	
Socio-economics	**Main risks, constraints and opportunities**
Economic activity	Longfield Solar energy farm (potential DCO boundary but not yet submitted), Feering Falcons and White Notley football grounds , King Edwards VI Grammar School Sports ground and Cressing Temple Barns
Overall Socio-economic impact: There is potential for the proposed infrastructure within the route corridor to interact with various existing, or proposed, commercial and leisure land-uses (for example solar generation, sports grounds etc) within or in proximity to the corridor. Whether or not there is a material effect on such activities or land-uses depends on detailed routeing and siting, and will also include consideration of potential mitigation and engagement with relevant parties. Affected parties may also be entitled to compensation, assessed in line with the Compensation Code. On this basis, at this route corridor stage, the presence of such land-uses is not in itself considered to be a barrier to or determinative for route corridor selection.	
Technical	**Main risks, constraints and opportunities**
Technical	Crossing of the 4VB 400kV National Grid overhead line asset in proximity to various ancient woodlands and the proposed Longfield Solar Energy Farm (potential DCO boundary not yet submitted). Challenging routeing in certain locations due to residential properties, listed buildings, farm complexes, commercial sites, ancient woodlands, recreational playing fields, a play park, the A12 dual carriageway, the A131 and the A120. Very challenging routeing southwest of Little Waltham and northeast of Newney Green due residential properties, listed buildings, historical landfill, woodland, and a scheduled monument. Multiple Distribution Network Operator assets and electrified railways are to be crossed. Underground cable section required to cross the existing 4VB 400kV National Grid overhead line. Additional angle pylons and infrastructure potentially required to avoid and /or overcome constraints and to enable perpendicular crossings. Increased construction and access volumes. Route to avoid / oversail historical landfill sites where possible. Geotechnical assessment may be required to determine ground conditions.
Overall Technical impact: The use of overhead line is envisaged for the majority of the section, with the exception of the 4VB National Grid overhead line crossing. This technology is considered low risk in terms of technical complexity. The section is moderately constrained in some areas, with certain sections of significant constraint. Residential properties and listed buildings, commercial and recreational sites, historic landfill and farm complexes reduce flexibility and make routeing challenging. The Villages of Little Waltham and Newney Green constrain routeing options significantly, providing areas of no flexibility and very challenging routeing. Existing rail and road infrastructure is to be crossed and distribution network operator assets are to be mitigated. The 4VB National Grid overhead line is to be crossed through the likely use of a short section of underground cable, increasing technical complexity (including additional above ground infrastructure).	

Sub Topics	Main risks, constraints and opportunities
Cost	
With routeing alternatives to each side of a number of substantive constraints identified (e.g. around Colchester), End to end options were pieced together from combinations of various sections. The costs for these end to end options are discussed in each chapter under the subtitle “Engineering, system and cost performance of options”.	

Topic Baseline Overview For Section L

Sub Topics	Main risks, constraints and opportunities
Environment	
Ecology/biodiversity	The main risks and constraints in this section arise from international and national designated sites – Special Protection Area (SPA) / Ramsar – Blackwater Estuary/SSSI: River Ter SSSI (part of above SPA), Essex Estuaries SAC. 13 blocks of Ancient Woodland (ASNW & PAWS) (Sandy, Scarletts, Ringers, Topping Hoe Hall, Ivy, Titbeech, Lost, Hollybred, Hall, and 4 unnamed Woods. Several priority habitats are also identified across the section and adjacent, including broadleaved woodland, traditional orchard, floodplain grazing marsh, semi improved grassland, open water, as well as several WFD watercourses crossed River Ter, River Chelmer (linked to the Blackwater SPA/Ramsar/SSSI/Essex Estuary SAC), Sandon Brook, plus unnamed. *Construction*: There would be no direct effects on the SPA (or Essex SAC), SSSI or the AW as they are outside the section (and in the case of the SPA /SAC at some distance)>~8km)). Mobile species could be subject to both direct and indirect effects. There would be no direct effects on the AW as they are outside the section. However, given the importance and weighting in both planning and legal terms of such designated biodiversity and to AW (in respect of potential indirect effects), they thus remain a potentially significant material constraint to development. There is potential for permanent/temporary direct effects on Priority Habitats including loss of habitat, fragmentation and disturbance during construction. In Operation there is potential for temporary indirect effects during operation from maintenance visits, and risk of bird collision (unlikely to be with designated site populations given distance inland) given wetland habitats/rivers in the wider vicinity. Opportunities: To support partnerships for Environmental Gain Overall in terms of ecology and biodiversity it is considered that the scheme element can be located in the area being appraised, and assuming normal routeing and siting practices and construction measures is capable of being considered acceptable. Nonetheless it is noted that there is the theoretical potential, prior to surveys and detailed design, for a negative impact on the International / National Site designations. There would be a requirement for HRA process to be undertaken (conducted in the absence of mitigation). If better more western alternatives are available (Section K is more westerly). At this stage of appraisal, and in the absence of detailed survey data and stakeholder consultation on that data, it is expected that the implementation of design incorporating best practice, would ensure no resultant LSEs.
Historic Environment	The western branch of this section contains or is close to a small number of Grade II listed buildings. South of the A12, this branch is close to the Grade I listed Boreham House which is within the Grade II registered Boreham House park and oversails the Chelmer and Blackwater Navigation close to a Grade II listed lock. The eastern branch of this section contains or is close to a small number of Grade II listed buildings as well as the Grade II* listed Termitts Farmhouse and Troys Hall. It also passes close to the Grade II registered parks at Terling Place and Faulkbourne Hall. South of Boreham this branch crosses the Chelmer and Blackwater Navigation and contains the Grade I listed Church of St Mary the Virgin and the Grade II* listed Little Baddow Hall. There is a pinch point at Sandon Brook which takes the route very close to three Grade II listed buildings.

Sub Topics	Main risks, constraints and opportunities
	The potential presence of archaeological remains is not considered to be a differentiating factor. This potential will be more fully considered during subsequent phases of design to ensure that effects on archaeological remains and constraint to design, consent and delivery can be better understood and managed. The northern branches present potential for multiple significant adverse effects. While it is likely that these could be mitigated to a degree it is an oversail of the Chelmer and Blackwater conservation area which may give rise to unacceptable effects to the conservation area, particularly in close proximity to designated canal structures. The western branch may present an opportunity to pass through a section of this conservation area where there is already overhead line infrastructure, but more detailed survey would be necessary to identify whether these effects could be managed by design in this area. There is a high potential for significant adverse effects at Sandon Brook which may become unacceptable and cannot be effectively mitigated. The overall effect of this route on the historic environment is that it will be very challenging to develop a solution that does not impact the conservation area either by oversail or cable installation. The use of HDD may be appropriate (but lengths are restricted to 800m and introduce effects arising from the CSEs for the transition to OHL. Subject to detailed routeing and siting it is possible that this corridor may be unacceptable from a historic environment perspective.
Landscape and Visual	**Landscape** Development within this section would not affect any nationally or locally designated landscapes. There is potential for development of a 400kV OHL within this section to give rise to significant adverse effects on local landscape character in combination with the 4VB 400kV OHL and the adjacent 132kV OHL. There is potential for development of a 400kV OHL within this section to give rise to significant adverse effects on the proposed country park at RAF Boreham to the north of Chelmsford, although the section is wide enough at this point for this to be avoided through detailed routeing. **Visual** Were the eastern branch of the section to be developed, there is potential for significant adverse cumulative effects to be experienced by residents of Boreham, although this might be avoided by the use of the more easterly part of that branch. There is high potential for significant adverse cumulative effects to be experienced by residents of Sandon in combination with the 4VB 400kV OHL and the adjacent 132kV OHL. There is high potential for significant adverse visual effects to be experienced by residents of Woodhill Road, to the east of Sandon, where the line would pass close to residential properties. This section also passes close to the Grade II registered parks at Terling Place and Faulkbourne Hall. The outcome of detailed routeing and siting would be required (should this section be taken forward) to understand the level of cumulative effect that may be experienced by landscape and visual receptors as a result of the development of this section in combination with 4VB and the adjacent 132kV OHL but some areas of challenge are apparent where measures over and above normal routeing and siting practices may be required to achieve an overall acceptable outcome in landscape and visual terms.

Sub Topics	Main risks, constraints and opportunities
Planning	The majority of this section passes through open countryside/farmland. To avoid settlements, the section splits at Terling and Boreham. In terms of local plan allocations in the Braintree LPA area there are no local plan allocations directly affecting the section. However in terms of local plan allocations in the Chelmsford LPA area, the western branch would pass through the edge of a Strategic Growth Site north east of Chelmsford allocated for a Garden Community comprising of housing and offices. In terms of the allocation northeast of Chelmsford with careful route alignment and siting of towers, it should be possible with this Section to minimise negative impacts on the allocation Much of the western branch of the section crosses the through the boundary of the proposed Longfield Solar Farm project, whilst a smaller component of the solar farm project boundary cuts across the eastern branch of the section, where the section crosses the A12 and railway line. Whilst the solar farm project has not yet been submitted for development consent, if the project were to come forward, the western branch of the section would become highly constrained, due to the proportion of the section that the solar farm project boundary covers. Routing in the eastern branch would be less constrained, however, would still be complex, due to the crossing of the A12 and railway line at the same location. In terms of minerals and waste, the section passes directly through an area of land south of Sandon identified as having capacity for Inert Waste Recycling and Inert Landfill. In accordance with the Supplementary Notes to the Holford Rules, an alignment should seek to minimise effects on these county designations. In terms of the Holford Rules, this section avoids major areas of highest amenity value (Holford Rule 1) and also avoids smaller areas of highest amenity value and scientific interest (Holford Rule 2). It offers the potential for a direct alignment and fewer changes of direction (Holford Rule 3). It is considered that alignments in this section could be defined to meet the requirements of Holford Rule 4 (choose tree and hill backgrounds). This section avoids ancient woodlands (Holford Rule 5). This section has the potential to result in a concentration of wirescape due to the intervisibility with the existing 400kV and 132kV overhead lines that are present in the landscape (Holford Rule 6). Holford Rule 7 (approach urban areas through industrial zones) does not apply to this section due to its rural nature. In terms of the Supplementary Notes to the Holford Rules, this section has been designed to avoid routeing close to residential areas as far as possible (Supplementary Note 1). In terms of Supplementary Note 2 (avoiding designations of County, District and Local Value) this section does pass through an area safeguarded for minerals development. The consideration of alternative pylon designs (Supplementary Note 3 to the Holford Rules) follows later in the mitigation hierarchy and can be considered once an alignment has been established and an assessment undertaken to establish whether alternative pylon designs are needed. The Longfield solar project presents a risk to the western branch though the eastern branch is expected to remain viable. Overall in terms of planning It should be possible to avoid negative impacts through careful route alignment and siting of towers whilst also complying with the Holford Rules. .
Overall Environmental and Planning risk: The summary environmental implications of this section are that in terms of Ecology it would be likely to have negative effects. There would be a requirement for HRA process to be undertaken (conducted in the absence of mitigation) and as such other, westerly sections are preferred. In terms of the historic environment, the potential impacts on a number of high value historic environment receptors including the Chelmer and Blackwater	

Sub Topics	Main risks, constraints and opportunities
Conservation Area present a very challenging situation that may not be addressed through OHL or cable technologies in an acceptable planning balance. In terms of Landscape and Visual, is considered that this section is likely to be consentable if the potential for cumulative effects with existing lines can be addressed which may require some line rationalisation. There are not expected to be any planning policy matters that would preclude routeing within this section though a solar proposal may substantially restrict routeing in one branch of the section.	
Socio-economics	**Main risks, constraints and opportunities**
Economic activity	Longfield Solar Farm Project (DCO proposal not yet submitted)
Overall Socio-economic impact: There is potential for the proposed infrastructure within the route corridor to interact with various existing, or proposed, commercial and leisure land-uses (for example solar generation) within or in proximity to the corridor. Whether or not there is a material effect on such activities or land-uses depends on detailed routeing and siting, and will also include consideration of potential mitigation and engagement with relevant parties. Affected parties may also be entitled to compensation, assessed in line with the Compensation Code. On this basis, at this route corridor stage, the presence of such land-uses is not in itself considered to be a barrier to or determinative for route corridor selection noting that whilst the western branch may appear to be very restricted (assuming all the proposed land is taken forward) the eastern branch is less constrained and a route is expected to be available.	
Technical	**Main risks, constraints and opportunities**
Technical	Multiple crossings of the 4VB 400kV National Grid overhead line with limited section width in places. Multiple Distribution Network Operator assets are to be crossed. Large flood zones, watercourses and waterbodies are present. Extent of existing underground assets associated with Grid Supply Point's and substations unknown. Challenging routeing due to residential properties, listed buildings, farm complexes, electrified railway, industrial sites, and landfill sites. Very challenging routeing due to Distribution Network Operator substation, National Grid Substation, grid supply point, proposed Longfield Solar Energy Farm (DCO), A12 dual carriageway and proposed widening scheme. Extent of existing underground assets associated with Grid Supply Point's and Substations unknown. Limited section width in places to route new 400kV overhead line near existing 132kV and 4VB National Grid 400kV overhead line. Complex phasing and programming of works. Additional infrastructure required to facilitate underground crossing of the 4VB line (terminal towers and cable sealing end compounds). Unknown constraints could require additional cables to meet rating requirements. Underground cable rating will also be required to match overhead lines. Alternative construction methods to overcome constraints may be required. Construction and access volumes are likely to be increased
Overall Technical impact: Overhead line is envisaged for this section, with the potential for short section of underground cable between CSEs to cross existing National Grid overhead lines. This technology is considered low risk in terms of technical complexity. The Eastern Leg is marginally constrained by a small number of residential properties; however, no significant limiting features exist that would hamper the construction/delivery of an overhead line. The Western Leg is however more constrained, due in large part to the crossing of the 4VB National Grid overhead line, and either the parallel or dismantling of an existing Distribution Network Operator asset for a significant section of the section through narrow and constrained areas. At the confluence of the two legs, the crossing of the A12 dual carriageway (and proposed widening scheme), multiple angle pylons, limited section width and the parallel of the existing transmission and distribution infrastructure greatly reduce flexibility and would require complex crossing protection. From a technical perspective, routeing west via Section K would be less complex.	
Cost	

Sub Topics	Main risks, constraints and opportunities
With routeing alternatives to each side of a number of substantive constraints identified (e.g. around Colchester), End to end options were pieced together from combinations of various sections. The costs for these end to end options are discussed in each chapter under the subtitle “Engineering, system and cost performance of options”.	

