AENC-ARC-ENV-REP-0158

Norwich to Tilbury

Volume 6: Environmental Statement

Document: 6.9.A2 Environmental Statement Appendix 9.2 - Qualitative Minerals Resource and Infrastructure Assessment

Final Issue A

August 2025

Planning Inspectorate Reference: EN020027

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 Regulation 5(2)(a)

nationalgrid

Contents

9. Qualitative Minerals Resource and Infrastructure Assessment

9.1 Introduction

Overview

9.1.1 This appendix presents a Qualitative Minerals Resource and Infrastructure Assessment (MRIA) to inform Chapter 9: Contaminated Land, Geology and Hydrogeology (document reference 6.9) of the Environmental Statement (ES) (Volume 6 of the Development Consent Order (DCO) application for Norwich to Tilbury (the 'Project'). This appendix has been prepared to provide baseline information on minerals and minerals infrastructure present within the Study Area and identify the potential effects of the Project on minerals infrastructure, Minerals Safeguarding Areas (MSA) and/or Mineral Consultation Areas (MCA).

9.1.2 The purpose of this assessment is to establish the potential impact of the Project on mineral resources of economic importance and to consider whether further consideration and mitigation is required.

9.1.3 As described in Chapter 1: Contaminated Land, Geology and Hydrogeology (document reference 6.9), the Study Area for geology comprises the Order Limits plus a 250 m buffer.

9.1.4 This MRIA has been written with regard to the Minerals Safeguarding Practice Guidance (Minerals Production Association, 2019) which provides guidance on the scope and format of a minerals assessment.

9.1.5 The Project has also been sub-divided into eight geographical sections for reader accessibility, based largely on Local Planning Authority boundaries and comprise:

- Section A – South Norfolk Council
- Section B – Mid-Suffolk District Council
- Section C – Babergh District Council, Colchester City Council and Tendring District Council
- Section D – Colchester City Council
- Section E – Braintree District Council
- Section F – Chelmsford City Council and Brentwood Borough Council
- Section G – Basildon Borough Council and Brentwood Borough Council (and part of Chelmsford City Council)
- Section H – Thurrock Council.

9.1.6 The need for the Project is set out in Chapter 1: Introduction (document reference 6.1) of the ES (Volume 6 of the DCO application).

9.1.7 The Project comprises the installation of approximately 159 km of overhead line, approximately 509 pylons, seven new Cable Sealing End (CSE) compounds, and includes connection works into existing substations. There are two new substations, one on the Tendring Peninsula (East Anglian Connection Node (EACN) Substation) and Tilbury North, to the south of Orsett Golf Course. In addition, the Project includes approximately 21 km of underground cabling. Further detail is provided in Chapter 4: Project Description (document reference 6.4).

9.2 Minerals Policy and Planning

National Policy Statements

9.2.1 As described in Chapter 2: Key Legislation and Planning Policy (document reference 6.2) of the Environmental Statement, when determining an application for development consent, the Planning Inspectorate is required to have regard for the relevant National Policy Statements (NPS). The two relevant NPS for the Project are the Overarching NPS for Energy (EN-1) (Department for Energy Security and Net Zero (DESNZ), 2024a) and the NPS for Electricity Networks Infrastructure (EN-5) (DESNZ, 2024b). However, EN-5 does not discuss minerals.

9.2.2 Full consideration of the relevant NPSs for the Project can be found in the Policy Compliance Document (document reference 5.7).

9.2.3 Paragraph 5.11.19 of EN-1 states, '*Applicants should safeguard any mineral resources on the proposed site as far as possible, taking into account the long-term potential of the land use after any future decommissioning has taken place''*.

9.2.4 Paragraph 5.11.28 of EN-1 states *'Where a proposed development has an impact upon a Mineral Safeguarding Area (MSA), the Secretary of State should ensure that appropriate mitigation measures have been put in place to safeguard mineral resources*'.

9.2.5 Although the relevant NPS provide the primary policy against which the Project should be decided, regional and local policy documents may also be considered important and relevant to decision-making. Therefore, the relevant minerals plans have been considered when developing this MRIA.

2025 Revisions to National Policy Statements

9.2.6 In April 2025, the government launched a consultation on proposed changes to EN-1 and EN-5 that ended on 29 May 2025. The consultation covers updates to:

- Draft: Overarching National Policy Statement for Energy (EN-1) (DESNZ, 2024a)
- Draft: National Policy Statement for Electricity Networks Infrastructure (EN-5) (DESNZ, 2024b)

9.2.7 Changes consulted upon in the draft 2025 updates to the energy infrastructure NPSs include alignment with Clean Power 2030 targets and endorsement of the Centralised Strategic Network Plan. The 2025 revisions have strengthened the process for delivering major new infrastructure, reinforcing the government's ambition to deliver clean power by 2030.

9.2.8 The transitional provisions on the status of the 2025 revisions say:

'While the review is undertaken, the current suite of energy NPS remain relevant government policy and EN-1 to EN-5 have effect for the purposes of the Planning Act 2008. The Secretary of State has decided that for any application accepted for examination before amending the energy NPSs, the current suite of energy NPS, published in 2024, should have effect. The amended energy NPSs will therefore only have effect in relation to those applications for development consent accepted for examination after the publication of the final amended energy NPSs. However, any emerging draft energy NPSs (or those amended but not having effect) are potentially capable of being important and relevant considerations in the decision-making process. The extent to which they are relevant is a matter for the relevant Secretary of State to consider within the framework of the Planning Act 2008 and with regard to the specific circumstances of each development consent order application'.

9.2.9 At the point of submission of the Project, the NPSs designated in January 2024 were government policy.

9.2.10 If the revised NPSs are designated prior to a decision being made on the application for development consent, deliverables will be reviewed for consistency with the newly-designated NPSs, and any additional requirements would be captured within an errata document post submission. It was confirmed in Section 51 advice received from the Planning Inspectorate that if the new NPSs are adopted after the application has been submitted, the Examining Authority can issue procedural decisions to ask all parties for views on the impacts of new NPSs.

National Planning Policy Framework

9.2.11 The National Planning Policy Framework (NPPF) (Ministry of Housing, Communities & Local Government, 2025) Section 17, paragraphs 222 to 227 describe how planning policies should facilitate the sustainable use of minerals.

9.2.12 Paragraph 223 states that '*Planning policies should:*

c) Safeguard mineral resources by defining Mineral Safeguarding Areas and Mineral Consultation Areas; and adopt appropriate policies so that known locations of specific mineral resources of local and national importance are not sterilised by non-mineral development where this should be avoided (whilst not creating a presumption that the resource defined will be worked); and

d) set out policies to encourage the prior extraction of minerals, where practical and environmentally feasible, if it is necessary for non-mineral development to take place'.

9.2.13 The NPPF also states in paragraph 226 that '*Minerals planning authorities should plan for a steady and adequate supply of aggregates by*:

f) maintaining landbanks of at least 7 years for sand and gravel … whilst ensuring that the capacity of operations to supply a wide range of materials is not compromised'.

Local Planning Policy

Norfolk County Council Minerals and Waste Development Framework

9.2.14 The current Norfolk County Council Minerals and Waste Development Framework (Norfolk County Council, 2011) covers Section A of the Order Limits and was adopted in September 2011 and covers the period from 2010 to 2026.

9.2.15 The plan is currently under review and Norfolk County Council are preparing a Norfolk Minerals and Waste Local Plan to update the policies and extend the plan period to the end of 2038 which is due for adoption in May 2025. The draft Norfolk Minerals and Waste Local Plan was submitted to the Planning Inspectorate for examination in December 2023 and the Planning Inspectorate's report was published in March 2025. A current publication of the Norfolk Minerals and Waste Local Plan is available online along with the modifications proposed following the Planning Inspectorates report.

9.2.16 The adopted Minerals and Waste Local Plan Policy MP11 relates to mineral safeguarding areas and minerals consultation areas states that '*The County Council will safeguard existing, permitted and allocated mineral extraction*. The policy also states that '*The Minerals Planning Authority should be consulted on all development proposals within Mineral Consultation Areas…the Minerals Planning Authority will object to development which would lead to the sterilisation of the mineral resource and it would be for the relevant Local Planning Authority to decide whether there are compelling planning reasons for over-riding this safeguarding'*.

9.2.17 Policy MP1 of the Minerals and Waste Local Plan (Norfolk County Council, 2025) (states that the sand and gravel landbank will be maintained at between a 7 and 10-year supply, depending on the mineral.

9.2.18 The policies map that accompanies the Minerals and Waste Local Plan confirms that parts of the Section A Study Area and the Order Limits are within a MSA for sand and gravel.

