Suffolk County Council

NORWICH TO TILBURY

EN020027

Relevant Representation

Suffolk County Council

FC74BF695

27 November 2025

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Glossary of Acronyms

DCO	*Development Consent Order*
ES	*Environmental Statement*
NSIP	*Nationally Significant Infrastructure Project*
PPA	*Planning Performance Agreement*

"The Council" / "SCC" refers to Suffolk County Council.

Purpose of this Document

The document has been prepared by Suffolk County Council to provide a response to the Planning Inspectorate's invitation for Interested Parties to submit Relevant Representations, between 16 October and 27 November 2025, outlining key issues for the Examination of Norwich to Tilbury. The contents of this document were approved by Suffolk County Council's Cabinet at the meeting of 4 November 2025.

1 Introduction

1.1 Suffolk County Council understands that the Applicant submitted the proposals to the Planning Inspectorate ("PINS") on 29 August 2025 and that PINS accepted the proposals for examination 26 September 2025.

Level of detail

1.2 The Council notes the recent changes to the Infrastructure Planning (Interested Parties and Miscellaneous Prescribed Provisions) Regulations 2015, which mean that Relevant Representations are now required to be "where practicable, the full particulars of the case". Because SCC expects to be invited to submit a Local Impact Report ("LIR") in due course, it should be noted that full technical details of the Council's case will necessarily follow in the LIR.

Local Policy

1.3 The Council recognises that, whilst the development of infrastructure to enable security of energy supply is supported in principle, there are still significant shortcomings within the submitted proposals which need to be addressed.

Need Case and Alternatives

1.4 In conjunction with Essex County Council and Norfolk County Council, the Council commissioned an independent report from Hiorns Smart Energy Networks to review the need for the National Grid Reinforcements in East Anglia being promoted by NGET **(Appendix A)**. That report was submitted to NGET in November 2023 in response to its non-statutory consultation. The report concluded that, having regard to the realities of when connection of new generation sources to the transmission network was likely to be required, an exceedance of current or committed transmission network capacity (including the Bramford to Twinstead Reinforcement which is currently underway) was not likely before 2035 (as opposed to the date of 2030 suggested by NGET). As a result, the report concluded that there was scope for further analysis of potential options, including a potential offshore HVDC link, and it could not be concluded that the NGET proposal was the best option. NGET responded to that report in April 2024 suggesting that it could not delay its reinforcement of the transmission network beyond 2030 without being in breach of its contractual and licence obligations. Whilst the Council notes that response, it is also the case that the Secretary of State is not a party to any of NGET's connection contracts or licence conditions and, notwithstanding that those matters may be material, they cannot be seen as over-riding when balancing the overall public interest. There is a process of reform of the system of connection arrangements, via Queue Management, currently underway and the Secretary of State is able

to take a holistic position looking strategically at how the transmission network can best be improved.

1.5 Whilst the Council recognises the principal need of grid reinforcement, it considers that it is premature for NGET to submit this DCO application until alternatives have been considered in full, and objects to the application because this work has not been undertaken. The Council would prefer further investigation of alternatives such as a coordinated offshore solution or High Voltage Direct Current undergrounding.

Undergrounding and Other Alternative Routes

1.6 NGET proposes to underground the cables in the sections under the Dedham Vale National Landscape. The Council supports this as a way of reducing the visual and landscape impact of the Norwich to Tilbury proposed development.

1.7 Whilst the proposed areas of undergrounding are supported, the Council is conscious of the concerns from local communities of the visual impact of the remaining sections of overhead lines.

1.8 The Council considers that other alternatives such as offshoring or undergrounding the entire length of the route between Norwich and Tilbury should be given further consideration particularly as the Council believes that the Norwich to Tilbury proposals are not required until the middle of the 2030s.

Cumulative Impacts

1.9 In terms of cumulative impacts these include the 400kV grid reinforcement proposals by NGET between Bramford and Twinstead, which would also connect at Bramford substation. This project (also a NSIP) was consented by the Secretary of State on the 12 September 2024 and is currently under construction. Bramford substation is already a focus for a number of energy related projects consented under the Town & Country Planning Act by Babergh & Mid Suffolk District Councils. Along the route there are also emerging proposals for additional solar farms and associated battery energy storage.

1.10 Further afield there are also cumulative impacts with other NSIP proposals including Sizewell C Nuclear Power Station for example with potential skills shortages.

Impacts by Service Area

2 Archaeology

2.1 Suffolk County Council Archaeological Service ("SCCAS") does not object in principle to the Proposed Development. However, without a full programme of archaeological, geoarchaeological, and palaeoenvironmental evaluation to inform a robust mitigation strategy, the scheme risks causing avoidable harm to the Historic Environment. This would be contrary to EN-1 section 5.9, which requires impacts (both direct and indirect) to be understood, and harm avoided or minimised through design and mitigation, with loss of archaeological assets preserved by record where justified.

2.2 Given the linear nature of the Proposed Development, which will traverse diverse archaeological landscapes of East Anglia (river terraces, clay plateaus, and valley floors), there is potential for remains and deposits of local to national significance. Establishing their significance requires evaluation (geophysical survey, trial trenching, coring, and deposit modelling) prior to finalising designs, as required by EN-1.

2.3 Responsibility for heritage matters is divided as follows:

i. Built heritage (designated and non-designated buildings, conservation areas): Babergh Mid Suffolk District Council ("BMSDC")

ii. Scheduled Monuments: Historic England

iii. Archaeology: Suffolk County Council Archaeological Service (SCCAS)

2.4 SCCAS has engaged positively with the Applicant and their consultants during pre-application and will continue constructive engagement throughout the Examination, including via the draft Development Consent Order ("dDCO"), Local Impact Report, Written Representations, and Statements of Common Ground.

Principal Issues and Risks

Incomplete Archaeological Evaluation

2.5 Archaeological evaluation (geophysical survey and trial trenching) has not been completed across all areas of development impact. Further work is required to establish archaeological potential and inform appropriate mitigation strategies, in line with HEAN 17 and CIfA standards. This should be secured through robust Requirement wording.

2.6 Investigations to date have identified multiple previously unrecorded sites of local and regional significance, requiring mitigation should consent be granted. This indicates a high likelihood of further unrecorded assets being identified

along the remainder of the route. Any remaining evaluation should therefore be undertaken at the earliest opportunity post-consent to ensure mitigation strategies can be developed and integrated into project programmes.

2.7 Provision must also be made to address any additional areas of significance identified during evaluation, including preservation in situ where remains of national importance are encountered.

Geoarchaeological and Palaeoenvironmental Assessment

2.8 The programme of geoarchaeological sleeved coring, deposit modelling, and palaeoenvironmental assessment to enable detailed stratigraphic analysis (e.g. pollen, diatoms, macrofossils) and scientific dating of buried sequences remains incomplete in areas where Quaternary deposits, alluvium, and peat may be affected (e.g. watercourse crossings). This work must be secured by robust Requirement wording and scheduled early enough to inform design and mitigation.

Mitigation Strategies

2.9 No archaeological mitigation has yet been undertaken. Mitigation will be secured through the Outline Archaeological Mitigation Strategy and Outline Written Scheme of Investigation ("AMS-OWSI"). This process document must set out the framework for producing Detailed Written Schemes of Investigation ("DWSI"), to be submitted to and approved by the Local Authority Archaeological Advisors ("LAAA") and the Local Planning Authority ("LPA") before works commence.

2.10 The submitted AMS-OWSI does not currently meet national standards or local guidance, nor does it secure an adequate level of assessment and mitigation as required under EN-1 and EN-5. SCCAS comments on the submitted version must be addressed before it can be considered acceptable.

2.11 Although the revised AMS-OWSI now includes methodologies for further assessment and mitigation, the proposed approaches remain inadequate. Additional field evaluation is required to inform appropriate mitigation strategies. The archaeological Requirement should therefore allow for amendment of the AMS-OWSI to reflect new discoveries.

2.12 Where remains are to be preserved in situ, whether due to significance or design constraints, they must be protected from damage during pre-commencement, construction, and operation. A strategy for their long-term protection must be incorporated into the mitigation framework, supported by a Historic Environment Management Plan ("HEMP") agreed with SCCAS to ensure appropriate management in perpetuity.

Draft DCO requirement

2.13 The draft Schedule 3 requirement for archaeology does not provide adequate protection for the Historic Environment. SCCAS will submit detailed comments and proposed wording at the Local Impact Report stage, setting out robust requirements for archaeology, geoarchaeology, and palaeoenvironmental matters to secure evaluation, mitigation, reporting, publication, and archiving in line with national and local guidance.

SCCAS request

2.14 To assist in resolving outstanding issues, SCCAS requests that the Applicant provide:

i. **Route-wide Evaluation Plan and Programme** – identifying locations of completed and proposed geophysical survey, trial trenching, geoarchaeological and palaeoenvironmental assessments across all areas of development impact.

ii. **An approved Archaeological Management Strategy and Outline Written Scheme of Investigation (AMS-OWSI)** – prepared in accordance with CIfA, Historic England, and local guidance, and in line with Local Authority Archaeological Advisor comments.

iii. **Geoarchaeological and Palaeoenvironmental Strategy** – defining key river valleys and sequences, with detailed sampling, dating and analytical methodologies to inform design and mitigation.

iv. **Draft OREAC/OCEMP** – setting out archaeological controls to appropriate standards.

2.15 SCCAS will provide detailed comments on the submitted documents at the Local Impact Report.

3 Ecology

3.1 In terms of Ecology and Biodiversity, the documents have been prepared to a good, professional standard by the Applicant. The scope and extent of the desk study and field surveys is considered to have resulted in a thorough and detailed baseline of data on which assessments can be accurately based. The methodologies used for collection of baseline information and assessment are considered suitable for the specific purpose of this proposal.

3.2 However, at the time of writing, the information provided within the Environmental Statement ("ES") and its appendices regarding field survey data and subsequent assessments is incomplete due to the outstanding 12.5% coverage of the land within the Order Limits. These data and assessment updates have been scheduled for publishing in November 2025. All comments within this document on Ecology and Biodiversity are therefore caveated in lieu of scrutiny of this additional information. This gap in information is acknowledged throughout the ES and its appendices and reasons for this delay have been given. Verbal feedback from the Applicant's team has indicated that no significant alterations to the Environmental Impact Assessment ("EIA") receptors for Ecology and Biodiversity are expected based on initial results from these works.

3.3 The proposals within the Order Limits would have no direct impact on any internationally designated sites. The assessment of potential impacts upon the Stour and Orwell Ramsar and Special Protection Area ("SPA") sites and proposed mitigation and precautions as detailed within the ES, Code of Construction Practice ("CoCP") and Landscape and Ecology Management Plan ("LEMP") adequately address any potential issues relating to the qualifying interest of the sites.

3.4 The proposals within the Order Limits would have no direct impact on any nationally designated sites. The assessment of potential impacts upon Middle Wood Site of Special Scientific Interest ("SSSI") and proposed mitigation and precautions as detailed within the ES, CoCP and LEMP adequately address any potential issues relating to significant accidental, incidental or indirect impacts on qualifying interest of the sites.

3.5 The scope and subsequent assessment of impacts on all locally designated wildlife sites and habitats within the assessment area but outside of the Order Limits are considered suitable for the proposed development.

3.6 The scope and subsequent assessment of impacts on all locally designated wildlife sites and habitats within the Order Limits are considered suitable for the proposed development. The proposed mitigation to mitigate for potential impacts within these areas are well defined and are likely to result in the

predicted negligible residual impacts providing the robustness of the CoCP and LEMP and the efficacy of the ECoW are sufficient to enable the appropriate procedures and task to be implemented effectively. We shall expect to be consulted and will make appropriate observations on any CoCP and LEMP.

3.7 Mitigation for permanent habitat loss via Biodiversity Net Gain ("BNG") areas, "Environmental Areas" and additional locations for tree planting etc. appears to be generally sufficient to provide replacement and potential gain. The Council's three for one replacement principle for trees must be followed within this process.

3.8 The mitigation required for replacement of "Important Hedgerows" however must be seen to take into account not only their intrinsic species and structural value but their value as functional corridors for other flora and fauna communities across the wider landscape. Therefore, wherever possible planting and replanting must take place in as close proximity to possible as the lengths lost and in such a way as to provide functional connectivity with remaining hedgerows in these areas.

3.9 The Council would like to reiterate that irreplaceable habitats (e.g. veteran trees) must always be fully protected and avoided wherever possible and the design of the scheme should go to extraordinary lengths to ensure this is the case.

3.10 The approach regarding INNS within the ES chapter refer to ensuring that no spread is caused by the proposals. It is the Council's view that rather than simple prevention of an offence through mitigation, ecological enhancement would be achievable by a commitment to eradicate INNS within the Order Limits when encountered, rather than just preventing spread.

3.11 The protected and notable fauna species surveys and assessments appear suitable to ascertain the baseline conditions for the site. Where protected species have been identified as receptors, the proposed mitigation, use of licenses and proposed implementation of the ECoW appears well designed to meet all legal, conservation and ecological requirements.

3.12 In regard to breeding and wintering birds, the Council requires clarification regarding the mitigation and compensation for permanent habitat loss. Whilst it is agreed that on the most part populations occurring within the Order Limits are of local value and displacement into surrounding habitat would be unlikely to result in significant impacts, if mitigation is considered necessary with regard to habitat replacement for breeding and/or wintering birds, this area should be a separate mitigation area and not considered to be covered by BNG areas. BNG is not designed or expected to provide mitigation for faunal species by purpose but rather to provide a gain to the habitat units of an area and therefore it's incidental benefits to faunal groups should not be considered when providing

mitigation for habitat loss on these groups. I.e. areas for replacement habitat should not also be used for BNG. If it is the case that no habitat placement is required to result in negligible impacts, this should be clear in the ES rather than suggesting BNG land will act as mitigation.

3.13 The Council welcomes the appointment of an Ecological Clerk of Works and considers this a critical role to deliver biodiversity mitigation, compensation, and enhancement, including Biodiversity Net Gain. The Council looks forward to supporting their work through liaison at the Ecology Working Group. Given the size and complexity of the site, the Council would like to ensure that sufficient resources are available for the ECoW role to be effectively carried out through all stages of the proposals. The hierarchy of responsibilities outlined within the LEMP indicates this will be the case but lacks specifics at this stage regarding the manpower and locations of ECoWs during the works and operation as required. Once these details are known, the Council would like to be able scrutinise this detail within the Ecology Working Group.

3.14 The Council welcomes the consideration of future potential impacts, specifically potential changes to habitat and faunal groups associated with the WaLOR project.

3.15 The long-term success of the BNG habitat will need to be guaranteed through a detailed HMMP or similar, not only stipulating the required creation and management to provide the 10%+ gain but also including contingency planning and monitoring to be able to identify any failures and facilitate replacements and or adaptations to management to ensure long term gain.

3.16 The Council would urge the Applicant to provide Biodiversity Awareness Training for construction workers, delivered by the Ecological Clerk of Works. This would help to ensure that workers are kept informed regarding what they may encounter, and how to deal with these situations appropriately.

3.17 The Council considers that the proposed five-year aftercare period for mitigation planting should be extended to ten years, particularly due to Suffolk's erratic weather patterns, especially in Spring.

3.18 Further, more detailed comments may be provided in the Local Impact Report in lieu of outstanding survey data, results and assessment.

4 Economy, Skills and Tourism

Workforce Demand and Skills Assessment

4.1 The ES recognises construction workforce needs but does not provide the granular modelling by project phase (civils, mechanical and electrical, commissioning) that SCC's Supplementary Guidance requires. This omission prevents accurate alignment with local training pipelines.

4.2 The Applicant assumes that only 10% of the construction workforce will be drawn from the Wider Study Area. This risks underestimating local labour capacity and opportunity, while also failing to model displacement effects from other NSIPs (Sizewell C, Sea Link, North Falls, Five Estuaries).

4.3 Without agreed, scenario-based modelling (low/medium/high local engagement), there is no robust basis to forecast impacts on transport, housing, or public services.

4.4 SCC requires the Applicant to work with the Regional Skills Coordination Function ("RSCF") to co-produce an evidence-based, phase-by-phase workforce model, consistent with SCC's Supplementary Guidance.

Cumulative Workforce Pressures

4.5 The ES does not sufficiently address cumulative competition for labour across Suffolk and the wider region.

4.6 Norwich to Tilbury will overlap temporally with Sizewell C, Sea Link, and multiple offshore wind projects. These projects will compete for scarce skills in project management, civils, and M&E trades.

4.7 SCC is concerned about displacement effects: diversion of skilled staff from local construction, education, health, and SME sectors, leading to delivery risks for essential services and local projects.

4.8 The Applicant must demonstrate how cumulative workforce demands have been considered and commit to coordinated regional workforce planning with SCC and other promoters.

Supply Chain Opportunities and Risks

4.9 The ES notes potential for supply chain benefits but lacks a scenario-based assessment of local procurement opportunities.

4.10 SCC's guidance requires promoters to distinguish hyper-local (district), local (county), and regional (East of England) supply chain opportunities, and to assess them under low/medium/high engagement scenarios. This has not been undertaken.

4.11 Without such modelling, there is no robust estimate of indirect or induced employment or Gross Value Added ("GVA").

4.12 There is also insufficient recognition of potential negative effects, including wage inflation, diversion of capacity from SMEs, and supply chain saturation due to overlapping NSIPs.

Governance and Delivery

4.13 SCC expects all major infrastructure promoters to agree governance arrangements for skills and supply chain delivery through the RSCF.

4.14 Norwich to Tilbury has not yet committed to such governance. Without this, there is no assurance that workforce and supply chain benefits will be realised or that adverse impacts will be mitigated.

4.15 SCC requires a formal commitment to:

i. Participate in the RSCF skills governance framework.

ii. Participate in the Major Infrastructure Forum

iii. Co-fund or support targeted skills interventions linked to project phases.

iv. Work with SCC to design monitoring frameworks to evidence outcomes.

5 Flood and Water Environment

5.1 Suffolk County Council, as the Lead Local Flood Authority ("LLFA") has several matters that need to be agreed prior to agreeing the statement of common grounds. These include, but are not limited to: -

i. FRA to be updated to included latest publish national flood maps.

ii. ES includes all the current legislation & guidance.

iii. Ensure that Chapter 12 (Hydrology, Land Drainage and Flood Risk) of the ES has been updated with desktop studies, assumptions etc.

iv. LLFA will require surface water drainage to be in accordance with the National standards for Sustainable Drainage Systems ("SuDs") and the SCC LLFA local guidance.

v. The LLFA considers that temporary drainage for construction shall be provided for approval in the form of a construction surface water management plan.

vi. LLFA reserves its position regarding the Protective Provisions for Section 23 of the Land Drainage Act and are in communication with the other Local Flood Authorities and Internal Drainage Boards to ensure consistency and consensus amongst all parties.

6 Highways

6.1 Comments herein are based on partial sight of the documentation at the time of writing and additional matters may be raised once all information has been reviewed.

6.2 As a Local Highway Authority ("LHA"), the Council is concerned about the impact of the extended working hours (including Sundays and Bank Holidays) on road users and local communities and propose typical working hours of Monday-Friday 0700-1900 and Saturday 0800-1300. This may be exacerbated in areas subject to significant seasonal fluctuation such as agriculture or tourism.

6.3 However, the DCO and supporting management plans should be sufficiently flexible to allow for approval of highway works outside the stated working hours where for example deemed necessary due to restrictions on the highway network to avoid excessive delays for roadworks.

Scoping

6.4 Whilst SCC accepts that most transport impacts for the operational phase are scoped out it considers that the AIL operational movements should be included with assessment. This is due to concerns about the resilience of the routes, for example being compromised by weight or other limits being placed on the network, together with the impacts of any temporary measures to overcome these. SCC accepts that inclusion of improvements to the Lorraine Way / Bullen Lane junction is a move towards this.

Draft Development Consent Order (dDCO) / OCTMP

Pre-commencement works

6.5 It is understood the dDCO includes construction of the temporary accesses within the definition of pre-commencement whilst the OCTMP states it will be inclusive of these works. This places a tension between the OCTMP commitment to use of agreed site access and haul roads and that construction of the haul road will be post commencement.

Road Closures and Traffic Regulation Orders

6.6 Careful programming of any road closures is required so that they do not coincide and cause unnecessary delays or confusion to road users. SCC has yet to be provided with details to review.

Protection for the Highway Authority

6.7 Disapplication of parts of the NRSWA (the 1991 act) should not fetter LHA in managing highway network (co-ordination), recovering reasonable costs and avoidance of long-term maintenance costs.

6.8 The undertaker should maintain temporary works for duration (not 12 months).

6.9 SCC will seek protective provisions or similar agreements to protect the safety of those using the public highway and local rate payers incurring costs resulting from this project and its long-term impacts.

Management Plans

6.10 As the Outline Construction Traffic Management Plan will be applicable to the pre-commencement works (as described in section 1.8.1) the document will need to be robust enough to cover these.

6.11 The applicant will need to retain overall control of the Construction Traffic Management Plan ("CTMP") particularly if multiple contractors are responsible for the roles as occurs in other similar projects.

6.12 SCC considers it would be appropriate for the Secretary of State to control numbers and routes of Heavy Goods Vehicles ("HGV") during the construction period as recommended in 5.14.14 of EN-1 Overarching National Policy Statement for Energy.

Transport Impacts of Construction

Working Hours

6.13 As an LHA, the Council is concerned about the impact of the extended working hours (including Sundays and Bank Holidays, as per section 2.3) on roads used for recreational purposes and the uninterrupted impacts on local communities.

Abnormal Indivisible Loads (AILs)

6.14 This project appears to be largely proposing a road only freight strategy with the exception of Abnormal Indivisible Loads ("AIL") arriving by sea. SCC would welcome efforts to explore the practicality of aggregate deliveries through local ports and railheads.

6.15 SCC will require more than 72 hours' notice of AIL movements taking place outside of the core hours as otherwise delays may occur if loads cannot safely pass over weaker structure. Early engagement on all AIL movements is essential and lack of engagement may result in movements being delayed.

Highway Access Routes

6.16 The estimate numbers of HGVs are similar to other energy projects (EA1(N), Bramford to Twinstead). This volume of movements will have negative impact for the highway network in the construction period, most noticeable, but not exclusively, on minor roads where existing HGV use is low.

6.17 With the number of NSIPs and other large infrastructure projects in East Anglia significant pressure is being put on the available facilities for HGV drivers and this matter should be considered by the applicant.

6.18 The authority recognises there is balance between a haul road dominated access plan as in this application and the alternative of many local accesses. The former requires significant volumes of material for haul roads but avoids use of unsuitable local roads and in the case of Norwich to Tilbury the impacts in highway terms are lessened by the projects approach. Note that this may not be the best solution for other disciplines.

6.19 In highway terms, SCC supports the inclusion of a temporary haul road to bypass the village of Holton St Mary to reduce impacts through the village and avoid the tight bends and narrow roads on the B1070. Note that this may not be the best solution for other disciplines.

6.20 Terminology used in the application must be consistent. For example, on plans made available to SCC the term bellmouth is used throughout but elsewhere there is a discrimination between a site access (i.e. where construction traffic gains access to the site) and crossing point (where no access is permitted).

6.21 The council is concerned that some of the access routes proposed for construction traffic are not appropriate for the significant volumes of construction traffic and that the transport impacts have been underestimated. Specific locations are:

i. bends south of Rickinghall
ii. manoeuvrability under the railway bridge at Gislingham
iii. manoeuvrability at the crossroads at Finningham
iv. manoeuvrability under the railway bridge at Finningham
v. A1120 / Saxham Street junction (NW of Stowupland)
vi. Mill Lane, Stowmarket (sharp bends, tight)

Highway Mitigation

6.22 SCC have yet to review the details of the assessment. However, based on the information available SCCs specific concerns are:

i. safety, particularly at evolved junctions where delays joining the main carriageway may result in driver frustration.
ii. that the impacts on the Major Road Network ("MRN") are not considered, in the case of Suffolk specifically the road safety at the A140/A143, Stoke Ash junctions.

iii. there is a reliance on others providing mitigation at the A1071/B1113 e.g. Beagle Roundabout.

6.23 Potential improvements for passage of AILs has not been considered such as the A1120 Cedars Link and A140 Brockford Street Bridge which have restrictions on AIL use.

6.24 SCC would welcome discussion on whether certain areas of mitigation can be left in place rather than removed at the end of the project.

