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Proposed Grid Supply Point Substation off the A131

Environmental Appraisal
April 2022

nationalgrid



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1. INTRODUCTION

1.1 Overview

- 1.1.1 This Environmental Appraisal has been prepared in respect of a new Grid Supply Point (GSP) substation off the A131 (hereafter referred to as 'the proposed GSP substation') by National Grid Electricity Transmission plc (hereafter referred to as 'National Grid'). The proposed GSP substation is required to facilitate the removal of approximately 25km of existing 132kV overhead line in connection with the proposed reinforcement of the 400 kilovolt (kV) transmission network between Bramford Substation in Suffolk and Twinstead Tee in Essex (hereafter referred to as 'the wider reinforcement project').
- 1.1.2 The proposed GSP substation is located off the A131 between Butler's Wood and Waldegrave Wood, to the east of Wickham Saint Paul and to the southwest of Sudbury. The proposed planning application site boundary is shown on Figure 1.
- 1.1.3 This Environmental Appraisal is being submitted to support the planning application using information gathered from desktop and site-based surveys to demonstrate the environmental work undertaken to avoid and reduce environmental effects resulting from the proposed GSP substation.
- 1.1.4 The Environment Appraisal has been undertaken following a negative Environmental Impact Assessment (EIA) Screening Opinion from Braintree District Council. As an EIA and associated EIA Report are not required, this Environmental Appraisal has not been prepared according to the Town and Country Planning (EIA) Regulations 2017 EIA Regulations and is being submitted as good practice to reflect the pre-application discussions with Braintree District Council.

1.2 Report Structure

- 1.2.1 This Environmental Appraisal comprises the following chapters:
- Chapter 1 – Introduction (this section): This provides an overview of the proposed GSP substation, sets out the report structure, summarises the approach to consenting, accompanying works required to facilitate the proposed GSP substation and previous consultation with Braintree District Council.
 - Chapter 2 – The Proposed GSP Substation: This describes the proposed GSP substation and how it would be constructed and decommissioned.
 - Chapter 3 – Environmental Appraisal: This reports the environmental appraisal of potential impacts of the proposed GSP substation. It describes measures embedded in the design of the proposed GSP substation to reduce environmental effects and refers to site-specific measures and construction methodologies that will be implemented to help avoid or reduce potential impacts described in Appendix 1 (Construction Environmental Management Plan (CEMP)).
 - Chapter 4 – Conclusion: This summarises the key points of the Environmental Appraisal and the conclusions of Chapter 3.
- 1.2.2 The Environmental Appraisal is supported by the following Figures and Appendices:
- Figure 1: Location Plan
 - Figure 2: Site Layout
 - Figure 3: Constraints Plan

- Figure 4: Planting Plan
- Appendix 1: Construction Environmental Management Plan (CEMP)
- Appendix 2: Landscape and Visual Assessment
- Appendix 3: Biodiversity Baseline
- Appendix 4: Biodiversity Net Gain (BNG) Report
- Appendix 5: Arboricultural Assessment
- Appendix 6: Historic Environment Baseline
- Appendix 7: Flood Risk Assessment
- Appendix 8: Phase 1 Contaminated Land Assessment
- Appendix 9: Agricultural Land Classification
- Appendix 10: Noise Assessment

1.2.3 The Environmental Appraisal should be read alongside the Planning Statement, the Design and Access Statement, the Transport Statement and the Statement of Community Involvement.

1.3 Bramford to Twinstead Wider Reinforcement Project

1.3.1 National Grid owns, builds and maintains the electricity transmission network in England and Wales. Under the Electricity Act 1989, National Grid holds a transmission licence, through which it is required to develop and maintain an efficient, coordinated and economical electricity transmission system. National Grid is also required to consider ways to preserve amenity under Schedule 9 of the Electricity Act 1989.

1.3.2 National Grid intends to submit an application for an order granting development consent for the wider reinforcement project, necessary to continue to meet power supply and demand by the end of the decade.