9.2.19 Information received from Norfolk County Council has provided the locations of safeguarded minerals infrastructure and/or allocated sites for mineral extraction and their relevant consultation areas. This information is shown on Figure 9.3: Minerals Safeguarded Areas, Minerals Consultation Areas and Minerals Infrastructure (document reference 6.9.F3).

9.2.20 The data set indicates that the most northern part of the Study Area and Order Limits crosses the safeguarded areas for the following active and safeguarded sites; Swardeston Quarry, Mangreen Recycling Centre and Mangreen Quarry (which relates to site MIN81, discussed below).

9.2.21 Information provided by Norfolk County Council indicates that the Study Area and Order Limits also cross three Adopted Sites (MIN79, MIN80 and MIN81). However, MIN79 andMIN80, have been noted as 'deleted' (withdrawn by the operator) in the pre-submission publication of the Norfolk Minerals and Waste Local Plan, published in May 2022 and are no longer adopted. Site MIN81 has also been noted as 'deleted' however this is due to the site receiving planning permission in February 2015 and implementing the permission.

Suffolk County Council Minerals and Waste Local Plan

9.2.22 The Suffolk Minerals and Waste Local Plan (Suffolk County Council, 2020) was adopted in July 2020, and covers Section B and the northern two-thirds of Section C of the Order Limits. The policies map within the adopted Minerals Local Plan identifies that '*sand and gravel resources are located throughout the County'*. The adopted plan indicates that parts of the Section B and C Study Area are located within the Suffolk MCA, as shown on Figure 9.3: Mineral Safeguarded Areas, Mineral Consultation Areas, and Minerals Infrastructure (document reference 6.9.F3).

9.2.23 Policy MP10 of the Suffolk Minerals and Waste Local Plan (Suffolk County Council, 2020) advises that these areas will be safeguarded from proposed development of more than 5 ha. As the Order Limits exceed 5ha within an MCA, a MRIA has been produced to assess whether '*the sand and gravel present is not of economic value, or not practically or environmentally feasible to extract, or that the mineral will be worked before the development takes place or used within the development'* in accordance with Policy MP10.

9.2.24 The Order Limits of the Project also interact with an existing concrete batching plant (Poundfields Products), as shown on Figure 9.3: Mineral Safeguarded Areas, Mineral Consultation Areas, and Minerals Infrastructure (document reference 6.9.F3). Policy MP9 of the Local Plan deals with the safeguarding of concrete manufacture and states that the County Council should be consulted where '*proposals made would result in the loss of or might potentially compromise the use*' of a facility. However, the Order Limits only interact with the concrete batching plant site because the Project is proposing to utilise the existing access roads, and the proposed pylons within this area will be positioned outside of the facility. Therefore, the Project will not cause the loss of, or compromise the works of the facility, and therefore it is considered that there are no potential significant impacts in relation to this facility and no further assessment is included herein.

Essex County Council Minerals Local Plan

9.2.25 The Essex Minerals Local Plan (Essex County Council, 2014) was adopted in July 2014 and covers Sections C, D, E, F and G. The Essex Minerals Local Plan is currently under review and a Draft Replacement Essex Minerals Local Plan (Essex County Council, 2024) was published for consultation in February 2024 to extend the plan end date to 2040. The consultation on the document closed in July 2024. During the review of the Essex Minerals Local Plan a call for sites exercise was undertaken to support development up to 2040 and the sites are now being considered by Essex County Council for their potential inclusion in the new Plan.

9.2.26 Policy S8 of the adopted Minerals Local Plan requires that the Minerals Planning Authority be consulted, and its views considered on '*all planning applications for development on a site located within an MSA and/or MCA that would have the potential to sterilise 5ha or more for sand and gravel, 3 ha or more for chalk and greater than 1 dwelling for brickearth or brick clay*'. Where development exceeds these thresholds, a minerals assessment is required.

9.2.27 Policy MP10 of the adopted Minerals Local Plan advises that the MSA will be safeguarded from proposed development more than 5ha. If a project sterilises 5 ha of mineral within the MCA, the developer needs to demonstrate that '*the sand and gravel present is not of economic value, or not practically or environmentally feasible to extract, or that the mineral will be worked before the development takes place or used within the development*'.

9.2.28 The Essex Minerals Local Plan is currently under review to extend the plan period to 2040. The Draft Replacement Essex Minerals Local Plan (Essex County Council, 2024) has similarly worded policies around minerals safeguarding.

9.2.29 The Essex Minerals Local Plan defines sand and gravel MSA as being all areas of glacial, glaciofluvial and river terrace deposits of sand and gravel identified on the British Geological Survey (BGS) mapping (and other supplementary sources of evidence). Brick Clay MSA are also defined by BGS mapping and are localised within Essex.

9.2.30 The policies map within the adopted Essex County Council Minerals Local Plan confirms that parts of the Study Area (for the Sections identified) are located within a MSA for sand and gravel and brickclay. The Study Area also interacts with some existing minerals sites and their associated MCAs, as shown on Figure 9.3: Mineral Safeguarding Area, Mineral Consultation Area, and Minerals Infrastructure (document reference 6.9.F3).

9.2.31 Information received from Essex County Council has provided the locations of the following safeguarded existing minerals infrastructure sites that the Order Limits and Study Area interact with:

- Crown Quarry (Section C) – Within the Order Limits
- Bradwell Quarry (Section E) – The information received from Essex County Council in relation to the Minerals Local Plan identifies Bradwell Quarry outside of the Order Limits. However, a review of planning applications and consultation feedback from Essex County Council indicates the proposed extension of the site is within the Order Limits
- Blixes Farm (Section E) and the corresponding MCA are located within the Study Area, and a small part of the Order Limits also cross the MCA for this site. However, this part of the Project only proposes to utilise an existing access road and the proposed Project infrastructure will be outside of the site's boundary
- Sheepcotes (Section F), located north-east of Little Waltham – is within the Order Limits, however the parts of the Sheepcotes site that are within the Order Limits only comprise existing access roads and the proposed infrastructure for the Project will be outside the site's boundary and not within the operational part of the site
- Roxwell Quarry, Chignall St James (Section F) – is within the Order Limits, however proposed pylons within this section of the Order Limits are to be placed outside of the working boundary of Roxwell Quarry.

9.2.32 In addition to these existing minerals sites, the Order Limits and Study Area also cross the following candidate sites identified during the call for sites undertaken to support the Essex minerals plan review. These sites are not currently allocated within the Minerals Local Plan and therefore have a lower sensitivity (currently) compared to the existing sites detailed above:

- A85 and A86 Martells (Section C) – Within the Order Limits
- A79 and A80 Crown Quarry (Section C) – Within the Order Limits
- A47 Bradwell Monks Farm (Section E) – Within the Order Limits
- A59 Lowleys Farm (Section F) – Within the Order Limits.

Thurrock Council Local Development Framework – Minerals and Waste Thematic Policies

9.2.33 The development plan for minerals in Thurrock is comprised of the adopted Core Strategy and Policies for Management of Development (Thurrock Council, 2015), which was adopted in January 2015, and the Essex Minerals Local Plan adopted first review (Essex County Council, 1996). These documents cover Section H.

9.2.34 The Thurrock Council Local Development Framework (Thurrock Council, 2015) contains information relating to minerals planning policy in CSTP31 and CSTP32. Policy CSTP32 of the Core Strategy states that MSA in Thurrock are '*based on the work undertaken for the ECS*' (Environmental Capacity Statement) (SKM Enviros, 2010).

9.2.35 Thurrock Council's Environmental Capacity Statement (SKM Enviros, 2010) states that a MSA '*identifies and raises awareness to developers of the possible presence of workable mineral deposits. The potential for extracting these deposits must be considered when submitting and determining planning applications for non-mineral related development. This ensures valuable mineral resource are not needlessly sterilised*'.

9.2.36 Figure 11 of the ECS indicates that sections of the Section H Order Limits are within a MSA for sand and gravel.

9.2.37 The following safeguarded existing minerals infrastructure sites are identified within the Order Limits and Study Area:

- Burrows Farm, Brentwood Road, Bulphan (Section H) – designated by Thurrock Council as an aggregate recycling site – located approximately 150 m north-west of the Order Limits therefore the Project infrastructure will be outside of the site's boundary
- Orsett Quarry (Section H) - current permitted minerals site, with a pending application for an extension to the east of the existing quarry – located within the Order Limits
- Rainbow Shaw Quarry (Section H) - designated by Thurrock Council as an aggregate recycling site – located within the Order Limits, however the Project is only proposing to utilise the existing access road and the proposed infrastructure for the Project will be outside of the site's boundary
- Mill House Farm (Section H) – designated as a permitted minerals site which is located inside the Order Limits. The area is included for the use of temporary pylons for the Project
- Dansand Quarry, Stanford Road (Section H) – designated by Thurrock Council as an operational sand and gravel quarry and is located directly adjacent to the west side of the Order Limits.