Cumulative Impact

6.25 SCC considers there is a third type of cumulative impact other than Intra-project and Inter-project effects. This is the repeated impact of multiple NSIPs or other major projects in a geographical location over a length of time, specifically repeated impacts on a community by repeated delivery of these schemes. An example would be a series of repeated closure of PRoW which would have a cumulative impact on amenity, severance and public health.

Environmental Impact

Air Quality

6.26 It is understood that the applicant has agreed within the standard mitigation that the applicant will ensure all on-road vehicles comply with the requirements of the London Low Emission Zone standards where applicable. This appears to be discretionary. SCC would expect a commitment for HGVs to comply with relevant emission standards e.g. EURO VI with appropriate monitoring and enforcement.

Construction Traffic

6.27 The assessment of driver and public transport delay should include the impacts of any significant diversions for roads closed during construction.

6.28 In terms of severance, fear and anxiety for pedestrians, cyclists and horse riders SCC remains concerned about the impacts, practically where PRoW are diverted onto adjacent roads, especially if these are also used by the project's construction traffic or workers.

7 Landscape

Key issues

7.1 SCC considers that the key issues for landscape and visual matters that will need to be addressed by the Applicant during examination are around mitigation and compensation, including consideration of change requests put forward by SCC and BMSDC in August 2024:

i. Proportionate, landscape scale compensation in the Waveney Valley and south of Diss following the decision not to provide undergrounding of the high voltage electricity line through the Waveney Valley

ii. Exploration of further options to mitigate the adverse impacts of the scheme around Mellis and Gislingham

iii. Opportunity for restoration of the historic landscape and for Biodiversity Net Gain at the poplar plantation west of Wickham Skeith

iv. Exploration of further options to mitigate the adverse impacts of the scheme in the Gipping Valley, through potential changes in alignment or undergrounding of the 400kV line, as well as further rationalisation of the existing 132kV and 33kV networks, south-east of Stowmarket in particular, as part of this project

v. Positive strategic placemaking around Bramford substation

vi. Effects of undergrounding on the Dedham Vale National Landscape

vii. Consideration of additional sections of Horizontal Directional Drilling ("HDD")

viii. Comprehensive mitigation and screen planting around Cable Sealing End ("CSE") compounds

7.2 **Technical and presentation issues**

7.3 Apart from the key issues with regards to the scheme itself, comments are offered at the end of this section with regards to technical and presentation issues, such as:

i. The importance of Good Design

ii. Approach

iii. Documentation of vegetation losses to establish a robust baseline,

iv. Visual assessment and its presentation

v. Reinstatement planting, Biodiversity Net Gain and landscape and visual mitigation,

vi. Full application of the Mitigation Hierarchy, including compensation for residual landscape and visual impacts

vii. Outline LEMP and other control documents

7.4 **The Waveney Valley and change requests south of Diss**

7.5 SCC considers the Waveney Valley to be a highly valued and highly sensitive landscape and has provided evidence to support this.[7] The Waveney Valley west of Diss is a shallow, intimate landscape consisting of a distinct valley floor and gentle valley sides. It is within an area that was previously designated as a Special Landscape Area in Mid Suffolk. In the South Norfolk Local Plan, it is recognised as a valued landscape.

7.6 While SCC acknowledges that the new proposed alignment of an overhead line, east of Wortham Ling SSSI and west of Roydon Fen Local Nature Reserve, would reduce adverse effects of the scheme to the west of Wortham Ling SSSI, on Listed Buildings and Bressingham Steam and Gardens, the proposed alignment is now crossing the Waveney Valley in a more remote, yet publicly accessible area, previously recognised as a Special Landscape Area.

7.7 The Angles Way is a 93-mile long-distance walking trail from Great Yarmouth to Thetford, following the river Waveney and the powerline would be expected to dominate the valley floor in this area. Additionally, the alignment proposed in the submission documents is, in landscape and visual terms, worse than that from the last consultation. Towers RG85 – RG87, would no longer run parallel to the Angles Way but cross it at a very shallow angle, exacerbating the PRoW users' experience of walking underneath the powerline. SCC considers that the alignment in this area should be reconsidered.

7.8 SCC considers that the significant adverse effects on landscape character and visual amenity in this area resulting from the proposal as currently presented, would be incapable of mitigation and severe in their level of harm.

7.9 SCC welcomes the extension to the proposed undergrounding of the existing 132kV powerline north to tower PKF35 (from PKF 28). However, SCC considers that this does not effectively rationalise the various powerlines to the west of Palgrave and that the undergrounding should have been extended further, to partially offset the impacts of the scheme.

7.10 SCC considers that the further rationalisation (undergrounding) of the existing 132kV powerline all the way to Diss substation or as near as possible to it (around PKF40, near Elm Vale Farm), would compensate to some degree for the adverse impacts of the proposals in this area by reducing the extent of the cumulative wire-scape to the south of Diss and in the Waveney Valley. This would also benefit several Listed properties in the area and PRoWs, which the 132kV line currently crosses.

7.11 SCC welcomes the change in alignment of the proposed 400kV line in order to protect the function and flight path of Brook Farm airstrip.

Exploration of further options to mitigate the adverse impacts of the scheme around Mellis and Gislingham

Mellis Common

7.12 SCC notes that the route is aligned to avoid crossing Mellis Common. However, the adverse visual effects on views from this Conservation Area remain moderate-major, therefore significant, according to the Applicant's own assessment (Doc Ref 7.12, Figure 7.12 F26_VP2.05c and e, Viewpoint 2.05: Mellis Road, Mellis Green). SCC considers that adverse effects might in fact be major and that the viewpoint assessment does not sufficiently address the perceptual qualities within the views from the common and its cultural heritage aspect. The sequential nature of the effects, when walking around the common, also do not appear to have not been addressed. SCC considers that changes to the design of the powerline should be considered to reduce the adverse effects on this area.

7.13 Currently there are four directional changes (at towers RG108, RG110, RG112, and RG117) to the north-east of Gislingham. SCC acknowledges that this alignment was probably chosen to avoid impacts on the setting of the moated site at Moatyard Plantation. However, this includes crossing Burgate Road twice, which is likely to result in significant adverse effects and disbenefits for the visual amenity along this route, which is used for recreation.

7.14 SCC (Landscape) considers, without prejudice, that there is potential to avoid the double crossing of Burgate Road by locating the powerline between Burgate Road to the west and the Moatyard Plantation to the east, while still respecting the setting of the moated site, (by starting the route change at RG 108). This would also largely avoid cutting through the Green Lane connecting Burgate Road and Mellis Road. In landscape and visual amenity terms this would be a significant improvement to the alignment. This would also help to reduce cumulative effects with other energy proposals (solar) in this area.

7.15 SCC (Landscape) further considers, without prejudice, that the concentration of energy infrastructure at Burgate Road could be further reduced by continuing the undergrounding of the UKPN line to PKF 14 and providing robust screen planting around the CSE compound.

Access points from Thornham Road/Major Lane, Gislingham

7.16 SCC (Landscape) welcomes that the proposed access to the construction corridor between Thornham Road/Major Lane and Coldham Lane has been removed from the scheme, avoiding thereby considerable adverse effects for

ecology and cultural heritage. According to the Arboricultural Impacts Plan (AIP) **[APP-322]** mature trees on either side, including one veteran tree, will now not be affected by the scheme. It is still now proposed to use a track south of Coldham Lane, but according to the AIP this would not affect any trees west of railway line. SCC (Landscape) further welcomes that the promoter now proposes to use the existing field path, just east of the railway embankment, along a route which minimises impacts on trees.

Opportunity for restoration of the historic landscape and for Biodiversity Net Gain (BNG) at Poplar Plantation west of Wickham Skeith

7.17 It is notable that the current alignment north of a visually prominent poplar plantation has been modified in comparison to earlier consultations. A tower that was previously placed in the middle of a probable roman site to the north of the plantation (https://heritage.suffolk.gov.uk/Monument/MSF7298) has been moved further west. The line still crosses the poplar plantation, but further west than the original crossing point.

7.18 The poplar plantation itself is in a small field, with the River Dove flowing through it. The field is bounded to the north and south by hedgerows with prominent and locally characteristic pollard oak trees, some of which show veteran characteristics, historically there were also Elm pollards present. During the 1960s the entire area underwent a comprehensive and extensive programme of field amalgamation. However, this small stream side enclosure remained intact, because the river was too large to be piped. The field could not be incorporated into the adjacent land to the north and was bounded to the south by Wickham Road. However, the landowner did take the opportunity to plant commercial hybrid poplars (Populus × canescens) onto the site, certainly with a view to selling these, possibly for match production. See Ordnance Survey mapping from 1903[9] and 1953[10].

7.19 Cutting through this relatively short-lived commercial plantation to make way for the overhead line is likely to increase the risk of wind-throw for the remaining trees, which are now comfortably middle-aged. This could create a serious risk for users of Wickham Road and the PRoW in and adjacent to the plantation.

7.20 Therefore, it is essential that these trees are carefully inspected to understand their current health and disease profile, and how they might react to the significant change in their environment by the removal and disturbance of part of the plantation. Depending on the findings of these inspections, and notwithstanding the visual prominence of this plantation, the most responsible approach to forestall the anticipated public safety / access and highway risks associated with the ageing and deterioration of this plantation may be to remove the entire plantation.

7.21 Should this be the case, SCC considers that this would present a unique opportunity for the Norwich Tilbury project to deliver significant historic landscape and biodiversity gains at this site.

7.22 The extensive work necessary to accommodate the new pylons would provide the opportunity for the site to be cleared, de-stumped, and for the previous historic landscape of the riverside meadow to be revealed.

7.23 SCC considers that throughout this process, it is essential for the final alignment to avoid impacts on the historic pollard trees in the site boundary, and those on the southern side of Wickham Road.

Public Rights of Way (PRoW) west of Wickham Skeith

7.24 The currently proposed alignment crosses Wickham Road at a point where two PRoW meet.

7.25 One PRoW leads westwards through the plantation to Eastlands Lane. This PRoW would be part of the restoration proposals, with the potential for additional voluntary open access, subject to landowner agreement.

7.26 The PRoW leading south-east from Wickham Road would, under the current proposals meet the power line again where it ends at a single-track lane to the south. Previous hedgerow restoration adjacent to the west of this PRoW, which would provide some screening from the close-range views of the power line along this route, and which would further improve over time, is put at risk by the current proposals. The adverse visual and amenity effect on the PRoW users will be increased by the current alignment. SCC considers that the alignment should be adjusted as it will be essential for public amenity to appropriately protect this hedge and its young hedgerow trees during the construction and operation phase of the scheme.

7.27 Exploration of further options to mitigate the adverse impacts of the scheme in the Gipping Valley, through potential changes in alignment or undergrounding of the 400kV line as well as further rationalisation of the existing 132kV and 33 kV networks, south-east of Stowmarket in particular, as part of this project.

Gipping Valley, Needham Market, Stowmarket to Bramford

7.28 SCC welcomes the proposed rationalisation and incorporation into the project of the existing 132kV line in this area but considers that there is a wider opportunity for a comprehensive scheme of undergrounding to include 132kV and 33kV infrastructure that would, subject to archaeological constraints, compensate for, through offsetting, the harm of the 400kv line, providing significant landscape and heritage benefits.

The Gipping Valley

7.29 SCC is disappointed that the Promotor has not taken on board the request to realign the 400kV line through the Gipping Valley from its current alignment further to the west and continues to have concerns about the proposed alignment through the wider Gipping Valley, and considers that the currently proposed alignment through the Gipping Valley requires re-configuration.

7.30 While the Gipping Valley has in many parts lost its remote, tranquil and undeveloped character, there are still pockets where field patterns and the spatial relationship between the valley sides and the valley floor are legible. In these areas, which were formerly identified as a Special Landscape Area, any development can have a profound visual impact, in particular new vertical elements within the valley side landscape, such as pylons.

7.31 The current alignment passes closely to the east of Creeting Hall, through one such area, crossing two small tributary valleys, that were formerly a Special Landscape Area and still exhibit the key characteristics and features such as small fields bordered by hedgerows and visually prominent trees and pockets of grasslands. Whereas, to the west of Creeting Hall, the land rises to an open plateau landscape which has been subject to a comprehensive programme of agricultural improvement and rationalisation of boundary features.

7.32 Therefore, SCC requests that the alignment is moved to the west of Creeting Hall by changing the alignment between RG161 and RG168. This would also result in reducing the adverse effects to the setting for the Grade II*Listed Creeting Hall.

7.33 SCC considers that the potential additional adverse effects on St Peter's Church (Grade I Listed), the war memorial (Grade II Listed) and Glebe House (Grade II Listed) and their settings that may result from this change request would need to be assessed.

Further rationalisation of the existing 132kV network generally, and south-east of Stowmarket in particular, as part of this project

7.34 The southern valley sides of the Gipping River retain a more intact landscape pattern and provide an important setting for the valley as well as for Stowmarket and Needham Market. Located on these southern slopes south of Stowmarket is the significant cultural heritage site of Badley Hall Farm and St Mary's Church cluster.

7.35 As the visual assessment (Doc ref 7.12, Figure: 7.12.F37_VP2.16a-e, Viewpoint 2.16: PRoW near Badley Hall Farm (Badley 21)) shows, the setting of this cluster is already impacted by two existing 132kV powerlines, passing the site to the east in close proximity. A further powerline crosses the approach from the B1113. With the addition of the proposed 400kV powerline the setting of this

cluster would be further significantly eroded. SCC considers that it would be appropriate and reasonable to compensate for the impacts of the new 400kV powerline through a comprehensive scheme of undergrounding of the 132kV and other lower voltage lines in this area.

7.36 Holyoak Farm and the settlement of Combs, which are currently sandwiched between two powerlines would be additional areas, where undergrounding or rationalisation of 132kV and 33kV powerlines would provide compensation for the adverse effects of the proposed 400kV powerline in form of wider landscape restoration.

Positive strategic placemaking around Bramford substation

Bramford substation

7.37 SCC is concerned that the cumulative effects around Bramford substation will result in a landscape dominated by pylons and electricity infrastructure, with a wide-ranging visual envelope. The Council considers it essential that the Applicant should focus on strategic positive placemaking around Bramford substation, to address the significant adverse effects on landscape character and visual amenity in this area, resulting from high voltage electricity transmission infrastructure converging. This should include rationalisation and/or undergrounding of power lines, as well as strategic planting and placemaking at a landscape scale. The cumulative effects of the proposed reinforcement of the Bramford to Twinstead line must also be addressed in this context and acknowledged on the Norwich to Tilbury plans and drawings as well as in the assessments.

Bramford to Dedham Vale National Landscape (NL) (formerly Area of Outstanding Natural Beauty (AONB))

7.38 SCC welcomes the proposed removal/rationalisation of existing 132kV overhead lines east of Bramford Substation which will be essential for the new alignment to be considered acceptable.

Effects of undergrounding on the Dedham Vale National Landscape (NL) (formerly Area of Outstanding Natural Beauty (AONB)

7.39 SCC welcomes, in principle, the proposals for undergrounding the proposed 400kV line within the Dedham Vale NL, and the efforts made by the applicant to avoid significant adverse effects on honeypot locations, such as Flatford.

7.40 However, the undergrounding may in itself result in significant adverse impacts and effects on the NL. These are likely to result from the requirement to navigate the complex and wooded valley slopes which define the vale, the need to cross the river Stour west of Stratford St Mary and navigate various waterbodies on the

valley floor, to cross the Black Brook in a further, parallel, tributary valley to the south, as well as the A12 near Langham.

7.41 The landscape within the NL is intrinsically sensitive and change can result in significant adverse effects on the immediate environment, as well as on longer distant views across the valley. The new proposed alignment is likely to result in significant adverse effects on longstanding and traditional landuse patterns and in the loss of mature trees, which form an integral part of the landscape.

7.42 SCC considers that the Promoter has a duty to minimise adverse effects on trees and hedge, and is concerned about some of the proposed access routes for example at the track heading east from West Lodge, northwest of Langham Hall (Project Design Section C, Page 31 of 63).

Wenham/Raydon

7.43 The Council welcomes the siting of the Cable End Sealing compounds so that they avoid significant harm to the Dedham Vale National Landscape and Raydon Airfield. Although in order to ensure that a conflict with Raydon Airfield is avoided, moving the Cable End Sealing Compounds further north to Lattice Tower JC026 in the vicinity of Wenham Thicks would be beneficial. It would also lessen the impacts upon and the Grade II Listed Buildings at Wenham Grange and Vauxhall. The Council is concerned that this request is not reflected in the current proposals.

7.44 As the location of the CSE compound remains unchanged under the current proposals, SCC (Landscape) welcomes that the cable corridor now is proposed to head east rather than west at the very beginning of the undergrounding from the CSE compound. This is likely to result in the loss of fewer field trees in this area. It would still need to be clarified, whether or not the CSE compound and the current arrangement are interfering with the landing strip of Raydon Airfield and any archaeological constraints.

The undesignated landscape south of the NL

7.45 SCC welcomes the proposal to continue the undergrounding to the EACN Substation, as this would reduce the adverse effects outside the NL, especially around Ardleigh, and on views from the NL.

Consideration of additional sections of Horizontal Directional Drilling (HDD)

7.46 SCC re-iterates that additional HDD (in addition to further HDD requests elsewhere) should be considered by the Applicant to minimise the adverse effects on landscape features that are integral to the NL and its setting.

Approach to Glebe Farm

7.47 Without prejudice to comments from Essex County Council and Colchester City Council, SCC (Landscape) notes the changes in alignment that have been made around Langham Hall and Glebe Farm, Langham (a Grade II listed Farmhouse and Barn). SCC welcomes that the cable corridor now avoids the approach to the farm and the young avenues leading up to it. However, SCC queries what the reasons are behind the placement of construction compound JC-CC03 (Doc Ref: 6.4.F1, Figure 4.1 – Project Description - Proposed Project Design Section C, Page 31 of 63), and whether this could be re-considered. It appears that the compound and attenuation basin, are isolated form the cable corridor and necessitating a temporary haul road of considerable length, which would still cut through the avenue of trees leading up to Glebe Farm and one other tree line resulting in the loss of at least five trees and a considerable length of hedgerow along Rectory Road (Doc Ref: 6.13.A6.F1, Figure A13.6.1 - Landscape and Visual Arboriculture Impact Plan, page 173 of 352). SCC considers that this may be avoided, if the compound was located to the between Rectory Road and Dedham Road and accessed from Dedham Road. It is acknowledged that this would result in additional adverse effects on the residential receptors along Dedham Road and would have to be weighed up carefully. However, these additional adverse effects would be limited to the construction period and would preserve the fabric of the landscape and the setting of Glebe Farm. While Glebe Hall is not situated within the National Landscape (NL), it is within 500m of the National Landscape to the west, north and east, and arguably part of the setting of the NL.

7.48 SCC welcomes that the woodland block near Springfield Farm is now to be avoided (Figure 4.1, Page 32).

7.49 From here, corridor leads on, east of Priory Cottage to the cross the Black Brook. Here a large, wooded area, including a veteran tree (T566), and large parts of an avenue of trees is earmarked for removal (Doc Ref: 6.13.A6.F1, Figure A13.6.1, Page 175 of 352. SCC (Landscape) considers that this area should be assessed in detail and that vegetation losses should be reduced/minimised through micro-siting and that HDD drilling should be considered to cross the Black Brook. In particular, every effort should be made to avoid harm to the veteran tree.

Comprehensive mitigation and screen planting around Cable Sealing End (CSE) compounds

7.50 SCC considers that the required Cable Sealing End compounds will need to be carefully sited and mitigated. As a design principle, Cable Sealing End compounds should be sited away from the more sensitive valley sides, on the

plateaux, where the potential for successful effective screening through strategic landscape scale planting may be achieved. Site selection for Cable Sealing End Compounds should further be guided by existing landscape features as well as built structures, which should be utilised to help embed the compounds into their surroundings.

The importance of Good Design

7.51 Paragraph 2.2.6 of the National Policy Statement for Electricity Networks Infrastructure (EN-5) states that 'locational constraints identified [...] do not, of course, exempt applicants from their duty to consider and balance the site-selection considerations set out below, much less the policies on good design and impact mitigation detailed in Sections 2.4-2.9.'

7.52 Paragraphs 2.2.8 -2.2.12 add:

i. '2.2.8 There will usually be a degree of flexibility in the location of the development's associated substations, and applicants should consider carefully their location, as well as their design.

ii. 2.2.9 In particular, the applicant should consider such characteristics as the local topography, the possibilities for screening of the infrastructure and/or other options to mitigate any impacts (See Section 2.10 below and Section 5.10 in EN-1).

iii. 2.2.10 As well as having duties under Section 9 of the Electricity Act 1989, (in relation to developing and maintaining an economical and efficient network), applicants must take into account Schedule 9 to the Electricity Act 1989, which places a duty on all transmission and distribution licence holders, in formulating proposals for new electricity networks infrastructure, to "have regard to the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features of special interest and of protecting sites, buildings, and objects of architectural, historic or archaeological interest; and ...do what [they] reasonably can, to mitigate any effect which the proposals would have on the natural beauty of the countryside or on any such flora, fauna, features, sites, buildings or objects."

iv. 2.2.11 Depending on the location of the proposed development, statutory duties under Section 85 of the Countryside and Rights of Way Act 2000, Section 11A of the National Parks and Access to the Countryside Act 1949 (as amended by Section 62 of the Environment Act 1995), and Section 17A of the Norfolk and Suffolk Broads Act 1988 may be relevant. Applicants should note amendments to each of these

provisions contained in Section 245 of the Levelling Up and Regeneration Act 2023.

v. 2.2.12 Transmission and distribution licence holders are also required under Schedule 9 to the Electricity Act 1989 to produce and publish a statement setting out how they propose to perform this duty generally.'

7.53 SCC considers that there is the opportunity to achieve a coherent landscape design approach for all Cable sealing End Compound sites and substations along the route, which should be explored by the Applicant.

7.54 This should be based on the Mitigation Hierarchy, as defined in the Glossary of Overarching National Policy Statement for Energy (EN-1), November 2023: The 'avoid, reduce, mitigate, compensate process that applicants need to go through to protect the environment and biodiversity.'

7.55 SCC therefore expects the Applicant to provide measures of compensation, where residual harm persists beyond measures to avoid, reduce and mitigate.

7.56 SCC would support the principle of a Design Champion (para 4.7.5, Overarching National Policy Statement for Energy (EN-1), November 2023) being engaged sufficiently early in the development of the project to oversee the design process, primarily within highly sensitive landscapes and around substation and Cable Sealing End Compounds, where positive placemaking will be essential. Further, there would be opportunities for the Design Champion to contribute to back-checking of various alignment alternatives and to the integration of the proposals into the landscape at the detailed design, construction, and operational stages of the project, including micro-siting of pylons. As this this work will need to straddle both engineering and landscape disciplines, two key leads may be required to work in close collaboration.

7.57 The skillset required of a Design Champion has not been clearly defined within the National Infrastructure Strategy. The Institution of Civil Engineers (ICE) and the National Infrastructure Commission Design Group (NICDG) have produced a useful working paper 'Defining and developing the design champion role', (August 2022), in this respect.

Approach

Rochdale Envelope

7.58 SCC welcomes the application of the Rochdale Envelope but considers that this needs to be remembered both at the DCO decision making stage and throughout the detailed design stage and in all control documents. The Rochdale Envelope, presenting a reasonable worst-case scenario, requires that micro-siting and rationalisation of construction options are integral in further

reducing harm to landscape features, landscape character and visual amenity post-consent.

Approach to rationalisation of the UK Power Networks 132kV pylons and of UKPN Low Voltage24/11 kV/33 kV and Openreach wood pole infrastructure

7.59 As the rationalisation and/or undergrounding of 132kV powerlines and of low voltage infrastructure along the reinforcement route from Norwich to Tilbury is expected to form an essential part of the mitigation and compensation for the scheme, SCC considers that further technical clarity and certainty are required, in particular, regarding how this work would be managed contractually, and how it would be controlled.

7.60 While the single trenches and working corridors are reduced in scale in comparison with the proposal's 400kV infrastructure SCC considers that a full assessment of impacts and effects, including vegetation loss and impact on archaeology will be required.

7.61 SCC further requests detailed information with regards to the Decommissioning Strategy for the 132kV power lines, for example, whether foundations will be removed to plough depth.