1.3.3 The wider reinforcement project is a Nationally Significant Infrastructure Project (NSIP) and would be approximately 29km long, comprising approximately 19km of overhead line and approximately 10km of underground cable. It is proposed that approximately 27.5km of existing overhead line would be removed (25km of existing 132kV overhead line between Burstall Bridge and Twinstead Tee, and 2.5km of the existing Bramford-Braintree-Rayleigh 400kV overhead line to the south of Twinstead). The removal of the 132kV overhead line means that alternative arrangements must be put in place to secure the supply of the local electricity distribution network. This would be achieved by the proposed GSP substation, which would transform the voltage from 400kV to 132kV, to connect the high voltage line to the local distribution network.

1.3.4 The Statement of Community Involvement explains where feedback from the non-statutory and statutory consultation for the wider reinforcement project has been used to inform the design development of the proposed GSP substation.

1.4 Approach to Consenting

Proposed GSP Substation

1.4.1 Although also included in the proposals for the wider reinforcement project as ‘associated development’, the proposed GSP substation (which includes the substation compound,

adjacent 400kV single circuit cable sealing end (CSE) compound, and access road) is not itself an NSIP, and can be consented independently of the wider reinforcement project via the Town and Country Planning Act (TCPA). Reflecting National Grid's statutory duties, and in support of wider UK targets to deliver 40 gigawatts (GW) of offshore wind to the networks by 2030 and achieve 'net zero' by 2050, there are advantages to progressing the proposed GSP in advance of the wider reinforcement project by seeking permission independently via the TCPA route.

- 1.4.2 Therefore, the TCPA planning application is currently being progressed in parallel with retaining the proposed GSP substation as part of the wider reinforcement project.

Accompanying Works

- 1.4.3 While the primary purpose of this Environmental Appraisal relates to the proposed GSP substation, National Grid is also proposing accompanying works that will facilitate the use of the proposed GSP substation. The accompanying works largely comprise electric line works of various types which would be consented where necessary through different regimes to the proposed GSP substation itself (including, where relevant, via Section 37 of the Electricity Act 1989, Section 37 exemptions, and/or permitted development rights).
- 1.4.4 The accompanying works are considered in the assessment of cumulative effects in Section 3.12 of the Environmental Appraisal to demonstrate to Braintree District Council that National Grid has given due consideration of potential impacts resulting from the proposed GSP substation and the accompanying works.
- 1.4.5 The use of both the Section 37 process and the Exemption Regulations will require further inputs from the local planning authority, including on the likelihood of significant adverse environmental effects, and in the case of Section 37 there is a discrete EIA screening process via the Secretary of State (pursuant to the Electricity Works (EIA) (England and Wales) Regulations 2017). These processes will be undertaken at the appropriate future time, and the relevant inputs from Braintree District Council sought, in the context of ongoing dialogue with Braintree District Council's planning department.

Role of this Report

- 1.4.6 For clarity and the context of the approach to consenting described above, this report describes and considers the proposed GSP substation (which includes the substation compound itself, adjacent single circuit cable sealing end (CSE) compound, and access road) in the TCPA planning application to Braintree District Council separately from the accompanying works (comprising largely above and below ground electric line works).
- 1.4.7 The environmental appraisal in Section 3 of this report considers the potential impacts of the proposed GSP substation and describes the measures proposed to avoid or reduce them. It is undertaken following a negative EIA screening opinion and to reflect pre-application discussions with Braintree District Council.
- 1.4.8 The Environmental Appraisal should be read alongside the Planning Statement which draws on the conclusions to inform the assessment of compliance with relevant national and local planning policy.

Consultation with Braintree District Council

- 1.4.9 A pre-application meeting regarding the proposed GSP substation was held between National Grid and Braintree District Council on 11 August 2021 and written pre-application

advice was provided by Braintree District Council on 6 September 2021 (Reference Number: 21/60181/PREAPP).

- 1.4.10 National Grid subsequently submitted a Request for an Environmental Impact Assessment (EIA) Screening Opinion in October 2021, according to the requirements set out in the Town and Country Planning (EIA) Regulations 2017. This assessed that no likely significant effects would be anticipated during construction, operation or decommissioning of the proposed GSP substation and that a statutory EIA was not required to support a planning application. Braintree District Council responded on 23 December 2021 and confirmed that the proposed GSP substation would not require an EIA.
- 1.4.11 Further pre-application discussions were held with Braintree District Council on 22 February 2022 and 5 April 2022 and a record of how feedback has been considered in the preparation of the planning application documents is set out in Chapter 5 of the accompanying Planning Statement.