9.3 Local Aggregate Assessments

9.3.1 The current landbank for various aggregates for any given Mineral Preferred Area (MPA) is usually documented in a Local Aggregate Assessment (LAA), which reports annually on aggregate supply and demand within the relevant planning area.

Norfolk County Council Local Aggregate Assessment

9.3.2 The latest LAA for Norfolk County Council (Section A) was published in February 2024 and reflects the position of Norfolk Council minerals at the end of 2022. The LAA contains the following relevant information:

- **Sand and Gravel Sales**: The 10-year average sales have decreased since the previous LAA and currently stands at 1.413 million tonnes (Mt) as of December 2022. The 3-year average sales currently stands at 1.390 Mt which is a marginal increase compared to the previous LAA
- **Sand and Gravel Landbank**: The permitted reserves are currently estimated at 17.954 Mt, which has decreased since the previous LAA. This translates to a current landbank of permitted reserves, based on the 10-year sales average, of 12.7 years which is a decrease from the previous LAA where the landbank stood at 13.4 years. This is significantly greater than the seven-year requirement set out in the NPPF and above the requirement set out in Policy CS1 of the Norfolk Minerals and Waste Development Plan
- **Mineral Permitted Reserves**: Two planning permissions for mineral extraction were granted in 2022 for sand and gravel extraction, which are outside of the Study Area. There were also three planning applications for additional sand and gravel extraction in the process of being determined in 2022. All of these applications are located outside of the Study Area.

Suffolk County Council Local Aggregate Assessment

9.3.3 The most recent LAA for Suffolk (Section B and the northern half of Section C) reflects the position at the end of 2022. This contains the following relevant information:

- **Sand and Gravel Sales**: The 10-year average sales have decreased slightly since the previous LAA and currently stands at 1.077 Mt as of December 2022, however the 3-year average was slightly higher at 1.083 Mt
- **Sand and Gravel Landbank**: The landbank of permitted reserves as of December 2022, based on the 10-year sales average, was 9.555 years which is a slight decrease from the previous LAA. This is greater than the seven-year requirement set out in the NPPF
- **Mineral Permitted Reserves**: the LAA for Suffolk does not provide information on minerals extraction sites that are in the process of obtaining planning permission or those that have been recently granted permission. The LAA does state there are currently 15 sand and gravel quarries in Suffolk, however further details on whether they are currently active or dormant are not presented.

Greater Essex Local Aggregate Assessment

9.3.4 The latest available LAA for Greater Essex (Sections C, D, E, F, G and H), which covers the areas of Essex County Council and Thurrock Council, was published in March 2024 and reflects the position at the end of 2022. The LAA contains the following relevant information:

- **Sand and Gravel Sales**: The 10-year annual average sales (2013 to 2022) figure was 3.45 Mt and the three-year annual average sales was 3.33 Mt, which are both below the predicted tonnage of 4.45 Mt per annum which was used to determine the required provisions in the current adopted Minerals Plan. These figures have increased from the previous LAA although the predicted 4.45 Mt provided for in the current Minerals Plan has never been realised
- **Sand and Gravel Landbank**: The permitted reserves stood at 37.15 Mt at the end of 2022. The current landbank is calculated using the 10-year sales average, which translates to 10.75 years which is significantly greater than the seven-year requirement set out in the NPPF and is a marginal increase from the last LAA
- **Mineral Permitted Reserves**: During 2022, nine applications for mineral extraction were granted which increased the permitted reserves by 6.7 Mt. As of December 2022, there were a further four pending permissions across Greater Essex that were awaiting determination, which would permit the working of an additional 4.14 Mt of sand and gravel, increasing the permitted reserve to 41.29 Mt which would represent the highest permitted reserve since 2007. Of these applications two are located within the Study Area (Bradwell Quarry and Orsett Quarry) which are discussed in the sections below.

9.4 Existing Baseline

Geology and Mineral Details

9.4.1 The geology in the Study Area is shown on Figure 9.1: Superficial Geology (document reference 6.9.F1) and Figure 9.2: Bedrock Geology (document reference 6.9.F2) and summarised below. Further information on the geology is presented in Appendix 9.1: Baseline Information and Preliminary Contamination Risk Assessment (document reference 6.9.A1).

Published Geology – Superficial Deposits

9.4.2 The superficial geology beneath the Study Area within Sections A, B, D, E and F generally comprises the Lowestoft Formation (Diamicton). Where river valleys cross the Order Limits the superficial deposits in these areas comprise the Lowestoft Formation (Sand and Gravel), Alluvium, River Terrace Deposits, Head Deposits and Kesgrave Catchment Subgroup.

9.4.3 The superficial geology within Section C of the Study Area comprises the river valley deposits described above and large areas of Cover Sands.

9.4.4 Superficial deposits within Section G and Section H of the Study Area are indicated to be absent within parts of these sections and where present are dominated by the river valley deposits of Alluvium, River Terrace Deposits and Head Deposits.

Published Geology – Bedrock

9.4.5 In Section A the bedrock comprises the White Chalk Subgroup. In Section B the bedrock comprises the White Chalk Subgroup, Newhaven Chalk Formation and Crag Group. In Section C the bedrock comprises the Thames Group, Thanet Formation and Lambeth Group (Undifferentiated), and Red Crag. In Sections D, E, F and G the bedrock comprises the London Clay Formation, with the Claygate Member and Bagshot Formation also outcropping within Section F and Section G. In Section H the bedrock comprises the London Clay Formation, Harwich Formation, Lambeth Group, Thanet Formation, and the White Chalk Subgroup.

Mineral Assessment Reports

9.4.6 There are 12 relevant Minerals Assessment Reports (MAR) which cover parts of the Order Limits. The MAR are a series of reports that describe the mineral resources across areas of the United Kingdom. The reports were produced using data gathered from borehole surveys and contain qualitative and quantitative data on lithology, composition, particle size analysis and other information of commercial value in relation to mineral resources.

9.4.7 The MAR subdivides the area covered into resource blocks where the mineral is present, then further sub divides into areas where it is exposed and areas where it is present beneath overburden.

Minerals Assessment Report, 001

9.4.8 MAR001 (Nickless, 1971), covers the northern part of Section A.

9.4.9 The part of Section A covered by MAR001 is located within resource block C in the MAR, and most of the area is characterised as '*continuous or almost continuous spreads of mineral beneath overburden*'. Some areas crossed by the Order Limits are identified as having mineral present that is less than 1m thick or areas where the sand and gravel is exposed. The sand and gravel in this resource block is identified as being of varied thickness and quality with varying levels of overburden. Towards the south of the section the mineral is described as often found to be interbedded with the Lowestoft Formation (Diamicton), noted as Boulder Clay in the MAR.

Minerals Assessment Report, 137

9.4.10 MAR137 (Wilcox and Stanczyszyn, 1983), covers the southern part of Section A, directly to the north of Diss.

9.4.11 The part of Section A covered by MAR137 is located within resource block A in the MAR, characterised as '*continuous or almost continuous spreads of mineral beneath overburden*'. This block is also within an area described as '*Area with excessive overburden.'* and *'Sand and Gravel absent locally*'. Resource block A is covered by Boulder Clay (Lowestoft Formation (Diamicton)) which is very thick in places, especially in the north of the section. The main mineral resources in this section are Glacial Sand and Gravel and the Kesgrave Sands and Gravels (Kesgrave Catchment Subgroup) and are mostly exposed where the River Waveney has cut through the overburden. Boreholes within the area have proven the presence of Glacial Sands and Gravels within the Boulder Clay, however these are thought to be lenticular and not laterally continuous. The mean thickness of the mineral is indicated to be 6.1 m with the overburden indicated to have a mean thickness of 9.2 m.

Minerals Assessment Report, 117

9.4.12 MAR 117 (Auton, 1982) covers the northern third of Section B, from Roydon to Wickham Street. The part of Section B covered by MAR117 is located within resource blocks A, B, D and F.

9.4.13 Resource block A is located around the area of Roydon to the north of the River Waveney. Much of the area is described in the MAR as the Boulder Clay plateau, and in part is described as '*barren of mineral'*. Elsewhere deposits of sand and gravel are beneath the Boulder Clay and described as unworkable due to the excessive overburden thickness. Mineral deposits are identified close to the River Waveney as the River has cut through much of the Boulder Clay overburden. The mean thickness of mineral is indicated to be 7.7 m and the overburden is indicated to have a mean thickness of 7.3 m.