Topic Baseline Overview For Section M

Sub Topics	Main risks, constraints and opportunities
Environment	
Ecology/biodiversity	The main risks and constraints in this section arise from international and national designated sites – Special Protection Area (SPA) / Ramsar – Blackwater Estuary, Special Area of Conservation (SAC) Essex Estuaries and Blackwater Estuary (and component SSSIs) Tiptree Heath SSSI (Acid grassland and dwarf heath); 13 blocks of Ancient Woodland (ASNW & PAWS) (Seller, Fan, Inworth, Perrys, New, Howbridges/Tiptree, Strowling/Criers, Chantrey/Mope, Sparkey, Moor Gardens Wood, plus 3 unnamed blocks at Braxted Park, Mountains Road and Spickets Brook, Great Totham woods.). There is 1 Local Nature reserve – Whetmead and several priority habitats are also identified across the section and adjacent, including broadleaved woodland, traditional orchard, coastal/floodplain grazing marsh , lowland heath, open water and several WFD watercourses which are crossed; River Chelmer, River Blackwater (linked to the Blackwater SPA/Ramsar/SSSI/Essex Estuary SAC, and ~2km at the closest point in the southern reaches), Roman River and Domsey Brook, plus unnamed other. Optimise crossing location of the River Chelmer (and other crossings) to minimise any associated indirect effects on it and downstream designated sites *Construction*: There would be no direct effects on the SPA or SAC, SSSI or the AW as they are outside the section, however, mobile species could be subject to both direct and indirect effects. Thus, given the importance and weighting in both planning and legal terms of such designated biodiversity and to AW (in respect of potential indirect effects), they remain a potentially significant material constraint to development. There is potential for permanent/temporary direct effects on Priority Habitats including loss of habitat, fragmentation and disturbance during construction. In Operation there is potential for temporary indirect effects during operation from maintenance visits, and risk of bird collision (connected with designated site populations downstream, particularly in the southern reaches of M) given wetland habitats/rivers in the vicinity. Opportunities: To support partnerships for Environmental Gain Overall for ecology and biodiversity it is considered that with normal routeing and siting practices applied the scheme element can be located in the area being appraised, and be considered acceptable. Nonetheless, there remains potential for a negative impact on the International / National Site Designations and a requirement for HRA process to be undertaken (conducted in the absence of mitigation). It is expected that effects would be lower than more eastern sections in this area (P and N). However, in the absence of additional data (following routeing and siting) that would be required to establish a firm conclusion in respect of AEoSI beyond scientific doubt, and of stakeholder opinion on that data, if better alternatives are available (in more western L and preferably K sections), they should be preferred as options.
Historic Environment	Between Copford and Braxted, this section contains or is very close to a large number of listed buildings, mostly listed at Grade II but also including the Grade II* St Mary's Grange and the Grade I listed Church of St Mary, Easthorpe. It also passes close to the Copford Green and Messing conservation areas as well as the Grade II* registered Braxted Park. The western fork of this section contains multiple listed buildings, including the Grade II* listed Blue Mills and Ulting Hall. This fork would also oversail the Chelmer and Blackwater Navigation conservation area, and come close to numerous listed buildings at Ulting Hall and Curling Tye Green. An alternative fork, east of Great Totham, contains or is close to a small number of Garde II listed buildings.

Sub Topics	Main risks, constraints and opportunities
	The potential presence of archaeological remains is not considered to be a differentiating factor. This potential will be more fully considered during subsequent phases of design to ensure that effects on archaeological remains and constraint to design, consent and delivery can be better understood and managed. Overall it appears likely that multiple significant adverse effects would arise to listed buildings as a result of change to setting, although normal routeing and siting practices should lead to an acceptable outcome. However it is unlikely that significant adverse effects could be entirely avoided in the western fork of this section due to unavoidable routing through the /Chelmer and Blackwater Navigation conservation area . The eastern fork to the east of Totham appears significantly less constrained. As with section L the overall effect of this route on the historic environment in the western corridor is that it will be very challenging to develop a solution that does not impact the conservation area either by oversail or cable installation. The use of HDD may be appropriate (but lengths are restricted to 800m and introduce effects arising from the CSEs for the transition to OHL. The eastern corridor offers a more appropriate and acceptable routeing option in isolation but any onward corridor to Tilbury also unavoidably crosses the same Conservation Area.
Landscape and Visual	The absence of 132kV DNO assets in this area negates the potential for significant adverse cumulative effects to arise in relation to this section. **Landscape** Development within this section would not affect any nationally or locally designated landscapes. It is not anticipated that the introduction of a 400kV OHL in this section would give rise to any significant adverse effects on local landscape character. **Visual** There is potential for significant adverse visual effects to be experienced by residents of Copford, where the section crosses the B1408, where the line would pass close to residential properties. Significant adverse visual effects may also be experienced by users of Benton Hall Golf Course to the west of Wickham Bishops. To the west of Tiptree, the section is adjacent to Braxted Park registered park and garden, which functions as a wedding and corporate event venue. The boundaries of the park are well wooded with the exception of the main entrance, which faces directly toward the south-western branch of this section. The outward view along the entrance avenue appears narrow and may be able to be avoided through careful siting. Overall in landscape and visual terms and subject to normal routeing and siting processes it is considered that this section is likely to be acceptable. .
Planning	The majority of this section passes through open countryside/farmland. It splits into two branches at Great Baxtead with one passing north and west of Wickham Bishops and one heading south to Great Totham. In terms of local plan allocations, there are no local plan allocations directly affecting the section for Colchester, Braintree or Maldon LPAs. In terms of Minerals and Waste, the section passes through a Safeguarded Mineral Transhipment Site at Marks Tey (Marks Tey Rail Siding). The policy states that these sites are of strategic importance and shall be safeguarded from development that would compromise their continued operation. In three areas the section would cross or be situated directly adjacent to Minerals Consultation areas. This means that consultation with the relevant Minerals Planning Authority (Essex County Council), on applications for non-mineral development in that area would be required, to avoid sterilisation of potential future mineral resources. Much of the section is also located within areas of sand and gravel minerals safeguarding designated under the Essex Minerals Local Plan. The northern end of the section would also cut across an area of brick clay minerals safeguarding.

Sub Topics	Main risks, constraints and opportunities
	In terms of the Holford Rules, this section avoids major areas of highest amenity value (Holford Rule 1). In terms of Holford Rule 2, the section passes through the Chelmer and Blackwater Navigation Conservation Area. Due to the width of this Conservation Area it would not be possible to avoid this designation and therefore an Option that utilises this section would be contrary to Holford Rule 2. The section is relatively straight, although if the western branch is selected several angle pylons would be needed to complete a connection resulting in the need for changes of direction. As a result, a relatively direct alignment would be a challenge and therefore this section would be less compliant with Holford Rule 3 compared to other sections. It is considered that alignments in this section could be defined to meet the requirements of Holford Rule 4 (choose tree and hill backgrounds). This section avoids ancient woodlands (Holford Rule 5). This section has the potential to result in a concentration of wirescape due to the intervisibility with the existing 400kV and 132kV overhead lines that are present in the landscape (Holford Rule 6). Holford Rule 7 (approach urban areas through industrial zones) does not apply to this section due to its rural nature. In terms of the Supplementary Notes to the Holford Rules, this section has been designed to avoid routeing close to residential areas as far as possible (Supplementary Note 1). In terms of Supplementary Note 2 (avoiding designations of County, District and Local Value) this section does pass through an area safeguarded for minerals development. The consideration of alternative pylon designs (Supplementary Note 3 to the Holford Rules) follows later in the mitigation hierarchy and can be considered once an alignment has been established and an assessment undertaken to establish whether alternative pylon designs are needed. . As the section passes through the Chelmer and Blackwater Navigation Conservation Area, it complies to a lesser extent than other sections with Holford Rule 2. The overall assessment of the effect of this route section in terms of planning is that it has potential to be acceptable but the planning balance may weigh against the section due to conservation area effects.
Overall Environmental and Planning risk: The summary environmental implications of this section are that in terms of Ecology this is relatively constrained in terms of constraints. There would be a requirement for HRA process to be undertaken (conducted in the absence of mitigation) and as such other, more westerly sections are preferred. In terms of the historic environment, the potential impacts on a number of high value historic environment receptors including the Chelmer and Blackwater Conservation Area present a constraint to routeing in this section and may prove challenging to overcome as crossing the area is unavoidable by either OHL or cable.. The eastern fork to the east of Totham appears significantly less constrained. In terms of Landscape and Visual, is considered that this section is likely to be consentable subject to measures to respond to potential cumulative wirescape effects which may include rationalisation of the existing 132kV OHL. There are not expected to be any planning policy matters that would preclude routeing within this section. It is also noted that routeing to Tilbury via the eastern leg necessitates the use of a further corridor that has to cross the same conservation area and in whole connection terms is no better performing than the western branch.	

Socio-economics	Main risks, constraints and opportunities
Economic activity	Benton Hall Golf & Country Club, Forrester Park Golf Club, Willowmead Residential Care Home, Solar farm near Inworth
Overall Socio-economic impact: There is potential for the proposed infrastructure within the route corridor to interact with various existing, or proposed, commercial and leisure land-uses (for example golf courses, social care establishments, solar generation) within or in proximity to the corridor. Whether or not there is a material effect on such activities or land-uses depends on detailed routeing and siting, and will also include consideration of potential mitigation and engagement with relevant parties. Affected parties may also be entitled to compensation, assessed in line with the Compensation Code. On this basis, at this route corridor stage, the presence of such land-uses is not in itself considered to be a barrier to or determinative for route corridor selection.	

Sub Topics	Main risks, constraints and opportunities
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Technical	**Main risks, constraints and opportunities**
Technical	Large flood zones, waterbodies, and watercourses. Challenging routeing due to A12 dual carriageway (Incl. A12 widening scheme), watercourse, electrified railways, residential properties, listed buildings, historical landfill, farm complexes, garden centre, electrified railway solar farm and ancient woodland. Very challenging routeing due to Benton Hall Golf and Country Club. Distribution Network Operator asset is to be crossed. Avoiding or oversailing flood zones are only possible at certain points across the section. Reduced flexibility for routeing. Increased construction and access volumes. Alternative construction methods or earthworks to overcome constraints. Available section width reduced near Copford.
Overall Technical impact: The use of overhead line is envisaged for this section. This technology is considered low risk in terms of technical complexity. The section is moderately constrained in some areas, with certain sections of significant constraint. Residential properties and listed buildings, commercial sites, historic landfill and farm complexes reduce flexibility and make routeing challenging. Routeing through Benton Hall Golf and Country Club acts to significantly constrain routeing options, providing areas of no flexibility and very challenging routeing that may lead to construction and operational access issues. Existing rail and road infrastructure is to be crossed and distribution network operator assets are to be mitigated. Both legs of this section are heavily constrained with sections of no routeing flexibility.	
Cost	
With routeing alternatives to each side of a number of substantive constraints identified (e.g. around Colchester), End to end options were pieced together from combinations of various sections. The costs for these end to end options are discussed in each chapter under the subtitle “Engineering, system and cost performance of options”.	

Topic Baseline Overview For Section N

Sub Topics	Main risks, constraints and opportunities
Environment	
Ecology/biodiversity	The main risks and constraints in this section arise from international and national designated sites. Special Protection Area (SPA) / Ramsar – Colne Estuary SPA/Ramsar, Blackwater Estuary SPA/Ramsar, Abberton Reservoir SPA; Special Area of Conservation (SAC) Essex Estuaries and Blackwater Estuary (and component SSSI); SSSI /NNR – Blackwater, Upper Colne Marshes Roman River Colne Estuary Abberton Reservoir and Blackwater Estuary. There are 15 blocks of Ancient Woodland (ASNW & PAWS) (Churn, Money, Mill, Captains, Palegate, Park, Cockaynes, Donyland, Friday Woods, and 6 unnamed blocks of wood (at the A120 Great Bromley, Churn wood Sloug Lane, Donlany wood, Abberton, Barnhall Rd, Abberton, Barnhall Rd, Tolleshunt Knights and Tudwick Rd, Tolleshunt Major.). Additionally there is 1 Local Nature reserve – Colne and several priority habitats are also identified across the section and adjacent, including floodplain grazing marsh, saltmarsh, mudflats, lowland heathland, broadleaved woodland, traditional orchard, semi improved grassland, open water, as well as several WFD watercourses are crossed River Colne, Roman River (linked to the Colne/ Blackwater SPA/Ramsar/SSSIs and Essex Estuaries SAC), Bently, Spickets ,Tenpenny and Sixpenny Brooks, plus unnamed and it will be important to optimise crossing location of all Rivers with pathways to the SPA and SAC designations. Design would incorporate best practice pathway control measures to stop or minimise indirect effects *Construction*: The international sites (and supporting SSSIs) are in the section/immediately adjacent to it, and habitats and mobile species could be subject to both direct and indirect effects**.** Where avoidance / reinstatement is not possible and should no reasonable alternative route option be available, consideration should be given to an appropriate form of cabling for ZOI for the qualifying species. Of the options at Abberton – this would apply more so to the southern/eastern spur; both spurs would still have to be subject to confirmatory survey work to fully understand flight-lines, movements and functionally linked habitats in the vicinity to understand the extent of implications of either option, and thus the extent and potential effectiveness of mitigation (including alternative technology) . It should be noted that the ZOI will not be determined by one designation alone, but with the Blackwater Estuary and Abberton Reservoir as the level of exchange of birds between each is likely to be considerable. It is acknowledged that HDD may present equal or greater (though different) effects on biodiversity. The use of HDD is consequently considered only where an overriding consent requirement may remain/arise where exceptional reasoning would be if sufficient avoidance is not possible through further detailed design). There would be no direct effects on the AW as they are outside the section. However, given the importance and weighting in both planning and legal terms of such designated biodiversity and to AW (in respect of potential indirect effects), they thus remain a potentially significant material constraint to development. There is potential for permanent/temporary direct effects on Priority Habitats including loss of habitat, fragmentation and disturbance during construction. In Operation there is potential for temporary indirect effects during operation from maintenance visits, and risk of bird collision (connected with designated site populations) given wetland habitats/rivers in the vicinity. Opportunities: To support partnerships for Environmental Gain