7.62 As it is proposed that this work is undertaken by third party statutory undertakers, and the works have to be implemented prior to commencement of construction of the Norwich to Tilbury Line (ES, Chapter 4 – Project Description, paragraph 4.8.88), SCC would welcome some information on the Applicant's cooperation and coordination with the third parties to achieve this, on programming and envisaged timelines for separate applications, and clarification as to whether these would TCPA applications.

Existing Baseline and Documentation of vegetation losses

Baseline data

7.63 SCC assumes that the Applicant is aware of tree and hedge data from Suffolk Biodiversity Information Service (SBIS) for mapping and data and the Joint Babergh and Mid Suffolk District Council Landscape Guidance Joint Babergh and Mid Suffolk District Council Landscape Guidance, 2015.

7.64 SCC considers that the proposals regarding the Bramford to Twinstead reinforcement should be included in plans, drawings and assessments as a likely part of the baseline.

Access Points, visibility splays, temporary access routes and work compounds

7.65 SCC (Landscape) considers that proposed temporary access points and routes, as well as compound areas, need to be carefully considered, fully assessed and ground-truthed with regards to existing vegetation (trees, hedges and woodland)

that may be affected. Visibility splays need to be fully considered in this context. SCC (Landscape) considers it essential that temporary works, in particular, are rationalised and co-ordinated with the purpose to avoid and minimise impacts on vegetation. Temporary haul roads should not lead along narrow, tree-lined or wooded tracks. The default vegetation management for visibility splays should be hedge coppicing, not hedge removal.

7.66 No compounds or laydown areas shall be located within the National Landscape, except HDD compounds.

7.67 Where conflicts with mature vegetation of landscape, amenity or screening value are identified, alternatives should be actively sought by the Applicant. SCC welcomes that one particularly concerning example at Gislingham (Coldham Lane), has been removed from the scheme, but there may be others (for example the proposed access from High Road, Diss, Norfolk, leading to the Grade II Listed Farmhouse at Grove Farm, although the AIA predicts that no trees would be affected by the proposals).

Hedgerows

7.68 It appears that the hedgerow surveys are currently incomplete. SCC would welcome clarification, why some potentially important hedgerows were not chosen for survey (Doc Ref: 6.8.A3 Figure A8.3.1 - Ecology and Biodiversity - Hedgerows Regulations Assessment, Page 1 of 24) and if/when the Applicant intends to complete the surveys.

7.69 There should be a clear listing of how many metres/ kilometres of hedge are permanently or temporarily lost, how many kilometres will be coppiced and how many kilometres of hedgerow will be retained through HDD. This should be done for each section of the scheme to inform the mitigation requirements in different areas and needs to include all enabling works, such as haul roads, site compounds, access points and all works associated with the removal and undergrounding of section of 132kV power lines and other required associated works that need to be undertaken by Third Parties the enable the Scheme.

7.70 Please note for Appendix 8.1 Habitat Report, Chapter 4 Results, paragraphs 4.2.13 ff:

i. Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006 lists Hedgerows as habitats of principal importance in England, as boundary and linear features.

ii. Any important hedgerows that are to be removed should be listed in a Schedule (Removal of Important Hedgerows) and identified on an appropriate plan.

iii. No work should be allowed to commence until full and complete hedgerow surveys have been carried out. This is necessary to inform the baseline against which Biodiversity Net Gain and the success of the LEMP need to be assessed and to agree replacements as part of the landscaping scheme.

7.71 SCC considers that important hedgerows for the purposes of this scheme should include:

i. Those meeting the Hedgerow Regulations (1997), including the criteria for Archaeology, History, Wildlife and Landscape as listed in Schedule 1 of the Regulations. If bat surveys identify 20 or more passes by bats the hedgerow should be considered important as a bat corridor.

ii. All the hedgerows where one or more passes of a barbastelle have been recorded - due to the rarity of the species and margin for error in recording. The Regulations do not appear to set out a basis for a threshold of 5 passes.

iii. Those that perform an important visual function.

7.72 To enable full understanding and assessment of locations of important hedges, and areas, where either Horizontal Directional Drilling (HDD) needs to be undertaken, or off-setting of residual impacts needs to be agreed, SCC would ask the Applicant to:

i. Append a column which identifies, by reference to the Hedgerow Regulations (1997), why hedgerows are considered important.

ii. Display the above hedges on a colour – coded map of an appropriate scale, distinguishing between the different criteria. This should also include the additional hedgerows covered by points 2 (bat passes) and 3 (visual importance) above.

iii. Confirm that the hedgerows in the DCO limits have been assessed against all the criteria in the hedgerow regulations, regarding, for example the presence of other protected species (Part II 6 (3)) and proximity to rights of way (Part II 8).

iv. Provide photos of each of the hedgerows which fall within the definition of 1, 2 and 3 above as and in accordance with point C. This will provide a reference for the baseline.

v. Confirm which hedgerows the Applicant is proposing to HDD.

Trees

7.73 SCC welcomes the Arboricultural Impact Assessment (AIA) and Tree Survey in accordance with BS 5837:2012 Trees in relation to design, demolition and

construction. This data should be used to inform the detailed design stage and micro-siting of all works, to further reduce impacts on trees, in particular irreplaceable habitats, such as veteran trees.

7.74 For the detailed design stage, there should be a clear, revised record and audit of how many trees are permanently or temporarily lost, how many need to be pruned or coppiced (please define these terms) and how many would be retained. This needs to be done for each section/stage of the scheme to inform the mitigation requirements in different areas and needs to include all enabling works, such as haul roads, site compounds, access points and all works associated with the removal and undergrounding of section of 132kV power lines and other required associated works that need to be undertaken by Third Parties the enable the Scheme.

7.75 No works should be allowed to commence until a full Arboricultural Impact Assessment (including Tree Survey and Tree Protection Plan) and an Arboricultural Method Statement, (including location specific special construction method statements, where works are to be carried out within rootzones of trees that are to be retained) in accordance with BS 5837:2012 are submitted to and agreed with the relevant LPA in writing. SCC considers that it is essential that this is secured in the DCO and welcomes that this is addressed in the Outline LEMP.

7.76 No article in the DCO should authorise any works to any tree subject to a tree preservation order. Such works, if demonstrated to be unavoidable, should be agreed with the relevant LPA on a case-to-case basis so that appropriate compensation can be agreed and secured.

7.77 The trees that are being lost should be appropriately evaluated by using an appropriate asset-based tree valuation system which calculates the replacement value of each tree and the benefits it provides in terms of carbon sequestration, carbon storage, air pollution removal and rainwater retention. This is to ensure that compensation measures are met for any replacement planting for the loss of those ecosystem services. SCC usually considers that any tree lost to the scheme needs to be replaced with three replacement trees.

Visual assessment and its presentation

Viewpoints

7.78 SCC welcomes that through desk top study, site work and stakeholder engagement the number of viewpoints was increased from the original 89 to 206, which does appear to be a more appropriate ratio when applied over the 184km of the project, although this still only translates to just over one viewpoint per km, and inevitably leaves considerable gaps. (In comparison, National Grid's Bramford to Twinstead project had an average of 5.3 viewpoints per km.)

7.79 SCC notes that, within Suffolk, there appear to be only two viewpoints outside the 3km study area (VP3.20 photomontage and VP3.29 baseline photograph only) and that none were considered at a greater distance of up to 5 km from the scheme. SCC considers that there is potential for significant visual effects beyond the 3 km study area, for example where there are particularly sensitive visual receptors and where topography allows more far-reaching views, and that there may also be additional viewpoints closer to the scheme that should have been assessed.

Viewpoint map

7.80 It would have been helpful if Figure 13.7 - Landscape and Visual -Visual Receptors and Viewpoints, (Doc Ref 6.13.F7) could have been presented using Figure 4.1 – Project Description - Proposed Project Design (Doc Ref: 6.4.F1) as a base and indicate the viewing direction with a cone. The location maps on the viewpoints assessment pages alleviate the coarseness of the viewpoint map to some extent; however, the scale of the viewpoint map suggests a density in viewpoints that is not matched in the field.

Arrangement and presentation of visualisations

7.81 SCC welcomes the revised layout of the viewpoint assessment pages with clear location maps with recognizable reference points, and bigger and clearer viewpoint numbers, title and viewing directions.

7.82 However, the sequence of the viewpoint assessment pages remains confusing, as there is no consistent sequence from north to south along the alignment. It appears that viewpoints that were added later are presented later in the document, and therefore fall outside the geographical sequence, which makes reviewing more difficult.

Reinstatement and Biodiversity Net Gain (BNG) and landscape and visual mitigation

7.83 SCC (Landscape) welcomes the Applicant's commitment to a 10% minimum BNG, recognising that this is in fulfilment of the obligations with their regulator Ofgem.

7.84 The pre-requisite to achieving BNG is successful reinstatement planting.

7.85 With the current, justified focus on BNG and reinstatement, the third element of successful mitigation is in danger of being overlooked and ignored: planting for mitigating the landscape and visual effects of the development.

7.86 While reinstatement planting would form the basis for landscape and visual mitigation planting, and BNG measures could also achieve landscape and visual mitigation, the rationale and aims for this third element are distinct from the two others: Landscape mitigation seeks to conserve and enhance landscape features and the landscape character impacted by the development,

while Biodiversity Net Gain is linked to the habitats impacted. Visual mitigation is required so that the visual effects of development are minimised, by helping to embed the development into the surrounding landscape with effective screen planting, where possible.

7.87 While the three types of planting are interlinked, the Council does not consider that landscape and visual mitigation requirements are by default satisfied, once reinstatement planting and BNG goals are achieved. The Council expects that full consideration is given to landscape and visual mitigation and, if required, to compensation measures. The Council considers that landscape and visual mitigation planting is offers additional opportunities to the overall BNG being achieved.

7.88 SCC welcomes the indicative landscape design around the new/ extended National Grid permanent assets (i.e. CSE compounds and substations) (OLEMP Appendix D: Outline Landscape Proposals), designed to provide landscape and visual mitigation while also offering ecological value. SCC will provide further comments on these designs in the Local Impact Report.

7.89 SCC considers that the planting around these new assets should be managed and maintained for 30 years or for the life-span of the assets, whichever is longer.

Full application of the Mitigation Hierarchy, including compensation for residual landscape and visual impacts

Mitigation

7.90 SCC has concerns with regards to the terminology regarding different types of mitigation. While SCC agrees with the definition given of embedded mitigation (paragraph 13.6.2), the council considers that the definition for standard mitigation (paragraph 13.6.5) is insufficient, and that for additional mitigation (paragraph 13.6.8) unhelpful and inappropriate.

7.91 Any planting for Landscape and Visual Mitigation (i.e. which is proposed in addition to reinstatement planting for vegetation that was removed to enable the scheme) with the purpose of screening or filtering views of CSE compounds and/or other elements of the scheme, is considered by SCC to be required and necessary to mitigate impacts and to minimise effects on visual receptors (application of the mitigation hierarchy), and to make the scheme acceptable in landscape terms. It stands side by side with reinstatement planting and planting for Biodiversity Net Gain and cannot be considered 'additional' or 'above and beyond' (paragraph 13.6.8).

7.92 Paragraphs 13.6.8 and 13.6.9 appear to contradict each other, the former stating the LVIA has identified a requirement for further mitigation, while the latter

negates this. SCC disagrees with paragraph 13.6.9 and considers that further mitigation in form of tree and hedge planting is required for this project.

Compensation

7.93 Despite the assessment of long-term significant adverse impacts and effects on landscape character and long-term significant adverse effects on visual receptor groups including residents, road users and recreational receptors are likely, the Applicant does not sufficiently explore the fourth column of the Mitigation Hierarchy, Compensation, in the landscape chapter.

7.94 SCC considers that residual adverse impacts, that cannot be mitigated, will need to be compensated, by means of wider landscape restoration and a coordinated Landscape, Ecology, Archaeology, and Rights of Way Masterplan, in particular, but not exclusively, in areas which are disproportionately affected by energy infrastructure, such as Bramford, Burstall, and the Gipping Valley.

7.95 In Table 13.1 *Engagement undertaken relevant to Landscape and Visual*, the Applicant considers offsite tree planting to be compensation. SCC welcomes offsite tree planting as it would contribute to the enhancement of the landscape character and visual amenity. It will be essential to agree an effective mechanism to mitigate/compensate for tree loss, both under the line and in the wider corridor, and a comprehensive programme of planting on a 3:1 ratio should form the starting point. The Council acknowledges that it would be difficult to plant such quantities of trees within the DCO boundary.

7.96 The Council considers that it will need to be clarified and quantified, to which extent offsite tree planting will be counted towards replacement planting, necessary as a foundation to achieve BNG targets, and how much will be further compensation for the adverse effects of the scheme that cannot be mitigated.

7.97 The offsite tree planting and wider landscape enhancement is expected to be secured outside the DCO boundary via a Section106 agreement.

Outline LEMP and other control documents

7.98 SCC broadly welcomes the Outline LEMP and will provide detailed comments on it and on other control documents in the Local Impact Report.

7.99 SCC welcomes that the working swathe, will be reduced to 12m, when a hedgerow is being crossed (paragraph 8.3.2, Outline LEMP Doc Ref 7.4). It should also be anchored in the OLEMP, as well as the CoCP and REAC that the default for vegetation management for temporary visibility splays will be coppicing rather than removal of the hedgerows.

7.100 SCC welcomes that and Arboricultural Impact Assessment and Plan has been provided at submission, which greatly aids the understanding of the effects of the proposals oh high category trees. It is further welcome that an Arboricultural

Method Statement (AMS) (including Tree Protection Plan) will be produced following detailed design and agreed with the relevant LPAs prior to construction activity commencing.

7.101 SCC will comment in more detail on Tree Protection in the LIR.

7.102 SCC welcomes that the Applicant has agreed to a five-year adaptive aftercare period for sites with reinstated woodland, trees and hedgerows. This means, planting will need to reach agreed growth and survival rates in order to be moved forward into the next year of agreed aftercare. This may result in different duration of aftercare periods for different types of planting (hedge/scrub/trees/ woodland) or different areas within the scheme.

7.103 The rationale behind this is as follows: If the reinstatement planting cannot achieve a return to the baseline conditions which existed prior to the development, whether this is because certain elements of habitats cannot be reinstated (such as trees) or because implemented reinstatement planting has failed during the aftercare period, this will impact on, and reduce the percentage of BNG that is achieved elsewhere on site. In other words, more biodiversity measures need then to be implemented to achieve 10% BNG.

7.104 The Council therefore considers that the aftercare for reinstatement planting needs to be linked to considerations about BNG. This may result in extended aftercares periods, if successful establishment of the reinstatement planting is not achieved within five years. The success, or lack thereof, of the reinstatement planting needs to be considered, when the success of the biodiversity enhancement measures is evaluated, and management measures are reconsidered.

7.105 Any tree or shrub that is removed, dies, or becomes seriously damaged or diseased during the aftercare period, must be replaced with suitable replacement plants or trees to the specification agreed in writing with the relevant LPA during the next available planting season (ideally the following November/December).

7.106 The proposals should allow for the costs of annual post monitoring inspections by and reports to the LPAs for the life span of the project or at least for the first 15 years, and longer if mitigation goals are not being achieved (dynamic aftercare).

7.107 The baseline to monitor against is the pre-construction baseline data.

8 Legal

8.1 **Article 2(1) (interpretation)** – the definition of "maintain" includes the replacement of any part of the authorised development and the replacement of the whole of it. The Council would like to know to what extent "replacement" has been assessed and where this is considered in the Environmental Statement. The Council would like to know to what extent the definition of "maintain" duplicates the applicant's PD rights.

8.2 **Article 2(1) (interpretation)** – the definition of "permit scheme" means a permit scheme in force on the date on which the Order is made. The Council consider the definition should allow for the situation where a permit scheme is updated after the date on which the Order is made. It would be strange for an extant permit scheme to control certain works in Suffolk and for a historic permit scheme to control others.

8.3 **Article 2(1) (interpretation)** – the definition of "pre-commencement operations" is wide-ranging and goes well beyond the Explanatory Memorandum's ("EM") description of these works as "de minimis or [having] minimal potential for adverse impacts" (paragraph 3.6.6) [APP-057]. The Council would like to know –

i. how each operation will be controlled (especially the "set up works associated with the establishment of construction compounds and temporary laydown areas" and "temporary accesses"),

ii. which buildings are proposed to be demolished as part of the "pre-commencement operations",

iii. whether land used for temporary works will be reinstated to a condition suitable for its former use and, if not, why not,

iv. the relevant paragraphs of the ES which deal with the assessment of these works. (This request is made in the context of paragraph 3.6.7 of the EM which states: "The Environmental Statement does not indicate that the excluded works and operations would be likely to have significant environmental effects. For this reason, National Grid considers that the exclusion of these works and operations from the definition is appropriate".) [APP-057].

8.4 **Article 3(6) (development consent etc. granted by the Order)** – this provision states that the development consent granted by the Order allows works (including demolition of buildings or other structures) within the Order limits to the extent they "relate to, are required by or are incidental to the carrying out of the authorised development". This is a broad power which does not appear to have been included in the precedents cited by the applicant in paragraph 1.2.5 of the EM

[APP-057]. It will be remembered that paragraph 1.2 of Advice Note Fifteen: drafting Development Consent Orders states: "A thorough justification should be provided in the Explanatory Memorandum for every Article and Requirement, explaining why the inclusion of the power is appropriate in the specific case. The extent of justification should be proportionate to the degree of novelty and/ or controversy in relation to the inclusion of that particular power". [Emphasis added]. Contrary to the advice, here, no justification for this provision is included in the EM (see paragraph 1.2.5 of the EM [APP-057]). To allow the Council to understand the need for this provision, the Council requests that the next draft of the EM is updated to include justification for this provision. It would also be helpful to know which buildings within the Council's administrative are proposed to be demolished.

8.5 **Article 7 (consent to transfer benefit of Order)** – this article allows any or all of the benefits of the provision of the Order to be transferred, with the consent of the Secretary of State, to others. In the event of such a transfer, owing to its role in determining consents under the dDCO, the Council requests that it is notified as soon as reasonably practicable.

8.6 **Article 10(2) (planning permission)** – this provides that any planning permissions or DCO which conflict with the authorised development can proceed without the risk of enforcement action being taken notwithstanding any incompatibility between the Project and the development authorised under that planning permission or DCO. It would be helpful if the applicant would confirm whether it has any specific planning permission or DCO in mind.

8.7 **Article 11(1) (street works)** – absent a suitable highways side agreement or protective provisions to protect the Council's highways interests, the Council considers art.11(1) should be subject to the street authority's consent.

8.8 The same point applies in respect of the following articles:14(1) (power to alter layout, etc. of streets), 15(1) (permanent stopping up of streets and public rights of way), and 16(1)(a) (temporary closure of streets and public rights of way).

8.9 **Article 11(2) (street works)** – Under several of the draft DCO's articles (including article 11(2)), the Council is required to grant approval for certain street works, and provision is made to say that approval must not be "unreasonably withheld or delayed" and there is also a provision that it is deemed to be given after 28 days. In several cases this appears to be unprecedented in DCOs or not well precedented.

8.10 The Council will be receiving considerable numbers of requests for approval and will ensure that they are dealt with as quickly as possible. With the deeming provisions included there is no need to also say that the approvals must not be "unreasonably withheld or delayed".

8.11 The Council request that the same amendment is made to the following articles: 14(4) (power to alter layout, etc. of streets), 15(2)(a) and (b) (permanent stopping up of streets and public rights of way), 16(2), 16(5)(b) (temporary closure of streets and public rights of way), 17(1)(b) (access to works), 20(3), 20(4)(a) (discharge of water), 49(2) (traffic regulation), 55(1) (procedure regarding certain approvals etc.).

8.12 **Article 11(3) (street works)** – provides that if a street authority fails to respond to an application for consent within 28 days of the application being made, that street authority is deemed to have given its consent.

8.13 While the Council will ensure that any application for consent will be dealt with as quickly as possible, it will be remembered that the Council will be receiving a considerable number of requests for approval across several nationally significant infrastructure projects which have already been consented (For example: East Anglia ONE North Offshore Wind Farm Order 2022 (SI 2022/432), East Anglia TWO Offshore Wind Farm Order 2022 (SI 2022/433), Sizewell C (Nuclear Generating Station) Order 2022 (SI 2022/853), Sunnica Energy Farm Order 2024 (SI 2024/802), and National Grid (Bramford to Twinstead Reinforcement) Order 2024 (SI 2024 / 958). Forthcoming DCO applications for which the Council will be a host authority include National Grid Electricity Transmission's Sea Link application and National Grid Interconnector Holdings Limited's LionLink Interconnector application). A 28-day decision-making period in this context is unrealistic and potentially detrimental to the effective consideration of applications.

8.14 Given the volume of work which will arise from the number of NSIPs being delivered in Suffolk, the Council considers 28 days is too short and requests that it is replaced with 56 days. The Council also considers that this period should be paused if the highway authority considers that additional information is reasonably required to make a decision.

8.15 The Council requests that 28 days is also replaced with 56 days in the following provisions: 14(5) (power to alter layout, etc. of streets); 16(8) (temporary closure of streets and public rights of way); 17(2) (access to works); 20(9) (discharge of water); 22(8) (authority to survey and investigate land), 49(10) (traffic regulation) and 50(5) (felling or lopping).

8.16 A similar point applies in respect of paragraph 1(1) (applications made under requirements) of Schedule 4 (discharge of requirements), which is mentioned below.

8.17 **Article 12(2)(d) (application of the permit schemes)** – this provision prohibits "the relevant street authority" from permitting certain works at a certain time but then says "local highway authority" may grant a permit for immediate works.

Should those references be to the same body? If not, why not? Also, the term "local highway authority" is not used elsewhere in the dDCO (save in a single definition) and is not a defined term itself. In articles 12(3), (4) and (5) "the relevant highway authority" referred to and the Council wonders whether that term should also be used (whether once or twice) in article 12(2)(d). The Council would welcome the applicant's explanation on this drafting point.

8.18 **Article 13(3) and (4) (application of the 1991 Act)** – The Council is concerned by the extent of disapplication proposed by article 13(3) and (4).

8.19 **Article 16 (temporary closure of streets and public rights of way)** – by article 16(1), the undertaker may, "for any reasonable time" divert traffic from the street or public right of way; and prevent all persons from passing along the street or PROW. The Council would welcome more information as to what "a reasonable time" might be.

8.20 In addition, the Council considers that article 16 should provide that any temporary diversion specified in column (4) of Part 1 or Part 3 of Schedule 8 must be open for use, and in the case of a street, must be completed to the reasonable satisfaction of the street authority, before the corresponding street or public right of way in temporarily stopped up, altered or diverted.

8.21 **Article 16(5)(b) (temporary closure of streets and public rights of way)** – this provision refers to the street authority's ability to attach reasonable conditions to a certain consent. Other provisions which state conditions may be added to a consent include articles 20(3) (discharge of water) and 42(3)(a) (crown rights); however, other provisions which provide for consent are silent as to whether conditions can be added. Since there is no restriction on the imposition of conditions, the Council considers that can be added; however, for consistency and the avoidance of doubt, the Council considers each provision which provides for the grant of consent or approval should state explicitly that conditions may be attached to such consent or approval e.g. the following articles: 11(2) (street works), 14(4) (power to alter layout, etc. of streets), 16(2) (temporary closure of streets and public rights of way), 17(1)(b) (access to works), 22(5) (authority to survey and investigate the land), 49(2) (traffic regulation), and 50(4) (felling or lopping).

8.22 **Article 34(1) (time limit for exercise of authority to acquire land and rights compulsorily)** – the Council considers allowing the applicant seven years to issue 'notices to treat' or a 'general vesting declaration' to acquire the land or rights that is subject to the power of compulsory purchase is excessive. Five years is the usual position and the Council considers the usual position should be adopted here, especially since (per article 34(4)) that period will not be eaten into by any legal challenge to the decision to grant development consent for the project.

8.23 **Article 49(5) (traffic regulation)** – this provision refers to the "instrument" made under paragraph (1), (2) or (3) of article 49. The Council considers it would be helpful if a copy of the made instrument were made available by the undertaker and sent to the Council. In the light of this, the Council would suggest a new article 49(13) to provide as follows –

i. "(13) A copy of the instrument referred to in paragraph (5) must be held at the registered office address of the undertaker for inspection during normal working hours and, as soon as reasonably practicable after being made, a copy must be served on the highway authority".