9.4.14 Resource block B spans north and south of the River Waveney, with the main mineral deposit identified as the River Terrace Deposits and underlying Glacial Sand and Gravel located within the valleys and buried channel systems. This section is described as a mixture of '*exposed mineral'* and '*continuous or almost continuous spreads of mineral beneath overburden*'. The minerals are indicated to have a mean thickness of 8.5 m. The mean thickness of overburden is indicated to be 1.7 m

9.4.15 Resource block D is located to the south of resource block B and the Waveney Valley between Burgate and Wortham. Much of this block crossed by the Order Limits is described as '*continuous or almost continuous spreads of mineral beneath overburden*' with some small sections identified as '*exposed mineral*'. The mineral in this section comprises Glacial Sand and Gravel, and the Kesgrave Catchment Subgroup which underlies the Boulder Clay and outcrops at the valley edges. The MAR describes '*barren land'* where Head Deposits directly overly the Chalk, and we assume this refers to an absence of mineral. The mineral is indicated to have a mean thickness of 4.3 m. It is also identified that mineral was absent within much of the Boulder Clay plateau (except for the limited areas of exposed Glacial Sand and Gravel). The overburden in the block is indicated to have a mean thickness of 8.8 m.

9.4.16 Resource block F is located to the south of resource block D, around Wickham Street. The mineral in this block is indicated to be the Kesgrave Catchment Formation, which is overlain by the Boulder Clay, and laterally impersistent beds of Glacial Sand and Gravel. River Terrace Deposits are also identified within the valleys of small streams. Much of the area crossed by the Order Limits is described as '*continuous or almost continuous spreads of mineral beneath overburden*' with some small sections described as '*exposed mineral*'. The minerals are indicated to have a mean thickness of 8.3 m and the overburden an average thickness of 12.5 m.

Minerals Assessment Report, 55

9.4.17 MAR 55 (Allender and Hollyer, 1981) only covers a very small area of the Order Limits in the southern part of Section B and the northern part of Section C. The part of these sections covered by MAR55 are located within resource blocks B and E. However, as the Order Limits cover such a small area of these resource blocks the generalised description may not provide accurate information regarding the area crossed by the Order Limits and therefore mean thicknesses have been left out of the descriptions below.

9.4.18 Resource block B is located directly to the south of Bramford Substation and extends just north of Washbrook Street. The area crossed by the Order Limits is generally described as '*sand and gravel absent or potentially not workable*'.

9.4.19 Resource block E is located directly south of resource block B. The area crossed by the Order Limits is generally described as '*sand and gravel absent or potentially not workable*' with a small part indicated to be '*exposed mineral*'.

Minerals Assessment Report, 14

9.4.20 MAR 14 (Ambrose, 1975) covers the area to the north-east of Colchester (Section C) around Ardleigh to Little Bromley. The part of Section C covered by MAR14 is located in resource blocks B and C.

9.4.21 Resource block B crosses the Order Limits around Ardleigh. The mineral in this section is indicated to be the Glacial Sands and Gravels. This area is mostly described as '*continuous or almost continuous spreads of mineral beneath overburden*' with an area indicated as '*exposed mineral*' to the east and south-east of Ardleigh where the mineral outcrops on the valley sides. The mean mineral thickness is indicated to be 5.2 m and a mean overburden thickness of 2.5 m described as '*normally comprising loam deposits'*.

9.4.22 Resource block C is located to the east of resource block B and covers the areas towards Little Bromley. The area is indicated to mostly be covered by loam, underlain by mineral comprising Glacial Sands and Gravels. To the south of the resource block, around Little Bromley, but outside of the Order Limits, the Glacial Sand and Gravel are indicated to be exposed at the surface. In general, the area is described as '*continuous or almost continuous spreads of mineral beneath overburden'*. The minerals are indicated to vary in thickness, with a mean thickness indicated to be 6m. The overburden is also found to vary in thickness with a mean thickness of 2.5 m estimated.

Minerals Assessment Report, 85

9.4.23 MAR 85 (Hopson, 1981) covers the area around Great Horkesley in Section D. The part of Section D covered by MAR85 is located within resource block H of the MAR. The mineral within this resource block is indicated to be the Glacial Sand and Gravel, the Kesgrave Catchment Subgroup, and the Red Crag. The majority of resource block H is described as '*exposed mineral*' with the western section described as '*continuous or almost continuous spreads of mineral beneath overburden'.* The mean total thickness of the minerals is indicated to be 5.7 m. The overburden in this section is indicated to be thin, except to the south of Little Horkesley, where it ranges up to 8 m thick.

Minerals Assessment Report, 10

9.4.24 MAR 10 (Ambrose, 1974) covers the southern half of Section D. The part of Section D covered by MAR10 is located within resource blocks A, C and D.

9.4.25 Resource block A is located around the area of Fordham. Much of the area is indicated to be within an area where the overburden ratio is more than 3:1 and the Boulder Clay is more extensive than the Glacial Sand and Gravel. Very small, limited areas of the Order Limits are within an area where minerals are indicated to be exposed.

9.4.26 Resource block C is located along the banks of the River Colne where the mineral is indicated to be the River Terrace Deposits. The resource block is generally described as '*continuous or almost continuous spreads of mineral beneath overburden*' with the thickness of the mineral found to be variable but generally increasing from about 1.5 m thick in the west to over 3 m in the east, normally with less than 1.5 m of overburden.

9.4.27 Resource block D is located south of block C, between the River Colne and Marks Tey. The mapping generally indicates that the outcrop of Glacial Sand and Gravel is irregular, and the mineral is mainly present beneath overburden of Boulder Clay. The MRIA indicates that the mineral is absent or unworkable across the majority of the area, with small, limited areas of exposed mineral.

Mineral Assessment Report, 102

9.4.28 MAR 102 (Booth and Merritt, 1982) covers the southern part of Section D and the northern quarter of Section E. The part of Sections D and E covered by MAR102 are located within resource blocks B2, C and D.

9.4.29 Resource block B2 is in the central area between Marks Tey and the River Blackwater. The Kesgrave Catchment Subgroup and Glacial Sand and Gravel are identified as the mineral within this area, beneath an overburden of Boulder Clay. There are large parts of the area where the Boulder Clay is identified as too thick to extract the mineral, with other sections described as '*continuous or almost continuous spreads of mineral beneath overburden*'. The mean overburden thickness is indicated to be 7.4 m. It is also indicated that only 8% of the mineral within the resource block is exposed with a mean thickness of 6.4 m.

9.4.30 Resource block C is located to the south of the River Blackwater, described as an area where 92% of the area is mineral bearing. The area is generally described as '*continuous or almost continuous spreads of mineral beneath overburden*' with small sections, mostly associated with the banks of the River Blackwater described as '*exposed mineral*'. The mean thickness of the overburden is indicated at 6.4 m, with the mineral having a mean thickness of 6.6 m.

9.4.31 Resource block D is located along the River Blackwater, and includes the fluvial deposits of the river valley, of which 76% is mineral bearing. Most of the section is described as '*discontinuous spreads of mineral beneath overburden*'. Potentially workable mineral deposits, with a mean thickness of 1.9 m, but which are indicated to be discontinuous, are located beneath overburden of Alluvium, which has a mean thickness of 3.5 m.

Mineral Assessment Report, 002

9.4.32 MAR 002 (Haggard, 1972) covers the central part of Section E. The part of Section E covered by MAR002 is located within resource blocks A and B.

9.4.33 Resource block A contains an almost continuous spread of Chelmsford Gravels beneath an overburden of Till present across most of the block, described as '*continuous or almost continuous spreads of mineral beneath overburden*'. Exposed mineral is indicated to be present at the edges of the river valleys. The mean thickness of the mineral is indicated to be 7.5 m with the mean overburden being 7.2 m thick. Mineral is indicated to be absent within the riverbeds themselves as they have been incised down to the London Clay.

9.4.34 Resource block B is generally the same as resource block A, with the mean overburden being 6.4 m and the mean mineral thickness being 5.7 m.

Mineral Assessment Report, 006

9.4.35 MAR 002 (Eaton, 1973) covers the south-west part of Section E and the northern part of Section F. The part of Sections E and F covered by MAR006 are located within resource blocks B, C, D and H.

9.4.36 Resource block B is located between Faulkbourne and White Notley. Much of the area is described as '*continuous or almost continuous spreads of mineral beneath overburden*', with the areas adjacent to the River Brain described as '*exposed mineral*' and the mineral indicated to be absent within the river bed. The Chelmsford Gravel is indicated to be the mineral within this resource block generally present below Boulder Clay overburden. However, in some areas the mineral is absent, and the Boulder Clay directly overlies the London Clay bedrock. The thickness of overburden ranges from 0.3 m to 12.6 m with the thickness of the mineral ranging from being absent to 9.5 m.