2. THE PROPOSED GSP SUBSTATION

2.1 Introduction

- 2.1.1 Figure 1 shows the location of the proposed GSP substation and the site boundary for where an application for planning permission under the TCPA is being sought. The site is located between Butler's Wood and Waldegrave Wood, approximately 5km south of Sudbury and 1km northeast of Wickham St Paul. It is accessed directly from the A131 to the east.
- 2.1.2 Figure 2 shows the site layout of the proposed GSP substation as well as the indicative location of the accompanying works outlined in Section 1.4 and considered in the cumulative assessment (Section 3.12), and which will be consented via the separate consenting regimes.
- 2.1.3 There is currently an existing 400kV overhead line passing through the site, which is owned and operated by National Grid. There is also an existing 132kV overhead line to the south of the proposed GSP substation, that is operated by the Distribution Network Operator (DNO) (UK Power Networks), who distributes electricity at lower voltages to industrial, commercial and domestic users.
- 2.1.4 This Environmental Appraisal is based on the Front End Engineering Design (FEED) of the proposed GSP substation. It is recognised that there may be minor refinements as part of the detailed design development by National Grid's appointed Principal Contractor, referred to as the 'contractor'. Nevertheless, the environmental appraisal is precautionary to incorporate potential minor amendments to the design that could occur.
- 2.1.5 The evolution of the design of the proposed GSP substation are presented in Section 5 of the Planning Statement.

2.2 Description of the Proposed GSP Substation

Operation

- 2.2.1 The layout of the proposed GSP substation is shown on Figure 2 and a full description is provided in Section 4 of the Planning Statement which also describes the accompanying works, comprising overhead line and underground cable works. Section 5 of the Planning Statement explains how feedback from pre-application discussions with Braintree District Council have informed the design development of the proposed GSP substation while the Statement of Community Involvement sets out how the engagement from the local communities specifically, has influenced the proposed GSP substation.
- 2.2.2 The proposed GSP substation would be designed, constructed and operated in accordance with applicable health and safety legislation. It would also need to comply with design safety standards including the National Electricity Transmission System Security and Quality Supply Standard (NETS SQSS), which sets out the criteria and methodology for planning and operating the National Electricity Transmission System. This informs a suite of National Grid policies and processes, which contain details on design standards required to be met when designing, constructing and operating assets such as proposed on the project. National Grid also employs procedures on the use and management of assets which contain Sulphur Hexafluoride (SF6) which is required in the circuit breakers at the proposed GSP substation. National Grid is undertaking research

and development to find a suitable alternative to SF6, however, there is no suitable alternative at the present time.

Maintenance

- 2.2.3 The proposed GSP substation would be unmanned during operation. Routine site visits would be required to visually inspect the condition of equipment, structures and buildings for signs of damage or wear. The routine maintenance would be undertaken on a three-year cycle. This involves electrical isolation of the equipment and checks to the equipment. In addition, there would be maintenance of the auxiliary systems, which would be tested monthly and maintained as required. For example, the back-up diesel generator would be required for a short period of time using the associated load bank, on a routine basis. This varies from manufacturer to manufacturer but is normally around 5-10 minutes, once a month. This ensures that the back-up diesel generator will start correctly, keeps the various bearings lubricated and can highlight any starting or running issues.
- 2.2.4 If the proposed GSP substation required refurbishment or replacement works, this would be similar to the construction activities but on a smaller scale and would involve vehicles to bring workers and materials to the site for the repairs and the removal of old equipment.
- 2.2.5 No new woodland edges are expected to require maintenance in terms of trimming during operation. The area of BNG would undergo a period of maintenance such that its target condition is met. Further details are included in Appendix 1 (CEMP).