Sub Topics	Main risks, constraints and opportunities
	Overall in terms of ecology and biodiversity, and without more detailed data (and stakeholder opinion), this is considered the most constrained section of all options studied and is considered likely to prove unacceptable on alternative grounds. (i.e. an alternative without effects on SPA/SAC designations or qualifying features is available). There would be a requirement for HRA process to be undertaken (conducted in the absence of mitigation). If better (the more western section K into R) alternatives are available, they should be preferred. .
Historic Environment	This section contains or is close to a relatively low density of Grade II listed buildings, with some higher graded assets, primarily churches, such as the Grade I listed Churches of St Nicholas, Beckingham and St Andrew, Abberton, or high-status houses such as the Grade II* Blind Knights or Beckingham Hall. This section also contains a number of scheduled monuments, including Berechurch Dyke, bowl barrows at Paynes Farm, Salcot and Beckingham Hall, and the scheduled gatehouse of Beckingham Hall. This section passes close to the Wivenhoe, Fingringhoe, and Tolleshunt Darcy conservation areas, and the Grade II Wivenhoe Park registered park. The northern section option around Abberton reservoir appears constrained, crossing the scheduled Berechurch dyke and containing more highly graded listed buildings. To the north of the section is the Grade II registered park at Layer Marney Tower, part of a group which contains the Grade I listed Layer Marney Tower and Church of St Mary the Virgin and the Grade II* listed Wick Farmhouse, which has clear and panoramic views to the south across this section. The potential presence of archaeological remains is not considered to be a differentiating factor. This potential will be more fully considered during subsequent phases of design to ensure that effects on archaeological remains and constraint to design, consent and delivery can be better understood and managed. It appears likely that significant adverse effects could be effectively managed by normal routeing and siting processes through most of this route, although it is likely that the northern route round Abberton Reservoir would give rise to significant adverse effects which could not be adequately mitigated without additional measures. This potential constraint is also influenced by potential cumulative effects arising from the interaction of the existing 132kV overhead line with any proposed infrastructure. The Layer Marney Tower group presents a potentially very significant constraint to overhead line development in the area between Layer Breton and Salcott, and care will be required in design and routing to develop an acceptable option. Overall it appears challenging to establish the basis for an acceptable route within this section in terms of the historic environment. Normal routeing and siting may well need to be enhanced with other measures to achieve an acceptable planning balance potentially through rationalisation of 132kV infrastructure or alternatives to standard lattice pylons. Solutions may be more challenging for the northern route through Layer-de-la-Haye, than the option to the south of Abberton which appears less constrained.
Landscape and Visual	**Landscape** If connecting to EAC Zone A, there is potential for a 400kV OHL to give rise to significant adverse effects on local landscape character in combination with the 132kV OHLs that converge on Lawford 132kV substation and/or the new 400kV line in Sections A or F. If the connection is to be made to EAC Zones B or C, there is potential for a 400kV OHL to give rise to significant adverse effects on local landscape character in combination with the north-western section of the 132kV OHL that traverses the Tendring peninsula between Lawford and Holland Road 132kV substations and/or the new 400kV line in Sections A or F. The northern approaches to EAC Zone B or C would be preferable from a landscape character perspective as they would allow the substations to represent the furthest extent of 400kV OHL into the Tendring peninsula.

Sub Topics	Main risks, constraints and opportunities
	The branch of the section to the south of Abberton Reservoir may have the potential to give rise to significant adverse effects on local landscape character due to the highly open nature of this landscape and the lack of other prominent industrial structures. The branch of the section to the north of Abberton Reservoir and the combined section to the south-west of Abberton Reservoir may have the potential to give rise to significant cumulative adverse effects on local landscape character in combination with the existing 132kV OHL in these sections. **Visual** There is the potential for significant adverse visual effects to the south of Great Bromley, where the connection would have to pass within 70m of at least one residential property if using the northern branch of the section to access EAC Zone B or C. Accessing EAC Zone B or C via this route could also give rise to potentially significant adverse cumulative visual effects in combination with the new 400kV route in either Section A or F for residents of Great Bromley and properties in the vicinity of Mary Lane North and Stone Road (EAC Zones B and C) or in the vicinity of Hilliards Road (EAC Zone B only). The southern approach to EAC Zones B or C could result in significant adverse visual effects for residents of Balls Green, Hare Green and Raven's Green (EAC Zones B and C) and Little Bentley (EAC Zone B only). If connecting to EAC A, there is the potential for development within this section to give rise to significant adverse cumulative effects in combination with the 132kV for residents of Bromelry Cross. The branch of this section to the north of Abberton Reservoir has the potential to give rise to significant adverse non-cumulative and cumulative (in combination with 132kV OHL to the south-west of Colchester) visual effects for residents within and in close proximity to the section in the vicinity of Malting Green, Layer-de-la-Haye and Layer Breton. The branch of this section to the south of Abberton Reservoir has the potential to give rise to significant adverse non-cumulative visual effects for residents within and in close proximity to the section in the vicinity of Abberton, Peldon and Great Wigborough. The southern section of this section would result in adverse effects on users of the Five Lakes Golf Course and Hotel, to the east of Salcott. The potential for cumulative landscape and visual effects from new 400kV connections and existing 132kV connections provide the focus for challenge in this section around the EAC substation and around Abberton reservoir. In both locations normal routeing and siting may be insufficient to avoid significant residual effects requiring consideration of enhanced measures to achieve acceptable effects in landscape and visual terms.
Planning	The majority of this section passes through open countryside/farmland. To avoid settlements, the section splits at Elmstead Market, Wivenhoe and Abberton. It also splits to avoid Abberton Reservoir (a Ramsar, SPA and SSSI). The section also passes over a Tidal River which will necessitate consultation with the Marine Management Organisation if this section is taken forward. In terms of local plan allocations, in the Tendring LPA area the northern branch of the section passes through a housing allocation for the "Tendring Colchester Border Garden Community" located between Elmstead Market and Colchester where careful route alignment and siting of the towers would be needed to minimise effects of this allocation. In the Colchester area the northern branch of the section passes through an area of land allocated for the expansion of Essex University though an alignment to the south of Elmstead Market would avoid this allocation.

Sub Topics	Main risks, constraints and opportunities
	In terms of minerals and waste, the southerly branch of this Section passes through a preferred site for mineral extraction near Wivenhoe. It is an extension to an existing minerals and quarry site. The same location is also identified for as a waste site for inert landfill and an inert recycling waste. The section also passes through a Safeguarded Mineral Transhipment Site at Fingringhoe. The policy states that these sites are of strategic importance and shall be safeguarded from development that would compromise their continued operation. In terms of waste, there is an inert landfill site south of Fingringhoe which sits in the centre of the southerly branch of the section. In accordance with the Supplementary Notes to the Holford Rules, an alignment should seek to minimise effects on these county designations. In terms of the Holford Rules, this section avoids major areas of highest amenity value (Holford Rule 1). Whilst the section does pass close to the Ramsar, SPA and SSSI at Abberton Reservoir, it has been specifically designed to avoid this area of high amenity value. However, either side of Wivenhoe, the section passes directly through two SSSIs. On the southern branch of the section, it passes immediately adjacent to both the Colne Estuary Ramsar and SPA and the Upper Colne Marshes SSSI. On the northern branch it passes through the Upper Colne Marshes SSSI and the Roman River SSSI north of Abberton. It also passes close to the Blackwater Estuary SSSI and Essex Estuaries SAC. As a result, the section is not as compliant with Holford Rule 2, which seeks to avoid areas of high amenity value, compared to other sections. It offers the potential for a direct alignment and fewer changes of direction (Holford Rule 3). It is considered that alignments in this section could be defined to meet the requirements of Holford Rule 4 (choose tree and hill backgrounds). Whilst this section does contain ancient woodland, it is considered that there is ample space to ensure that these woodlands are avoided as part of the detailed routeing process, thus ensuring compliance with Holford Rule 5. This section has the potential to result in a concentration of wirescape due to the intervisibility with the existing 400kV and 132kV overhead lines that are present in the landscape (Holford Rule 6). Holford Rule 7 (approach urban areas through industrial zones) does not apply to this section due to its rural nature In terms of the Supplementary Notes to the Holford Rules, this section has been designed to avoid routeing close to residential areas as far as possible (Supplementary Note 1). In terms of Supplementary Note 2 (avoiding designations of County, District and Local Value) this section does pass through an area safeguarded for minerals development. The consideration of alternative pylon designs (Supplementary Note 3 to the Holford Rules) follows later in the mitigation hierarchy and can be considered once an alignment has been established and an assessment undertaken to establish whether alternative pylon designs are needed. As the route overlaps and passes in immediate proximity to several SPAs and SSSIs, this section complies to a lesser extent with Holford Rule 2 than other sections. The overall assessment of the effect of this route section in terms of planning is that it is capable of being acceptable
Overall Environmental and Planning risk: The summary environmental implications of this section are that in terms of Ecology this is the most constrained section of all options for this part of the connection, potentially resulting in effects on multiple internationally and nationally designated sites. There would be a requirement for HRA process to be undertaken (conducted in the absence of mitigation) and as such other sections are preferred. In terms of the historic environment, it is possible that significant adverse effects could be effectively managed but would require enhanced measures beyond normal routeing and siting with particular challenge to the northern route round Abberton Reservoir. In addition, in the area between Layer Breton and Salcott care will be required in design and routeing to develop an acceptable option. As a result, the option to the south of Abberton appears less constrained, albeit a requirement for mitigation would remain. In terms of Landscape and Visual, is considered that this section is likely to be consentable subject to mitigation measures, with preference given to the northern access to EAC B or C and to the branch of the section to the north of Abberton Reservoir. From a planning perspective, this section is in immediate proximity to SPAs/Ramsar and directly passes through two SSSIs (and potentially in IRZs) which complies to a lesser extent with Holford Rule 2 than other sections.	

Sub Topics	Main risks, constraints and opportunities
Socio-economics	**Main risks, constraints and opportunities**
Economic activity	Five Lakes Resort (hotel and golf course)
Overall Socio-economic impact: There is potential for the proposed infrastructure within the route corridor to interact with various existing, or proposed, commercial and leisure land-uses (for example golf courses, hotels) within or in proximity to the corridor. Whether or not there is a material effect on such activities or land-uses depends on detailed routeing and siting, and will also include consideration of potential mitigation and engagement with relevant parties. Affected parties may also be entitled to compensation, assessed in line with the Compensation Code. On this basis, at this route corridor stage, the presence of such land-uses is not in itself considered to be a barrier to or determinative for route corridor selection.	
Technical	**Main risks, constraints and opportunities**
Technical	Very challenging routeing in Lower Eastern and Western Legs due to River Colne, multiple waterbodies, large flood zones, Upper Colne Marshes SSSI, Colne Estuary Ramsar / SAC / SPA, Colne Local Nature Reserve, large woodland blocks, Wivenhoe and Ballast Quarries, Sixpenny Brook, historic landfill sites, an electrified railway, solar farm planning application and gas pipeline (western leg). Colchester and District MoD Land also occupy a large portion of the section legs. Challenging routeing throughout due to residential properties, listed buildings, farm complexes, industrial areas, a meteorological mast, ancient woodlands, A120 and A133 dual carriageways, Roman River SSSI, a scheduled monument, solar farm planning application, gas line, Distribution Network Operator substations, Iceni Marksmen FT Airgun Club and Five Lakes Resort and Golf Club. Various Distribution Network Operator Assets. Underground assets in proximity to Distribution Network Operator substation unknown.
Overall Technical impact: Overhead line is envisaged for this section, with the potential for underground cable to cross Colne Estuary. This technology is considered low risk in terms of technical complexity. The section is moderately constrained in some areas, with certain sections of significant constraint. Residential properties and listed buildings, industrial sites and environmentally protected sites reduce flexibility and make routeing challenging. The protected areas around the Colne Estuary, the width of the River Colne and the extent of the flood zones on the banks of the river, make underground cable and the use of a horizontal directional drill, as the preferred method for crossing these constraints (including additional above ground infrastructure). These constraints increase technical complexity, with additional limiting factors of the Wivenhoe and Ballast Quarries also reducing flexibility and potentially requiring additional angles to effectively mitigate. A solar farm planning application and gas line in the western leg of the section make routeing very challenging, however these constraints may be avoided to the east. Due to the presence of MoD land in this section, confirmation needs to be obtained regarding the feasibility of positioning pylons along much of the western leg. Pending this confirmation, it is not guaranteed that routeing in the western leg is possible, which would reduce the flexibility of this section. Another major impediment to overhead line routeing involves avoiding the Five Lakes Resort and Golf Club. This will require additional and larger angle pylons and routeing through this area will significantly limit routeing flexibility. Additionally, existing road infrastructure is to be crossed and distribution network operator assets are to be mitigated throughout the section. Opportunities exist to widen the section at certain areas of limited flexibility, as well as an option to utilise a distribution network operator's 132kV overhead line alignment for a section of the section. Whilst this route is technically feasible it is subject to multiple areas of significant constraint restricting routeing flexibility whilst increasing technical construction/delivery complexity, thus the sections north of Colchester are deemed preferable.	
Cost	

Sub Topics	Main risks, constraints and opportunities
With routeing alternatives to each side of a number of substantive constraints identified (e.g. around Colchester), End to end options were pieced together from combinations of various sections. The costs for these end to end options are discussed in each chapter under the subtitle “Engineering, system and cost performance of options”.	