8.24 **Article 50 (felling or lopping)** – The Council is concerned that important hedgerows under the Hedgerow Regulations 1997 are included in this Article without any provision for special consideration to minimise impacts, for example by using HDD or coppicing and temporary storage prior to replanting, instead of removal. In any event, the Council notes the following from Advice Note Fifteen: drafting Development Consent Orders: "...the Article should include a Schedule and a plan to specifically identify the hedgerows to be removed (whether in whole or in part). This will allow the question of their removal to be examined in detail. Alternatively, the Article within the DCO could be drafted to include powers for general removal of hedgerows (if they cannot be specifically identified) but this must be subject to the later consent of the local authority" (paragraph 22.1).

8.25 Regarding "a plan to specifically identify the hedgerows to be removed", while the applicant has prepared "trees and hedgerows to be removed and/or managed plans" it is not clear those plans apply to all hedgerows or important hedgerows to be removed and the Council would welcome clarification on this point.

8.26 Regarding consent, only trees "within or overhanging the extent of the public highway" (and not included in the "trees and hedgerows to be removed and/or managed plans") are subject to consent. Depending on the confirmation received in respect of the point mentioned above, the Council might seek the amendment of this article to include a more general consent provision.

8.27 **Schedule 3 (requirements) (paragraph 1 (interpretation))** – paragraph 1(1) defines "discharging authority" as "the body responsible for giving any consent, agreement or approval required by a requirement included in this Order ...". Requirement 4 (construction management plans) provides for the involvement of the "other discharging authority" in certain activities; however, it is not clear who that authority is. Requirements are the DCO equivalent of planning conditions (Section 120(2)(a) Planning Act 2008) and one of the six tests for conditions is precision (Circular 11/95: Use of conditions in planning permission (paragraph 14). The Council consider the inclusion of "discharging authority" in

requirement 4 creates imprecision and requests that the applicant recasts requirement 4 so that the body they want to be involved in requirement 4 is named.

8.28 Schedule 3 (requirements) (paragraph 1 (interpretation)) – paragraph 1(4) needs to be amended as follows –

i. "Where an approval or agreement is required under the terms of any requirement or a document referred to in a requirement, or any requirement specifies "unless otherwise approved" or "unless otherwise agreed" by the relevant highway authority or the relevant planning authority, such approval or agreement may only be given where it has been demonstrated to the satisfaction of the relevant highway authority or the relevant planning authority that the subject matter of the approval or agreement sought will not give rise to any materially new or materially different environmental effects from those identified in the Environmental Statement".

8.29 This amendment is consistent with the drafting of the equivalent paragraph of the National Grid (Bramford to Twinstead Reinforcement) Order 2024 (SI 2024/958).

8.30 **Schedule 3 (requirements) (requirement 3(1) (stages of authorised development))** – requires that a written notice setting out the anticipated programme for the carrying out of pre-commencement operations must be given to the relevant planning authority no less than seven days prior to the date on which those pre-commencement operations are first carried out. This is included in the equivalent requirement of the National Grid (Bramford to Twinstead Reinforcement) Order 2024 (SI 2024/958). The Council's experience of discharging requirements under that Order has shown the time period to be too short. In the light of this, the Council requests that the 7-day period is increased to 35 days.

8.31 **Schedule 3 (requirements) (requirement 3(2) and (3) (stages of authorised development))** – provides for notice of the commencement and completion of each stage to be given to the relevant planning authority within 28 days of the event occurring. The Council does not understand why it should take a month for this information to be provided and considers it should be provided in 5 working days.

8.32 **Schedule 3 (requirements) (requirement 6(2) (archaeology))** – this provision names "the relevant planning authority" as the discharging authority. In Suffolk, the Council should be the discharging authority because archaeology is a county function. This approach is precedented. For instance, requirement 3 (project wide: archaeology and peat) of the Sizewell C (Nuclear Generating

Station) Order 2022 (SI 2022/853) names the Council as the approving authority for archaeological matters.

8.33 Schedule 3 (requirements) (requirement 7 (construction hours)) – this provision needs significant reworking in order to allow for community respite. For example, the Council considers Saturday hours should be between 08:00 and 13:00 and there should be no working on Sundays and Bank Holidays. The Secretary of State considered a similar approach appropriate in the East Anglia ONE North Offshore Wind Farm Order 2022 (S.I.2022/432). Requirement 24 of that Order states the core hours are "between 0700 hours and 1900 hours Monday to Friday and 0700 hours and 1300 hours on Saturdays, with no activity on Sundays or bank holidays", subject to certain exceptions listed in sub-paragraph (2). The Council's proposed amendments to requirement 7 include the following. Requirement 7(1) should be amended as follows –

i. "Subject to sub-paragraphs (2) to (5) work may only take place between the hours of 07.00 and 19.00 Monday to Friday and 08.00 07.00 and 13.00 17.00 on Saturdays, Sundays, bank holidays and other public holidays (the core working hours), unless otherwise approved by the relevant planning authority".

8.34 Requirement 7(2) should be amended as follows –

i. "No percussive piling works may take place outside of the hours of 0700 to 1900 Monday to Friday and 08.00 0700 to 13.00 1700 on Saturdays, unless otherwise approved by the relevant planning authority".

8.35 Requirement 7(3) should be amended as follows –

i. "Subject to sub-paragraphs (4) and (5), no HGV deliveries may be made to site outside of the hours of 0700 to 1900 Monday to Friday and 08.00 0700 to 13.00 1700 on Saturdays, unless otherwise approved by the relevant highway authority".

8.36 Requirement 7(4)(a) should be omitted.

8.37 Requirement 7(4)(g) is less detailed than the equivalent provision of the National Grid (Bramford to Twinstead Reinforcement) Development Consent Order 2024, which paragraph 4.3.5 of the EM [APP-057] cites as a precedent for the requirements. For example, requirement 7(3)(g) of the Bramford Order states –

i. "(3) The following operations may take place outside the core working hours referred to in sub-paragraph (1)—

ii. (g) the completion of works delayed or held up by severe weather conditions which disrupted or interrupted normal construction activities that the undertaker and its contractor agree forms the critical path for the accepted construction programme. In such cases, the

undertaker must, as soon as practicable, notify the relevant planning authority of the disruption or interruption and explain why that work could not be completed within the core working hours referred to in sub-paragraph (1)"; [Words not included in the dDCO shown underlined].

8.38 The Council considers the bold and underlined text (which the Council requested should be included in the Bramford DCO) should be included in the dDCO.

8.39 Requirement 7(5) is less detailed than the equivalent provision of the National Grid (Bramford to Twinstead Reinforcement) Development Consent Order 2024, which paragraph 4.3.5 of the EM [APP-057] cites as a precedent for the requirements. For example, requirement 7(4) of the Bramford Order states –

i. "The core working hours exclude start up and close down activities up to 1 hour either side of the core working hours. A 50dBA noise limit (LOAEL) will apply at the nearest noise-sensitive receptors for start-up and close down activities up to one hour either side of the core working hours".

8.40 The Council considers the underlined text (which the Council requested should be included in the Bramford DCO) should be included in the dDCO.

8.41 **Schedule 3 (requirements) (requirement 9(3) (reinstatement planting scheme))** – this provision states – "Any trees or hedgerows planted as part of an approved reinstatement planting plan that, within a period of five years after planting (or such other period as is specified in the landscape and ecological management plan approved pursuant to requirement 4), are removed, die or become in the opinion of the relevant planning authority seriously damaged or diseased, must be replaced in the first available planting season with a specimen of the same species and size as that originally planted, unless otherwise approved by the relevant planning authority".

8.42 The reference to "5 years" should be changed to "10 years", which would provide greater ecological improvements.

8.43 **Schedule 4 (discharge of requirements) (paragraph 1, timescales)** – the timescales in Schedule 4 are too short and should be changed so that they are, at the very least, no shorter than those set out in Advice Note Fifteen: drafting Development Consent Orders. The EM [APP-057] justifies the shorter timescales as follows –

i. "Whilst it is acknowledged that the time limits included in Schedule 4 (in relation to the determination of applications made pursuant to the Requirements and any requests made by the relevant discharging authority for further information) do differ from those recommended in Advice Note 15, National Grid considers that shorter time limits are

necessary and proportionate in light of the immediate and pressing national need which the project is intended to address. There is precedent for these time frames in the recently made National Grid (Bramford to Twinstead Reinforcement) Development Consent Order 2024". (paragraph 4.4.2).

8.44 This argument is unconvincing. The 28-day decision-making period in paragraph 1(1) of Schedule 4 (compared to the 42-day period in paragraph 1(2) of Appendix 1 to Advice Note Fifteen) is unlikely to affect "the immediate and pressing national need which the project is intended to address".

8.45 While the Council will ensure that any request for approval will be dealt with as quickly as possible, it will be remembered that the Council will be receiving a considerable number of requests for approval across several nationally significant infrastructure projects. A 42-day decision-making period would be challenging in this context; the reduction of the timeframe to 28 days is unrealistic and potentially detrimental to the effective consideration of requests. Owing to these circumstances, the Councils consider a 56-day decision-making period would be reasonable.

8.46 Paragraph 4.4.3 of the EM [APP-057] says this schedule is "identical to the National Grid (Bramford to Twinstead Reinforcement) Development Consent Order 2024". It is not. The equivalent period in the Bramford Order is 35 days. The Council's experience of determining applications for the discharge of requirements for that Order have shown that 35 days is insufficient. More time, not less, is required here.

8.47 **Schedule 4 (discharge of requirements) (paragraph 3, fees)** – the fees proposed in paragraph 3(1) are unreasonably low and need to be increased. Moreover, paragraph 3(2) – which provides for the refund of fees in certain circumstances – is unreasonable and should be deleted.

8.48 **Schedule 17 (public general legislation)** – the disapplication of section 23 of the Land Drainage Act is not agreed, and neither are the protective provisions included at Part 3 (for the protection of drainage and flood authorities) of Schedule 16 (protective provisions) to the dDCO.

8.49 **Schedule 18 (amendment of local legislation)** – The Council requests copies of the Acts which affect their administrative area.

9 Planning

9.1 SCC is the Minerals and Waste Planning Authority in Suffolk. The proposed development does not directly impact existing or proposed minerals and waste development. In terms of minerals safeguarding, the sand and gravel resources within Suffolk are of at most regional importance as opposed to these proposals which are of national significance.

9.2 SCC also determines planning applications for its own development including new schools and highways improvements. There are no known conflicts at the time of writing.

9.3 SCC has at the request of councillors through the course of the evolution of these proposals sought to safeguard aviation interests. This work has included help facilitate discussions between NGET and the Civil Aviation Authority and attending meetings convened by the General Aviation Awareness Council and airfield operators. The Council will continue to support in particular Raydon Airfield which is still considered to be adversely affected.

9.4 SCC supports additional financially based side agreements with NGET to offset or compensate for the potential impacts of these proposals including:

i. a legal agreement to supply funding to the Dedham Vale National Landscape Project to enable works identified the current Management Plan in order to further the purposes of the National Landscape in accordance with Section 85 of the Countryside and Rights of Way Act 2000 and to offset the impact of undergrounding through the Dedham Vale National Landscape;

ii. a legal agreement to facilitate a feasibility study of the potential removal of the existing 132kV overhead line which runs between the existing Bramford and Lawford substations to offset the impact of undergrounding through the Dedham Vale National Landscape;

iii. a legal agreement to supply funding to the Suffolk Wildlife Trust to enable works in accordance with the Waveney and Little Ouse Landscape Project to offset the impact the proposed pylons which will bisect the Waveney Valley;

iv. a legal agreement to supply funding to the relevant Councils to support compensatory tree planting in lieu of the loss of existing trees along the route of the proposed development.

v. A legal agreement to support the monitoring of Biodiversity Net Gain for a period of 30 years.

10 Public Health

Document 5.1 Consultation Report – Appendix K: Targeted Consultation 2025

10.1 The consultation process pays regard to the Planning Act 2008, Section 47(1) and Section 42(1).

10.2 The process included three rounds of consultation, a Statement of Community Consultation (SoCC) was developed in consultation with all host local authorities, and multiple channels for engagement were used.

10.3 Whilst the Community Engagement process has been extensive, several areas could be strengthened. Councils requested longer consultation periods (six weeks), but the Applicant maintained a 30-day period for targeted consultations, citing proportionality. This may have limited the ability of some community representatives to coordinate and respond effectively.

10.4 A number of councils expressed concern that the zones may exclude interested parties just outside the boundary, particularly in rural areas. The Applicant did make information available online and accepted feedback from anyone, but direct notification was limited to defined zones.

10.5 Overall, the Applicant's approach to community engagement demonstrates many aspects of good practice, including multi-channel communication, targeted and proportionate consultation, and efforts to reach hard-to-reach groups. However, Public Health consider that further improvements could be made. Most notably, to ensure targeted consultation periods are extended where requested by stakeholder for justifiable reasons to ensure effective engagement and to take more pragmatic steps to engage with interested parties that may be just outside of the boundary, particularly in rural areas.

Document 6.4 Project Description

10.6 It is the view of Public Health that the proposed core working hours of 07:00–19:00 (weekdays) and 07:00–17:00 (weekends and bank holidays) exceed those considered appropriate to safeguard public health and raise material concerns regarding potential impacts on health and residential amenity. The inclusion of weekend and bank holiday working, as well as the potential for night working for trenchless crossings and other exceptions, raises concerns about the adequacy of protection for public health and residential amenity.

10.7 The applicant's reliance on management plans (CoCP, CTMP, etc.) for mitigation is noted, however there is a risk that extended hours, night working, and start-up/close-down activities could result in unacceptable levels of noise, disturbance, and stress for local residents, particularly those in rural and semi-rural locations close to the works.

10.8 **Recommendation:** Core working hours be reduced to more typical levels with no routine working on Sundays or bank holidays, except where essential for safety or agreed with affected residents. Night working be strictly limited to essential activities only, with advance notice, robust justification, and additional mitigation for affected receptors. Start-up and close-down activities be included within the core hours, not permitted outside them. The applicant be required to consult with affected communities and local authorities before agreeing any variations to working hours or mitigation measures.

Document 6.7 Environmental Statement Chapter 7 – Air Quality

10.1 Chapter 7 of the Environmental Statement details the assessment of the potential residual effects of Norwich to Tilbury on Air Quality. Covering effects from Dust, Traffic emissions, Generator and Non-Road Mobile Machinery (NRMM) emissions. Following the implementation of the mitigation measures, the effects of construction dust (7.7.4), construction traffic (7.7.7, 7.7.10, 7.7.13, 7.7.16), NRMM and plant including generators (7.7.27 -7.7.28) are concluded to be not significant. Public Health welcomes the mitigation measures proposed and as a result has no specific recommendations relating to air quality.

Document 6.10, Environmental Statement Chapter 10 – Health and Wellbeing

10.2 The scope and extent of the baseline data, including ward level analysis and consideration of vulnerable groups, is thorough and indicates alignment with best practice as set out in national guidance (NPS EN-1, EN-5, IEMA, Wales Health Impact Assessment Support Unit (WHIASU) and Public Health England. The methodologies used for assessment are considered suitable by Public Health for the specific purpose of this project.

10.3 The assessment references the following policies and strategies:

i. Paragraph 10.2.1 - National Policy Statement EN-1 and EN-5 (Department for Energy Security and Net Zero, 2024)

ii. Paragraph 10.2.14 - National Planning Policy Framework (NPPF, 2025) and “accompanying” planning practice guidance.

iii. Paragraph 10.2.14 - Environment Act 1995,

iv. Paragraph 10.2.14 - Health and Social Care Act 2012

v. Table 10.1 - Local Health and Wellbeing Strategies (e.g. Norfolk, Essex, Thurrock, Babergh, Mid Suffolk) – though notably Suffolk Joint Local Health and Wellbeing Strategy 2022 – 2027 is absent.

vi. Paragraph 10.2.17 - Guidance from IEMA (2017, 2022a, 2022b), WHIASU (2021), and Public Health England (2020, 2021), Mental Wellbeing Impact Assessment (MWIA).

10.4 Chapter 10 references a range of local and national datasets, however the coverage is not fully comprehensive as neither the Suffolk Office of Data & Analytics (SODA), the Suffolk Joint Local Health and Wellbeing Strategy 2022–2027 nor the Suffolk Joint Strategic Needs Assessment (JSNA) appear to have been considered. The Suffolk Health and Wellbeing Strategy is only briefly mentioned as a baseline source elsewhere in the chapter, with the JSNA referred to in the Bibliography only. These omissions suggest that important Suffolk specific data sources may not have been fully incorporated, potentially limiting the depth and relevance of the health and wellbeing evidence base for Suffolk. Notably, the Babergh and Mid Suffolk Health and Wellbeing Strategy is cited, but this is distinct from the Suffolk wide strategy.

10.5 The assessment methodology is presented as proportionate and indicates alignment with guidance from the Institute of Environmental Management and Assessment (IEMA) and the WHIASU. Stakeholder engagement with statutory consultees including Suffolk County Council and Norfolk County Council has been documented, and the use of the Mental Wellbeing Impact Assessment (MWIA) toolkit is welcomed. However, the Health and Wellbeing Chapter does not provide clear evidence of direct engagement with the wider community, parish councils, or vulnerable groups, nor does it critically evaluate the effectiveness, timing, or inclusivity of consultation activities. Public Health cannot therefore confirm that effective community engagement has been fully achieved through review of the Health and Wellbeing Chapter alone.

10.6 Embedded and standard mitigation measures such as those that would be set out in the Code of Construction Practice (CoCP), Construction Traffic Management Plan (CTMP), and Public Rights of Way (PRoW) Management Plan, are acknowledged within Chapter 10, but they are not described in detail or specifically referenced within the chapter itself. Instead, the text indicates that these measures are defined and discussed in other Environmental Statement chapters and related documents. From a Public Health perspective, it is considered good practice for the Health and Wellbeing chapter to include clear examples of relevant mitigation measures, particularly those that directly address health related impacts. Quoting or summarising key mitigation actions within the chapter would improve transparency and allow stakeholders to better assess the adequacy and appropriateness of the proposed measures in relation to health and wellbeing outcomes.

10.7 In accordance with the principles set out in Suffolk County Council's Community Engagement and Wellbeing Supplementary Guidance Document (SGD), further detail is required on:

i. The monitoring of health and wellbeing outcomes, including mental health, physical activity, and access to services, using baseline data such as Suffolk's Emotional Needs Audit and Key Performance Indicators for engagement and wellbeing.

ii. The process for reviewing and updating mitigation measures in response to community feedback and emerging evidence, with participatory monitoring and adaptive management.

iii. The role of Public Health and local authorities in ongoing scrutiny of engagement, including the expectation for continuous, honest, and collaborative engagement with communities and parish councils.

iv. Consideration of appointing an independent relationship manager to act as a consistent, impartial point of contact for communities, building trust and reducing negative impacts on wellbeing.

10.8 The proposals involve substantial electrical infrastructure with associated Electric and Magnetic Fields (EMFs). The Chapter explains the project is designed in accordance with National Grid design standards, complies with guidelines and policies related to EMF as stated in NPS EN-5 (DESNZ, 2024b), including the International Commission on Non-Ionizing Radiation Protection (ICNIRP) guidelines (ICNIRP, 1998). The Chapter further clarifies compliance means the project will already have designed out potential effects from EMF to a level appropriate to meet health and safety standards, including precautionary measures. However, it is important to specifically acknowledge that anxieties and perceptions around EMFs can have real and measurable impacts on mental wellbeing. The Chapter recognises that such concerns may link to anxiety (paragraph 10.7.136) and the Applicant has committed to providing clear, accessible information and ongoing local engagement generally, including a dedicated website, helpline, and specialist support at consultation events, to help address concerns.

10.9 **Recommendation:** To fully address the potential mental health impacts associated with EMF perceptions, further detail should be provided on the delivery of mental health mitigation. This should include local education programmes, targeted community engagement, and the monitoring of mental health outcomes during both construction and operation.

10.10 The Environmental Statement acknowledges in Table 10.4 that "*During construction there would be disruption to recreational routes or areas of open space which may affect opportunities for physical activity. During the operation*

(and maintenance) phase, access to recreational routes would be reinstated and no effects are anticipated in relation to physical activity (Table 10.4). Use of the term "*no effects are anticipated*" should be carefully scrutinised in each case, as even temporary or localised disruptions to PRoWs can have a disproportionate impact on physical activity, social connectedness, and mental wellbeing, particularly for vulnerable groups.

10.11 The chapter notes in Paragraph 10.7.87 that "*The majority of PRoWs would be affected for short durations only and the strategy is aimed at maintaining them as open Rights of Way throughout the construction period, wherever practicable*". From a public health perspective, it is essential that all reasonable effort is made to ensure that these "*short durations*" are minimised as far as possible, and that "*wherever practicable*" is interpreted robustly, so that the right to access and use PRoWs is preserved for the community.

10.12 A significant adverse effect from construction traffic noise has been identified at Bentley Road (PAR 30), with a predicted increase of 11.4 dB, exceeding the Significant Observed Adverse Effect Level (SOAEL). The Outline Construction Traffic Management Plan proposes mitigation measures and whilst these measures may help reduce noise, the Environmental Statement acknowledges in 14.7.36 that "*major significant adverse effects from construction traffic noise would still be expected on Bentley Road*" From a Public Health perspective, it is essential to recognise that the proposed mitigation may not be sufficient to prevent significant adverse impacts on residents' health and wellbeing. It is recommended that the applicant explores further site-specific mitigation options, this should include ongoing engagement with affected residents and robust monitoring.

Document 6.14 Environmental Statement Chapter 14 - Noise and Vibration

10.13 The Chapter identifies in Paragraph 14.7.24 that construction vibration may exceed the Significant Observed Adverse Effect Level (SOAEL) at 74 Noise Sensitive Receptors (NSRs), primarily due to compaction activities associated with highway works, haul road construction, and temporary construction compounds. With mitigation in the form of Best Practicable Means (BPM), the magnitude of impact is expected to be negligible to small at all nearby residential, low to medium sensitivity to non-residential NSRs, and negligible at nearby high-sensitivity NSRs, resulting in a residual effect that is not significant. There does however appear to be any specific commitment to vibration monitoring in the Outline Construction Traffic Management Plan. From a Public Health perspective, whilst the use of BPM is welcomed, it is recommended that the applicant provides greater clarity on how vibration impacts will be where monitoring indicates action is necessary during construction.

Document 6.17, Environmental Statement Chapter 17 – Cumulative Effects

10.1 The cumulative effects of multiple infrastructure projects in the same locality can result in significant adverse impacts on community wellbeing, including increased anxiety, loss of control, and emotional distress, as identified in the Suffolk County Council's Community Engagement and Wellbeing SGD. The chapter goes some way to recognise this in Paragraph 17.5.47: "*In a number of instances, adverse effects on mental health and wellbeing may be particularly relevant as a result of the scale of other development (for example significant residential or infrastructure development) and associated perceived effects on neighbourhood quality / sense of place / uncertainty during the construction phases*." These impacts may not be fully captured by the EIA process and require mitigation through early, continuous, and collaborative engagement, as well as support for community leaders and volunteers.

10.2 Table 17.3 acknowledged that for some groups, the cumulative effect of noise, visual, and access impacts is considered significant: "*Owing to the significance of visual effects within 500 m of the Order Limits, and as further mitigation is unlikely to be practicable, it is anticipated that the residual cumulative effect of visual and noise amenity effects with access and delay effects would lead to a significant intra-project cumulative effect on pedestrians, cyclists and horse riders. However, the significant effects are no greater than reported in Chapter 13: Landscape and Visual*". No additional mitigation measures are proposed within the chapter beyond those already identified in the other topic chapters.

10.3 **Recommendation:** Given that the chapter concludes further mitigation is "*unlikely to be practicable*," it is recommended that the Applicant continues to engage proactively with affected communities, particularly those within 500 m of the Order Limits to monitor the real world impacts on pedestrians, cyclists, and horse riders. The Applicant should remain open to implementing targeted, site-specific measures or enhancements if significant adverse effects are observed during construction or operation, even if these go beyond standard mitigation.

10.4 The assessment concludes in Paragraph 17.5.46 that inter-project cumulative effects on health and wellbeing are not significant during both construction and operation phases. This conclusion is based on the assumption that other developments will implement best practicable means (BPM) and standard mitigation measures.