9.4.37 Resource block C generally forms the plateau area between the River Ter and River Brain. Mineral is indicated to be present beneath overburden, except for the river valley edges where mineral is exposed, and in the riverbed where it is absent. The overburden within this block ranges from 0.3 m to 13.1 m and the mineral thickness ranges from being absent to 11.9 m.

9.4.38 Resource block D generally forms the valley of the River Ter. The River Ter is incised into the London Clay formation therefore the mineral is generally found to be absent within the river bed, however the Chelmsford Gravels are indicated to be present within the river valley sides as '*exposed mineral*'. The overburden within this block is indicated to be between 0.3 m and 10.4 m thick with the mineral ranging from being absent to 11.3 m thick.

9.4.39 Resource block H is generally indicated to be absent of mineral with the Boulder Clay directly overlying the London Clay across much of the area.

Mineral Assessment Report, 52

9.4.40 MAR 52 (Marks, 1980) covers the central part of Section F. The part of Section F covered by MAR52 is located within the south-east corner of resource block E.

9.4.41 Resource block E and the area of the Order Limits is described generally as '*continuous or almost continuous spreads of mineral beneath overburden*' and an area where the mineral is potentially unworkable or absent. The mineral within this block is indicated as being almost exclusively located beneath overburden of Boulder Clay, which has a mean thickness of 7.7 m but ranges up to 16.3 m.

Mineral Assessment Report, 66

9.4.42 MAR 66 (Hopson, 1981) covers the southern part of Section F. The part of Section F covered by MAR66 is located within resource blocks A, B and C.

9.4.43 Resource block A covers the area between Chignall St James to just south of Great Oxney Green. Much of the sand and gravel within this block is concealed beneath overburden of Boulder Clay with limited outcrops in the river valleys. The area crossed by the Order Limits mostly comprises areas described as '*continuous or almost continuous spreads of mineral beneath overburden*' around the area of Chignall St James with the rest indicated as potentially unworkable or absent. The overburden within areas where mineral is indicated to be present has a mean thickness of 5.7 m. The sand and gravel beneath the Boulder Clay are indicated to thin out in the south of the block with a mean thickness of 4.9 m.

9.4.44 Resource block B covers the area to the west of the River Wid and Margaretting. Much of the mineral in this area is indicated to be potentially unworkable or absent, with only small, limited areas of mineral concealed beneath a thin layer of overburden comprising Head Deposits. The overburden has a mean thickness of 0.4 m. The mineral in this block is indicated to have a mean thickness of 3 m.

9.4.45 Resource block C covers the area south of Margaretting with much of the mineral in the area crossed by the Order Limits described as potentially unworkable or absent. The overburden in the area consists of Alluvium, Head Deposits and Boulder Clay with a mean thickness of 2.3 m. The mean recorded thickness of the mineral is 2.7 m.

9.5 Assessment

Effects of the Project on Safeguarded Extents

9.5.1 The policies maps accompanying the relevant minerals plans indicate that large parts of the Order Limits are located within safeguarded areas – predominantly for sands and gravels and brick clay. However, the Order Limits are the largest extent of the area within which the Project may be placed and do not represent the actual potential area where mineral may be sterilised by the Project, which would be significantly smaller. The actual physical footprint of the built operational Project components is a relatively small proportion of the Order Limits.

9.5.2 At the current time, the majority of the route is proposed to be overhead line with pylons spaced typically approximately 330 m apart, and the conductors which span between the pylons. The conductors may not result in sterilisation of minerals on their own, as minerals could be extracted from beneath the overhead line, if required, following suitable assessment and consultation with National Grid. Therefore, this assessment relates only to the pylon bases and any operational clearance required, areas of undergrounding, new substations and CSE compounds.

9.5.3 In addition, any potential mineral sterilisation can be considered to be temporary, as access to the underlying mineral could be restored if parts or all of the infrastructure are decommissioned.

Norfolk County Council

9.5.4 The policies map accompanying the Norfolk Minerals and Waste Local Plan (Norfolk County Council, 2011) indicates that approximately 4% of the Order Limits, within Norfolk County, are located within a MSA. This is shown on Figure 9.3: Minerals Safeguarding Areas, Minerals Consultation Areas and Minerals Infrastructure (document reference 6.9.F3).

Suffolk County Council

9.5.5 The Safeguarding and Proposals Map accompanying the Suffolk Minerals and Waste Local Plan (Suffolk County Council, 2020) indicates that approximately 52% of the Order Limits, within Suffolk County, are located within a MCA. This is shown on Figure 9.3: Minerals Safeguarding Areas, Minerals Consultation Areas and Minerals Infrastructure (document reference 6.9.F3).

9.5.6 The county of Suffolk is approximately 3,800 km^2 in area, and approximately 52% of the county is located within a MCA. The Order Limits within Suffolk that are covered by a MSA represents approximately 0.3% of the total MSA in Suffolk.

Essex County Council

9.5.7 The policies map accompanying the Essex Minerals and Waste Local Plan (Essex County Council, 2014) indicates that approximately 67% of the Order Limits, within Essex County, are located within a MSA for sand and gravel. This is shown on Figure 9.3: Minerals Safeguarding Areas, Minerals Consultation Areas and Minerals Infrastructure (document reference 6.9.F3).

9.5.8 The county of Essex is approximately 3,600 km^2 in area, and approximately 36% of the county is currently safeguarded for sand and gravel deposits. The Order Limits within Essex that are covered by a MSA represents approximately 1.1% of the total sand and gravel MSA in Essex. It is also noted that pylons have been sited outside of the brick clay safeguarded areas as far as practicable to reduce the impacts on the brick clay mineral.

Effects of the Project on Existing Minerals Infrastructure

9.5.9 Several Minerals Infrastructure sites are located within the Study Area; however, these sites are mostly located outside of the Order Limits or within areas where the Project proposes only to use the existing access tracks (Swardeston Quarry (Section A), Mangreen Recycling Century (Section A), Mangreen Quarry (Section A), Poundfields Products (Section B), Blixes Farm (Section E), Burrows Farm (Section H), Rainbow Shaw Quarry (Section H), Mill House Farm (Section H), Dansand Quarry (Section H)). Therefore, significant impacts and effects on the Minerals Infrastructure Sites are not considered to be likely. Where the minerals infrastructure is within the Order Limits, the Project has where practicable, placed the infrastructure outside of each sites' boundary. Further details of where proposed Project infrastructure may impact existing minerals sites is presented below.

Crown Quarry

9.5.10 Crown quarry is located to the west of Ardleigh Reservoir and is crossed by the Order Limits within Section C. There is currently one pylon proposed within the boundary of the quarry (TB20), along the northern boundary of the site along Wick Lane, and a further two pylons (TB19 and TB21) within the MCA for the site.

9.5.11 A review of the plans for Crown quarry on the Essex County Council planning portal suggests that the northern part of the site along Wick Lane is not proposed to be worked as the mineral is not expected to extend that far. Further discussions with the quarry operator will be undertaken to agree any mitigation that may be required and minimise impacts on the working area so that significant effects are unlikely.

Bradwell Quarry

9.5.12 Bradwell Quarry is located to the south-west of Coggeshall and is crossed by the Order Limits in Section E. There is currently one pylon (TB84) proposed within the boundary of the quarry in the section denoted by the quarry as A7 as shown on the information included within the planning application, along the southern boundary of the site.

9.5.13 A review of the plan for the site on the Essex County Council planning portal suggests that the southern corner of section A7, in the location of the proposed pylon, is not within the proposed extraction area. Therefore, significant effects are considered to be unlikely.

Sheepcotes (Quarry)

9.5.14 Sheepcotes is located to the north-east of Little Waltham and is crossed by the Order Limits within Section F. In this section the Order Limits only cross the access roads for the quarry, with overhead line conductors, and do not interact with any of the operational parts of the site. It is considered that there would be minimal impact on the site and therefore significant effects are unlikely.

Roxwell Quarry

9.5.15 Roxwell quarry is located to the south-west of Chignall St James and is crossed by the Order Limits within Section F of the Project. However, the pylons within this section are to be placed outside of the Roxwell quarry boundary. In addition, a review of the site from the latest available aerial imagery (dated 2024) suggests the site has been fully restored. Therefore, it is considered that there would be no impact on the site.

Orsett Quarry

9.5.16 Orsett Quarry is located to the north of East Tilbury, Thurrock and is crossed by the Order Limits within Section H of the Project. The proposed pylon locations within this area have been amended during the change control process for the Project and are now placed outside of the site boundary. Further discussions with the quarry operator will be undertaken to agree any mitigation that may be required and minimise impacts on the working area so that significant effects are unlikely.

Effects of the Project on Candidate Minerals Infrastructure Sites

9.5.17 The Order Limits and Study Area also interact with the following Candidate Sites that have been put forward following the Essex County Council Call for Sites (Essex County Council, 2023). It is noted that these sites have not currently been allocated however they could be in the new minerals local plan once adopted.