Topic Baseline Overview For Section P

Sub Topics	Main risks, constraints and opportunities
Environment	
Ecology/biodiversity	The main risks and constraints in this section arise from international and national designated sites – Special Protection Area (SPA) / Ramsar – Blackwater Estuary SPA/Ramsar/SSSI. Special Area of Conservation (SAC) Essex Estuaries and Blackwater Estuary (and component SSSIs). 15 blocks of Ancient Woodland (ASNW & PAWS) (South, Captains, Eastland/Maypole, Heybridge, Parsonage, Hazeleigh Hall, Kent, Slough House, Folks, Jack letts, Squeaky Gates, Great, Thrift, Embersons and 1 unnamed wood south of great Canney. Additionally there is 1 Local Nature reserve – Colne. There are also several priority habitats identified across the section and adjacent, including mudflats, saltmarsh , broadleaved woodland, coastal and floodplain grazing marsh, traditional orchard and lowland fen, as well as open water and several WFD watercourses that are crossed; River Chelmer, and Blackwater, Langford Cut (linked to the Blackwater SPA/Ramsar/SSSIs and Essex Estuaries SAC*), Spickets Brooks, plus others unnamed. *Construction*: Linked international sites (and supporting SSSIs) are~1km away; habitats and mobile species could be subject to both direct and indirect effects. Other SSSI are within 200m. There would be no direct effects on the AW as they are outside the section. However, given the importance and weighting in both planning and legal terms of such designated biodiversity and to AW (in respect of potential indirect effects) they thus remain a potentially significant material constraint to development. There is potential for permanent/temporary direct effects on Priority Habitats including loss of habitat, fragmentation and disturbance during construction. In Operation there is potential for temporary indirect effects during operation from maintenance visits, and risk of bird collision (connected with designated site populations) given wetland habitats/rivers in the vicinity. Opportunities: To support partnerships for Environmental Gain For much of this section normal routeing and siting practices would be expected to be capable of confirming an acceptable location for the scheme element within the area being appraised, However there remains potential for a negative impact on the International / National Sites designations. Extensive survey and consultation would be needed to establish this an, even then an alternative demonstrably further from the designations is available meaning this section is likely to prove unacceptable on alternative grounds. There would be a requirement for HRA process to be undertaken (conducted in the absence of mitigation). In the absence of additional data required to establish a firm conclusion in respect of AEoSI beyond scientific doubt, and of stakeholder opinion on that data, this is assessed as a significantly constrained section. If better (the more western sections L or K) alternatives are available, they should be preferred.
Historic Environment	This section crosses the Chelmer and Blackwater Navigation and contains three discrete groups of listed buildings. These are: within the conservation area, including the Grade I listed Beeleigh Abbey; at Woodham Mortimer; and at Cock Clarks. It appears likely that multiple significant adverse effects of high magnitude would arise from an overhead line crossing of the Chelmer and Blackwater navigation in this area. The density of listed buildings to either side of the crossing of the Chelmer and Blackwater Navigation makes this area particularly sensitive, and the presence of the existing 132kV overhead line presents a potential for cumulative effects. More detailed study would be required to understand how far any effects could be effectively managed through the adoption of alternative

Sub Topics	Main risks, constraints and opportunities
	technologies noting that they still need to cross this designation with only HDD potentially avoiding direct effects but not without its effects from construction areas. There are numerous further listed buildings and the scheduled Woodham Walter Hall adjacent to this section. The potential presence of archaeological remains is not considered to be a differentiating factor. This potential will be more fully considered during subsequent phases of design to ensure that effects on archaeological remains and constraint to design, consent and delivery can be better understood and managed. Whilst normal routeing and siting practices may be able to achieve an acceptable planning balance for most designated heritage assets potentially affected, the crossing of the conservation area presents substantive challenge. As with other sections crossing this area the overall effect of this route on the historic environment in the western corridor is that it will be very challenging to develop a solution that does not impact the conservation area either by oversail or cable installation. The use of HDD may be appropriate (but lengths are restricted to 800m and introduce effects arising from the CSEs for the transition to OHL.
Landscape and Visual	**Landscape** Development within this section would not affect any nationally or locally designated landscapes. There is potential for development of a 400kV OHL within this section to give rise to significant cumulative adverse effects on local landscape character in combination with the existing 132kV OHL within the section. **Visual** There is potential for significant adverse cumulative visual effects to be experienced by residents on the northern and north-western edges of Maldon, especially in the vicinity of Broad Street Green, in combination with the existing 132kV OHL in this area. Were the new line to replace the existing 132kV OHL, the magnitude of visual change would be greatly reduced. Significant adverse visual effects may also be experienced by residents in the southern part of the section to the east and south of Woodham Mortimer in the vicinity of Hazeleigh, Rudley Green and Cock Clarks. Normal routeing and siting practices are likely to be able to address most potential effects however the potential for cumulative effects or properties being positioned between new and existing OHL in the northern and central parts of the section. remains. However as potential mitigation is available if required for all of the predicted effects, it is considered that this section is capable of being acceptable from an LVIA perspective.
Planning	The majority of this section passes through open countryside/farmland. It avoids the settlements of Heybridge and Maldon and the ribbon settlements of Hazeleigh and Rudley Green in line with the Supplementary Notes to the Holford Rules which seek to seek routeing close to residential as far as possible on the grounds of general amenity. The section also passes over a Tidal River which will necessitate consultation with the Marine Management Organisation if this section is taken forward. In terms of local plan allocations, in the Maldon LPA area Garden Suburbs and Strategic Allocations (for housing and economic development) are proposed to the north of Heybridge and Maldon. The eastern extent of the section would pass through these allocations. However with careful routeing and siting an alignment on the northern and western edge of the section would avoid / reduce effects on this allocation.

Sub Topics	Main risks, constraints and opportunities
	In terms of local plan allocations, in the Chelmsford LPA area there are no local plan allocations directly affecting the section. Much of the section is located within areas of sand and gravel minerals safeguarding designated under the Essex Minerals Local Plan. In accordance with the Supplementary Notes to the Holford Rules, an alignment should seek to minimise effects on these county designations. It is not considered that siting of pylons would cause sterilisation of any mineral resources due to careful routeing and siting, and consultation with the relevant minerals planning authorities along with the small footprint of individual pylons. In terms of the Holford Rules, this section avoids major areas of highest amenity value (Holford Rule 1). It would pass through the Chelmer and Blackwater Navigation Conservation Area which extends across the whole section and cannot be avoided and therefore does not avoid smaller areas of highest amenity value and scientific interest (Holford Rule 2). It offers the potential for a relatively direct alignment (Holford Rule 3). It is considered that alignments in this section could be defined to meet the requirements of Holford Rule 4 (choose tree and hill backgrounds). Whilst this section does contain ancient woodland, it is considered that there is ample space to ensure that these woodlands are avoided as part of the detailed routeing process, thus ensuring compliance with Holford Rule 5. This section has the potential to result in a concentration of wirescape due to the intervisibility with the existing 400kV and 132kV overhead lines that are present in the landscape (Holford Rule 6). Holford Rule 7 (approach urban areas through industrial zones) does not apply to this section due to its rural nature. In terms of the Supplementary Notes to the Holford Rules, this section has been designed to avoid routeing close to residential areas as far as possible (Supplementary Note 1). In terms of Supplementary Note 2 (avoiding designations of County, District and Local Value) this section does pass through an area safeguarded for minerals development. The consideration of alternative pylon designs (Supplementary Note 3 to the Holford Rules) follows later in the mitigation hierarchy and can be considered once an alignment has been established and an assessment undertaken to establish whether alternative pylon designs are needed. It should be possible to avoid negative planning impacts through careful route alignment and siting of pylons and whist close investigation would be needed to establish if the exiting line presents an opportunity to parallel it or whether divergence is needed the overall assessment of the effect of this route section in terms of planning is that it is capable of being considered acceptable**.**
Overall Environmental and Planning risk: The summary environmental implications of this section are that in terms of Ecology the effects would be negative. There would be a requirement for HRA process to be undertaken (conducted in the absence of mitigation) and as such other sections without or with lower effects should be preferred. In terms of the historic environment, the potential impacts of the unavoidable crossing on this route of the conservation area and on listed buildings around the Chelmer and Blackwater area present a constraint to routing in this section and will be very challenging to find an acceptable solution in the planning balance. In terms of Landscape and Visual, is considered that this section is likely to be consentable subject to detailed consideration or cumulative effects in particular with the existing 132kV OHL in the northern and central parts of the section. From a planning perspective, there are not expected to be any planning policy matters that would preclude routeing within this section.	

Socio-economics	Main risks, constraints and opportunities
Economic activity	Maldon Golf Club, Woodham Mortimor Pre-school
Overall Socio-economic impact: In terms of the Woodham Mortimor Pre-school, detailed routeing and siting could mitigate any issues which would bring risk into the consenting process. There is potential for the proposed infrastructure within the route corridor to interact with various existing, or proposed, commercial and leisure land-uses (for example golf courses) within or in proximity to the corridor. Whether or not there is a material effect on such activities or land-uses depends on	

Sub Topics	Main risks, constraints and opportunities
detailed routeing and siting, and will also include consideration of potential mitigation and engagement with relevant parties. Affected parties may also be entitled to compensation, assessed in line with the Compensation Code. On this basis, at this route corridor stage, the presence of such land-uses is not in itself considered to be a barrier to or determinative for route corridor selection.	
Technical	**Main risks, constraints and opportunities**
Technical	Challenging routeing due to residential properties, listed buildings, farm complexes, ancient woodlands and Maldon Golf Club. Very challenging routeing due to various properties, listed buildings, farm complexes and an ancient woodland to the north of Heybridge and the east of Hazeleigh. Additional angle pylons and infrastructure potentially required to avoid and /or overcome constraints and to enable perpendicular crossings. Increased construction and access volumes. Various Distribution Network Operator Assets. Underground assets in proximity to Distribution Network Operator substation unknown. The combination of the above give no flexibility for routeing at points of significant constraint where routeing is deemed very challenging.
Overall Technical impact: Overhead line envisaged throughout, which is considered low risk in terms of technical complexity. Section P sees areas of significant constraint, particularly where residential properties, listed buildings and ancient woodland, act to limit the available room for routeing north of Heybridge and the east of Hazeleigh, thus providing no flexibility for routeing of the overhead line and increasing the construction/delivery complexity. Distribution network operator assets would also require mitigation, including a substantial section of an existing 132kV overhead line.	
Cost	
With routeing alternatives to each side of a number of substantive constraints identified (e.g. around Colchester), End to end options were pieced together from combinations of various sections. The costs for these end to end options are discussed in each chapter under the subtitle “Engineering, system and cost performance of options”.	

Topic Baseline Overview For Section Q

Sub Topics	Main risks, constraints and opportunities
Environment	
Ecology/biodiversity	The main risks and constraints in this section arise from international and national designated sites – Special Protection Area (SPA) / Ramsar – Crouch and Roach Estuaries SPA/Ramsar, Special Area of Conservation (SAC) Essex Estuaries and component SSSI). 1 SSSI – Thrift Wood (Ancient Woodland) and 8 blocks of Ancient Semi-natural Woodland (ASNW & PAW).). Thrift, Forest, Swan, Little, Long, Pound and Rook Woods, and 1 unnamed wood on the B1007 near Stock. Several priority habitats are also identified across the section and adjacent, including floodplain grazing marsh, traditional orchard, broadleaved woodland, open water, as well as several WFD / Main watercourses are crossed – River Wid, Sandon Brook, plus unnamed river from Hanningfield Reservoir SSSI. Construction: There would be no direct effects on the SSSI or the AW as they are outside the section. However, given the importance and weighting in both planning and legal terms of such designated biodiversity and to AW (in respect of potential indirect effects), they thus remain a potentially significant material constraint to development. There is potential for permanent/temporary direct effects on Priority Habitats including loss of habitat, fragmentation and disturbance during construction. In Operation there is potential for temporary indirect effects during operation from maintenance visits, and some, albeit limited risk of bird collision (though not for designated sites) given wetland habitats/rivers in the vicinity. Opportunities: To support partnerships for Environmental Gain In terms of ecology and biodiversity it is concluded that the scheme element can generally be located in the area being appraised, and is expected to be acceptable on the assumption of normal routeing and siting practices being applied. The potential exception remains in relation to the possiblity for a negative impact on the International / National Site designations. : In relation to Crouch and Roach and Essex Estuary designations, at this stage of assessment, and in the absence of detailed survey data, it is expected that the implementation of design process – and incorporating best practice, would ensure no resultant LSEs. In this circumstance, and the absence of better alternatives, a NSER would be expected to be completed. However there would be a requirement for HRA process to be undertaken (in the absence of mitigation and subject to stakeholder consultation) and if better alternatives are available (in sections further west of the designated site), they should be preferred as options.
Historic Environment	This section contains a small number of Grade II listed buildings and the Grade II* Coleville Hall. Further listed buildings and the Stock Conservation Area are within 100m of this section. The potential presence of archaeological remains is not considered to be a differentiating factor. This potential will be more fully considered during subsequent phases of design to ensure that effects on archaeological remains and constraint to design, consent and delivery can be better understood and managed. Overall it is expected that the application of normal routeing and siting principles will minimise the potential for any significant adverse effects in this section and in terms of the historic environment effects are likely to be considered acceptable.