10.5 Paragraph 17.4.22 explains that "*No monitoring is proposed during construction or operation (and maintenance).*" This appears a notable gap given the potential for significant combined impacts on physical activity, mental wellbeing, and community amenity.

10.6 **Recommendation:** Public Health recommend targeted monitoring of health and wellbeing outcomes for affected communities is undertaken, especially where significant cumulative effects are identified. Processes should be put in place and documented to communicate and engage with users of PRoWs, schools, and community facilities to ensure timely information about closures, diversions, and mitigation measures. Additionally, the Applicant should proactively distribute mental health resources (e.g. WellMinds https://simplebooklet.com/wellmindssuffolk#page=1) provide funded Mental Health First Aid training for community members, and support local mental health organisations to mentor volunteers, as recommended in the Suffolk County Council Community Engagement and Wellbeing SGD.

10.7 Sensitivity testing as detailed within Paragraph 17.6.4 indicates that delays to the construction programme would not result in new or different significant inter-project cumulative effects.

10.8 **Recommendation:** Public Health recommend the applicant maintain flexibility in mitigation and monitoring plans to respond to unforeseen cumulative impacts, especially if construction timelines or project overlaps change.

11 Public Rights of Way

11.1 The proposed new pylon route significantly affects the public rights of way ("PROW") network during the construction phase due to this SCC strongly advocates this is dealt with within its own chapter. It is therefore covered in health and well-being chapter; landscape and visual chapter; social economics, recreation and tourism and transport and traffic chapter. As a result, the post methodology's do not recognise the importance of the quality of the experience enjoyed by the public when going for a walk or ride. We do welcome the Draft PROW Management Plan but would like all the other aspects to be covered off or repeated in a dedicated PROW chapter, or in a subsection of the Traffic and Transport section.

11.2 The PRoW Management Plan should be a standalone document.

11.3 Section 15 covers receptors and some long-distance trails, some notable circular walks have been omitted and need to be referenced and assessed, using the 'Discover Suffolk website' routes affected are and not limited to:

i. Great Bricett Moat & Pub Walk,

ii. Great Bricett Airfield & Hall Walk,

iii. Bramford Mills and Meadows Walk.

11.4 SCC has concerns about the impact of multiple National Grid projects particularly within the Bramford area and the long-term impact on restrictions on the rights of way network. The combination of projects could see closures for significant lengths of time effectively severing the network and creating long term disruption to PRoW users. Although the closures are not permanent, this will impact on access and thus on the health and well-being of the local community over a lengthy period. SCC considers that appropriate mitigation for these residual impacts is required.

11.5 Several promoted long-distance routes will be affected by the proposal covering the Stour Valley Path, Gipping Valley Footpath and Mid Suffolk Footpath and connecting promoted circular routes, in addition to local strategic routes close to villages. These routes need to be monitored during construction of the line and usage of haul roads, to identify impacts and where required further mitigate. This should also cover the increase in construction traffic on minor routes close to villages that are also used for non-motorised access to the PRoW network. SCC are happy to provide details of specific areas of known medium to high use that should be included in further surveying. - This comment carries over from previous correspondence and should also be addressed in the Public Rights of Way Management Plan (PRoW MP), which has not been attached to the submission documents but referred to as document 7.6.

11.6 SCC also expects mitigation measures for the impact on the popular sections of the rights of way to offset the disruption to local communities. Consideration needs to be given to whether temporary infrastructure can assist as legacy for PRoW access as a permanent measure once completion of the scheme, including any proposed structures. Further discussion would be welcomed on this.

11.7 Further details would be welcomed on treatment of routes and proposals for closures.

Additional PROW general comments

11.8 A pre and post condition survey must be carried out including identification and assessment of surface condition and with a scope of coverage and methodology to be agreed with SCC as Highway Authority. This should include pre-construction work where PRoW might be used to gain access to the corridor and reinforcement works might be required prior to use by vehicles. Pre and post condition surveys are covered in 2.2.4 and will be required and agreed by SCC PRoW and adequately covered and agreed in the PRoW MP.

11.9 A) Where impacted by the works, any PROW will be restored to original condition or to a condition agreed with SCC - where there are existing defects, the applicant should agree restoration measures with the SCC, and this should be included within a Code of Construction Practise. This is referred to in 2.2.4 of the Draft PROW Management Strategy and adequately covered and agreed in the PRoW MP.

11.10 B) Where PRoW cross the cable corridor, haul road, access tracks and other sites, the surface must be kept in a safe and fit condition at all times for all users. Management measures should be included within the Construction Traffic Management Plan and adequately covered and agreed in the PRoW MP.

11.11 C) Pre-construction works must not obstruct or disturb any public rights of way (e.g. new fencing, archaeology surveys etc) unless otherwise agreed with SCC. Management measures should be discussed, and any temporary closures will need to be included in the DCO and adequately covered and agreed in the PRoW MP.

11.12 D) Public rights of way that are used for any stage of construction access should remain open, safe, and fit for the public to use at all times with management measures put in place with the agreement of SCC.

11.13 E) Any temporary closure of a PRoW must be agreed with SCC and the duration kept to the minimum necessary, this must be included within the DCO.

11.14 F) An alternative route must be provided for any public right of way that is to be temporarily closed prior to closure. The location of alternative routes to be

agreed with SCC and adequately covered and agreed in the PRoW MP. The path or way must not be substantially less convenient to the public in consequence of the diversion.

11.15 G) Any alternative route must be safe and fit for the public to use at all times – suitable surface, gradient and distance with no additional road walking between the natural destination points. Any diversion route surface, width and gradient should be at least commensurate with the existing route. Any routes which divert onto a road, which does not currently emerge onto a road, should have an Road Safety Audit undertaken to ensure that it is safe for all users.

11.16 F) Any temporary closure and alternative route will be advertised in advance on site and in the local media, and to the local parish councils including a map showing the extent of the closure and alternative route. The closure and alternative should be signed accordingly and SCC PRoW informed prior to closure. Also, the path or way must not be substantially less convenient to the public in consequence of the diversion

11.17 G) There should be no new gates or stiles erected on any public rights of way that are impacted by the cable corridor and any other associated site.

Document: 6.15 Environmental Statement Chapter 15 - Socioeconomics

11.18 Recreation and Tourism, Table 15.24, p88: W-129/025/0 is marked as significant in the construction phase, but still marked as low in sensitivity, what mitigation is proposed to lessen the significant impact?

Document: 6.16 Environmental Statement Chapter 16 - Traffic and Transport

11.19 16.4.15 Refers to PRoW surveys and states that PRoW officers agreed the scoping. This is not totally correct, as SCC PRoW did not agree locations, or days, or months prior to the survey being undertaken. When we were approached after the surveys, we advised that it needed to be at least three days and in holiday season as well as school time and we needed locations of where the surveys were to be undertaken and the methodology behind the locations, along with the method of collection, as permissions should be sought on PRoWs.

11.20 16.4.31 Refers to the dates the surveys were taken and noted that the PRoW users would be higher in spring/summer months when the weather is more favourable and daylight hours are greater. This is agreed and SCC PRoW would request more accurate surveys to be undertaken.

11.21 We recommend altering the following statement:

11.22 S02: PRoWs crossing the working areas will be managed in discussion with the relevant Local Planning Authorities and SCC PRoW team and potential temporary closures and diversions applied, where required. Road closures and

diversions will be kept as brief as possible, , with alternative routes maintained where practicable. Access disruption would be reduced while construction activities occur where practicable. Any required temporary diversions will be clearly marked at both ends with signage explaining the diversion, the duration of the diversion and a contact number for any concerns. This should be in prior discussion with SCC PROW with regards to dates, timeframes, routes and signage.

11.23 16.7.25 Mentions the Disruption PRoW Management Plan (document reference 7.6). This document has not been added to the submitted documents for us to review.

Suffolk County Council

NORWICH TO TILBURY

EN020027

Appendix A (East Anglia Transmission Network Reinforcements Report)

Suffolk County Council

FC74BF695

EAST ANGLIA TRANSMISSION NETWORK REINFORCEMENTS

Hiorns Smart Energy Networks

Abstract

Review of National Grid Energy Transmission (NGET) proposals for East Anglia Network reinforcement with a focus on the need and timing of the proposed 400 kilovolt (kV) line from Norwich to Bramford to Tilbury 400 kV substations

Author: Andy Hiorns

Date: September 2023

Acronyms

Term	Definition
ASTI	Accelerated Strategic Transmission Investment
BESS	Battery Energy Storage System
CPA	Construction Planning Assumptions
CCGT	Combined Cycle Gas Turbine
CFD	Contract for Difference
CMIS	Constraint Management Intertrip Service
DNO	Distribution Network
EC5	East Coast 5 boundary export
ESO	Electricity System Operator
EYTS	Electricity Ten Year Statement
FES	Future Energy Scenarios
GIL	Gas Insulated Line
GSP	Grid Supply Point
GW	Giga Watts
HND	Holistic Network Design
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
IA	Interconnector Allowance
kV	Kilo Volt
MITs	Main Interconnected Transmission System
MW	Mega Watts
EC5N	Necton & Norwich Export Group
NGET	National Grid Electricity Transmission
NOA	Network Option Assessment
OHL	Overhead Line
OTNR	Offshore Transmission Network Review
PFC	Power Flow Control
SIEX	Sizewell Export Group
SSE	Scottish and Southern Electricity
SQSS	Security and Quality of Supply Standards
TEC	Transmission Entry Capacity
TOs’	Transmission Owners

1. Executive Summary

1.1 Growth in offshore Wind Generation, along with potential new Interconnectors to Europe and Nuclear Generation development in East Anglia region will make a significant contribution in reaching the Net Zero Targets. The generation in this region could potentially meet some 25% - 50% of UK demand at any given time depending on the prevailing wind conditions.

1.2 In seeking to ensure there is adequate transmission capacity to accommodate this volume of generation, several major network reinforcements have been proposed. The proposed reinforcements include a new 400kv line between Bramford to Twinstead Tee, a new 400kv between Norwich – Bramford – Tilbury along with a high voltage direct current (HVDC) link between Sizewell to Richborough. NGET is seeking to complete all these reinforcements by 2031 in line with the contracted connection dates for the generation being developed in this area.

1.2 This report reviews:

a. The need and timing for additional capacity out of the East Anglia region against the Electricity System Operators (ESO) Contracted Generation.
b. The need against a range of credible Generation Scenarios to assess the robustness of the need case.

1.3 The analysis undertaken in this report concurs with National Grid Electricity Transmission conclusion that if all the Generation which is presently contracted proceeds in accordance with its contracted dates, then there is a requirement for additional transmission capacity identified above. The proposed solutions provide the most economical solution in meeting these needs.

1.4 However, the need for Norwich to Bramford to Tilbury OHL has been demonstrated against the Contracted Generation. The ESO have noted that 70% of Generation projects listed in the Generation Contracted may never be built and it should also be noted that many of the projects which are eventually built come online later than their contracted dates. In looking at a range of more credible scenarios there is significant uncertainty with regard both the required volume of additional transmission capacity and timing when all this additional transmission capacity will be required.

1.5 The proposed development of the Bramford - Twinstead Tee and the Sizewell to to Richborough HVDC link, with some minor incremental investment provides additional transmission capacity across a number of key boundaries and would accommodate circa 12 gigawatts (GW) of additional offshore Windfarm Generation in the East Anglia Region.

1.6 The analysis undertaken in this report concludes that the need for the Norwich-Bramford-Tilbury overhead line can be deferred by 5 years. Whilst the proposed new overhead lines (OHL) may ultimately be the optimum solution to meet the future needs, given the level of uncertainty associated with the Contracted Generation background it too early to conclude it represents the best overall solution in meeting future system needs.

1.7 Given the uncertainty with respect to both volume and timing of future generation along with the timely development of the Bramford - Twinstead Tee and the Sizewell to to Richborough HVDC link it provides the opportunity to pause development of the Norwich to Bramford to Tilbury until future Generation requirements crystallized and for the need case to be reviewed against the proposals outlined in Great Britain (GB) connection reform.

1.8 This approach would not impact on the development of the offshore wind Generation projects which are required to meet the Net Zero challenge given the additional capacity provided by the development of the Bramford – Twinstead Tee and the HVDC link between Sizewell and Richborough along with ESO Connection reform which would ensure equitable release of available transmission capacity.

END

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2. Introduction

2.1 Existing Transmission Network Capacity

2.1.1 The transmission network in the East Anglia region was built to serve demand in the region and has remained largely unaltered since being constructed in the 1960's. The last major network upgrade in this area was undertaken to accommodate Sizewell B nuclear generation.

2.1.2 Peak demand In the East Anglia area is circa 1.5GW and anticipated to grow to circa 2GW by 2035/36. Demand is supplied to the East Anglia area predominately from Walpole, Norwich Main, Bramford Grid Supply Points (GSP). A map of the transmission system in East Anglia is shown in Figure 2.1[1].

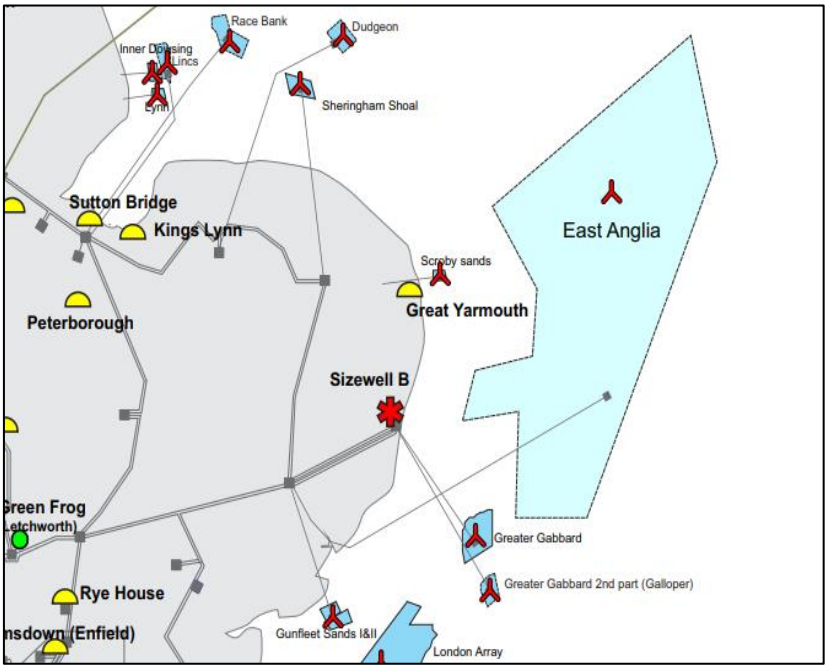

Figure 2.1 - Map showing the electricity transmission system in East Anglia

2.1.3 There is a 400kV double circuits between Walpole 400kV substation to Twinstead Tee point, shown in Fig 2.2 below, which connects the four 400kV GSP (Necton, Norwich, Bramford & Sizewell) to the Main Interconnected Transmission System (MITs). There are two 400kV double circuits between Sizewell and Bramford 400kV substation to connect the generation at Sizewell to the Main MITs.

[1] Figure 2.1 & 2.2 have been extracted from ESO 2022 Electricity Ten Year Statement (ETYS).

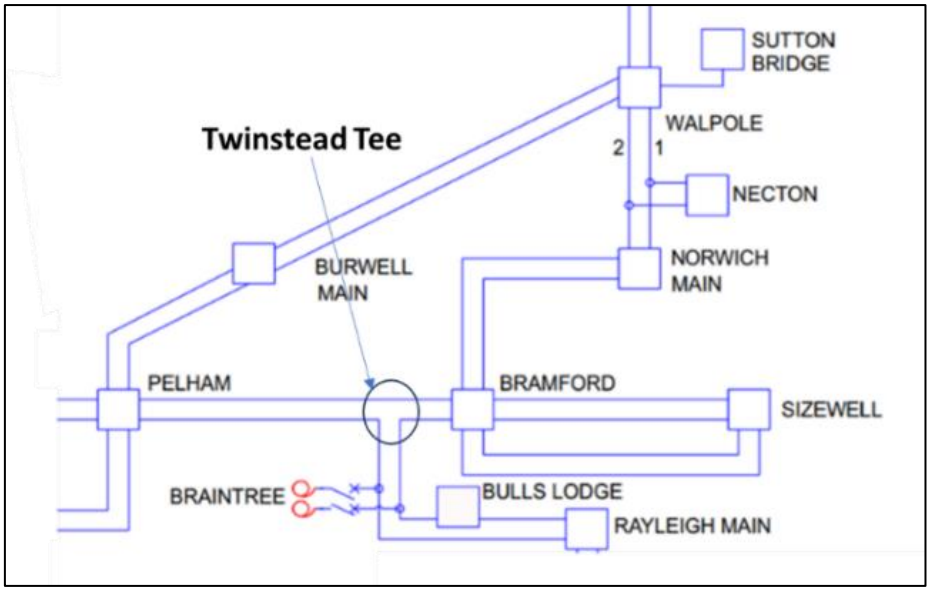

Figure 2.2 – Diagram showing the electricity transmission system in East Anglia

2.2 Network Boundaries

2.2.1 In considering network transmission capacity it is convenient to consider the transmission network as a series of 'boundaries.' The concept of 'boundaries' is to notionally split the system into two parts, the boundary crossing critical paths that carry power between the areas where power flow limitations may be encountered.

2.2.2 The transmission system is planned in accordance with the Security and Quality of Supply Standards[2] (SQSS) such that no boundary under consideration unduly restricts the ability of the generation to meet the GB consumer demand.

2.2.3 Where the required transfer exceeds the boundary capacity then National Grid Electricity Transmission plc (NGET) have a licence obligation to provide additional transmission network capacity to ensure the required transfers can be accommodated.

2.2.4 Three boundaries have been developed for the East Anglian area to evaluate the adequacy of the transmission network capacity as shown in Figure 2.3 below, these are: -

a. EC5N; Generation export from the Necton and Norwich Main GSP's
b. EC5 Boundary; Generation export from the Necton, Norwich Main, Bramford and Sizewell C GSP's
c. SIEX; Generation export boundary from Sizewell & Leiston[3].

2.2.5 When a shortfall of transmission capacity is identified across a boundary, NGET will identify a range of viable solutions to address this shortfall in transmission capacity. The Electricity System Operator (ESO) reviews these options and makes recommendations of which of the identified solutions should be taken

[2] https://www.nationalgrideso.com/document/266526/download
[3] A second GSP at Leiston is being established which will connect into the existing Bramford to Sizewell circuits and will form part of the SIEX group.

forward. NGET will then progress the reinforcement which the ESO have recommended.

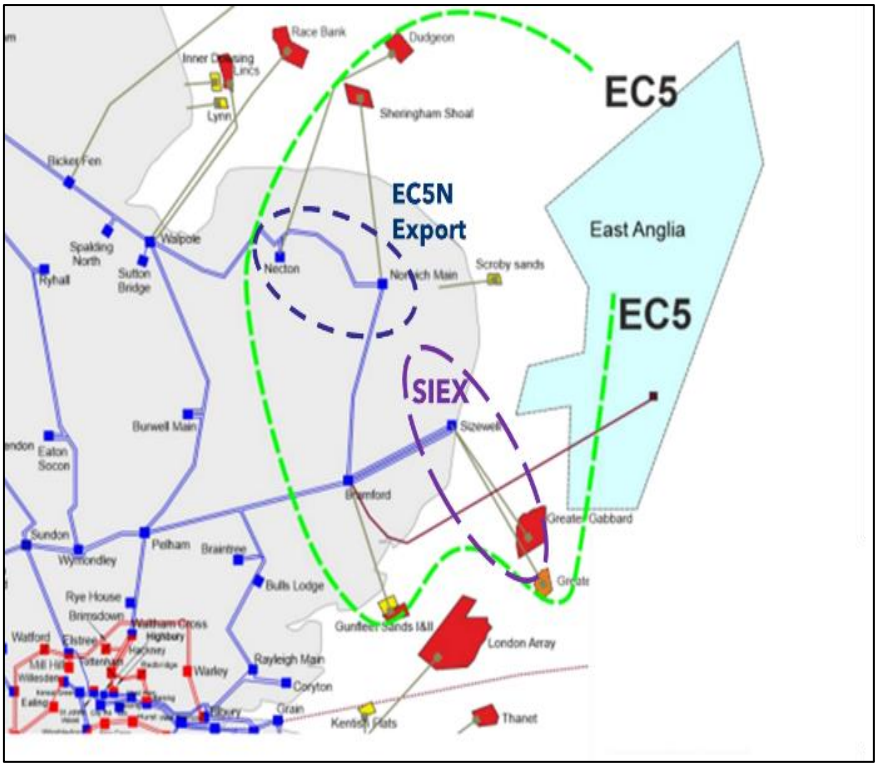

Figure 2.3 - Map showing the electricity transmission boundaries in East Anglia.

2.3 EC5N Boundary

2.3.1 The EC5N boundary consists of Necton and Norwich Main 400kV Substation. For the outage of the double circuit between Bramford and Norwich Main the generation will be left connected to MITs via the Necton to Walpole 400kV double circuits. The capacity of this group under this outage is shown in Table 2.1 below.

Table 2.1 – EC5N electricity transmission boundary		
Circuit Name	Winter Rating[4] (MVA)	Winter Rating (MVA)
Norwich Main – Necton- Walpole 1	3326	Contingency
Norwich Main – Necton- Walpole 2	3326	Contingency
Necton – Walpole 1	3326	3326
Necton – Walpole 2	3326	3326
Total	**13304**	**6652**

Table 2.1 – Table showing the electricity transmission capacity of ECN5 Boundary

[4] The ratings are extracted from Appendix B of the 2022 Electricity Ten Year Statement (ETYS)

2.3.2 The capacity shown in Table 2.1 is higher than quoted in the 'Norwich to Tilbury Strategic options Backcheck and Review' document recently issued by NGET. However, following discussions with NGET they have advised they will update their boundary capacity in the next update of the Backcheck and Review Report[5].

2.4 EC5 Boundary

2.4.1 EC5 crosses two 400kV double circuits and encloses four 400kV GSP. The theoretical maximum thermal export capacity of this group under outage condition is circa 6200MW as shown in the Table 2.2 below.

2.4.2 Due to unbalanced circuit loading the net export capacity is presently declared as 3850MW[6]. NGET have identified a series of incremental reinforcements, which have been endorsed by ESO via the Network Option Assessment (NOA) process, which will increase the export capacity to 6200 megawatt (MW).

Table 2.2 – EC5 Boundary export capacity		
Circuit Name	Winter Rating (MVA)	**Winter Rating (MVA)**
Norwich Main – Necton-Walpole 1	3326	Contingency
Norwich Main – Necton-Walpole 2	3326	Contingency
Bramford - Pelham	3102	3102
Bramford –Braintree	3102	3102
Total	**12856**	**6204**

Table 2.2 – Table showing the electricity transmission capacity at EC5 Boundary

2.4.3 Given the volume of additional Generation seeking to connect within the EC5 boundary, NGET are actively progress the 'Bramford – Twinstead Tee' project. Given the status of this project, this report assumes that this projects will be completed in evaluating the need for further additional transmission capacity.

2.4.4 Following establishment of the Bramford – Twinstead Tee project the transmission network will be as shown in Figure 2.4 below. The completion of this project provides a third 400kV double circuit across the EC5 boundary which significantly increases the network capacity across this boundary.

2.4.5 The critical double circuit outage for this boundary now becomes the Walpole to Burwell Mail 400kV double circuit. For this critical outage, power will flow into the group at Walpole, transiting through the East Anglia and exiting at Bramford. These power flows will then be supplemented by the generation export from the East Anglia area as shown in Figure 2.5. These through flows from Walpole to Bramford have the potential to reduce boundary transfers across EC5.

[5] The Backcheck and Review Report is a live document with NGET updating as latest information becomes available.
[6] The 2022 Electricity Ten Year Statement quotes the boundary capability of key boundaries.