A85 and A86 Martells

9.5.18 Sites A85 and A86 are located to the east of Ardleigh and are crossed by the Order Limits within Section C. The sites are being promoted as an extension to an existing silica sand and sand and gravel mineral site which is outside of the Order Limits and Study Area.

9.5.19 Consideration has been given to alternative route options for the Project at this location, however the Project needs to connect to the new EACN Substation and there are other constraints in this area that limit the route options. The route has been amended to reduce the impact on this candidate site as far as practicable.

9.5.20 The Limits of Deviation for the overhead line and underground cable and the Order Limits have also been widened within this area to facilitate further adjustments to the Project if the site becomes allocated in a future minerals plan as described in Chapter 4: Project Description (document reference 6.4) within Section 4.6.

A79 and A80 Crown Quarry

9.5.21 Sites A79 and A80 are located to the west of Ardleigh and to the west of Ardleigh Reservoir. The candidate site is crossed by the Order Limits within Section C of the Project. The sites are being promoted as an extension to the active Crown Quarry minerals site.

9.5.22 The Order Limits within this area have been widened to allow flexibility for an alternative alignment to be developed to reduce the impacts on the candidate site, as described in Chapter 4: Project Description (document reference 6.4).

A47 Bradwell Monks Farm

9.5.23 Site A47 is located to the south of Coggeshall and is crossed by the Order Limits within Section E. The site is being promoted as an extension to the active Bradwell Quarry.

9.5.24 Through consultation discussions with the site's promoter, the Order Limits within this area have been widened to allow flexibility for an alternative alignment should the site be allocated in a future minerals plan. This alternative alignment means that the pylons could be moved to the site boundaries to reduce the impact on the site as described in Chapter 4: Project Description (document reference 6.4).

A59 Lowleys Farm

9.5.25 Site A59 is located to the east of Chatham Green and is crossed by the Order Limits within Section E. The site is being promoted as a new minerals site off Goodmans Road, Chelmsford.

9.5.26 Through consultation discussions with the site's promoter, the Order Limits within this area have been widened to allow flexibility for an alternative alignment should the site be allocated in a future minerals plan. This alternative alignment means that the pylons could be moved to the site boundaries to reduce the impact on the site as described in Chapter 4: Project Description (document reference 6.4).

Engineering and Construction Considerations of Prior/Incidental Extraction

9.5.27 Prior extraction refers to the removal of a mineral resource, to prevent sterilisation, prior to the commencement of construction works on a project. Incidental extraction refers to the removal of mineral during the construction of the Project. In both scenarios there is the option to extract only the mineral that is encountered during the normal construction works required to facilitate the Project, or to go further than the normal construction requirements and excavate all the accessible mineral beneath any built parts of the Project.

9.5.28 In this case, neither prior nor incidental extraction are considered feasible due to the likely engineering requirements needed following mineral extraction, to create an appropriate development platform for the Project, and in combination with the relatively small volume of mineral produced, and the potential associated environmental impacts and effects of the extraction. The works required to create an appropriate development platform for the Project following prior extraction would require significant time that is likely to delay the construction programme.

Overhead Line Sections

9.5.29 The Project is expected to comprise the installation of approximately 159 km of overhead line comprising approximately 509 pylons. Any prior extraction at pylon bases is likely to produce a very small quantity of economic mineral and would also need to include an area significantly bigger than both the proposed pylon bases and any excavations proposed to facilitate their construction (for reasons of practicality and stability). The mineral would then have to be replaced by appropriate material which would need to be engineered to meet any specific geotechnical design requirements for the pylon bases. This is likely to require significant additional cost to over excavate, replace with imported material, engineer the material and to provide the suitable stability assessments and specifications required to demonstrate/facilitate short and long-term stability of the excavations and the pylons.

9.5.30 It has also been considered whether National Gird could replace the excavated mineral with imported inert material as a recovery operation, in order to reduce the potential costs associated with prior/incidental extraction. However, this is unlikely to be practical in the context of the discrete relatively small areas and would require additional designs and engineering to fully understand the design implications.

9.5.31 In addition, the use of imported inert material would require separate additional applications to be made to the Environment Agency for environmental permits (for a waste recovery activity) including supporting risk assessments such as hydrogeological risk assessments and stability risk assessments. This is likely to result in both additional cost and delay to the programme affecting both National Grid's duty to be economical and efficient and put at risk meeting the proposed operation date. The potential environmental impacts of using imported material could also be significant and are likely to require environmental assessment and planning permission in their own right.

9.5.32 Furthermore, it is considered that the long relatively narrow corridor that comprises the Order Limits, would limit the potential (from a cost and practicality perspective) for prior extraction in the context of the relatively low volume of mineral likely to be extracted. This is before consideration of the quality and value of the mineral (which may further reduce the volume). The cumulative costs of extraction of the mineral, the transport of the mineral to an off-site facility for processing and the subsequent infilling of the void (either with inert waste or engineered fill), together with the potential environmental implications and geotechnical engineering enhancement needed to provide an appropriate material on which to construct the Project is considered to significantly outweigh the economic value of the relatively small volumes of extracted mineral.

Underground Cable Sections

9.5.33 The Project is anticipated to comprise 21 km of underground cabling and seven new CSE compounds to connect the overhead lines to the underground sections.

9.5.34 The mineral is generally present below a thickness of overburden material (which varies within and between Project sections). Therefore, both prior or incidental extraction could require excavation and storage of significant volumes of overburden during extraction of the mineral that may require additional land outside of the current Order Limits. If prior/incidental extraction were to take place within the underground cable sections, the excavation required to extract the mineral may therefore need to be enlarged (in terms of depth and lateral extent) beyond the current proposed footprint (approximately 60 m wide for trenched sections and 200 m for trenchless sections) to reach the mineral below.

9.5.35 The resultant over-enlarged void would need to be backfilled with suitable imported material, that may need to be appropriately engineered to meet specific geotechnical design requirements to return the ground level to pre-existing levels. The backfill material would also need to be suitable for the proposed location, in relation to its chemical composition and potential to impact groundwater quality. This would add additional cost to the Project associated with the backfill material and the additional construction work required to extract the minerals and backfill the void.

9.5.36 As described in the Overhead Line Sections above, the relatively long narrow corridor of the Order Limits, and typically shallow trench depths of the cable trenches; the potential (from a cost and practicality perspective) for either prior or incidental extraction in the context of the relatively low volume of mineral likely to be extracted is limited.

Substations and CSE Compounds

9.5.37 The proposed EACN Substation is located on the Tendring Peninsula and the proposed Tilbury North Substation is located in Thurrock to the south of Orsett Golf Course. The sites are located within a MSA for Sand and Gravel, as shown on the policies map within the Essex County Council adopted Minerals Local Plan (Essex County Council, 2014).

9.5.38 Modification works are also required at Norwich Main Substation and Bramford Substation is proposed to be extended to allow for the Project to connect into the substation. The modification and extension works are not located within a MCA for Sand and Gravel, as shown on the policies map within the Suffolk County Council Minerals Local Plan (Suffolk County Council, 2020).

9.5.39 Seven CSE compounds are also required where the overhead line transitions to undergrounding cables (and vice versa).

9.5.40 Prior/ incidental extraction is not considered feasible at the substations and CSE compounds due to the likely engineering requirements (and associated timescales for completion) needed following mineral extraction, to create an appropriate development platform for the substation.

9.5.41 Extraction of the potential mineral at the substations and CSE compounds would leave a void that would then have to be replaced/filled by appropriate material which may need to be engineered to meet any specific geotechnical design requirements for the development platform and foundations for the proposed substation. In practical terms, the whole site would need to be worked to prevent sterilisation (by default) of mineral in between the built elements. This would require additional cost to over excavate, replace with imported material, engineer the material and to provide the suitable stability assessments and specifications required to demonstrate/facilitate short and long-term stability of the excavations and the subsequent structures.

9.5.42 There is currently an existing overhead line passing through some of the proposed substation sites. Any prior extraction would need to provide appropriate stand off to the existing pylon bases which reduces the amount of mineral available within this relatively small area.

9.5.43 To reduce the potential costs associated with prior/incidental extraction, National Grid could replace the excavated mineral with imported inert material as a recovery operation. However, this is unlikely to be practical in the context of the relatively small

area and would require additional designs and engineering to fully understand the design implications. In addition, the use of inert material would require separate additional applications to be made to the Environment Agency for environmental permits (for a waste recovery activity) including supporting risk assessments such as hydrogeological risk assessments and stability risk assessments. This would result in both additional cost and delay to the programme affecting both National Grid's duty to be economical and efficient and put at risk meeting the proposed operation date. The potential environmental impacts could also be significant and are likely to require environmental assessment and planning permission.