Sub Topics	Main risks, constraints and opportunities
Landscape and Visual	**Landscape** Development within this section would not affect any nationally or locally designated landscapes. If entering the section from Section P, to the east, there is potential for development of a 400kV OHL within this section to give rise to significant adverse effects on local landscape character in combination with the 4VB 400kV OHL and the adjacent 132kV OHL that cross the central section of the section. **Visual** There is potential for significant adverse visual effects to be experienced by residents in the vicinity of the B1418 at the eastern end of the section and in the relatively densely settled, though dispersed area to the south-east of East Hanningfield. There is also a pinch-point in the vicinity of Downham Road, to the north-east of Stock, where the line would have to pass close to at least one residential property. Adverse visual effects seem likely for users of Crondon Park Golf and Country Club to the north of Stock in the western part of the section. Routeing and siting outcomes including location of CSEs around a cable crossing of the 4VB will inform the extent of cumulative effects on local landscape character that may arise in the vicinity of 4VB. Overall and assuming normal routeing and siting practices are applied in terms of landscape and visual effects it is considered that this section is likely to be acceptable with the western half of the section likely to be preferrable to the eastern half.
Planning	The majority of this section passes through open countryside/farmland. The eastern section of the route unavoidably passes through the Green Belt to achieve a connection to Tilbury given that the Green Belt extends from the River Thames in the south all the way to Chelmsford in the north In terms of local plan allocations, in the Chelmsford LPA area there are no local plan allocations directly affecting the section. A small part of the section north of Stock is located within an area of sand and gravel minerals safeguarding designated under the Essex Minerals Local Plan. In accordance with the Supplementary Notes to the Holford Rules, an alignment should seek to minimise effects on these county designations. It is not considered that siting of pylons would cause sterilisation of any mineral resources due to the small footprint of individual pylons, however, careful routeing and siting, and consultation with the relevant minerals planning authorities should help to avoid significant effects. In terms of the Holford Rules, this section avoids major areas of highest amenity value (Holford Rule 1) and also avoids smaller areas of highest amenity value and scientific interest (Holford Rule 2). It offers the potential for a direct alignment and fewer changes of direction (Holford Rule 3). It is considered that alignments in this section could be defined to meet the requirements of Holford Rule 4 (choose tree and hill backgrounds). Whilst this section does contain ancient woodland, it is considered that there is ample space to ensure that these woodlands are avoided as part of the detailed routeing process, thus ensuring compliance with Holford Rule 5. This section has the potential to result in a concentration of wirescape due to the intervisibility with the existing 400kV and 132kV overhead

Sub Topics	Main risks, constraints and opportunities
	lines that are present in the landscape (Holford Rule 6). Holford Rule 7 (approach urban areas through industrial zones) does not apply to this section due to its rural nature. In terms of the Supplementary Notes to the Holford Rules, this section has been designed to avoid routeing close to residential areas as far as possible (Supplementary Note 1). In terms of Supplementary Note 2 (avoiding designations of County, District and Local Value) this section does pass through an area safeguarded for minerals development. The consideration of alternative pylon designs (Supplementary Note 3 to the Holford Rules) follows later in the mitigation hierarchy and can be considered once an alignment has been established and an assessment undertaken to establish whether alternative pylon designs are needed. The overall assessment of the effect of this route section in terms of planning is that it is capable of being acceptable
Overall Environmental and Planning risk: The summary environmental implications of this section are that effects on ecology is likely to be acceptable subject to careful routeing and siting of the connection and given a potential HRA process required, where no better alternative is available. From an historic environment perspective, there are no significant consenting or delivery concerns arising from this section where design can be used to maximise separation from designated heritage assets close to the section. From a Landscape and Visual perspective, it is considered that this section is likely to be consentable subject to normal routeing and siting measures. There are not expected to be any planning policy matters that would preclude routeing within this section noting that whilst the eastern part of the section passes through the Green Belt it would not be able to avoid this designation to achieve a connection to Tilbury given that the Green Belt extends from the River Thames in the south all the way to Chelmsford in the north.	
Socio-economics	**Main risks, constraints and opportunities**
Economic activity	Crondon Park Golf Club
Overall Socio-economic impact: There is potential for the proposed infrastructure within the route corridor to interact with various existing, or proposed, commercial and leisure land-uses (for example golf courses) within or in proximity to the corridor. Whether or not there is a material effect on such activities or land-uses depends on detailed routeing and siting, and will also include consideration of potential mitigation and engagement with relevant parties. Affected parties may also be entitled to compensation, assessed in line with the Compensation Code. On this basis, at this route corridor stage, the presence of such land-uses is not in itself considered to be a barrier to or determinative for route corridor selection.	
Technical	**Main risks, constraints and opportunities**
Technical	4VB National Grid overhead line assets to be crossed. Terminal Towers and cable sealing end compounds required for underground cable to cross the existing 4VB overhead line for interface from overhead line to underground cable. Challenging routeing due to residential properties, listed buildings, farm complexes, Crondon Park Golf Course and the A130 dual carriageway giving reduced flexibility for routeing. Additional angle pylons and infrastructure potentially required to avoid and /or overcome constraints and to enable perpendicular crossings. Increased construction and access volumes. Distribution Network Operator assets are to be crossed. .
Overall Technical impact: The use of overhead line is envisaged for the majority of the section, with the exception of the 4VB National Grid overhead line crossing. This technology is considered low risk in terms of technical complexity. Section Q is moderately constrained in places as a result of residential properties, listed buildings and Crondon Park Golf Course, which will likely incur the use of additional angle pylons to avoid, thus reducing routeing flexibility. The 4VB National Grid	

Sub Topics	Main risks, constraints and opportunities
overhead line will require an underground cable crossing (including additional above ground infrastructure) either near to or within a flood zone, which increases the technical complexity of this section. Existing road infrastructure including the A130 dual carriageway is to be crossed and distribution network operator assets are to be mitigated throughout the section.	
Cost	
With routeing alternatives to each side of a number of substantive constraints identified (e.g. around Colchester), End to end options were pieced together from combinations of various sections. The costs for these end to end options are discussed in each chapter under the subtitle “Engineering, system and cost performance of options”.	

Topic Baseline Overview For Section R

Sub Topics	Main risks, constraints and opportunities
Environment	
Ecology/biodiversity	The main risks and constraints in this section arise from international and national designated sites – Thames Estuary and Marshes SPA and Ramsar site and supporting SSSIs; 8 blocks of Ancient Woodland (ASNW & PAWS) (Kitchen, Harespring, Wid, Park Hill, Friern Manor and 3 x unnamed woods; 2 south of Wid river, and 1 near to Dunton road). Several priority habitats are also identified across the section and adjacent, including floodplain grazing marsh, traditional orchard, broadleaved woodland, open water, as well as several WFD watercourses are crossed - River Wid and an unnamed watercourse that is linked to the Thames Estuary and Marshes SPA and Ramsar site (and constituent SSSIs) ~375m away). Much of the grazing marsh and other wetland habitat towards the southern extent of the section is likely to be functionally linked habitat to this, plus other unnamed watercourses. *Construction*: The international sites (and supporting SSSIs) are outside the section, but habitats and mobile species could be subject to both direct and indirect effects**.** Routeing should maximise distance between asset and the Thames Estuary designation. Where avoidance / reinstatement is not possible, consideration should be given to habitat creation in the area, with successful examples associated with the re-development of Tilbury power station (and examples therefore of approaching the assessment of HRA in relation to the Thames Estuary SPA/Ramsar in the context of an already urban and industrial setting There would be no direct effects on the AW as they are outside the section. However, given the importance and weighting in both planning and legal terms of such designated biodiversity and to AW (in respect of potential indirect effects), they thus remain a potentially significant material constraint to development. There is potential for permanent/temporary direct effects on Priority Habitats including loss of habitat, fragmentation and disturbance during construction. In Operation there is potential for temporary indirect effects during operation from maintenance visits, and risk of bird collision (connected with designated site populations) given wetland habitats/rivers in the vicinity. Opportunities: To support partnerships for Environmental Gain In terms of ecology and biodiversity it is concluded that the scheme element can generally be located in the area being appraised, and is expected to be acceptable on the assumption of normal routeing and siting practices being applied. The potential exception remains in relation to the possiblity for a negative impact on the International / National Site designations. There would be a requirement for HRA process to be undertaken (conducted in the absence of mitigation). In the absence of additional data required to establish a firm conclusion in respect of AEoSI beyond scientific doubt, and of stakeholder opinion on that data, this is assessed as a partially constrained section. If,at this stage, no better alternatives are available then Section R is preferred over other more alternatives closer to the coast.
Historic Environment	This section contains a relatively small number of Grade II listed buildings and the Grade I listed Church of St Giles, Mountnessing. At the extreme southern end, it also contains parts of the West Tilbury conservation area. Adjacent to the section are numerous listed buildings and highly-graded designated heritage assets, including the Grade I listed Ingatestone Hall, the scheduled and Grade II* listed

Sub Topics	Main risks, constraints and opportunities
	Barn at Ingatestone Hall, scheduled monuments at Moated Site east of Heron Hall, Anti-Aircraft Gun Battery at Bowaters Farm, East Tilbury Battery and Coalhouse Fort, and the East Tilbury and Hutton Village conservation areas. The potential presence of archaeological remains is not considered to be a differentiating factor. This potential will be more fully considered during subsequent phases of design to ensure that effects on archaeological remains and constraint to design, consent and delivery can be better understood and managed. . It is likely that significant adverse effects can be controlled through the application of normal routeing and siting processes, although the greater density of designated heritage assets and existing OHL infrastructure towards the southern end of the route section will require careful attention in design to ensure that this existing infrastructure can be used to minimise effects rather than introduce potential cumulative effects. The East Tilbury Conservation Area is designated as an example of planned mid-late 20th century planned industrial development and may be less sensitive to infrastructure development. The effect of this section on the historic environment is assessed as being capable of being considered acceptable in the planning balance.
Landscape and Visual	**Landscape** Development within this section would not affect any nationally or locally designated landscapes. There is potential for significant adverse cumulative effects on landscape character in combination with the 132kV OHL between Brentwood and Tilbury that runs within this section for most of its length. There is high potential for significant adverse cumulative effects on landscape character in combination with the multiple 400kV and 132kV OHL that converge on Tilbury substation to the south of the A13 at Stanford-le-Hope. Development within the south-easternmost branch of the section, in the vicinity of Coalhouse Fort, would result in significant adverse effects on local landscape character. **Visual** There is potential for significant adverse visual effects to be experienced by residents in the vicinity of the A129/Rayleigh Road between Hutton and Havering's Grove and by residents of properties in the vicinity of the A13 between Southfields and Stanford-le-Hope. To the south of the A13, the development of the section for a 400kV OHL seems likely to lead to significant adverse cumulative visual effects for residents including those to the immediate south of the A13 and those in the vicinity of West Tilbury and if the eastern part of the section were developed, residents on the eastern edges of East Tilbury, Linford and Buckland. Development of the south-eastern branch of the section on East Tilbury Marshes would break the sense of separation that currently exists between the industrial areas to the west and residents of East Tilbury Village and visitors to Coalhouse Fort Park. Addressing these potentially significant adverse visual effects for these receptors will necessitate consideration to possible removal of the 132kV OHL that runs within the majority of this section at least as far south as the A13. To the south of the A13, similar consideration should be given to avoid significant adverse cumulative landscape and, particularly, visual effects. Likewise (for the section of the section on East Tilbury Marshes), noting that enhanced measures may be required to avoid significant adverse landscape and visual effects in an area where the provision of substantial screening may be incompatible with local landscape character.

Sub Topics	Main risks, constraints and opportunities
	The detailed requirements are complicated by the expected change in the area from other developments notably the Lower Thames Crossing proposals and the need to cross existing 400kV infrastructure. Such changes and requirements do create the opportunity for combined solutions and overall, as this potential mitigation is available if required for all of the predicted effects, it is considered that this section is capable of being acceptable from a landscape and visual perspective. Overall section R is preferred to Section S due to the lower numbers of visual receptors with the potential to experience significant adverse effects .
Planning	The majority of this section passes through open countryside/farmland, with a limited number of scattered residential properties and farmsteads/agricultural buildings located within the section, all of which could be avoided through detailed routeing in accordance with the Supplementary Notes of the Holford Rules. The section also unavoidably passes through the Green Belt (which extends from the River Thames in the south all the way to Chelmsford in the north) across the three LPAs it falls within (Brentwood, Basildon and Thurrock). In terms of local plan allocations, in the Brentford LPA, under the emerging local plan, approximately 259 hectares is allocated to the east of the A128, south of the A127 and north of the C2C railway line for a residential-led development (with employment land and community facilities) to deliver “Dunton Hills Garden Village” as well as a smaller site adjoining this area, allocated for employment land. The garden village allocation spreads across the entire width of the section at this location and also extends beyond the section on the western side. On the eastern side of the allocation there are constraints in the form of ribbon development along Lower Dunton Road and Church Road, towards Dunton Hall. Further east of these properties is Southfields Business Park/Laindon district of Basildon. Under the emerging Basildon local plan, there is also an allocation for a residential-led development 20 hectares in size adjacent to the east of Lower Dunton Road. To the south of Dunton Hall there is an existing solar farm which the section currently avoids by moving out to the west. Therefore, any potential widening of the section to the east at this location would be very constrained and difficult to plot an alignment through. As the garden village allocation also extends out to the west (between 0.7 and 1.7km from the western edge of the section) any widening to the west to avoid the allocation may involve a significant diversion and would require further investigation. The section would also pass through some small areas of minerals safeguarding (sand and gravel) as designated under the Essex Minerals Local Plan, however, it is not considered that siting of pylons would cause significant sterilisation of any potential future mineral extraction, due to the small pylon footprint and limited areas of safeguarding affected. However, in accordance with the Supplementary Notes to the Holford Rules, any alignment should seek to minimise effects on these county designations. In terms of the Holford Rules, this section avoids major areas of highest amenity value (Holford Rule 1) and also avoids smaller areas of highest amenity value and scientific interest (Holford Rule 2). It offers the potential for a direct alignment and fewer changes of direction (Holford Rule 3). It is considered that alignments in this section could be defined to meet the requirements of Holford Rule 4 (choose tree and hill backgrounds). Whilst this section does contain ancient woodland, it is considered that there is ample space to ensure that these woodlands are avoided as part of the detailed routeing process, thus ensuring compliance with Holford Rule 5. This section has the potential to result in a concentration of wirescape due to the intervisibility with the existing 400kV and 132kV overhead lines that are present in the landscape (Holford Rule 6). In terms of Holford Rule 7 (approach urban areas through industrial zones), this section has the opportunity to pass through industrial areas, particularly at the southern end of the section on the approach to Tilbury.