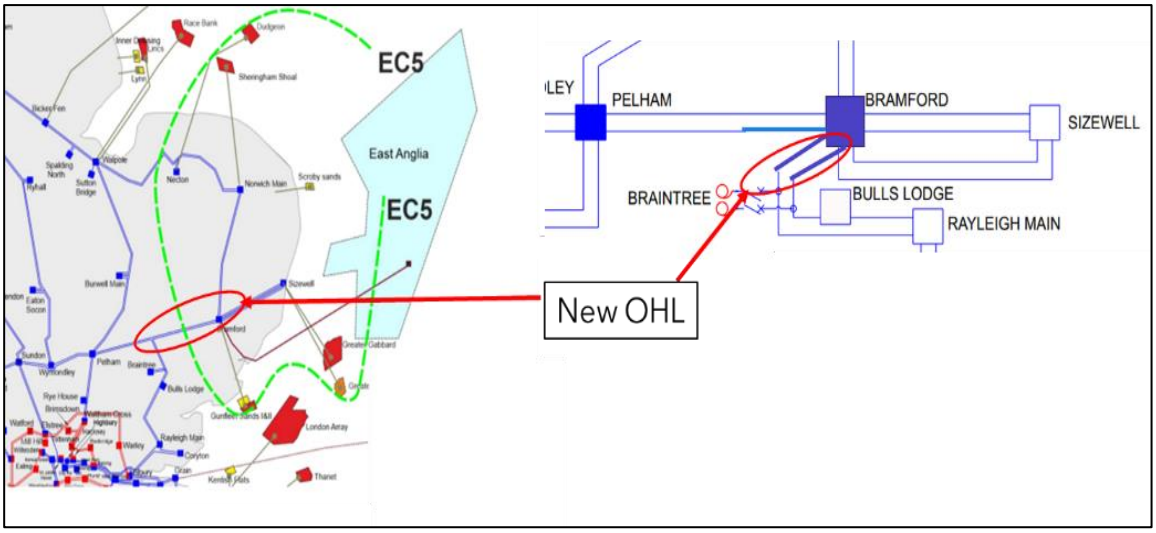

Figure 2.4 - Map and diagram showing the East Anglia Transmission Network incorporating Bramford – Twinstead Tee OHL

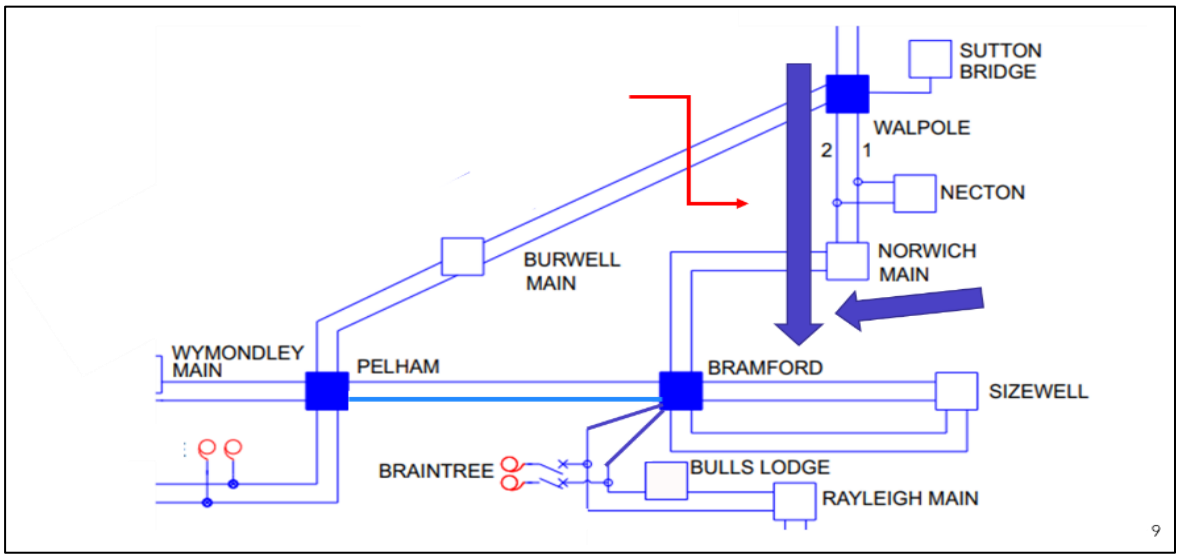

Figure 2.5 - Map and diagram showing electricity transfer following establishment of Bramford – Twinstead Tee

2.4.6 The maximum thermal capability of this group, assuming all lines could be fully utilised would be 14292 MW as shown in Table 2.3 below. NGET have confirmed that the usable export capacity out of this group is 12580MW. This represents 88% network utilisation, which is higher than typical norms and reflects that National Grid have sought to maximise existing and future network capability prior seeking transmission expansion.

Table 2.3 – Maximum EC5 export capacity following establishment Bramford – Twinstead Tee OHL		
Circuit Name	**Planned Winter Rating (MVA[7])**	**Planned Winter Rating (MVA)**

[7] Data extracted from Appendix B of 2022 Electricity Ten Year Statement (ETYS)

Norwich Main – Necton-Walpole 1	3326	Contingency
Norwich Main – Necton-Walpole 2	3326	Contingency
Bramford – Pelham 1	3326	3326
Bramford – Pelham 2	3326	3326
Bramford – Braintree-Rayleigh	3820	3820
Bramford –Braintree-Bulls Lodge	3820	3820
Total	**20944**	**14292**

Figure 2.3 – Table showing the maximum export capacity in the EC5 Boundary following the establishment of the Bramford – Twinstead Tee OHL.

2.5 SIEX Group

2.5.1 SIEX consists of a single GSP with generation connected to Sizewell with local demand being supplied. A second GSP at Leiston is being established which will connect into the existing Bramford to Sizewell circuits and will form part of the SIEX Group. For the loss of either of the double circuit between Bramford and Sizewell the generation export will be left connected to the MITs via the other Bramford to Sizewell double circuit. The capacity of this group under outage contingency is shown in Table 2.4 below.

Table 2.4 – Export capacity of SIEX electricity transmission capacity group		
Circuit Name	**Winter Rating (MVA)**	**Winter Rating (MVA)**
Bramford – Sizewell 1 400kV	2779	Contingency
Bramford – Sizewell 2 400kV	2779	Contingency
Bramford – Sizewell 3 400kV	2779	2779
Bramford – Sizewell 4 400kV	2779	2779
Total	**11116**	**5558**

Figure 2.4 – Table showing the export capacity in the SIEX Group under outage contingency.

3. Roles & Responsibilities

3.1 The 1989 Electricity Act defines transmission of electricity within GB and its offshore waters as a prohibited activity which cannot be conducted without transmission license. These license holders are known as Transmission Owners (TOs), with responsibility for owning and maintaining transmission assets. Through the transmission license the TOs' are responsible for ensuring compliance with the SQSS which seeks to establish the minimum level of transmission capacity which the TOs are obliged to provide. A single

transmission license has been granted to the ESO that permits operation of the Transmission Network within Great Britain and its offshore waters.

3.2 The ESO provides the contractual interface with the Generators and Interconnectors which are either connected, or seeking to connect, to the transmission network. Potential Generator and Interconnectors apply to the ESO for a Connections Agreement to connect the GB transmission Network. The ESO works closely with the TOs to confirm what, if any additional transmission capacity is required to accommodate proposed connection of future generation and agrees with the TOs when any necessary reinforcements can be completed. The conclusion of this assessment forms the basis of the Connection Agreement which the ESO offers to the Generator seeking to connect to the Transmission System.

3.3 The ESO are also responsible for several other additional activities which they undertake on behalf of the electricity industry, including the publication each year of:

a. Future Energy Scenarios (FES) which takes a range of energy industry views and develops a set of energy growth scenarios which is used as the basis for determining future MITs requirements.

b. Electricity Ten Year Statement (ETYS) which sets out the system development requirements of the MITs over the next 10 years.

c. Network Options Assessment (NOA), which provides an economic assessment of the TOs potential options for reinforcing the MITs.

3.4 In Summer 2022 the ESO published its Holistic Network Design (HND)[8] in response to the Governments Offshore Transmission Network Review (OTNR). The HND sets out a single integrated transmission network design to ensure that the transmission connections for offshore wind connections are delivered in the most appropriate way considering the increased ambition for offshore wind. In making its recommendations the report considered environmental, social and economic costs. The HND recommended the development of a new 400kV line between Norwich Main to Tilbury 400kV substations.

3.5 Following the publication of the HND and 2022 NOA Refresh, Ofgem published the Accelerated Strategic Transmission Investment (ASTI) decision[9], which is seeking to facilitate achieving the government targets by streamlining the regulatory approval process and to ensure adequate regulatory funding in place to support development and delivery of the ASTI projects. The schedule of projects which Ofgem gave funding to proceed included the new 400kV double circuit going North and South of East Anglia

3.6 The TOs are obliged to provide the capacity required by the ESO, which includes the reinforcements identified in the HND and which regulatory approval has been provided in the ASTI decision. Furthermore, the TO's are incentivised

[8] https://www.nationalgrideso.com/document/262676/download
[9] Decision on accelerating onshore electricity transmission investment (ofgem.gov.uk)

to deliver these projects in accordance with schedule included in the ASTI decision report.

4. Drivers for Transmission Expansion

4.1 The electricity industry is undergoing an unprecedented change in transitioning from a reliance on fossil fuels towards low carbon Generation. Closure of fossil fuel Generation and end of life of existing nuclear power stations will require significant investment in new Generation and Interconnection[10] capacity to ensure security of supply is maintained.

4.2 The UK Government published the British Energy Security Strategy in April 2022 setting out a strategy for secure, clean and affordable energy. This strategy sets out the UK's energy ambitions, which included:

a. Up to 50GW of offshore wind connected by 2030.
b. Up to eight new nuclear reactors reaching up to 24GW to be achieved by 2050:

4.3 Crown Estate has produced a map showing potential sites for offshore windfarm projects. Figure 4.1 provides an extract showing potential offshore projects which may connect to the East Anglia Area.

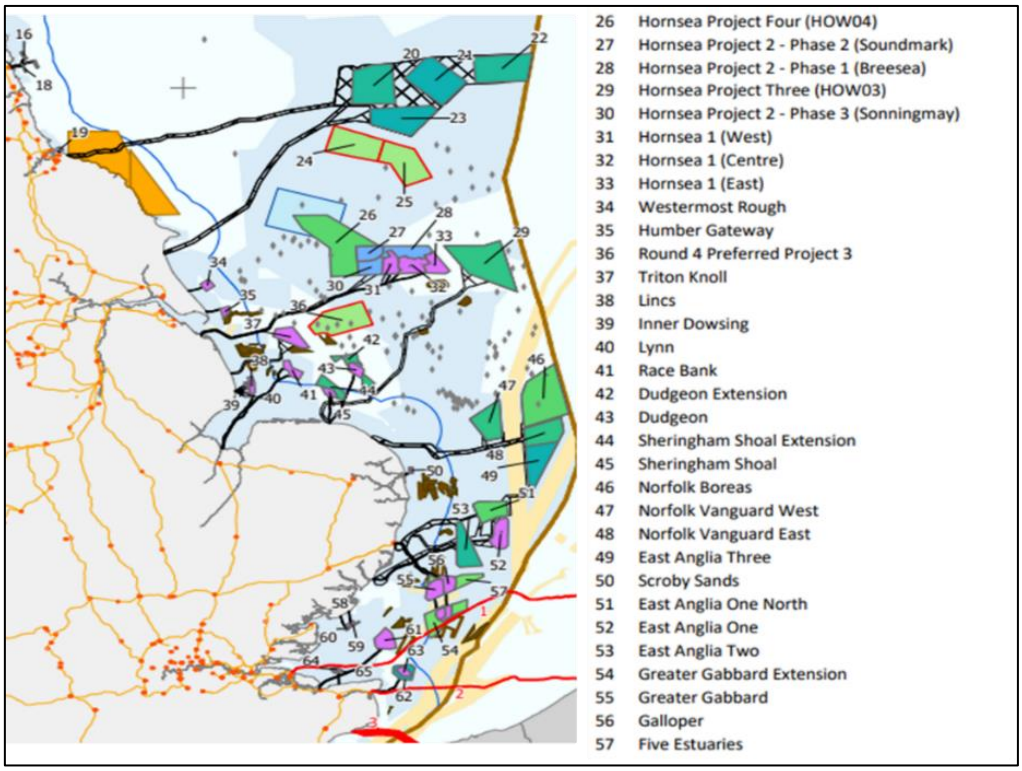

Figure 4.1 – Map showing the Crown Estate and potential offshore wind projects in the East Anglia region.

5. Contracted Generation

[10] Interconnectors between different countries will play a critical role in allowing access renewable generation to be traded between countries.

5.1 All existing Generators and Interconnectors who are either connected to, or use the Transmission Network, have a Connection Agreement with ESO. These Connection Agreement identify the point of connection and define the total MW output which can be injected onto the transmission system (defined as the Transmission Entry Capacity (TEC)).

5.2 When a new Generator or Interconnector is developing a project which will either connect to the transmission system, or seek to utilise the transmission network, they will make an application to the ESO for a Connection Agreement.

5.3 For an onshore generator, ESO consult with the appropriate to determine the most efficient way to accommodate this connection request. For offshore Generator and Interconnectors, the ESO will look to determine the optimum onshore connection point by evaluation of all parties cost. The Generator or Interconnector will then be offered a Connection Agreement which will define his connection point, along with the allowable TEC and year of connection.

5.4 The ESO publishes all schedule of all Generation with Connection Agreements via its TEC register[11]. There is presently 75.5GW (of which 12.6GW is offshore Wind) of Generation either connected to, or as contracts to use, the transmission network. There is a further 275GW of potential new generation projects (of which there is circa 110GW offshore Wind) which have Connection Agreements to connect to, or to use, the Transmission system.

5.5 The ESO also publishes the Interconnector TEC register. This shows that presently there is 9.5GW of Interconnector capacity connected to the GB Transmission system with a further 24.7GW of potential new Interconnectors having a contract for connection.

5.6 The combined Generation and Interconnector TEC register is referred to as the 'Contracted Generation' within this report.

5.7 The ESO has recognised that lead time to connect renewable project is too long and this is hindering progress to deliver Net Zero. ESO are taking forward a range of actions to address this issue, referred to as the 5-point plan. ESO have stated that the changes to in way they design the network and how and when they provide access to the network can bring forward connection dates. ESO anticipate 70% of the pipeline of connecting projects, which currently have a connection date after 2026, will be able to connect some 2 and 10 years earlier then presently envisaged following the adoption of the 5-point plan.

5.8 ESO proposed plan[12] consists of:

a. Allowing Generators to terminate their agreement without incurring penalties.

b. Change in background modelling assumptions - updating how project connection dates are determined. The ESO is working with TO's to review and update existing contracts with these new Construction Planning Assumptions (CPAs).

[11] https://www.nationalgrideso.com/industry-information/connections/reports-and-registers
[12] GB Connection Reform ESO End of Year Report May 2021 (nationalgrideso.com)

c. Batteries and other energy storage technologies soak up energy generation when connected to the grid as well as releasing it back onto the grid. As this technology has a dual purpose, the ESO have changed how it calculates its impact on the system.

d. Developing new contractual terms for connection contracts to manage the queue more efficiently, so those projects that are progressing can connect and those that are not can leave the queue.

e. Enabling energy storage projects to connect to the grid more quickly allowing their flexibility to support development of the Transmission network.

5.9 These reforms will allow existing transmission capacity to be released in a more equitable manner and allow some of the generation connection dates to be brought forward.

6. ESO Future Energy Scenarios

6.1 Each year the ESO undertake an in-depth consultation process in developing a range of Future Energy Scenarios (FES)[13] , in which Fintan Slye ESO CEO noted that:

'*This year's Future Energy Scenarios continue to set out credible ways that the UK can achieve net zero by 2050, as well as the UK Government's commitment to a decarbonised electricity system by 2035. Based on extensive stakeholder engagement, research and modelling, each scenario considers how much energy we might need, where it could come from and how we continue to maintain outstanding levels of system reliability'*

6.2 In considering a plausible range of future outcomes the FES 2023 considered 4 scenarios, only one of these scenarios is predicated to achieves the target of 50GW of offshore Wind by 2030, with target only being achieved by 2035 and 2040 other scenarios.

6.3 Of the 110GW of contracted offshore wind, 103GW as a connection date by 2033 with the remaining generation contracted to connect by 2037. Given there is already 12.6GW of offshore wind connected to the UK network, the ESO scenarios suggests a maximum of 36% of new projects which have contract connection dates prior to 2035 will connect by this date.

6.4 As noted by Julian Leslie, Head of Networks, National Grid Electricity System Operator

''*Over 280 GW of generation projects are currently seeking to connect to the transmission network and an increasing number of those projects have connection dates into the mid to late 2030s. Renewable project developers are waiting too long to connect to the network, and this is hindering our progress to deliver Net Zero. The causes for these delays are clear. We have seen huge increases in the numbers and capacities of projects seeking to connect, yet our data shows that up to 70% of those projects may never be built. Those projects*

[13] Download our datasets | ESO (nationalgrideso.com)

are holding capacity that is significantly delaying the connection of other projects".

6.5 Lack of transmission capacity has been widely recognised as a major contributor to delays in the development of offshore wind generation projects. NGET along with the other GB TO's (i.e., Scottish Power and SSE) are under increasing pressure to increase network capacity more quickly to facilitate connection of generation in meeting UK renewable targets. The challenge the industry faces is to take forward the optimum investment in a timely manner. Investing against the Contracted Generation background will lead to unnecessary investment.

7. Contracted Generation - East Anglia Region

7.1 The existing generation contained in EC5 Boundary is shown in Table 7.1.

7.2 There is a significant volume of projects being developed in East Anglia area, Table 7.2 shows the potential offshore windfarms along with proposed connection point to the transmission network and connection dates which these projects have contracted with the ESO. It should also be noted that there are potential additional offshore windfarm projects being develop within this region which have not yet entered into a Connection Agreement with the ESO.

Table 7.1 - Generation in East Anglia (within the EC5 group)[14]

Project Name	Connection Site	Capacity (MW)	Plant Type
Dudgeon Offshore Wind Farm	Necton 400kV Substation	400	Wind Offshore
East Anglia One	Bramford 400kV Substation	680	Wind Offshore
Galloper Wind Farm	Sizewell 400kV Substation	348	Wind Offshore
Greater Gabbard Offshore Wind Farm	Sizewell 400kV Substation	500	Wind Offshore
Gunfleet Sands II Offshore Wind Farm	Bramford 400kV Substation	64	Wind Offshore
Gunfleet Sands Offshore Wind Farm	Bramford 400kV Substation	99.9	Wind Offshore
Great Yarmouth CCGT	Norwich Main 400kV Substation	420	CCGT
Scroby Sands	DNO Embedded	60	Wind Offshore
Sheringham Shoal Offshore Wind Farm	Norwich Main 400kV Substation	315	Wind Offshore
Sizewell B	Sizewell 400kV Substation	1230	Nuclear
Thetford	Bramford 400kV Substation	41	Biomass
Total		4158 MW	

[14] Data extracted from the ESO Transmission Entry Capacity (TEC) Register

Table 7.1 – Table showing existing electricity generation in the EC5 Boundary.

Table 7.2 - Future offshore Windfarm Projects in the EC5 group			
Project Name	Connection Site	Capacity (MW)	Effective From
East Anglia One North	Bramford 400kV substation	860	31/03/2026
East Anglia Three	Bramford 400kV substation	1200	31/12/2028
East Anglia Two	Bramford 400kV substation	860	31/12/2025
Norfolk Boreas	Necton 400kV Substation	1320	01/08/2026
North Falls Offshore Wind Farm[15]	Sizewell 400kV Substation	1000	31/10/2030
Scira-Dudgeon Extension	Norwich Main 400kV Substation	950	31/10/2031
Vanguard West	Necton 400kV Substation	1320	01/12/2025
Vanguard East	Necton 400kV Substation	960	01/03/2027
Vanguard East	Necton 400kV Substation	360	31/12/2028
Hornsea Three offshore Wind	Norwich Main 400kV Substation	3000	31/12/2028
Total		11830 MW	

Table 7.2 – Table showing future offshore windfarm projects with contracts to connect in EC5 Boundary.

7.3 In addition to these offshore windfarms there are further developments in both nuclear power stations, interconnectors and Energy Storage Systems which would also potentially drive the need for additional Transmission capacity. These are shown in Table 7.3 below. In total there is a potential 16GW of additional Generation contracted with the ESO to connect to the Transmission network in the East Anglia area.

Table 7.3 - Additional future new generation capacity in the EC5 group			
Project Name	Connection Site	Capacity (MW)	Effective From
Alcemi Bramford Battery Energy Storage	Bramford 400kV Substation	500	30/10/2030
Bramford (Tertiary) Energy Storage	Bramford 400kV Substation	49.9	01/11/2023
Brook Farm BESS Energy Storage	Bramford 400kV Substation	49.9	25/09/2022
Norwich CCGT	Norwich Main 400kV Substation	49.5	31/10/2023
Norwich 100MW BESS	Norwich Main 400kV Substation	100	31/10/2031
Sizewell C - Nuclear	Sizewell 400kV Substation	3340	31/10/2030
Total		4089 MW	

[15] This Generator could be potential connected to a new coastal node located south of the EC5 group.

Table 7.3 Table showing additional future electricity generation projects with contracts to connect in EC5 Boundary.

7.4 Growth in offshore wind generation, along with interconnectors to Europe and new nuclear generation in East Anglia will make a significant contribution in reaching the net Zero targets, if all the contracted generation in this area did proceed it would be potentially contributing in meeting over 25% - 50% of UK demand at any given time depending on the prevailing wind conditions.

7.5 The analysis undertaken by NGET is based on the Contracted Generation background with limited sensitivities been undertaken to assess the robustness of the need against range of potential credible outturns. Historic evidence as demonstrated that Generation Development vary significantly from the Contracted position.

7.6 The GB Connection reform introduces a revised methodology for calculating required network capacity based on an agreed set CPA to reflect current connection rates and reducing the assumption that most projects in the queue will connect. The ESO as also changed the methodology on how to calculate the impact of Batteries and other energy storage technologies in determining the required transmission network capacity given that this technology has a dual purpose. It is unclear how NGET have utilised this revised approach in determining future network capacity requirements.

7.7 It is therefore essential that in determining what future expansion is required the ESO/NGET provide more transparency on their assumptions on what future generation connections are likely to be in each area and not to restrict the justification on future network expansion solely on the ESO contracted position.

8. Need for Network Reinforcements

8.1 EC5N Boundary

8.1.1 With respect to EC5N Boundary, there is less than 1500MW demand within this group the generation connection criteria apply. This requires full export of all this generation from the group when considering a double circuit outage for all '*conditions on the onshore transmission which ought to be reasonably expected to arise in the course of a year of operation*[16]'

8.1.2 Table 8.1 considers the EC5N export requirements against the ESO contracted position. The required exports out of this group will exceed the group capability as the Generation volumes increase and to accommodate the contracted Generation additional transmission capacity will be required by 2028/29. However, it is noted that one project which did have Contract for Difference (CfD) and was being progressed as suspended work due to inflationary pressures making project not commercially viable and no further generation within this group obtained a CfD in this year's allocation which will delay buildup of generation in this group.

[16] Defined in section 2.8 of the SQSS.

Contracted Generation	Table 8.1 - Contracted Generation - EC5N Group									
	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33	2033/34	2034/35
(A) Existing	*1195*	*1195*	*1195*	*1195*	*1195*	*1195*	*1195*	*1195*	*1195*	*1195*
(B) New[1]	2137.5	4645.5	5358	6270	6612	6612	7524	7524	7524	7524
(C) Embedded Gen	*664*	*664*	*664*	*664*	*664*	*664*	*664*	*664*	*664*	*664*
(D) Demand	*1138*	*1172*	*1207*	*1243*	*1280*	*1319*	*1358*	*1399*	*1441*	*1484*
(E) Net Export (A+B+C-D)	2859	5333	6010	6886	7191	7152	8025	7984	7942	7899
(F) Network Capacity	6652	6652	6652	6652	6652	6652	6652	6652	6652	6652
Surplus/Deficit (F-E)	3793	1319	642	-234	-539	-500	-1373	-1332	-1290	-1247

Table 8.1 - Table showing existing and new contracted electricity generation in the EC5N Group

8.1.3 The 'Norwich to Tilbury Strategic Option Backtrack and Review' report issued by National Grid it was noted that a higher deficit identified. On inspecting National Grid results it can be seen that the shortfall they identified was for a wider group and critical fault was for the Walpole – Burwell Main – Pelham double circuit which results in increased power flows flowing through East Anglia transmission network from Walpole to Bramford. However, there are additional reinforcement options which may be available to mitigate these power flows. NGET should be invited to present additional options which have not been presented in the Norwich to Tilbury Strategic Option Backtrack and Review which could mitigate these overloads.