Construction

- 2.2.6 Construction activity would begin with site preparation including setting up the temporary accommodation, parking and laydown area. The permanent perimeter fencing would be completed early in the construction programme to secure the construction area. The permanent access road would be installed to connect the proposed GSP substation to the existing road network and would be design to highways standards.
- 2.2.7 The initial preparatory works would comprise the temporary removal of the top layer of ground and laying a temporary stone capping to provide a clean and stable working platform. Typically, the topsoil and a layer of subsoil would be excavated in the area of the field only using a tracked mechanical excavator and this is replaced with approximately 3.75cm thick, clean imported granular fill to form a surface to the compound. It is anticipated that excavated material would be re-used on-site for low level landscape mounding and an outline design of this are shown in Figure 4 (Planting Plan). A series of copper earth tapes would be installed below the ground to create an earth mat to distribute any electrical charge transferred to the ground by earthed equipment and infrastructure in the proposed GSP substation.
- 2.2.8 Following the preparatory works, any required permanent foul, oily water, including below ground oil separator, and surface water drainage systems would be installed.
- 2.2.9 Shallow concrete pad foundations and steel supports would be installed for the electrical equipment. The majority of electrical equipment is mounted on steel posts fixed to concrete foundations. Top of electrical equipment, and busbars connecting equipment, are typically up to 9m above ground level and are installed using a small crane. There would be one taller steel line landing gantry structure within the proposed GSP substation which supports the downloads off the pylon to the southeast. This gantry would be approximately 13m high.

- 2.2.10 Reinforced concrete bunds would be installed for each SGT. These bunds would comprise a perimeter concrete wall, a base slab continuous with the wall and a central plinth for supporting the SGT. The bunds act as a secondary oil containment measure.
- 2.2.11 The two SGTs would be transported to site as Abnormal Indivisible Loads (AIL) and installed within the bunds. Concrete for the foundations and bunds would be ready-mixed, brought to site in lorries and placed using small plant such as cranes and excavators.
- 2.2.12 Connection of the proposed GSP substation will require a series of outages on the 400kV and 132kV overhead lines. The scheduling of these outages, which take into account wider network considerations, will dictate elements of the construction programme.
- 2.2.13 The majority of the civil construction works (consisting of earthworks, concrete works and fencing) will be completed prior to any outages and would take approximately six to eight months.
- 2.2.14 Following the main civil construction works the mechanical and electrical works associated with one of the SGT circuits would be undertaken as well as the accompanying works (laying of high voltage cables, works associated with 132kV pylon replacement including installation and removal of a 132kV temporary diversion and installation of a 400kV a line temporary diversion).
- 2.2.15 Once operational, subsequent works will need to be undertaken during an outage on the 400kV overhead line and these include the replacement of the 400kV pylon, removal of the 400kV temporary overhead line diversion (accompanying works Ref: 6), remaining mechanical and electrical works for the other SGT circuit and commissioning of that circuit. The exact timing of these works will be dependent on when outages can be taken and may be up to a year after the 400kV overhead line diversion is installed.
- 2.2.16 As the construction activities and scheduling permits, the landscape works would be undertaken in the first suitable season during construction.
- 2.2.17 Once equipment is installed, commissioning tests would be undertaken to check that the individual items of plant and the system as a whole works as required. Following successful testing, the proposed GSP substation would be connected to the electricity transmission system.
- 2.2.18 It is anticipated that there would be an approximately 14 month period between commencement of construction and the start of operation of the proposed GSP substation, including commissioning.
- 2.2.19 The single circuit CSE compound is similar in the general form of construction to the proposed GSP substation but is much smaller and only houses a small number of high voltage plant equipment items in addition to a steel gantry to receive downloads from the replacement 400kV pylon. The single circuit CSE compound does not include any buildings or oil containing equipment and no drainage systems require to be installed. Access to the single circuit CSE compound would be via a proposed access road.
- 2.2.20 The proposed GSP substation would require the use of new materials during construction. The main materials would include steel, concrete for the foundations, insulator sets and aluminium conductors (wire) and cabling. The nature of the proposed GSP substation means that it is difficult to use secondary sources during construction, as this can affect the operation and the design life. However, National Grid has existing processes in place to source materials from sustainable sources and to use recycled materials where these do not compromise the required design standards and operational life.

- 2.2.21 It is currently assumed that no soil would need to be removed from the site. Any surplus soil gained would be reused within the site for landscape mounding as shown on Figure 4. Very little quantity of waste is anticipated on the project during construction. Where this is generated, the contractor would seek to reduce waste in the first instance and to implement appropriate measures to reuse and recycle materials where practicable.
- 2.2.22 Appendix 1 (CEMP) provides further details on construction methodologies, setting out how environmental management would be undertaken during construction of the proposed GSP substation. It also provides further details on how traffic, waste and proposed planting will be managed.