Sub Topics	Main risks, constraints and opportunities
	In terms of the Supplementary Notes to the Holford Rules, this section has been designed to avoid routeing close to residential areas as far as possible (Supplementary Note 1). In terms of Supplementary Note 2 (avoiding designations of County, District and Local Value) this section does pass through an area safeguarded for minerals development. The consideration of alternative pylon designs (Supplementary Note 3 to the Holford Rules) follows later in the mitigation hierarchy and can be considered once an alignment has been established and an assessment undertaken to establish whether alternative pylon designs are needed. For the majority of the section it should be possible to avoid negative impacts through normal routeing and siting practices whilst also complying with the Holford Rules and overall the section isc considered capable of being acceptable in planning terms.
Overall Environmental and Planning risk: The summary environmental implications of this section are that in terms of Ecology there is the potential for effects to be adverse but compared with the alternative line entry approach to Tilbury (Section S) section R is preferred over Section S. Nonetheless there would be a requirement for HRA process to be undertaken (conducted in the absence of mitigation). In terms of the historic environment, it appears likely that careful routeing and design could be used to minimise any significant adverse effects in this section. In terms of Landscape and Visual, is considered that this section is likely to be consentable subject to mitigation measures. However, this would be dependent upon detailed consideration of measures to reduce potential cumulative effects to the south of the A13 and the avoidance of any development within part of the section on East Tilbury Marshes. The interaction with existing 400kV connections and the Lower Thames Crossing may provide opportunities to address such cumulative effects. From a planning perspective, there are not expected to be any planning policy matters that would preclude routeing within this section. From a planning perspective, whilst the section passes through the Green Belt it would not be able to avoid this designation to achieve a connection to Tilbury given that the Green Belt extends from the River Thames in the south all the way to Chelmsford in the north.	
Socio-economics	**Main risks, constraints and opportunities**
Economic activity	Dunton Hills Family Golf Centre, South Essex Golf Club, Orsett Golf Club, Langdon Hills Golf Club, St Clere's Golf Club and a Solar Farm south of St Giles Church all present potential constraints to routeing along with other activites including Wedding Venue to the north of the A13
Overall Socio-economic impact: There is potential for the proposed infrastructure within the route corridor to interact with various existing, or proposed, commercial and leisure land-uses (for example golf courses) within or in proximity to the corridor. Whether or not there is a material effect on such activities or land-uses depends on detailed routeing and siting, and will also include consideration of potential mitigation and engagement with relevant parties. Affected parties may also be entitled to compensation, assessed in line with the Compensation Code. On this basis, at this route corridor stage, the presence of such land-uses is not in itself considered to be a barrier to or determinative for route corridor selection.	
Technical	**Main risks, constraints and opportunities**
Technical	Challenging routeing due to residential properties, listed buildings, ancient woodland, farm complexes, commercial buildings, water treatment works, solar farm, a woodland cemetery and golf courses. Very challenging routeing due to Dunston Hills Family Golf Centre, two existing 132kV Distribution Network Operator's overhead lines, a wind turbine, a solar farm, electrified railway, the A127 and A13 dual carriageways and associated service station. Various constraints in proximity to Tilbury Substation, including ZB 275kV and ZJ & YYJ 400kV overhead line's, Distribution Network Operator assets, existing electrified railway crossing, proposed National Highways LTC Motorway (DCO), Thurrock Flexible Generation

Sub Topics	Main risks, constraints and opportunities
	Plant (DCO) and Port Authority expansion plans. Additional angle pylons and infrastructure potentially required to avoid and /or overcome constraints and to enable perpendicular crossings. Increased construction and access volumes. Multiple potential options considered (not exhaustive) for approach to Tilbury Substation with varying constraints, all with requirements for sections of overhead lines and underground sections (including HDD crossings of infrastructure and additional above ground infrastructure. Further detailed investigation required. Multiple 132kV and 33kV Distribution Network Operator Assets
Overall Technical impact: This section has been deemed very technically constrained, however it is also considered preferable over the furthermore technically constrained Section S. Overhead line is envisaged for the majority of this section, with the requirement for underground cable sections upon approach to and at the line entries to Tilbury Substation. This technology is considered low risk in terms of technical complexity. The section is moderately constrained in some areas, with certain sections of significant constraint. Residential properties, listed buildings, farm complexes, ancient woodland, industrial sites and commercial areas often create challenging routeing, limiting routeing flexibility. Dunston Hills Family Golf Centre, two existing 132kV distribution network operator assets, a solar farm and the A127 / A13 dual carriageways and associated service station, create areas of no flexibility, with significant constraints to construction, access and maintenance of pylons thus increasing technical construction/delivery complexity. These constraints create areas of very challenging routeing, potentially requiring additional angle pylons to facilitate an overhead line. The approach to Tilbury Substation requires further detailed investigation, as multiple existing National Grid overhead lines, planning (including DCO's) applications, road and rail infrastructure and multiple distribution network operator assets require crossing and/or mitigation. This in mind multiple sections of underground cable (including HDD and additional above ground infrastructure) are likely to be required. There is little room for routeing flexibility and as such technical construction/delivery complexity is increased.	
Cost	
With routeing alternatives to each side of a number of substantive constraints identified (e.g. around Colchester), End to end options were pieced together from combinations of various sections. The costs for these end to end options are discussed in each chapter under the subtitle "Engineering, system and cost performance of options".	

Sub Topics	Main risks, constraints and opportunities
Environment	
Ecology/biodiversity	The main risks and constraints in this section arise from international and national designated sites – Special Protection Area (SPA) / Ramsar – Crouch and Roach Estuaries SPA/Ramsar, Benfleet and Southend marshes SPA/Ramsar, Thames Estuary and Marshes Estuaries SPA/Ramsar Special Area of Conservation (SAC) Essex Estuaries and Blackwater Estuary (and component SSSI). Further east lie the Outer Thames Estuary SPA and Ramsar and the Foulness SPA and Ramsar, and their constituent SSSIs. The route crosses Holehaven Creek SSSI, Pitsea Marsh SSSI and Vange & Fobbing Marshes SSSIs. Also present are Benfleet and Southend Marshes, Langdon Ridge SSSI and Mucking Flats and Marshes. There are 6 blocks of Ancient Woodland (ASNW & PAWS) Canney, Hawes, Embersons, Rettendon, Northlands Woods, and 1 unnamed wood at Main Road near Bicknacre. There is 1 Local Nature reserve – Linford LNR. Several priority habitats are also identified across the section and adjacent, including floodplain grazing marsh, traditional orchard, mudflats, saltmarsh, semi-improved grassland, broadleaved woodland, open water, as well as several WFD watercourses are crossed River Crouch and an unnamed watercourse (from Hanningfield reservoir) that is linked to the Crouch and Roach Estuary SPA/Ramsar/SSSI and Essex Estuaries SAC, the closest international designations at ~850m away), plus other unnamed. *Construction*: The international sites (and supporting SSSIs) are in the section/immediately adjacent, and habitats and mobile species could be subject to both direct and indirect effects**.** . This section passes through two national sites, and in close proximity or with clear pathways for effect to several international sites. Sensitive selection of crossing points needs to be considered (e.g Vange Creek) Given potential impacts of multiple designations, if S was preferred overall, it would be subject to confirmatory survey work to fully understand flight-lines, movements and functionally linked habitats in the vicinity to understand the extent effects, and thus the extent and potential effectiveness of mitigation (including alternative technology such as cabling). It should be noted that the ZOI will not be determined by one designation alone, but with the complex of multiple sites, as the level of exchange of birds between each is likely to be considerable. There would be no direct effects on the AW as they are outside the section. Given the importance and weighting in both planning and legal terms of such designated biodiversity and to AW (in respect of potential direct/indirect effects), they thus remain a potentially significant material constraint to development. There is potential for permanent/temporary direct effects on Priority Habitats including loss of habitat, fragmentation and disturbance during construction. In Operation there is potential for temporary indirect effects during operation from maintenance visits, and risk of bird collision (connected with designated site populations) given wetland habitats/rivers in the vicinity. Opportunities: To support partnerships for Environmental Gain

Sub Topics	Main risks, constraints and opportunities
	Overall the scheme element can be located in the area being appraised._However without more detailed data following detailed routeing and siting (and stakeholder opinion), this is considered to be the more constrained section of the two main options here, the alternative being R and thus given the requirements of the relevant legislation it is likely to prove unacceptable on alternative grounds. Until further surveys and consultation are undertaken, there remains potential for a negative impact on the International / National Site designations. There would be a requirement for HRA process to be undertaken (conducted in the absence of mitigation). In the absence of additional data required to establish a firm conclusion in respect of AEoSI beyond scientific doubt, and of stakeholder opinion on that data, this is assessed as a significantly constrained section. If alternatives are available (the western pink spur of S if S was preferred when balancing all factors overall, or preferably all of Section R), they should be preferred. .
Historic Environment	This section appears to contain a relatively small number of listed buildings, although it is important to note that the NHLE list entry for Stow Maries airfield misleadingly comprises not a single structure but 24 structures forming an entire airfield complex that is a nationally unique survival and is of very high significance. The true extent of this asset is more effectively demonstrated by the designated conservation area. There are multiple listed buildings and the scheduled moated mound at Purleigh, and similarly at Stow Maries village, including the Grade II* Church of St Mary and at Woodham Ferrers, including the Grade I listed Church of St Mary. Between Woodham Ferrers and Vange Creek there are a small number of listed buildings within or close to the section, mostly listed at Grade II but including the Grade II* listed Church of St Margaret, Bowers Gifford. South-west of Vange Creek, the route divides, the more southerly option comes close to the Fobbing and Corringham conservation areas, and contains a small number of listed buildings, including the Grade II* listed Church of St John the Baptist, Mucking. The northerly option passes close to the Horndon on the Hill conservation area. The southern end of the route passes close to the East Tilbury conservation area. The potential presence of archaeological remains is not considered to be a differentiating factor. This potential will be more fully considered during subsequent phases of design to ensure that effects on archaeological remains and constraint to design, consent and delivery can be better understood and managed. The north-eastern end of this section between Purleigh and Woodham Ferrers is constrained, and it is unlikely that multiple significant adverse effects on highly valued receptors could be avoided even after careful routeing and siting was applied. Elsewhere between Woodham Ferrers and Vange Creek, it is likely that most significant adverse effects could be avoided by normal routeing and siting practices. The southern end of the section appears more constrained, but it is likely that an acceptable overhead line solution could be achieved through careful routing and siting, particularly where design can be used to minimise the potential for cumulative adverse effects

Sub Topics	Main risks, constraints and opportunities
	Overall whilst much of the effect of this section on the historic environment is capable of being acceptable the more northern section is more challenging and may require enhanced measures to be considered in order to achieve an acceptable planning balance.
Landscape and Visual	**Landscape** Development within this section would not affect any nationally or locally designated landscapes. There is potential for significant adverse cumulative effects on landscape character in combination with the ZT route and 132kV OHL to the north of South Woodham Ferrers in the vicinity of Ilgar's Manor. There is potential for significant adverse cumulative effects on landscape character in combination with the ZT and 4VB routes and 132kV OHL to the north of Rayleigh substation. There is potential for significant adverse cumulative effects on landscape character in combination with the ZJ route and 132kV OHL between Rayleigh substation and Linford. This excludes the branch to the north of Corringham. Between Stanford-le-Hope and Tilbury substation, there is high potential for significant adverse cumulative effects on landscape character in combination with the multiple 400kV and 132kV OHL that converge on the substation. Development within the branch to the north of Corringham or the branch that crosses Mucking Marshes, to the east of East Tilbury, could result in significant adverse effects on local landscape character. **Visual** There is potential for significant adverse cumulative and non-cumulative visual effects to be experienced by residents at numerous locations between South Woodham Ferrers and Tilbury substation. These include residents in the vicinity of Shotgate and on the eastern edge of Wickford; those on the eastern edge of Bowers Gifford or the western edge of South Benfleet; those on the southern edges of Corringham and Stanford-le-Hope; and those at Mucking. Significant adverse visual effects may be experienced by visitors to Thameside Nature Discovery Park/ Thurrock Thameside Nature Park. Significant adverse cumulative visual effects may be experienced by visitors to Wat Tyler Country Park. Further analysis is needed to understand the likely cumulative effects on local landscape character that may arise in combination with 400kV OHL and 132kV OHL within and adjacent to the section and the extent to which measures over and above normal routeing and siting would be required to reduce potential effects. Similarly, further analysis is needed to predict the level of non-cumulative or cumulative visual effect that may be experienced by residents of properties within or in close proximity to the section. As potential mitigation is available if required for all of the predicted effects, it is considered that this section is likely to be acceptable from a landscape and visual perspective. However, this would be dependent upon the successful implementation of screening for potentially very large numbers of residential receptors in the vicinity of Shotgate and on the eastern edge of Wickford; those on the eastern edge of Bowers Gifford or the western edge of South Benfleet; those on the southern edges of Corringham and Stanford-le-Hope; and those at Mucking. Additional measures may also be required to reduce cumulative effects potentially including removing th 132kV OHL. Overall Section S is considered less preferrable than Section R due to the greater numbers of visual receptors with the potential to experience significant adverse effects.
Planning	The northern part of this section passes through open countryside/farmland. To the west of South Woodham Ferrers it travels through gaps in the built environment between Runwell, Rayleigh and Basildon. Once south of Basildon the section heads in a south westerly direction where it splits to avoid the settlements of Fobbing and Corringham and Stanford le Hope before passing to the east of East Tilbury. The section passes through the Green Belt. The section also passes over a Tidal River which may necessitate consultation with the Marine Management Organisation if this section is taken forward.