Overall Summary of the Engineering Considerations

9.5.44 As described within this section, prior/incidental extraction of the minerals is not considered practical due to the over enlarged excavations that would be required to extract the minerals. There would be additional cost to excavate the overburden and mineral, and to backfill the resulting void to return ground levels to pre-works levels and engineer the material to create a suitable development platform. This would significantly increase the cost of the Project and would compromise National Grid's duty to be economical and efficient.

9.5.45 The cumulative costs of extraction of the mineral, the transport of the mineral to an offsite facility for processing and the subsequent infilling of the void (either with imported inert material or engineered fill), together with the geotechnical engineering enhancement to provide an appropriate material on which to construct the Project is considered to significantly outweigh the economic value of the relatively small volume of extracted mineral. This is before consideration of the quality and value of the mineral (which may further reduce the volume/economic value).

9.5.46 In addition, the prior or incidental extraction would extend the construction programme. This would mean that National Grid would likely miss the Project's intended delivery date, which could also risk the meeting of the Government target of 50 GW of offshore wind by the 2030s. Therefore, it is considered that in the context of the additional cost and time required, prior/incidental extraction is not viable.

Environmental Considerations of Extraction

Overhead Line Sections

9.5.47 The specific environmental implications of extraction of the material from each pylon base would need to be considered and assessed in the context of the potential impacts related to noise, dust, traffic, landscape, and visual impact (which may vary at each location). In the context of the relatively small discrete areas of the pylon bases, and therefore the small volume of mineral realised, the environmental impacts are likely to outweigh the economic value of the mineral.

Underground Cable Sections

9.5.48 Approximate 21 km of undergrounding is currently proposed, with five trenchless crossing locations as detailed within Chapter 4: Project Description (document reference 6.4).

9.5.49 Prior/incidental extraction of the minerals along the underground cable route would lead to a larger footprint and a longer construction duration within these areas. As the cable sections have been chosen due to proximity to sensitive receptors, such as the

Dedham Vale National Landscape (an Area of Outstanding Natural Beauty (AONB)), it is considered unlikely that there would be a future application for mineral extraction within such sensitive areas. Extending the Order Limits to accommodate the additional width and depth required to safely extract the minerals, would increase the magnitude of impact on the sensitive receptors.

9.5.50 Trenchless crossing techniques (as described in Chapter 4: Project Description (document reference 6.4)) have been selected in certain areas to avoid significant impacts and effects on sensitive receptors (for example the River Stour). It is considered unlikely that such areas would be excavated in the future for minerals extraction due to the potential for significant environmental impacts and effects on those same sensitive receptors.

9.5.51 Prior/incidental extraction within underground sections would likely require over excavation through the cohesive overburden to reach the mineral and the resulting void would need to be back filled with appropriate material. This could either be through importation of clean fill material or using inert material as a recovery activity, which is unlikely to be acceptable within these sensitive areas.

9.5.52 The potential impacts of extracting minerals could include increased noise and dust levels across the Project. There could also be a significant increase in traffic movements associated with the heavy goods vehicles required to remove the minerals from site to any processing or sales yards. The extraction could increase the landscape and visual effects across the wider area and could also result in the loss of habitats and disturbance to protected species during construction.

Substation

9.5.53 Prior/incidental extraction at the proposed EACN Substation and Tilbury North Substation would require an excavation area greater than currently proposed and may require the working area to be extended.

9.5.54 The specific environmental implications of extraction of the mineral from the site would need to be considered and assessed in the context of the potential impacts related to noise, dust, traffic, landscape, and visual impact. In the context of the relatively small area of the site, and therefore the small volume of mineral realised, the environmental impacts are likely to outweigh the economic value of the mineral.

Overall Summary of the Environmental Considerations

9.5.55 The overall impact of extracting minerals prior to or during construction of the Project could mean the Order Limits and construction work would need to extend or further extend into sensitive areas, such as Dedham Vale National Landscape. Extracting the minerals is likely to increase the magnitude of impacts on the environment, and could generate additional effects relating to noise, dust, and traffic. The duration of construction would also need to extend, which would increase the level of disruption caused during construction. Therefore, the environmental impact associated with extracting the minerals is considered to be disproportionate to the value gained from extracting the minerals.

9.6 Conclusions

9.6.1 National Grid acknowledge that large parts of the Order Limits are located within either a MSA or an MCA for sand and gravel and/or brick clay. The MSA and MCA both extend beyond the Order Limits, across substantial areas of Norfolk, Suffolk, and Greater Essex. Even if the full extent of the Order Limits within an MSA/MCA were to sterilise mineral of sufficient quality and extent to be economically valuable, the extent of the sterilised area is very small in comparison to the extent of the MSAs/MCAs (<1.5%). The actual areas where built development would effectively sterilise any valuable mineral are significantly smaller still. Therefore, the quantity of mineral sterilised by the Project is insignificant in the context of the extensive occurrence of sand and gravel within all counties and the national need/significance of the Project.

9.6.2 In addition, whilst there are sand and gravel deposits safeguarded within the Order Limits, the existence, extent, and quality of such is not proven and is anticipated to be highly variable. Therefore, not all the safeguarded areas may contain mineral, or mineral of sufficient quality or economic value.

9.6.3 A number of existing and candidate minerals sites are also located within the Study Area and National Grid has and will continue to engage with the minerals operators and mineral proposers to discuss potential mitigations if appropriate. In addition, a number of design scenarios have been identified, as described in Chapter 4: Project Description (document reference 6.4), to enable flexibility within the Project if candidate sites do become allocated within a future minerals plan.

9.6.4 Consideration has been given to prior or incidental extraction of minerals as part of the Project construction programme. However, this has shown that the increase in cost associated with the extraction would increase the overall cost of the entire Project and may conflict with National Grid's duty to be economical and efficient. The additional time that would need to be added to the construction schedule would mean that National Grid could miss the Project's intended delivery date, which could also risk the meeting of the Government target for the connection of up to 50 GW of offshore wind by the 2030's. Therefore, it is considered that in the context of the additional cost and time required and the unproven economic value of the small amount of mineral that could be realised, prior extraction in these areas is not viable.

9.6.5 In addition, any potential mineral sterilisation can be considered to be temporary, as access to the underlying mineral could be restored if parts or all of the infrastructure are decommissioned. The Project has sought to avoid and reduce effects on sensitive environmental features/receptors through its design process. The prior or incidental extraction of minerals would significantly increase the magnitude of environmental effects created by the Project and would lengthen the duration of construction works in sensitive areas, such as Dedham Vale National Landscape. The environmental impact associated with extracting the minerals is considered to be disproportionate to the value gained from extracting the minerals.

9.6.6 The NPS EN-1 (DESNZ, 2024) requires that developments should safeguard minerals as far as possible and in consideration of the land use following decommissioning. Whist it is acknowledged that some temporary sterilisation of some small areas of minerals resources may occur associated with the Project, these resources will be available following any decommissioning of the Project.

9.6.7 The NPPF encourage prior extraction of minerals '*where practical and feasible*', and this MRIA indicates that prior extraction is not practical or feasible on the Project.

9.6.8 Based on the national significance of the Project and that Norfolk, Suffolk and Greater Essex have more than the seven-year land bank of sand and gravel, as required by the NPPF, and sufficient additional safeguarded areas, it is considered that the potential impact of sterilising the small volume associated with the Project is acceptable without further consideration, assessment or mitigation.

Abbreviations

Abbreviation	Full Reference
AONB	Area of Outstanding Natural Beauty
BGS	British Geological Survey
CSE	Cable Sealing End (compound)
DCO	Development Consent Order
DESNZ	Department for Energy Security and Net Zero
EACN	East Anglia Connection Node
ECS	Environmental Capacity Statement
ES	Environmental Statement
GW	Giga Watt
LAA	Local Aggregate Assessment
MAR	Minerals Assessment Reports
MCA	Mineral Consultation Areas
MPA	Mineral Preferred Area
MRIA	Minerals Resource and Infrastructure Assessment
MSA	Mineral Safeguarding Area
Mt	Million Tonnes
NPPF	National Planning Policy Framework
NPS	National Policy Statements

Glossary

Term	Description
Bedrock geology	Solid rock formations underlying superficial deposits
Mineral Planning Authority	The Minerals Planning Authority is part of the planning group or county development unit of the Local Planning Authority.
Mineral reserve	Mineral deposit whose extraction is economically feasible
National Planning Policy Framework	The National Planning Policy Framework is a key part of the government's reforms to make the planning system less complex and more accessible. It vastly simplifies the number of policy pages about planning. The planning practice guidance to support the framework is published online and regularly updated.
Order Limits	The maximum extent of land within which the authorised development may take place
Overhead line	Conductor (wire) carrying electric current, strung from pylon to pylon.
Pylons	Structures that support the overhead line (conductors). There are two types of pylons; suspension (line), where the conductors are simply suspended from the tower and tension (angle).
Substation	Substations are used to control the flow of power through the electricity system. They are also used to change (or transform) the voltage from a higher to lower voltage to allow it to be transmitted to local homes and businesses.
Superficial geology	Uncemented sediments, such as alluvium, immediately beneath the soil and above the bedrock
Trenchless crossing	A crossing installation method that has limited above ground disturbance which is used to avoid a sensitive feature such as an environmental feature.
Underground cabling	An insulated conductor carrying electric current designed for underground installation. Underground cables link together two cable sealing end compounds.