8.2 EC5 Boundary

8.2.1 With respect to the EC5 boundary, the demand within this boundary will exceed 1500MW and as such the MITs planning criteria applies.

8.2.2 The EC5 boundary export requirements are considered in Table 8.2 below. Generation output has been reduced in accordance with the requirements of the SQSS (the planning standards do not assume the full output of all generation in each region). Against the contracted generation background this analysis identifies a need for additional transmission capacity from around 2028/29.

	Table 8.2 - Transmission Capacity required to accommodate contracted generation									
	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33	2033/34	2034/35	2035/36
(A) Existing	2994	2994	2994	2994	2994	2994	2994	2994	2994	2994
(B) New	5467	5887	7949	9612	10312	10984	10984	10984	10984	10984
(C) Total (A+B)	8461	8881	10943	12606	13306	13978	13978	13978	13978	13978
(D) EC5 Demand	1595	1643	1693	1743	1796	1849	1905	1962	2021	2082
(E) Embedded Gen	840	840	840	840	840	840	840	840	840	840
(F) Interconnectors	0	1600	1600	3000	3000	3000	3000	3000	3000	3000
(G) NET Generation (C+E+F)	9301	11321	13383	16446	17146	17818	17818	17818	17818	17818
(H) Interconnector allowance	875	1112.5	1375	1400	1500	1625	1625	1625	1625	1625
(I) Required Transmission capacity	8580	12390	14665	19103	19850	20594	20538	20481	20422	20361
(J) Network Capacity	12580	12580	12580	12580	12580	12580	12580	12580	12580	12850
(K) Surplus/Deficit (J-I)	4000	190	-2085	-6523	-7270	-8014	-7958	-7901	-7842	-7511

Table 8.2 - Table showing existing and new transmission capacity required to accommodate contracted electricity generation with scaling factors applied.

8.3 SIEX Group

8.3.1 With respect to SIEX group, there is less than 1500MW of demand of this group, hence the Generation connection criteria apply.

8.3.2 Table 8.3 below considers the SIEX export requirements against the ESO contracted position. It can be seen that the required exports out of this group will exceed the group capability as generation volumes increase. To accommodate the contracted generation additional transmission capacity will be required by 2029/30.

Contracted Generation	Table 8.3 - Contracted Generation - SIEX Group							
	2028/29	2029/30	2030/31	2031/32	2032/33	2033/34	2034/35	2035/36
(A) Existing	*2078*	*2078*	*2078*	*2078*	*2078*	*2078*	*2078*	*2078*
(B) New	1000	1000	*2670*	*2670*	*4340*	*5340*	*5340*	*5340*
(C) Interconnectors	0	0	1600	3000	3000	3000	3000	3000
(D) Demand	*100*	*150*	*150*	*150*	*150*	*150*	*150*	*150*
(F) Net Export (A+B+C-D)	2978	2928	6198	7598	9268	10268	10268	10268
(H) Transmission Capacity	5558	5558	5558	5558	5558	5558	5558	5558
(G) Surplus/Deficit (F-H)	2580	2630	-640	-2040	-3710	-4710	-4710	-4710

Table 8.3 - Table showing existing and new contracted electricity generation in the SIEX Group.

8.4 Review of Need

8.1 The analysis as identified that there is need for additional transmission capacity for EC5N, EC5 and SIEX boundaries when considering the ESO Generation contracted position.

8.2 However as noted previously, it is extremely unlikely that all projects will proceed in line with their contracted position. In considering the Generation with connection agreements, further consideration need to be given to:

a. Sizewell C Nuclear power station as a connection date of 31 Oct 2029 & 31 Oct 2030 for Units 1 & 2, respectively. This project has not yet reached financial close and on completion after financial close it is anticipated to take a minimum of 9-12 years. Earliest connection date is unlikely before 2035.

b. Interconnectors – Two Interconnectors with a total capacity of 3GW are planned to connect at or close to Sizewell. In reviewing the ESO Interconnector register its noted that both projects are still at the Non-Statutory Consultation Stage. Given that the connection at this location is a major contributor to future investment requirement, the ESO should give further consideration to optimum connection points, with the potential to move further South (potentially Tilbury or Bradwell) thus freeing up capacity to accommodate offshore wind generation.

c. Offshore Wind – there is presently circa 12GW of offshore wind generation being developed which may connect into the East Anglian region. To meet the government targets a further 35GW of offshore wind will be required to connect by 2030. There is presently over 110 GW of offshore wind farm

generation projects being developed. ESO have noted the majority of projects do not proceed in line with their contracted position. Whilst it's recognised that many of the East Anglian projects are actively being progressed, there is significant uncertainty if and when these Generations projects will connect.

8.3 Additional sensitivity studies have been undertaken in examining both the need and timing of future capacity out of the East Anglia Region. The sensitivity studies have been based on assumption that the Bramford – Twinstead Tee and Sizewell to Richborough HVDC link established with a commercial operational solution being applied. The results of this analysis are shown in Table 8.4 below.

8.4 Further analysis has been undertaken to assess how much additional offshore wind could be accommodated against a range of scenarios without the proposed Norwich to Bramford to Tilbury reinforcements. The results of this analysis are shown in table 8.5 below.

a. The capacity column shows volumes of offshore wind that could be accommodated in each group for the scenario being considered.
b. Generation accommodated shows the percentage of contracted generation which could be accommodated in in the three groups under consideration by 2030 and 2035.
c. The final column indicates the maximum volume of new generation which could be accommodated in the East Anglia region (within the EC5 boundary) without adoption of any operational solutions.
d. Thus, could be further enhanced by adopting operational solutions such as I/T and dynamic line ratings until additional transmission capacity was made available.

8.5 It should also be noted that given the GB Connection reform being progressed by the ESO it will be easier to re-allocate transmission capacity to projects which are ready to connect.

	Table 8.4 - Transmission Capacity required - delayed Sizewell C and only one interconnector in group.									
	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33	2033/34	2034/35	2035/36
(A) Existing	2994	2994	2994	2994	2994	2994	2994	2994	2994	2994
(B) New	5467	5887	6559	6811	7511	8183	8183	8183	8183	8183
(C) Total (A+B)	8461	8881	9553	9805	10505	11177	11177	11177	11177	11177
(D) EC5 Demand	1595	1643	1693	1743	1796	1849	1905	1962	2021	2082
(E) Embedded Gen	840	840	840	840	840	840	840	840	840	840
(F) Interconnectors	0	0	0	1600	1600	1600	1600	1600	1600	1600
(G) NET Generation (C+E+F)	9301	9721	10393	12245	12945	13617	13617	13617	13617	13617
(H) Interconnector allowance	875	1112.5	1375	1400	1500	1625	1625	1625	1625	1625
(I) Required Transmission capacity	8580	9190	10075	13501	14249	14992	14937	14880	14821	14760
(J) Network Capacity	12580	12580	12580	12580	12580	14580	14580	14580	14580	14580
(k) Operational solutions	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
(L) Surplus/Deficit (J-I-k)	5400	4790	3905	479	-269	988	1043	1100	1159	1220

Table 8.4 - Table showing electricity transmission capacity required with sensitivities applied relating to the delay of Sizewell C and including only one interconnector.

Table 8.5 -Volumes of additional Offshore Wind which can be accommodated without Norwich - Tilbury development						
Sensitivity studies	**EC5N**		**EC5**		**SIEX**	
	Available Capacity	**Generation accommodated**	**Available Capacity**	**Generation accommodated**	**Available Capacity**	**Generation accommodated**
(a) Contracted Generation	5.7GW	100% (72%)	0.6GW	8% (14%)	0	N/A
(b) As (a) but Sizewell C assumed to connected post 2035	5.7GW	100% (72%)	4.5GW	45% (48%)	0.5GW	N/A
(c) As (b) but with the Sizewell to Richborough HVDC link commissioned 2030	5.7GW	100% (72%)	5.9GW	68% (66%)	2.5GW	N/A
(d) As (c) but with Interconnectors moved out of group	5.7GW	100% (72%)	9GW	100% (100%)	5.5GW	N/A

Table 8.5 - Table showing electricity transmission capacity required with sensitivities applied relating to the delay of Sizewell C and including only one interconnector.

9. Description of Available Technical Solutions

9.1 Technology Overview

9.1.1 This section provides an overview of the technologies available to address the network capacity shortfalls. A high-level description of the relevant features of each technology and indicative cost for each of the technologies considered.

9.1.2 In providing this technology overview the consideration of available technology will be restricted to technologies which can provide adequate transmission

capacity to address shortfalls which have been identified in the East Anglia region.

9.1.3 The estimated costs provided are based on a high-level assessment of requirements and do not consider the detailed requirements for any individual project. These can only be ascertained following a design review of individual projects.

9.2 High Voltage Overhead Lines

9.2.1 High Voltage AC Overhead lines (OHL) form most of the existing transmission systems in Great Britain and in transmission systems across the world. OHL are made up of three main component parts which are pylons (used to support the conductors) and insulators (used to safely connect the conductors to the pylon) and Conductors (used to transport the power).

9.2.2 In GB network, the pylons are typically designed to carry two circuits, one at each side of the pylon. Each circuit consists of three phases, and each phase needs to be installed on a separate arm on the Pylon.

9.2.3 The number of conductors per phase depends on the amount of power to be transmitted. For 400kV operation there will be either three or four conductors per phase, which will provide a total capacity of circa 3400MW per circuit (which gives a total capacity of a new OHL of circa 6800MW).

9.2.4 However, it should be noted that given the meshed nature of the GB transmission system and the need to ensure the network remains secure following critical outages, it will be difficult to fully utilise this capacity without utilisation of power flow technology.

9.3 Onshore Underground Cables

9.3.1 Underground cables at 275kV and 400kV make up approximately 10% of the existing transmission system in England and Wales. Most of the underground cables are installed in Urban areas where achieving an overhead route is not feasible. However, there is becoming an increasing recognition of the importance of protecting nationally designated landscapes areas and preserving important views where underground cable solutions have been adopted for existing and new OHL.

9.3.2 Underground cable systems are made up of two main components – the cable and connectors. Cables consist of an electrical conductor in the centre, which is usually copper or aluminum, surrounded by insulating material and sheaths of protective metal and plastics. Due to the weight of a HVAC cable, they are delivered to site in drums which limits the maximum total length of an individual section of cable. Cable joints are required which connect one cable to another cable or connect a cable to an OHL.

9.3.3 The rating of a HVAC Cable is a function of voltage, cross sectional area of cable and number of cables utilised per phase. In seeking to match the rating of an OHL it will require 3 cables per phase which results in 9 cables per circuit.

9.3.4 Due to the electrical characteristic of underground cable the ability of HVAC cables to transfer power is reduced for longer cables. To offset these phenomena, compensation equipment is required at the ends of the cable. For longer cables compensation equipment is required every 20km to main circuit rating. Subject to installation of appropriate level of compensation there is no restriction on the length of cables.

9.3.5 An alternative to Cables is Gas Insulated Lines (GIL). GIL has been developed from well-established technology of gas insulated switchgear, which has been installed on the transmission system. GIL uses a mixture of nitrogen and Sulphur hexafluoride (SF6) gas to provide the electrical installation. GIL is constructed from Welded or flanged metal tubes, approximately 500mm in diameter, with aluminum conductors in the centre. Three tubes are required per circuit, one tube for each phase. Six tubes are therefore required for two circuits. The analysis in this report has been restricted to cables given the cable system will have a marginally lower cost than a GIL system.

9.3.6 There are several environmental considerations to be made when considering OHL verses cable systems, such as trench required and restrictions on development which can be undertaken on the HVAC cable route, however this consideration is outside the scope of this report.

9.4 Superconductivity Cable Solutions

9.4.1 Consideration was given to the potential use of superconductivity as a solution to transfer higher power on a given route. However, the technology is still in its infancy and whilst there are some small-scale high voltage superconductivity solutions, these have been restricted to short lengths in urban setting. Superconductivity does not presently offer a technical or financially viable alternative to standard high voltage cable solution.

9.5 High Voltage Direct Current (HVDC)

9.5.1 HVDC technology can provide efficient solutions for high power transfers on transmission system and whilst previously been predominately utilised for connection between HVAC systems (for example transferring of power between France and England) it is becoming increasing utilised within AC system to increase boundary capacity when undertaking an economic and environmental appraisal of options. This report will focus on economic appraisal.

9.5.2 A HVDC system comprises of a two-converter station interconnected via HVDC cables. The converter station converts the HVAC to HVDC (and vice versa) and then the power is transferred from sending convertor to the receiving converter via a pair of HVDC cables.

9.5.3 HVDC systems can offer advantages over HVAC underground systems, such as:

a. A minimum of two cables per circuit is required for HVDC system, whereas a minimum of three cables per circuit is required for a HVAC system.

b. Cables with smaller cross-sectional areas can be utilised on the HVDC system in carrying equivalent power on the HVAC system.
c. HVDC cables can be more easily installed and require a much smaller corridor than equivalent HVAC system.

9.5.4 However, whilst the cable system is smaller and easier to install it should be noted that land take to accommodate converter stations is substantial.

9.6 Unit Cost

9.6.1 In undertaking their strategic optioneering NGET have based their high-level option cost on an independent report commissioned by the IET (Electricity Transmission Costing Study – An Independent Report Endorsed by the Institute of Engineering & Technology' by Parsons Brinckerhoff in association with Cable Consulting International). NGET have taken the unit cost from the independent report and then updated the costs in line with inflation and prevailing market conditions as shown in Table 9.1 below. These costs form a reasonable basis for strategic optioneering.

Table 9.1 – Strategic Optioneering, unit cost

Equipment	Capital Cost (£m)	Description
400kv OHL (rating = 3190 MVA per circuit)	3.98	per km
400kv Cable (rating 3190 MVA per circuit)	39.89	per km
400kv GIL (rating 3190MVA per circuit)	43.25	per km
Cable compensation	27.14	per site
HVDC Converter Station	534	pair
HVDC cables - 2000NVA per circuit	3.09	per km

Table 9.1 - Table showing unit cost for each of the strategic options.

9.7 Economic Appraisal of Different Options

9.7.1 The cost of a 100km system is shown in table 9.2 below. The OHL provides the most economical solution for high power transfer over this distance, however: -

a. If a high percentage of the OHL is required to be via an underground system due to environmental considerations, then HVDC system can start to system becomes more economical attractive.
b. If lower ratings are required both cable and HVDC solutions start to look more economically attractive.
c. It can be technically challenging to fully utilise an OHL on a meshed network and consequentially it may not be possible to fully utilise capability

provided by the HVAC OHL system without further investment to manage power flows.

Table 9.2 - Capital costs for a 100kM 6GW system		
HVAC OHL System	HVAC Underground system	HVDC System
100km x £3.98M= £398M	100km x £39.89 M for cables 6 x £27.14M for compensation stations Total cost £4.2bn	3 x £534M for convertor stations 100km x £3.09M for HVDC cables Total cost £1.9bn

Table 9.2 - Table showing the capital costs for a 100-kilometre 6-gigawatt electricity system.

9.8 Incorporation of Offshore Cost

9.8.1 NGET have noted that incorporating the connection of offshore wind into a HVDC system could increase the cost of the HVDC circuit by circa £500M (cost of a HVDC converter on an offshore Platform). Whilst it true to note that the Transmission cost will increase if offshore wind generation is connected directly to a HVDC link, it is also probable that the total cost in accommodating offshore wind projects will fall as the cost of the offshore connections will fall given the offshore wind developer will no longer be required to build his own HVDC system to connect to the Transmission system and their connection to the grid will be shorter.

9.8.2 To determine the cost/benefits of connecting offshore wind directly to a HVDC transmission link needs a detailed cost appraisal of total costs. Given no justification has been provided for the additional cost it has not been included in the economic appraisal undertaken in this report.

9.9 Commercial Non-Build Solutions

9.9.1 Alongside network reinforcements the ESO has developed and procured a commercial non -build solution to address the shortfall in network capacity. An example of where this has been applied is across the B6 boundary (Anglo - Scottish border). The B6 Constraint Management Intertrip Service (CMIS) helps alleviate constraints which would occur due to lack of network capacity. The ESO has contracted with generators (totalling 2GW in capacity) in the region to provide a more economical method of managing constraints than actions through the balancing mechanism. After going live in April 2022, ESO as reported that this service has provided savings to the consumer of £80m in constraint costs during its first ten months of operation.

9.9.2 The 2003 ETYS notes that ‘In order to manage the constraints across the East Coast boundaries, the ESO is also proactively developing a commercial non-build solution, the EC5 Constraint Management Intertrip Service (CMIS)’. The ESO intend to contract with generators in the region to provide a more

economical method of managing constraints. This follows the success of the CMIS now in operation across the B6 boundary'.

9.9.3 Whilst the use of commercial non-build solutions does not provide additional transmission capacity it does provide an economic solution in meeting user requirements.

10. Potential Transmission Reinforcement Options

10.1 The following section considers potential reinforcement options to address the shortfall in Transmission Capacity previously identified. The options considered are at a conceptual stage and no environmental assessment has been undertaken with respect to the viability of any of the option under consideration.

10.2 EC5N Boundary

10.2.1 Against the Contracted Generation background additional transmission capacity is required. The limiting circuits have the highest rating which the existing Pylon and infrastructure can accommodate and therefore to provide more capacity out of this group either a new OHL or a HVDC circuit will be required. This could be achieved by connecting a new circuit directly to the existing 400kV substations at Necton or Norwich Main or by establishing a new 400kv substation between Necton and Norwich Main 400kv substations. For this high-level analysis it has been assumed that the new OHL or HVDC solution would be connected to the existing 400kv substation at Norwich.

10.3 EC5N Boundary – OHL solution

10.3.1 Four possible OHL solutions have been considered as shown in Figure 10.1 below. With a high-level assessment made on each potential option.

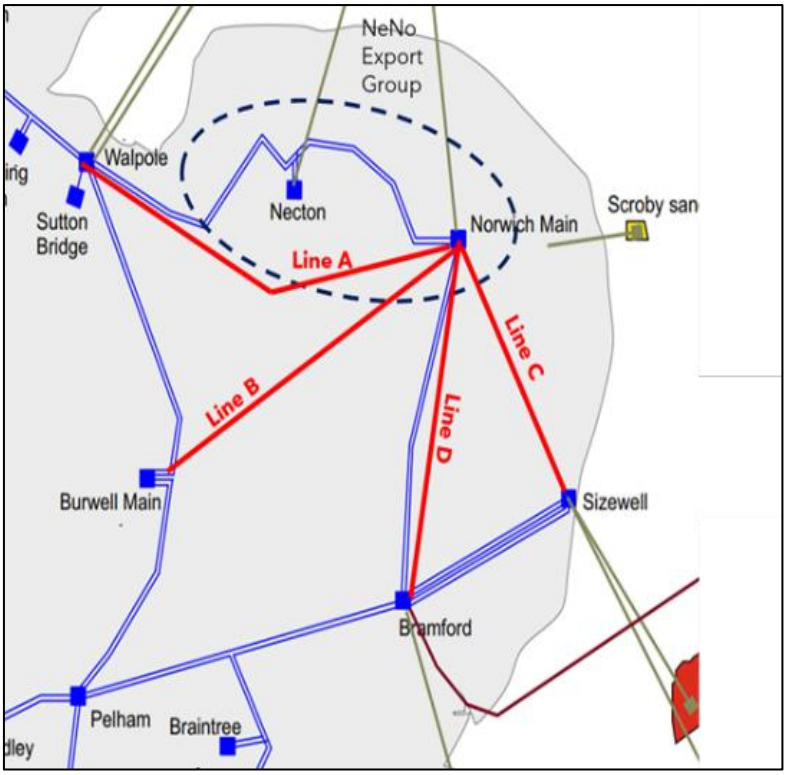

Figure 10.1 – Map and diagram showing potential overhead line solutions in EC5N Boundary.

Option Analysis for EC5N Boundary	
Line A	**OHL between Norwich Main to Walpole x (does not meet system requirements)**
	• Estimated total length 78kM (capital cost £352m)
	• Provides additional capacity to facilitate generation connection in EC5N boundary.
	• For loss/outage of circuits between Pelham – Walpole the Norwich Main to Bramford is potentially overloaded.
Line B	**OHL between Burwell Main to Norwich Main x (does not meet system requirements)**
	• Estimated total length circ 96kM (capital cost £424m)
	• Provides additional capacity to facilitate generation connection in EC5N boundary.
	• For loss of/outage of Burwell Main to Pelham the Norwich Main to Bramford is potential overloaded
Line C	**OHL between Sizewell to Norwich Main x (does not meet system requirements)**
	• Estimated total length circa 60kM (capital cost £280m)
	• Provides additional capacity to facilitate generation connection in EC5N boundary.
	• Would result in additional transfers into the SIEX group resulting in an accelerated need to reinforce this group.
Line D	**OHL between Bramford to Norwich Main √ (does meet system requirements)**

Option Analysis for EC5N Boundary	
	• Estimated total length 80kM (capital £350m)
	• Provides additional capacity to facilitate generation connection in EC5N boundary.
	• Provides additional capacity to accommodate loss/outage of circuits between Pelham -Walpole

Table 10.1 – Table containing bullet points related to the options analysis for EC5 Boundary

10.3.4 Of the four feasible options considered the OHL between Bramford to Norwich Main best meets the system requirements.

10.4 EC5N boundary – HVDC Solution

10.4.1 An alternative to an OHL solution would be the installation of HVDC solution. The shortfall of capacity out of this group is circa 1.25GW, thus requiring a single HVDC links with a total capacity of 2GW. One possible solution is shown in Fig 10.2 below.

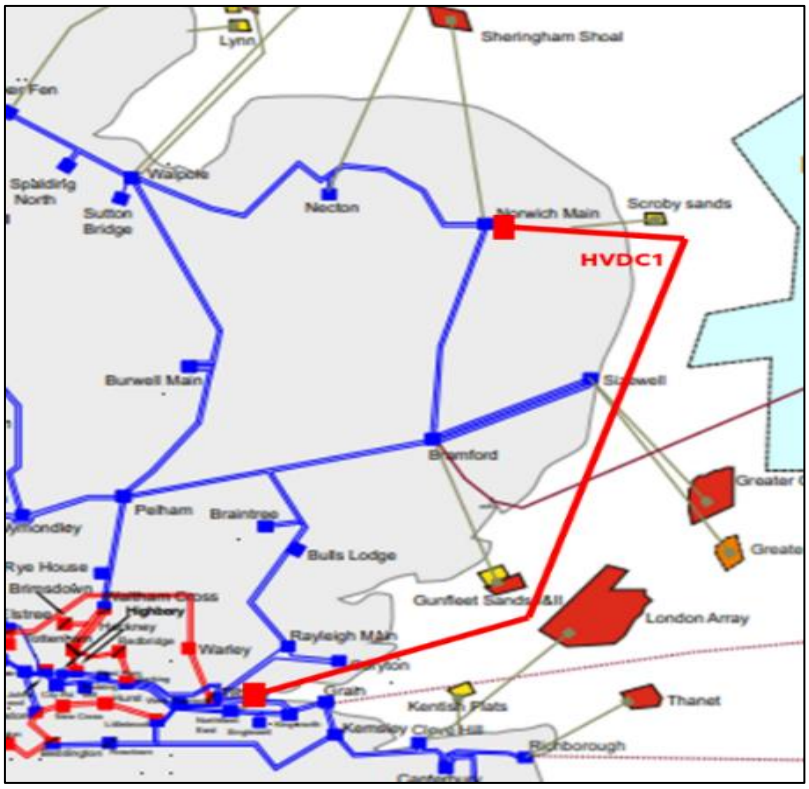

Figure 10.2 – Map and diagram of East Anglia showing potential high voltage direct current solutions in EC5N Boundary.

Option Analysis – HVDC Options	
HVDC1 – X 2GW link between Norwich Main to Tilbury, 400Kv	• Estimated Cost circa £1.3bn

Option Analysis – HVDC Options	
substation – approx. distance 220km.	• Provides 2GW of additional capacity across EC5N Boundary and EC5 Boundary.

Table 10.2 – Table containing bullet points related to the high voltage direct current options analysis for EC5N Boundary

10.5 EC5N boundary – Transfer Generation

10.5.1 The East Anglia network predominantly consists of a single double circuit between Walpole- Necton – Norwich Main – Bramford 400kv substations. The offshore connection is predominately via AC connection and to the nearest convenient point to the Transmission system. There is little opportunity to transfer to an alternative point on the transmission network without occurring significant delays and an increase in the offshore connection costs.