Sub Topics	Main risks, constraints and opportunities
	In terms of local plan allocations, in the Chelmsford and Basildon LPA area there are no local plan allocations directly affecting the section. Whereas in the Thurrock LPA area the section would pass through the Thurrock Green Belt north of Corringham through to Tilbury. In terms of the Holford Rules, this section avoids major areas of highest amenity value (Holford Rule 1). The section contains the Stow Maries World War One Aerodrome Conservation Area and therefore would be less compliant with Holford Rule 2 which seeks to avoid smaller areas of highest amenity value and scientific interest (Holford Rule 2). It also contains the Holehaven Creek SSSI, the Vange & Fobbing Marshes SSSI, the Mucking Flats and Marshes and the Thames Estuary & Marshes Ramsar site, resulting in this section being less compliant with Holford Rule 2 than the other sections. It offers the potential for a relatively direct alignment and fewer changes of direction (Holford Rule 3). It is considered that alignments in this section could be defined to meet the requirements of Holford Rule 4 (choose tree and hill backgrounds). This section avoids ancient woodlands (Holford Rule 5). This section has the potential to result in a concentration of wirescape due to the intervisibility with the existing 400kV and 132kV overhead lines that are present in the landscape (Holford Rule 6). In terms of Holford Rule 7 (approach urban areas through industrial zones), this section has the opportunity to pass through industrial areas, particularly at the southern end of the section on the approach to Tilbury. In terms of the Supplementary Notes to the Holford Rules, this section has been designed to avoid routeing close to residential areas as far as possible (Supplementary Note 1). However, the dense pattern of settlement and narrow width of areas between settlements in proximity to Section S, particularly between the settlements of Basildon/ Wickford and Thundersley/ South Benfleet, could result in visual effects being experienced by large numbers of people and may not be able to be mitigated. This section is therefore less compliant with Supplementary Note 1 than the other sections. In terms of Supplementary Note 2 (avoiding designations of County, District and Local Value) this section does pass through an area safeguarded for minerals development. The consideration of alternative pylon designs (Supplementary Note 3 to the Holford Rules) follows later in the mitigation hierarchy and can be considered once an alignment has been established and an assessment undertaken to establish whether alternative pylon designs are needed. The route passes through several SSSIs. It is not possible to avoid the majority of these designations as there are no gaps in the section to deviate away from them (the only exception to this is the Langdon Ridge SSSI). As a result, the section is less compliant with Holford Rule 2. Whilst the section contains the Stow Maries World War One Aerodrome Conservation Area it is assessed that sufficient space for alignments within Section S to avoid direct effects on this particular Conservation Area should be achievable. This section is less compliant with Supplementary Note 1 to the Holford Rules than the other sections due to the dense pattern of settlement and narrow width of areas between settlements, particularly between the settlements of Basildon/ Wickford and Thundersley/South Benfleet which could result in visual effects being experienced by large numbers of people and may not be able to be mitigated The overall assessment of the effect of this route section in terms of planning
Overall Environmental and Planning risk: The summary environmental implications of this section are that in terms of Ecology the effects would be negative. There would be a requirement for HRA process to be undertaken (conducted in the absence of mitigation) and as such the Section R is preferred. In terms of the historic environment, the north-eastern end of this route between Purleigh and Woodham Ferrers is very heavily constrained, and it is unlikely that multiple significant	

Sub Topics	Main risks, constraints and opportunities
adverse effects on highly valued receptors could be avoided. In terms of Landscape and Visual, is considered that this section is likely to be consentable subject to mitigation measures. However, this would be dependent upon the successful implementation of screening for potentially very large numbers of residential receptors in the vicinity of Shotgate and on the eastern edge of Wickford; those on the eastern edge of Bowers Gifford or the western edge of South Benfleet; those on the southern edges of Corringham and Stanford-le-Hope; and those at Mucking and consideration of reducing potential cumulative effects. From a planning perspective, this section passes through several SSSI which complies to a lesser extent with Holford Rule 2 than other sections. In addition, due to the dense pattern of settlement and narrow width of areas between settlements, particularly between the settlements of Basildon/ Wickford and Thundersley/South Benfleet, this could result in visual effects being experienced by large numbers of people and may not be able to be mitigated resulting in the section being less compliant with Supplementary Note 1 to the Holford Rules which seeks to avoid routeing close to residential areas. From a planning perspective, whilst the section passes through the Green Belt it would not be able to avoid this designation to achieve a connection to Tilbury given that the Green Belt extends from the River Thames in the south all the way to Chelmsford in the north.	
Socio-economics	**Main risks, constraints and opportunities**
Economic activity	Treehouse Club pre-school nursery
Overall Socio-economic impact: Detailed routeing and siting near Treehouse Club pre-school nursery could mitigate any issues which would bring risk into the consenting process. There is potential for the proposed infrastructure within the route corridor to interact with various existing, or proposed, commercial and leisure land-uses (for example educational establishments) within or in proximity to the corridor. Whether or not there is a material effect on such activities or land-uses depends on detailed routeing and siting, and will also include consideration of potential mitigation and engagement with relevant parties. Affected parties may also be entitled to compensation, assessed in line with the Compensation Code. On this basis, at this route corridor stage, the presence of such land-uses is not in itself considered to be a barrier to or determinative for route corridor selection.	
Technical	**Main risks, constraints and opportunities**
Technical	Multiple crossings of the 4VB, ZJ, ZJA and the discontinued ZT National Grid overhead line assets. Challenging to very challenging routeing due to residential properties, listed buildings, dual carriageways, large public highway intersections, industrial and commercial sites, a water treatment works, Stow Maries Aerodrome, landfill sites, the A13 dual carriageway, A-roads, and Holehaven Creek and Fobbing Marshes SSSIs, large flood zones, waterbodies, watercourses and electrified railways. Narrow Section at Vange Creek crossing near Wat Tyler Country Park. Housing Development east of High Road. Additional angle pylons and infrastructure potentially required to avoid and /or overcome constraints and to enable perpendicular crossings. Increased construction and access volumes and methodology (particularly in the SSSIs). Distribution Network Operator assets are to be crossed. Various constraints in proximity to Tilbury Substation, including ZB 275kV and ZJ & YYJ 400kV overhead line's, Distribution Network Operator assets, existing electrified railway crossing, proposed National Highways LTC Motorway (DCO), Thurrock Flexible Generation Plant (DCO) and Port Authority expansion plans. Further consultation required with Stow Maries Aerodrome regards flight paths etc. Route to avoid or oversail landfill. Geotechnical assessment to determine ground conditions may be required. Multiple potential options considered (not exhaustive) for approach to Tilbury Substation with varying constraints, all with requirements for sections of overhead lines and underground sections (including HDD crossings of infrastructure and additional above ground infrastructure with Terminal Towers and cable sealing end compounds required for underground cable to cross the existing National Grid overhead lines. Utilising the discontinued ZT alignment would require removal of the existing infrastructure in advance of the proposed works.

Sub Topics	Main risks, constraints and opportunities
	Reduced flexibility for routeing throughout. With substantial areas of no flexibility. Alternative construction methods or earthworks to overcome landfill sites if unavoidable. Avoiding or oversailing flood zones and the SSSI's is not possible at certain locations across the section, therefore infrastructure will likely be required within, thus increasing the technical construction / delivery complexity. Overhead line routeing not considered feasible in Eastern leg due to a narrowness of section, existing Distribution Network Operator assets and ZJ National Grid asset. North west section leg at Fobbing not feasible due to a housing development in construction limiting available section width. Also very constrained near Rayleigh Substation due to existing assets, substations and road network.
Overall Technical impact: A mixture of overhead line and underground cable is required for Section S. These technologies are considered low risk in terms of technical complexity. The section is moderately to highly constrained in many areas, with certain sections of significant constraint which prevent feasible routeing. Residential properties and listed buildings, commercial and industrial sites, environmentally protected areas, section narrowing's and a housing development create very challenging routeing, with limited to no flexibility especially around Rayleigh. The existing National Grid and Distribution Network Operator assets require substantial and technically complex mitigation, with assets in the Eastern Leg of this section preventing a viable routeing option. The Western Leg of the section is restricted to under 30m by the aforementioned housing development, and as such also prevents a viable routeing option. Existing road infrastructure including multiple dual carriageways and associated large intersections are to be crossed and distribution network operator assets are to be mitigated throughout the section. Due to the number of substantial National Grid and Distribution Network Operator overhead lines and other major infrastructure crossings involved in this section, the section is deemed undeliverable without complex engineering designs at significant additional cost and potential programme and phasing impacts. There are opportunities to utilise the route of a decommissioned National Grid overhead line (the ZT route) for part of the section and to underground existing overhead lines to facilitate a new route. These opportunities would however are also likely to add further programme risk and cost to the project. Opportunities to extend the section do provide some additional flexibility to the scheme, however the areas of greatest technical challenge and complexity remain. The approach to Tilbury Substation requires further detailed investigation, as multiple existing National Grid overhead lines, planning (including DCO's) applications, road and rail infrastructure and multiple distribution network operator assets require crossing and/or mitigation. This in mind multiple sections of underground cable (including HDD and additional above ground infrastructure) are likely to be required. There is little room for routeing flexibility and as such technical construction/delivery complexity is increased.	
Cost	
With routeing alternatives to each side of a number of substantive constraints identified (e.g. around Colchester), End to end options were pieced together from combinations of various sections. The costs for these end to end options are discussed in each chapter under the subtitle "Engineering, system and cost performance of options".	

Topic Baseline Overview For Section T North

Sub Topics	Main risks, constraints and opportunities
Environment	
Ecology/biodiversity	The main risks and constraints in this section arise from international and national designated interest – Proximity to Abberton Reservoir SPA. 5 blocks of Ancient Woodland (ASNW & PAWS) Calves Pasture, Potash Wood, Seller wood, Fan \Wood, and 1 unnamed wood north of Craxes Green Road. Several priority habitats are also identified across the section and adjacent areas, including – (deciduous woodland, traditional orchard, & ponds/water courses – in section and adjacent areas. Several WFD watercourses are crossed Roman River and Domsey Brook, plus unnamed tributaries. The Roman River links to international sites, but as such the distance (~10km) (Colne Estuary SPA/Ramsar/Essex Estuaries SAC), it's not expected to be a constraint to those. *Construction*:**.** There would be no direct effects on the AW as they are outside the section. However, given the importance and weighting in both planning and legal terms of such designated biodiversity and to AW (in respect of potential indirect effects), they remain a potentially significant material constraint to development. There is potential for permanent/temporary direct effects on Priority Habitats including loss of habitat, fragmentation and disturbance during construction. In Operation there is potential for temporary indirect effects during operation from maintenance visits, and risk of bird collision (connected with designated site populations) given wetland habitats/rivers in the vicinity. Opportunities: To support partnerships for Environmental Gain. Overall in general the scheme element can be located in the area being appraised, and is considered acceptable subject to normal routeing and siting practices. However there remains potential for a negative impact on the International / National Site designations and there would be a requirement for HRA process to be undertaken (conducted in the absence of mitigation). In the absence of additional data required to establish a firm conclusion in respect of AEoSI (or being able to state that no LSEs would result which may emerge) beyond scientific doubt, and of stakeholder opinion on that data, this is assessed as potentially constrained. If better (the western north – south options F, K and R) alternatives remain available, they are preferred.
Historic Environment	Key risks arise from potential change to setting of Grade II listed buildings in this section. To the west of the B1022 Maldon Road, these assets are relatively well dispersed other than at Eastthorpe and are mostly listed at Grade II, with one Grade II* building at Badcocks. The route to the east of the B1022 Maldon Road is more constrained, with the Birch Conservation Area and six Grade II listed buildings within the section and the scheduled and Grade II* listed ruins of St Mary's Church, Birch and the Grade I listed Church of St John the Baptist, Layer de la Haye very close to the section. The potential presence of archaeological remains is not considered to be a differentiating factor. This potential will be more fully considered during subsequent phases of design to ensure that effects on archaeological remains and constraint to design, consent and delivery can be better understood and managed. It appears likely that significant adverse effects would arise from the construction of an overhead line in this section, but that in the main those effects could be minimised through the application of normal routeing and siting processes and measures such as reinforcing

Sub Topics	Main risks, constraints and opportunities
	planting.The assessment of the effect of this section on the historic environment is therefore that it is capable of being acceptable in the planning balance.
Landscape and Visual	The absence of 132kV DNO assets in this area negates the potential for significant adverse cumulative effects to arise in relation to this section. **Landscape** Development within this section would not affect any nationally or locally designated landscapes. It is not anticipated that the introduction of a 400kV OHL in this section would give rise to any significant adverse effects on local landscape character. The highest levels of landscape sensitivity are likely to be in the east of the section, in the vicinity of Birch Park, where a connection could potentially pass through up to approximately 800m of this sensitive, but undesignated landscape. Routeing and siting taking into account existing woodland will reduce effects but may warrant consideration of other measures to reduce landscape effects. **Visual** The majority of the section is relatively wide and whilst the section contains or is located in close proximity to the settlements of Hardy's Green, Easthorpe and Feering, it is likely that significant adverse visual effects for the residents of these settlements could be avoided through carful routeing and siting of towers. The eastern part of the section is narrower and potentially constrained by the presence of Birch Park in its northern part. If routed through the gap between the settlements of Birch and Birch Green in the southern part of this section, a connection has potential to result in significant adverse visual effects for a small number of residents on the southern and northern edges of these settlements respectively. Much depends on the outcome of the application of normal routeing and siting practices and opportunity for localised measures. Overall impact of development of a 400kV OHL within this section in landscape and visual terms is considered to be acceptable
Planning	The majority of this section passes through open countryside/farmland. It avoids the settlements of Feering, Birch Green and Hardys Green in line with the Supplementary Notes to the Holford Rules which seek to seek routeing close to residential as far as possible on the grounds of general amenity. However, a small number of scattered residential properties and farmsteads are located within or surrounded by the section. In terms of Local Plan allocations, there are no major allocations which affect the section directly. To the east and north east of Feering there is however, a strategic allocation for 795 dwellings, with additional housing allocations also being present on adjoining sites, however, these areas are set back from the section. Whilst the section avoids the housing allocations in the east and north east of Feering, careful route alignment and siting of the towers would be needed to avoid negative visual impacts on these allocated sites. Under the Minerals Local Plan 25 hectares at Maldon Road, Birch, is identified as a Preferred and Reserve Sites for Sand and Gravel Extraction, however, this (and the existing minerals site adjacent to this location) is located just outside of the section and effects are therefore not anticipated. Much of the section would be located within an area of minerals safeguarding (sand and gravel) under the Essex Minerals Local Plan. It is not considered that siting of pylons would cause sterilisation of any mineral resources due to the small footprint of individual pylons, however, careful routeing and siting, and consultation with the relevant minerals planning authorities should help to avoid significant effects