Decommissioning

- 2.2.23 There are no plans to decommission the proposed GSP. However, in such a scenario decommissioning would involve removal of the above ground features using similar working methods to those outlined during construction. Foundations within the proposed GSP substation area would be excavated to approximately 1.5m below ground level, and the ground level restored. Any temporary access tracks and working areas required for decommissioning would be removed and the site reinstated. The use of decommissioned materials would follow the waste hierarchy such that they would be reused where possible before recycling and disposal were considered.
- 2.2.24 It is likely that any decommissioning of the proposed GSP substation would be beyond 2064, at least 40 years after the start of operation. At the time that decommissioning would take place, the regulatory framework, good industry practices and the future baseline could have altered. National Grid would consider and implement an appropriate decommissioning strategy taking account of good industry practice, its obligations to landowners under the relevant agreements and all relevant statutory requirements. In the event that the proposed GSP substation is to be decommissioned after the wider reinforcement project is operational, discussions would also be held with the distribution network operator (DNO) to agree alternative requirements for providing power to local communities and businesses.
- 2.2.25 In any scenario that involves decommissioning of the proposed GSP substation, a written scheme of decommissioning would be submitted for approval by Braintree District Council at least six months prior to any decommissioning works. The decommissioning works would follow National Grid processes at the time for assessing and avoiding or reducing any environmental impacts and risks.

3. ENVIRONMENTAL APPRAISAL

3.1 Introduction

General Approach

- 3.1.1 This section summarises the general approach to the environmental appraisal to describe the potential impacts resulting from the proposed GSP substation and methods to avoid or reduce them.
- 3.1.2 The following topics were considered within the Request for and EIA Screening Opinion (October, 2021). The decision from Braintree District Council confirmed that the proposed GSP substation was unlikely to cause potentially significant impacts for any of these topics and an EIA and accompanying EIA Report is not required. In accordance with good practice and to consider Braintree District Council's pre-application advice they are considered further within Sections 3.2-3.12 of this Environmental Appraisal.
- Landscape and Visual;
 - Biodiversity;
 - Historic Environment;
 - Water Environment;
 - Geology and Hydrogeology;
 - Agriculture and Soils;
 - Traffic and Transport;
 - Air Quality;
 - Noise and Vibration;
 - Other Issues (socio-economics, health and electro-magnetic fields, major accidents and disasters and climate); and
 - Cumulative Effects.
- 3.1.3 The environmental appraisal firstly describes the baseline. This is the reference level of the environmental conditions without implementation of the proposed GSP substation and accompanying works, against which the potential impacts are assessed. Desk-based studies have been undertaken to inform the baseline using available data held in the public domain which is referenced throughout. Site surveys have also been undertaken to inform the appraisal. These are described in Sections 3.2-3.12 of this report, where the study areas are also defined.
- 3.1.4 Where sensitive receptors are identified within the study area, the potential impact to the baseline is described during each phase as follows:
- Construction Phase: This includes potential impacts associated with the temporary works and construction activities described in Section 2.2.
 - Operation Phase: This includes operational impacts that would potentially occur as a result of the presence, operation and maintenance of the proposed GSP substation. Operation is anticipated to start in 2024.

- Decommissioning: given the decommissioning process explained in Section 2.2, it is considered that effects associated with decommissioning would be similar or no greater than those anticipated during construction. As such, decommissioning impacts are not considered further within the environmental appraisal.

3.1.5 The assessment takes into account a number of environmental commitments, good practice measures, construction methodologies measures embedded into the design to avoid or reduce potential impacts. These are set out in the CEMP and Code of Construction Practice (CoCP) which are explained below.

Construction Environment Management Plan

3.1.6 To help avoid or reduce potential effects of the project on the environment during construction, measures and construction methodologies will be implemented by National Grid's appointed contractor. These measures are set out in Appendix 1 (CEMP) and detail how environmental management would be undertaken during construction of the proposed GSP substation.

Code of Construction Practice and Good Practices Measures

3.1.7 The CEMP for proposed GSP substation includes environmental commitments and good practice measures which have been identified as part of the wider reinforcement project. Some of these good practice measures and commitments are relevant for the proposed GSP substation and would be implemented during construction. Where this is the case, the measures are referenced within Annex 1 (CoCP) of Appendix 1(CEMP).