10.6 SIEX Group

10.6.1 Against the Contracted Generation background additional transmission capacity is required. There is the potential to increase the group export capability by installing higher rated conductors on the four circuits connecting Sizewell to Bramford, but this will only increase the export capability of this group to circa 6800MW.

10.6.2 To provide the required capacity out of this group either a new OHL or a HVDC circuit will be required. This could be achieved by connecting directly to the existing 400kV substations at Sizewell as shown in Fig 10.3 below.

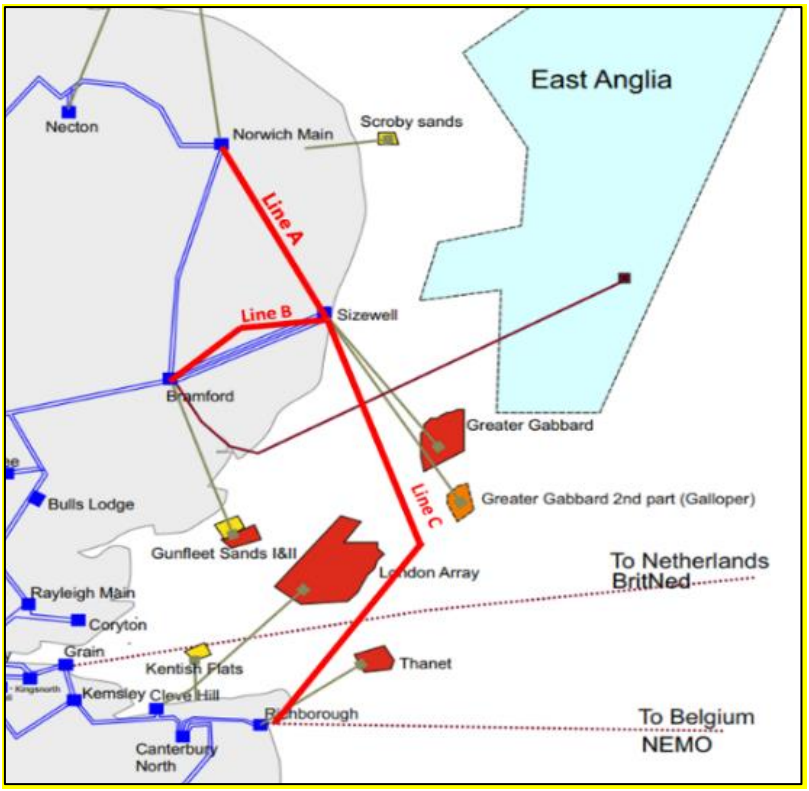

Figure 10.3 – Map and diagram of East Anglia showing reinforcement solutions in the SIEX Group

Option Analysis for SIEX Group	
A	**New OHL between Norwich Main to Sizewell x (does not meet system requirements)**
	• Estimated total length 60kM (£260M)
	• Provides little addition extra capacity[17] in facilitate generation connection in SIEX group.
	• Does not provide any additional capacity across EC5 boundary.
B	**New OHL between Bramford to Sizewell √ (does meet system requirements)**
	• Estimated total length circ 43kM (£212m)
	• Provides additional capacity to facilitate generation connection in SIEX group.
	• Does not provide any additional capacity across the EC5 boundary.
C	**New HVC Link between Sizewell to Richborough √ (does meet systems requirements)**
	• Estimated total length 120kM (£904M)
	• Provides additional capacity to SIEX group.
	• Provides 2GW of additional capacity across the EC5 boundary.
D	**Reconductor all circuits between Sizewell – Bramford √ (does meet systems requirements)**
	• Estimated cost £175M.
	• Provides circa 1GW of additional capacity to the SIEX group.

[17] The through Flows limit network utilisation.

Option Analysis for SIEX Group	
	• Does not provide any additional capacity across the EC5 boundary.

Table 10.3 – Table containing bullet points related to the options analysis for SIEX Group

10.6.3 Of the options consider, the Option A – new line between Bramford to Sizewell does provide significant additional capacity out of the SIEX group, increasing the transfer capability from 5550MW to 11100MW, but does not provide any additional capacity across EC5.

10.6.4 Combination of Option C - New HVDC Link between Sizewell to Richborough and option D - Reconductor all circuits between Sizewell – Bramford, does provide adequate additional capacity meet capacity requirements for SIEX group whist providing 2 GW of additional transmission capacity across EC5 boundary.

10.7 SIEX Group – Transfer Generation and/or Interconnectors

10.7.1 Consideration can be given to transferring the two Interconnectors presently planned to connect to Sizewell to location south of the EC5 boundary (possible Tilbury or Bradwell) to free up additional capacity to accommodate renewable generation which could potentially be connected via AC connection. Thus, would potentially reduce the overall cost to the consumer.

10.8 EC5 Boundary

10.8.1 Against the Contracted Generation background 7.5GW of additional transmission capacity is required. The limiting circuits have the highest rating which the existing Pylon and infrastructure can accommodate and therefore to provide more capacity out of this group either a new OHL’s or a HVDC circuits will be required. This could be achieved by connecting directly to the existing 400kV substations at either Bramford, Sizewell or Norwich as shown in Figure 10.4 below.

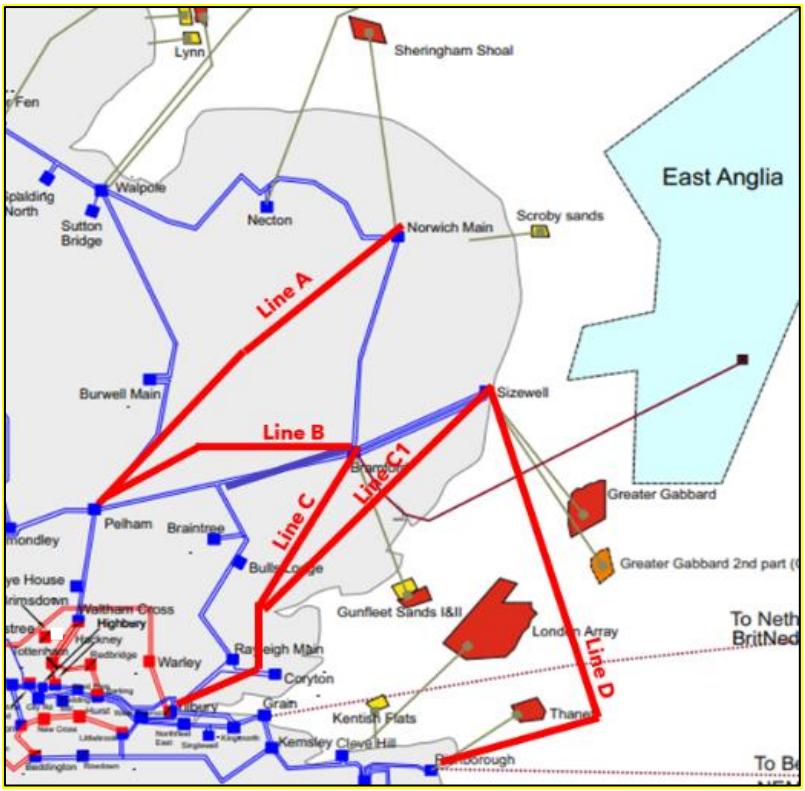

Figure 10.4 – Map and diagram of East Anglia showing potential overhead line and high voltage direct current solution in EC5 Boundary.

Option Analysis for EC5 Boundary	
Line A	**OHL between Norwich Main to Pelham x (does not meet system requirements)**
	• Estimated total length 140Km (£600M)
	• Provides additional capacity across the EC5 boundary.
	• However, in considering the of the outage of circuits between Pelham – Wymondly the Pelham to Waltham Cross would be overloaded.
Line B	**OHL between Bramford to Pelham x (does not meet system requirements)**
	• Estimated total length circ 70Km (£320m)
	• Provides additional capacity across the EC5 boundary.
	• However, for the outage of circuits between Pelham – Wymondly the Pelham to Waltham Cross would be overloaded.
Line C	**OHL between Bramford to Tilbury √ (does meet system requirements)**
	• Estimated total length circa 102 km (£448m)
	• Provides additional capacity across the EC5 boundary.
	• There is transmission capacity available at Tilbury to accommodate this line without triggering the need for further new OHL south of Tilbury.
	• Only provides a maximum of 6.8GW of additional capacity, further reinforcement required.

Option Analysis for EC5 Boundary	
Line C1	**OHL between Sizewell to Tilbury √ (does meet system requirements)**
	• Estimated total length circa 150Km (£640m)
	• Provides additional capacity across EC5 boundary & SEIX group.
	• Available transmission capacity at Tilbury to accommodate this line without triggering the need for further new OHL south of Tilbury.
	• Only provides a maximum of 6.8GW of additional capacity, further reinforcement required.
Line D	**2 x 2.2GW HVDC Link between Sizewell to Richborough √**
	• Estimated total length 120KM (£1.9bn)
	• Provides additional capacity across EC5 & SEIX
	• Provides additional capacity to accommodate loss/outage of circuits between Pelham -Walpole.

Table 10.4 – Table containing bullet points related to the options analysis for EC5 Boundary

10.8.2 To deliver the required additional capacity to meet the contracted position, no single reinforcement identified above provides sufficient capacity. Therefore, a combination of C), D) and E) would be required.

11. Potential Solution to Meet Overall Requirements.

11.1 Combination of OHL + HVDC

11.1 To meet the overall requirements to facilitate the connection of the contracted generation background a combination of OHL and HVDC could be adopted as shown in figure 10.5 below.

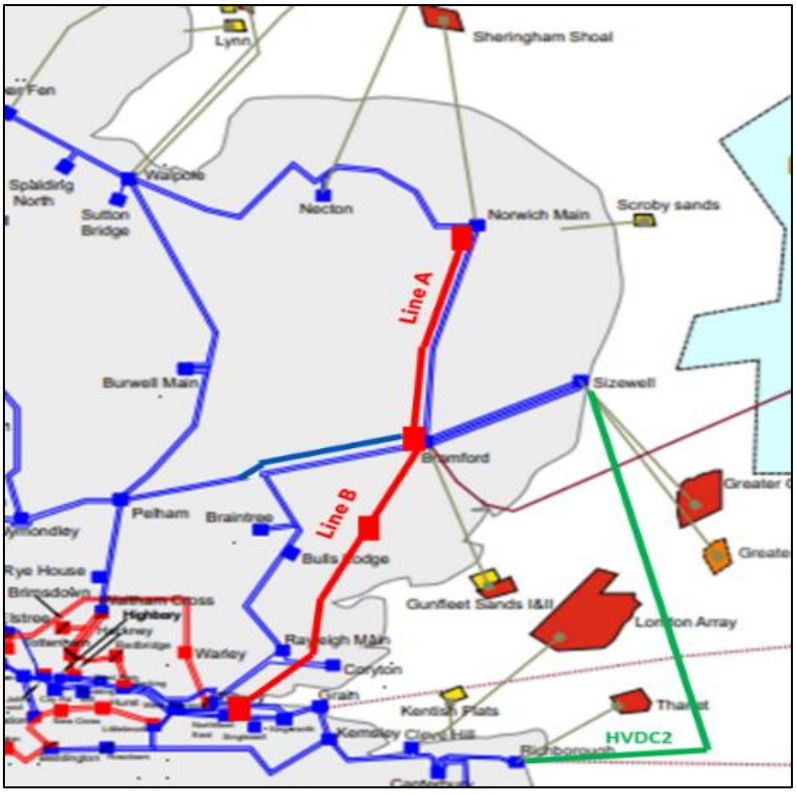

Figure 11.1 – Map and diagram of East Anglia showing a combined overhead line and high voltage direct current solution.

Utilising onshore and offshore solutions at cost of £1.5 bn
a) **Line A Line D - OHL between Bramford to Norwich Main**
• Estimated total length 61Km (£350m)
• Provides additional capacity to facilitate generation connection in EC5N group.
b) **Line B - OHL between Bramford to Tilbury**
• Estimated total length circa 102 km (£448)
• Provides additional capacity across EC5.
• Available transmission capacity at Tilbury to accommodate this line without triggering the need for further new OHL.
c) **HVDC 1 - 1 x 2 GW HVC Link between Sizewell and Richborough**
• total length 120kM (£985M)
d) **Reconductor all circuits between Sizewell – Bramford**
• Estimated cost £350M.
• C) + D) provides sufficient capacity to meet SIEX
This solution provides the following:
• 6.6 GW of additional capacity out of EC5N export
• 2.2 GW of additional capacity out of SEIX
• 8.8 GW of additional capacity out of EC5

Table 11.1 – Table containing bullet points detailing the utilisation of onshore and offshore solutions.

11.2 Offshore HVDC Solution

11.2 Alternatively, the capacity required to facilitate the contracted generation could be accommodated via a series of HVDC links as shown in Figure 10.6 below.

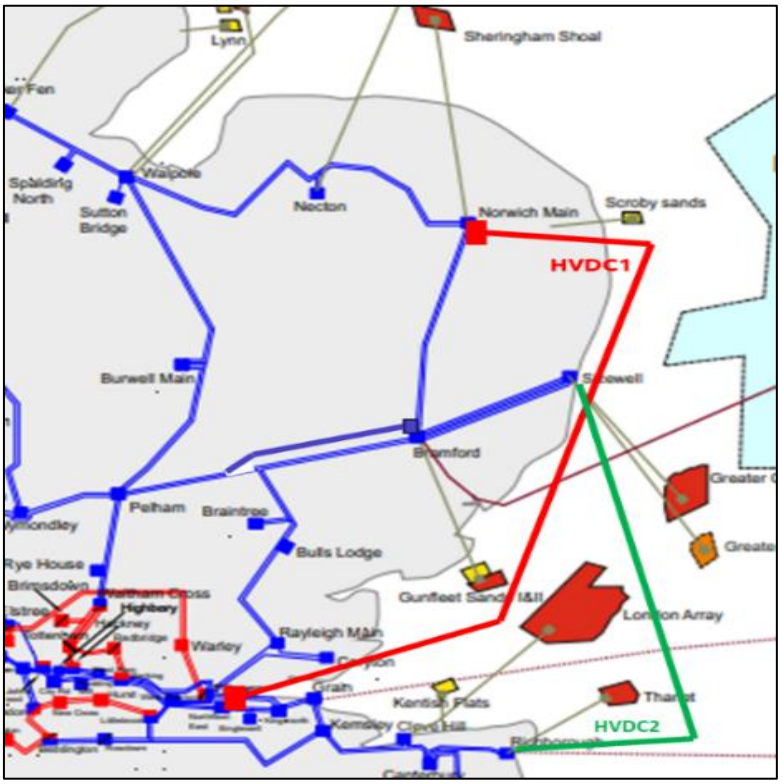

Figure 11.2 – Map and diagram of East Anglia showing a high voltage direct current solution.

Utilising offshore HVDC links at cost of £4.4bn
a) **HVDC 1: 2 x 2.2GW HVDC link between Norwich Main to Tilbury 400KV Substation**
• total length is 220Km.
• Estimated Cost circa £2.5bn
b) **HVDC 2 - 2 x 2.2GW HVC Link between Sizewell and Richborough**
• total length 120kM
• Estimated Cost circa £1,9bn for 2 x 2.2GW link.
This solution provides the following:
• 4.4GW of additional capacity across EC5N boundary
• 4.4GW of additional capacity out of SIEX
• 8.8GW of additional capacity across the EC5 boundary

Table 11.2 – Table containing bullet points detailing the utilisation of offshore high voltage direct current solutions.

11.3 Table 11.3 below provides a high-level summary of the potential solutions. It can be seen that the OHL solution does provide the most economical solution, but the cost of the onshore solution will increase if HVAC cables are required.

Table 11.1 - Cost Comparison of Viable Solutions										
Onshore Solution (OHL + HVDC link)			Onshore Solution (HVAC cables + HVDC link)				HVDC Solution			
Project	Capacity	Cost (£M)	Project	Capacity	Cost (£M)	Ratio	Project	capacity	Cost (£M)	Ratio
Norwich - Tilbury OHL	6.6GW	864	Norwich - Tilbury cabled	6.6GW	7674	8.9	2 X Norwich Main - Tilbury HVDC Link	4 GW	2508	2.9
Sizewell - Richborough HVDC Link	2GW	985	Sizewell - Richborough HVDC Link	2GW	985	1	2 X Sizewell - Richborough HVDC Link	4GW	1930	1.96
uprate Sizewell - Bramford circuits		175	uprate Sizewell - Bramford circuits		175					
Total	8.6GW	2024	**Total**	8.6GW	8834	4.4	**Total**	8.0 GW	4437	2.19

Table 11.3 – Table showing cost comparison of viable solutions.

12. Optimum Timing of Delivery of Required Reinforcements

12.1 In considering future capacity requirements for the EC5 group there is a clear requirement for the Bramford – Twinstead Tee proposal and this report as assumed they have proceeded.

12.2 In looking at subsequent reinforcement there is strong need for the Sizewell to Richborough HVDC link to provide additional capacity for both EC5 and SIEX exports, the timing being dictated by both the development of offshore wind and Sizewell C Nuclear Power Station. Whilst not considered in this report, this solution would provide additional transmission capacity across boundaries LE1 (London Import) and SC2 (South Coast import) (for more detail of these requirements see NGET report – Norwich to Tilbury Strategic Options Backcheck and review)

12.3 The Need for the Norwich to Bramford OHL is dictated by the development of offshore wind connected to Necton and Norwich Main Substation. The present contract position would indicate 2028/29, but there is significant uncertainty with respect to the timing of development of this generation. Furthermore, Operational solutions can be implemented to manage this uncertainty to minimise potential stranding risk. It should also be noted that this solution does not provide any additional transmission capacity across boundary SC2.

12.4 The Need for the Bramford to Tilbury OHL is driven by development of Offshore Wind, Sizewell C Nuclear Power Station a development of new HVDC Interconnectors. Given the uncertainty of volume and speed of development of generation in this group and the opportunity to locate the HVDC interconnectors outside this group, there remains significant uncertainty with regard the need and timing for this proposed reinforcement.

13. Conclusion

13.1 In considering the transmission capacity needs against the ESO Contracted Generation position as stated in the TEC register there is need for additional transmission capacity from both Norwich/Necton and Sizewell 400kV substation to Tilbury and Richborough respectively by 2030.

13.2 There are two credible alternative solutions, either:

Option 1 – 'Onshore solution'

a. Development of a 400kv OHL between Norwich via Bramford to Tilbury 400kv substation.
b. Reconductoring the existing circuits between Sizewell to Bramford.
c. HVDC link between Sizewell and Richborough 400kv substations.

Option 2 – 'Offshore solution'

a. HVDC links between Norwich to Tilbury and Sizewell to Richborough 400kv substation.

13.3 Table 13.1 below provides a comparison of the capital cost in developing Option 1 & Option 2 (note – cost/benefits of connecting offshore wind into the HVDC system have not been included in cost comparison).

Table 13.1 - Cost Comparison of Viable Solutions						
Onshore Solution (HVAC OHL + HVDC link)			HVDC Solution			
Project	Capacity	Cost (£M)	Project	capacity	Cost (£M)	Ratio
Norwich - Tilbury OHL	6.6GW	864	2 X Norwich Main - Tilbury HVDC Link	4 GW	2508	2.9
Sizewell - Richborough HVDC Link	2GW	985	2 X Sizewell - Richborough HVDC Link	4GW	1930	1.96
uprate Sizewell - Bramford circuits		175				
Total	8.6GW	2024	**Total**	8 GW	4437	2.19

Table 13.1 – Table detailing cost comparison of viable solutions.

13.4 However, as noted by the ESO, a high proportion of Contracted generation does not progress in accordance with its contracted position and given the uncertainty of likely generation connection, further sensitivity studies should be undertaken to assess both the robustness of need and timing of any additional transmission capacity which is required to support generation development in the East Anglia Region. These sensitivity studies should consider: -

a. The Timing of Connection of Sizewell C: presently a connection date of 31 October 2029 & 31 October 2030 for Units 1 & 2, respectively. Earliest connection date is more likely to be +2035.

b. Connection points for future Interconnectors – Two Interconnectors with a total capacity of 3GW are planned to connect at or close to Sizewell. The ESO should give further consideration about the connection points to the UK network, with the potential to move further South (potentially either Tilbury or Bradwell) thus freeing up capacity to accommodate offshore wind generation.

c. Volume and timing of Offshore Wind development – there is presently circa 12GW of offshore wind generation being developed which may connect into the East Anglian region. To meet the government targets a further 35GW of offshore wind will be required to connect by 2030 (i.e., Government Target of 50GW from Offshore wind by 2030). There is presently over 110 GW of offshore wind farm generation projects in the Contracted Generation Background. Whilst it's recognised that many of the East Anglian projects are actively being progressed, there remains significant uncertainty if and when these Generations projects will connect.

d. To consider impact of the revised methodology in modelling Batteries and other energy storage technologies in line with the revised ESO recommendations.

13.5 Following the establishment of the proposed Bramford to Twinstead developments NGET have confirmed that this will release significant additional capacity to support offshore development in the East Anglian Region. Table 12.2 below provides a high-level analysis of how much generation could be accommodated against a range of credible scenarios.

13.6 The results of this analysis his shown in Table 13.2 below.

a. The capacity column shows volumes of offshore wind that could be accommodated in each group for the scenario being considered.

b. Generation accommodated shows the percentage of contracted generation which could be accommodated in 2030 and 2035, respectively.

Table 13.2 - Maximum renewables which can be accommodated without Norwich - Tilbury development

Sensitivity studies	EC5N		EC5		SIEX		Max	
	Capacity	Generation accommodated	Capacity	Generation accommodated	Capacity	Generation accommodated	Capacity	Generation accommodated
(a) Contracted Generation	5GW	86% (63%)	0.4GW	5% (4%)	0	N/A	0.4GW	4% (3%)
(b) As (a) but Sizewell C assumed to connected post 2035	5GW	86% (63%)	4.4GW	40% (42%)	0.5GW	N/A	4.4GW	40% (37%)
(c) As (b) but with the Sizewell to Richborough HVDC link commissioned 2030	5GW	86% (63%)	7.2GW	66% (66%)	2.5GW	N/A	7.2GW	66% (61%)
(d) As (c) but with Interconnectors moved out of group	5GW	86% (63%)	11.8GW	100% (100%)	5.5GW	N/A	9.0GW	83% (76%)

Table 13.2 – Table detailing the maximum capacity of renewable energy that can be accommodated in the East Anglia region without the Norwich to Tilbury project.

13.7 From this analysis it can be seen that delaying the decision to commit to a further network expansion of the East Anglia network whilst additional sensitivity studies are undertaken would not delay development of the offshore Wind generation projects and it would ensure risk of stranded investment in Transmission Assets are reduced.

13.8 If this review concludes that there is a reduced need for additional transmission capacity out of the EC5 group, then the economics of the alternative HVDC solution compared to the OHL becomes more economical attractive as shown in Table 13.3 below. A detailed assessment of total cost may show that incorporating appropriate offshore wind development directly into HVDC links could further reduce total cost.

Table 13.3 - Cost Comparison of Viable Solutions with reduced EC5 capacity requirements						
Onshore Solution (HVAC OHL + HVDC link)			HVDC Solution			
Project	Capacity	Cost (£M)	Project	capacity	Cost (£M)	Ratio
Norwich - Tilbury OHL	6.6GW	864	1 X Norwich Main - Tilbury HVDC Link	2 GW	1214	1.4
Sizewell - Richborough HVDC Link	2GW	985	2 X Sizewell - Richborough HVDC Link	4GW	1930	1.96
Total	8.6GW	1850	**Total**	6 GW	3143	1.70

Table 13.3. – Table detailing the cost comparison of viable solutions with reduced EC5 boundary capacity requirements.

13.9 Whilst the proposed OHL from Norwich to Bramford to Tilbury may be the best solution to meet the future needs of the Generation development in East Anglia, given the level of uncertainty associated with the Contracted Generation background it too early at this stage to conclude it does presently represents the best solution in meeting future system needs.

13.10 Further sensitivity analysis is needed to determine both the need and timing for the proposed development. Given the earliest likely need is +2035 undertaking a more in-depth analysis would not delay the development of offshore projects in the East Anglian Region

END