Bibliography

Allender, R. and Hollyer, S.E. (1981) *The sand and gravel resources of the country around Ipswich, Suffolk: description of 1:25,000 resource sheet TM 14.* London, UK, British Geological Survey, 81pp. (Mineral Assessment Report 55) (Unpublished)

Ambrose, J.D. (1974) *The sand and gravel resources of the country west of Colchester, Essex: description of 1:25,000 resource sheet TL 92.* London, UK, British Geological Survey, 75pp. (Assessment of British sand and gravel resources No. 10, Report 74/6) (Unpublished)

Ambrose, J.D. (1975) *The sand and gravel resources of the country east of Colchester, Essex: description of 1:25,000 resource sheet TM 02.* London, UK, British Geological Survey, 113pp. (Mineral assessment report No. 14) (Unpublished)

Auton, C.A. (1982) *The sand and gravel resources of the country around Redgrave, Suffolk: description of 1:25,000 sheet TM 07 and part of TM 08.* London, UK, British Geological Survey, 102pp. (Mineral Assessment Report 116) (Unpublished)

Booth, S.J. and Merritt, J.W. (1982) *The sand and gravel resources of the country around Coggeshall, Essex: description of 1:25,000 resource sheet TL 82*. Edinburgh, UK, British Geological Survey, 101pp. (Mineral Assessment Report 102) (Unpublished)

Department for Energy Security and Net Zero (2024a) *Overarching National Policy Statement for Energy (EN-1).* [Online]. Available at: https://assets.publishing.service.gov.uk/media/65bbfbdc709fe1000f637052/overarching-nps-for-energy-en1.pdf [Accessed December 2024]

Department for Energy Security and Net Zero (2024b) *National Policy Statement for Electricity Networks Infrastructure (EN-5).* [Online]. Available at: https://www.gov.uk/government/publications/national-policy-statement-for-electricity-networks-infrastructure-en-5 [Accessed December 2024].

Department for Levelling Up, Housing and Communities (2025) *National Planning Policy Framework.* [Online]. Available at: https://assets.publishing.service.gov.uk/media/65a11af7e8f5ec000f1f8c46/NPPF_December_2023.pdf [Accessed December 2024].

Eaton, C.H. (1973) *The sand and gravel resources of the country around Terling, Essex: description of 1:25,000 resource sheet TL 71.* London, UK, British Geological Survey, 130pp. (Assessment of British Sand and Gravel Resources No. 6, Report 73/5) (Unpublished)

Essex County Council (2014) *Essex Minerals Local Plan* [Online]. Available at: https://www.essex.gov.uk/sites/default/files/migration_data/files/assets.ctfassets.net/knkzaf64jx5x/5UZuVtnjZbJ81olvZoZKVX/90acfc65df6fa8ee8ab20df3f0cda1c8/essex-minerals-local-plan-adopted-july-2014.pdf [Accessed December 2024]

Essex County Council (2023) *Assessment of Candidate Sand and Gravel Sites* [Online]. Available at: https://www.essex.gov.uk/sites/default/files/2024-02/Assessment%20of%20Candidate%20Sand%20and%20Gravel%20Sites.pdf [Accessed December 2024]

Essex County Council (2024) *Greater Essex LAA 2022* [Online]. Available at: https://www.essex.gov.uk/sites/default/files/2024-03/Greater%20Essex%20Local%20Aggregate%20Assessment%20-%2014.03.24.pdf [Accessed December 2024]

Essex County Council (2024) *Replacement Essex Minerals Local Plan 2025 to 2040 (Regulation 18 – Issues and Options)* [Online]. Available at: https://www.essex.gov.uk/sites/default/files/2024-02/Replacement%20Minerals%20Local%20Plan.pdf [Accessed December 2024]

Haggard, H.J.E. (1972) *The sand and gravel resources of the country around Witham, Essex: description of 1:25,000 resource sheet TL 81.* London, UK, British Geological Survey, 97pp. (Assessment of British Sand and Gravel Resources No. 2, Report 72/6) (Unpublished)

Hopson, P.M. (1981) *The sand and gravel resources of the country around Nayland, Suffolk: description of 1:25,000 resource sheet TL 93.* London, UK, British Geological Survey, 107pp. (Mineral Assessment Report 85) (Unpublished)

Hopson, P.M. (1981) *The sand and gravel resources of the country west of Chelmsford, Essex: description of 1:25,000 resource sheet TL 60.* London, UK, British Geological Survey, 65pp. (Mineral Assessment Report 66) (Unpublished)

Marks, R.J. (1980) *The sand and gravel resources of the country between Hatfield Heath and Great Waltham, Essex: description of 1:25,000 sheets TL 51/61.* London, UK, British Geological Survey, 109pp. (Mineral Assessment Report 52) (Unpublished)

Minerals Products Association (2019) *Minerals Safeguarding Practice Guidance* [Online]. Available at: https://mineralproducts.org/MPA/media/root/Publications/2019/MPA_POS_Minerals_Safeguarding_Guidance_Document.pdf [Accessed December 2024]

Nickless, E.F.P. (1971) *The sand and gravel resources of the country south-east of Norwich, Norfolk: description of 1:25,000 resource sheet TG 20*. London, UK, British Geological Survey, 101pp. (Assessment of British Sand and Gravel Resources No. 1, Report 71/20) (Unpublished)

Norfolk County Council (2011) *Minerals and Waste Development Framework* [Online]. Available at: https://www.norfolk.gov.uk/what-we-do-and-how-we-work/policy-performance-and-partnerships/policies-and-strategies/environment-and-planning-policies/minerals-and-waste-planning-policies/adopted-policy-documents#:~:text=We%20are%20responsible%20for%20planning%20for%20how%20the,minimises%20adverse%20impacts%20and%20maximises%20potential%20positive%20impacts. [Accessed December 2024]

Norfolk County Council (2022) *Norfolk Minerals and Waste Local Plan: Pre: Submission Publication* [Online]. Available at: https://www.norfolk.gov.uk/what-we-do-and-how-we-work/policy-performance-and-partnerships/policies-and-strategies/environment-and-planning-policies/minerals-and-waste-planning-policies/norfolk-minerals-and-waste-local-plan-review [Accessed December 2024]

Norfolk County Council (2024) *Local Aggregate Assessment for calendar year 2022* [Online] Available at: https://www.norfolk.gov.uk/article/39050/Annual-Monitoring-Reports [Accessed December 2024]

SKM Enviros (2010) *Environmental Capacity Statement: Designation of Mineral Safeguarding Area* [Online]. Available at: https://www.thurrock.gov.uk/sites/default/files/assets/documents/ldf_tech_env_capacity_2010.pdf [Accessed December 2024]

Suffolk County Council (2020) *Suffolk Minerals and Waste Local Plan* [Online]. Available at: https://www.suffolk.gov.uk/asset-library/imported/chapters-1-to-18-smwlp-adopted-july-2020.pdf [Accessed December 2024]

Suffolk County Council (2024) *Local Aggregates Assessment (2021 & 2022 Data)* [Online]. Available at: https://www.suffolk.gov.uk/asset-library/november-2024-suffolk-laa-2021-2022-data.pdf [Accessed April 2025]

Thurrock County Council (2015) *Core Strategy and Policies for Management of Development (as amended)* [Online]. Available at: https://www.thurrock.gov.uk/sites/default/files/assets/documents/core_strategy_adopted_2011_amended_2015.pdf [Accessed December 2024]

Wilcox, C.J and Stanczyszyn, R. (1983) *The sand and gravel resources of the country around Diss, Norfolk: description of 1:25,000 sheet TM 17 and part of TM 18.* London, UK, British Geological Survey, 91pp. (Mineral Assessment Report 137) (Unpublished)

National Grid plc
National Grid House,
Warwick Technology Park,
Gallows Hill, Warwick.
CV34 6DA United Kingdom

Registered in England and Wales
No. 4031152
nationalgrid.com