Sub Topics	Main risks, constraints and opportunities
	In terms of planning applications and infrastructure projects, an application for widening of the A12 between Chelmsford and the A120 is anticipated to be submitted to the planning inspectorate in 2022. The red line boundary of this scheme would cut across the western end of the section. Careful monitoring of the A12 widening scheme will need to be undertaken if this section is taken forward to determine whether any effects would occur (both on the other schemes a result of any alignment through the section, and on any alignment through the section as a result of the other schemes), however, it is anticipated that careful siting of pylons should help to avoid effects on the A12 scheme. At the eastern end of the section, there is an application for a solar farm with associated infrastructure, on a 96.80ha site which covers much of the area at the end of the section and if constructed would make routeing through this area constrained. In terms of the Holford Rules, this section avoids major areas of highest amenity value (Holford Rule 1). It would pass through smaller areas of highest amenity value and scientific interest (Holford Rule 2) as it contains the Birch Conservation Area. However, it is assessed that sufficient space for alignments within this section to avoid direct effects on this particular conservation area should be possible. It offers the potential for a direct alignment and fewer changes of direction (Holford Rule 3). It is considered that alignments in this section could be defined to meet the requirements of Holford Rule 4 (choose tree and hill backgrounds). Whilst this section does contain ancient woodland, it is considered that there is ample space to ensure that these woodlands are avoided as part of the detailed routeing process, thus ensuring compliance with Holford Rule 5. In terms of Holford Rule 6 (avoiding a concentration of wirescape) this section is unlikely to result in a concentration of wirescape (Holford Rule 6). Holford Rule 7 (approach urban areas through industrial zones) does not apply to this section due to its rural nature. In terms of the Supplementary Notes to the Holford Rules, this section has been designed to avoid routeing close to residential areas as far as possible (Supplementary Note 1). In terms of Supplementary Note 2 (avoiding designations of County, District and Local Value) this section does pass through an area safeguarded for minerals development. The consideration of alternative pylon designs (Supplementary Note 3 to the Holford Rules) follows later in the mitigation hierarchy and can be considered once an alignment has been established and an assessment undertaken to establish whether alternative pylon designs are needed. It should be possible to avoid negative planning impacts through careful route alignment and siting of towers whilst also complying with the Holford Rules. The overall assessment of the effect of this route section in terms of planning is **likely to be acceptable.**
Overall Environmental and Planning risk: The summary environmental implications of this section are that in terms of Ecology it can be located in the area being appraised, provided mitigation is implemented / element is located away from specific constraints / receptors. In terms of the historic environment, effects could be minimised through carful routeing and appropriate measures with a probable emphasis on reinforcement planting. In terms of Landscape and Visual, it is considered that the overall impact of development of a 400kV OHL within this section would be acceptable. There are not expected to be any planning policy matters that would preclude routeing within this section.	
Socio-economics	**Main risks, constraints and opportunities**
Economic activity	Planned solar farm

Sub Topics	Main risks, constraints and opportunities
Overall Socio-economic impact: There is potential for the proposed infrastructure within the route corridor to interact with various existing, or proposed, commercial and leisure land-uses (for example solar generation) within or in proximity to the corridor. Whether or not there is a material effect on such activities or land-uses depends on detailed routeing and siting, and will also include consideration of potential mitigation and engagement with relevant parties. Affected parties may also be entitled to compensation, assessed in line with the Compensation Code. On this basis, at this route corridor stage, the presence of such land-uses is not in itself considered to be a barrier to or determinative for route corridor selection	
Technical	**Main risks, constraints and opportunities**
Technical	Multiple Distribution Network Operator assets are to be crossed. Challenging routeing due to residential properties, listed buildings, farm complexes, ancient woodlands, electrified railway, A12 dual carriageway and proposed A12 widening scheme and a listed Monument Area near Rivenhall Church. Additional angle pylons and infrastructure potentially required to avoid and /or overcome constraints and to enable perpendicular crossings Use of overhead line envisaged for this section. Both legs only feasible when routeing east of Colchester via Section N which Is not a technically preferred section. Constrained in areas due to Listed Buildings and properties leading to additional angles. No major technical constraints.
Overall Technical impact: Overhead line is envisaged for this section. This technology is considered low risk in terms of technical complexity. Section T is moderately constrained in places as a result of residential properties, listed buildings, commercial buildings and ancient woodland which will potentially require the use of additional angle pylons and reduce flexibility in some areas. Existing road infrastructure including the A12 dual carriageway and associated widening scheme are to be crossed and distribution network operator assets are to be mitigated throughout the section. Whilst the connecting section is technically feasible, it is not possible to use without utilising Section N (and Section M for the southern connecting leg) which are technically less preferred than the northern Colchester and inland sections.	
Cost	
With routeing alternatives to each side of a number of substantive constraints identified (e.g. around Colchester), End to end options were pieced together from combinations of various sections. The costs for these end to end options are discussed in each chapter under the subtitle “Engineering, system and cost performance of options”.	

Topic Baseline Overview For Section T South

Sub Topics	Main risks, constraints and opportunities
Environment	
Ecology/biodiversity	The main risks and constraints in this section arise from international and national designated sites – Special Protection Area (SPA) / Ramsar – Blackwater Estuary; Special Area of Conservation (SAC) Essex Estuaries and Blackwater Estuary (and component SSSIs, though>8km from section), and potentially Abberton SPA; 5 blocks of Ancient Woodland (ASNW & PAWS) (Barrowfield Wood, Tarecroft Wood, Kelvedon Hall Wood, Howbridges/Tiptree Wood and New Wood). Several priority habitats are also identified across the section and adjacent areas, including deciduous woodland, traditional orchard, & ponds/water courses Several WFD watercourses crossed, River Blackwater (linked to the Blackwater SPA/Ramsar/SSSI/Essex Estuary SAC), Domsey Brook, plus unnamed. It will be important to optimise crossing location of the River Blackwater/Domsey Brook *Construction*: There would be no direct effects on the SPA or SAC, SSSI or the AW as they are outside the section, however, mobile species could be subject to both direct and indirect effects. Given the importance and weighting in both planning and legal terms of such designated biodiversity and to AW (in respect of potential indirect effects), they thus remain a potentially significant material constraint to development. There is potential for permanent/temporary direct effects on Priority Habitats including loss of habitat, fragmentation and disturbance during construction. In Operation there is potential for temporary indirect effects during operation from maintenance visits, and risk of bird collision (connected with designated site populations) given wetland habitats/rivers in the vicinity. Opportunities: To support partnerships for Environmental Gain. Overall in general the scheme element can be located in the area being appraised, and is considered acceptable subject to normal routeing and siting practices. However there remains potential for a negative impact on the International / National Site designations and there would be a requirement for HRA process to be undertaken (conducted in the absence of mitigation). In relation to the designations, at this stage of assessment, and in the absence of detailed survey data, it is expected that the implementation of design process – and incorporating best practice, would ensure no resultant LSEs in this section. In this circumstance, and the absence of better alternatives, a NSER would be expected to be completed. If better (the western north – south options F, K and R) alternatives remain available, they are preferred.
Historic Environment	Key risks arise from potential change to setting of highly graded designated heritage assets, most notably the scheduled Roman villa, Anglo-Saxon hall, cemetery and church site, around and to the north and east of St Mary and All Saints Church, the scheduled Rivenhall long mortuary enclosure, the Grade I listed Church of St Mary and All Saints, Rivenhall and the Grade II* Braxted Park. There are also a number of Grade II listed buildings in this section, particularly along Oak Road and Rickstones Road, Rivenhall, Braxted Road and at Kelvedon Hall Farm.

Sub Topics	Main risks, constraints and opportunities
	The scheduled monuments in this section fall into asset classes that are strongly suggestive of the presence of significant and sensitive archaeological remains within the nearby landscape, increasing the sensitivity of this area to direct disturbance, even where the designated areas are avoided. Avoidance of these buried constraints is likely to bring the proposed route into conflict with numerous Grade II listed buildings, and it appears unlikely that significant effects could be avoided without consideration of measures over and above normal routeing and siting processes and construction measures to achieve an acceptable planning balance in respect of the historic environment.
Landscape and Visual	The absence of 132kV DNO assets in this area negates the potential for significant adverse cumulative effects to arise in relation to this section. **Landscape** Development within this section would not affect any nationally or locally designated landscapes. It is not anticipated that the introduction of a 400kV OHL in this section would give rise to any significant adverse effects on local landscape character. The highest levels of landscape sensitivity are likely to be in the vicinity of Braxted Park and Faulkbourne Hall Registered Parks and Gardens, respectively located to the immediate south of the eastern and western parts of this section. However, it is noted that both of these areas benefit from a strong resource of mature tree cover along their northernedges. **Visual** The section is relatively wide and whilst it contains the settlement of Rivenhall and is located in relatively close proximity to the southern edge of the settlement of Kelvedon, to the north, and to Rivenhall End and the northern edge of Witham, to the south, it is likely that significant adverse visual effects for the residents of these settlements could be avoided through carful routeing and siting of towers. With normal routeing and siting practices applied and construction measures, it is considered that overall impact of development of a 400kV OHL within this section would be considered to be acceptable
Planning	The majority of this section passes through open countryside/farmland. It avoids the settlements of Witham, Rivenhall End and Kelvedon and the ribbon development along London Road and Crabbs Lane in line with the Supplementary Notes to the Holford Rules which seek to seek routeing close to residential as far as possible on the grounds of general amenity. However, the village of Rivenhall and a small number of scattered residential properties and farmsteads are located within or surrounded by the section. An alignment in the south of the section south of Rivenhall should minimise effects on the village. It is assumed that the section is sufficiently wide where it passes Kelvedon Park, such that an alignment could be plotted to avoid the site/allocation. In terms of planning allocations, within the centre of the section, adjacent to the A12, Kelvedon Park is allocated as a special employment area associated with the Essex Fire and Rescue Service Headquarters, under both the extant Braintree Site Allocations and Development Management Plan and the emerging Section 2 Local Plan. A 3.3ha extension to the site is allocated under the emerging Section 2 Local Plan. The area between Witham, Rivenhall and Rivenhall end is identified as a ‘green buffer’, where proposals for strategic infrastructure would be supported by the LPA, provided that consideration is given to the effect of infrastructure on the surrounding area. The area on the south-eastern edge of the village of Rivenhall is designated as a ‘Visually Important Space’ where development would not be

Sub Topics	Main risks, constraints and opportunities
	supported by the LPA but is considered likely to be avoidable. To the north of Witham, the section partially cuts across sports fields/informal recreation area associated with New Rickstones Academy. The area to the north east of Witham, is allocated as a Strategic Growth Allocation (housing) under the Core Strategy, and additionally there are other sites allocated for housing in the north of Witham, however, these are all just outside of the section. Under the Minerals Local Plan 46 hectares at Colemans Farm to the east of Witham, is identified as a Preferred and Reserve Sites for Sand and Gravel Extraction, however, this (and the existing minerals site adjacent to this location) is located just outside of the section and effects are therefore not anticipated. Much of the section would be located within an area of minerals safeguarding (sand and gravel) under the Essex Minerals Local Plan. Safeguarding ensures protection of mineral resources from risk of sterilisation as the result of development. In terms of planning applications and infrastructure projects, an application for widening of the A12 between Chelmsford and the A120 is anticipated to be submitted to the planning inspectorate in 2022. The red line boundary of this scheme would cut across the western end of the section. In terms of the Holford Rules, this section avoids major areas of highest amenity value (Holford Rule 1) and also avoids smaller areas of highest amenity value and scientific interest (Holford Rule 2). It offers the potential for a direct alignment and fewer changes of direction (Holford Rule 3). It is considered that alignments in this section could be defined to meet the requirements of Holford Rule 4 (choose tree and hill backgrounds). Whilst this section does contain ancient woodland, it is considered that there is ample space to ensure that these woodlands are avoided as part of the detailed routeing process, thus ensuring compliance with Holford Rule 5. In terms of Holford Rule 6 (avoiding a concentration of wirescape) this section is unlikely to result in a concentration of wirescape. Holford Rule 7 (approach urban areas through industrial zones) does not apply to this section due to its rural nature. In terms of the Supplementary Notes to the Holford Rules, this section has been designed to avoid routeing close to residential areas as far as possible (Supplementary Note 1). In terms of Supplementary Note 2 (avoiding designations of County, District and Local Value) this section does pass through an area safeguarded for minerals development. The consideration of alternative pylon designs (Supplementary Note 3 to the Holford Rules) follows later in the mitigation hierarchy and can be considered once an alignment has been established and an assessment undertaken to establish whether alternative pylon designs are needed. It is anticipated that the sport's fields associated with New Rickstones Academy could be avoided with detailed routing and siting of pylons. Careful monitoring of the A12 widening scheme will need to be undertaken to determine whether any effects would occur (both on the A12 widening scheme as a result of any alignment through the section, and on any alignment through the section as a result of the A12 widening scheme), however, it is anticipated that careful siting of pylons should help to avoid effects. It should be possible to avoid negative planning impacts through normal routeing and siting processes whilst also complying with the Holford Rules and the overall assessment of the effect of this route section in terms of planning is expected to be acceptable
Overall Environmental and Planning risk: The summary environmental implications of this section are that in terms of Ecology it would have a negative effect. There would be a requirement for HRA process to be undertaken (conducted in the absence of mitigation) and as such other sections are preferred as an alternative connection route. In terms of the historic environment, it is assessed that the impact of development would be negative and it is anticipated that mitigation would be	

Sub Topics	Main risks, constraints and opportunities
required to ensure the acceptability of the route. In terms of Landscape and Visual, it is considered that the overall impact of development of a 400kV OHL within this section would be neutral. There are not expected to be any planning policy matters that would preclude routeing within this section albeit quite challenging to appropriately route and site to reduce effects.	
Socio-economics	**Main risks, constraints and opportunities**
Economic activity	Nothing substantial identified.
Overall Socio-economic impact: Nothing substantive identified	
Technical	**Main risks, constraints and opportunities**
Technical	Multiple Distribution Network Operator assets are to be crossed. Challenging routeing due to residential properties, listed buildings, farm complexes, ancient woodlands, electrified railway, A12 dual carriageway and proposed A12 widening scheme and a listed Monument Area near Rivenhall Church. Additional angle pylons and infrastructure potentially required to avoid and /or overcome constraints and to enable perpendicular crossings Use of overhead line envisaged for this section. Both legs only feasible when routeing east of Colchester via Section N which Is not a technically preferred section. Constrained in areas due to Listed Buildings and properties leading to additional angles. No major technical constraints.
Overall Technical impact: Overhead line is envisaged for this section. This technology is considered low risk in terms of technical complexity. Section T is moderately constrained in places as a result of residential properties, listed buildings, commercial buildings and ancient woodland which will potentially require the use of additional angle pylons and reduce flexibility in some areas. Existing road infrastructure including the A12 dual carriageway and associated widening scheme are to be crossed and distribution network operator assets are to be mitigated throughout the section. Whilst the connecting section is technically feasible, it is not possible to use without utilising Section N (and Section M for the southern connecting leg) which are technically less preferred than the northern Colchester and inland sections.	
Cost	
With routeing alternatives to each side of a number of substantive constraints identified (e.g. around Colchester), End to end options were pieced together from combinations of various sections. The costs for these end to end options are discussed in each chapter under the subtitle “Engineering, system and cost performance of options”.	

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