3.1.8 Each good practice measure has been assigned a reference number, for example GG01. The commitment numbering has been kept consistent with the CoCP for the wider reinforcement project, and the numbering is therefore not consecutive in all cases, as commitments not relevant to the proposed GSP substation and accompanying works have been excluded from this focused appraisal. This is for ease of cross-reference to other documents.

3.1.9 The measures are generally either imposed through legislative requirements or represent standard sector good practices. As such, the assessment of likely effects takes cognisance of the good practice measures within the CoCP.

Embedded Measures

3.1.10 The assessment of potential impacts also considers 'embedded measures' in accordance with guidance from the Institute of Environmental Management and Assessment (IEMA, 2015). 'Embedded measures' are measures embedded into the design to mitigate environmental impacts at the outset and will therefore form part of the design of the proposed GSP substation that will be constructed and operated.

3.1.11 Environmental inputs have been an integral part of the design development process since conception, which has meant that the proposed GSP substation has been able to avoid environmentally sensitive features as far as reasonably practicable.

3.1.12 The embedded measures of the design avoid or reduce potential impacts that may otherwise be experienced during construction and operation. Table 3.1 outlines the key embedded measures that have been incorporated into the design to date.

Table 3.1: Embedded Measures

Embedded Measures	Benefits
The proposed GSP substation has been positioned between Butler's Wood and Waldegrave Wood	This location poses the least impact on the landscape character of the area, visual amenity, ecology and the historic environment. This option would also be the least constrained from a technical perspective and would have the shortest access road.
The proposed GSP substation would include noise enclosures around the SGT transformers, which is built into the designs presented. SGTs would also be installed on shallow concrete plinths surrounded by concrete bunds designed to contain spills.	The noise enclosure is a good practice design measure that would provide a barrier around the transformers and reduce the operational noise levels at the boundary of the site. The concrete plinth and bund structures will act to reduce the risk of pollution events as these are the only items of oil containing plant onsite.
The proposed GSP substation design has been located away from the southern edge of Butler's Wood.	The design of proposed GSP substation reduces the risk of damage to tree roots and removes the need for trimming existing trees that are not currently subject to management under existing wayleaves. No felling of trees is required within Butler's Wood or Waldegrave Wood to facilitate construction and operation of the proposed GSP substation.
The access road has been developed to reduce clear views of the proposed GSP substation from the A131 down the access road and avoid the need to fell trees within woodland designated as Ancient Woodland Inventory (AWI) habitat.	The site access addresses the visibility restrictions of northbound traffic on the A131, while also limiting the visibility of the proposed GSP substation from site entrance. While the location of the site access would involve the removal of a section of hedgerow and may require some tree trimming, it avoids felling trees within Butler's Wood and Waldegrave Wood, designated within the AWI.
Material generated from excavation areas is being reused on site to provide landscape mounding to the west of the proposed GSP substation and between the proposed GSP substation and A131. The western mound would be approximately 2.5m high while the eastern mound would be approximately 1.5m high.	This avoids creating waste material leaving the site and the softens views with respect to views from the west and east.
Rather than increasing the height of embankments in the western part of the proposed GSP substation, the design incorporates a retaining wall whereby the eastern extent of the proposed GSP substation is approximately 1m below the surrounding ground level.	Alongside the inclusion of a 1m mound between the GSP and the A131, the drop in ground level helps screen components of the GSP and soften views from the east. This also reduces the requirement for embankments so the western extent of the proposed GSP substation would not be as elevated and soil does not need to be imported.

Embedded Measures	Benefits
A 1:60 gradient for the level of the proposed GSP substation has been incorporated such that the western extent of the proposed GSP substation would not be as elevated and earthworks are reduced when compared to a flat design meaning the embankments required at the west of the access road are further from Butler’s Wood.	The reduced elevation of the western extent of the proposed GSP substation reduces the potential landscape and visual impacts and the reduced in required earthworks reduces the proximity to trees in Butler’s Wood.
Standard landscape planting has been incorporated around the proposed GSP substation.	The landscape planting would help to soften views towards the GSP substation and reconnect the two separate blocks of ancient woodland.
National Grid has committed to achieving a 10% BNG. As part of the proposed GSP substation an area for BNG using Biodiversity Metric 3.0 (Defra, 2021) has been identified.	This commitment means that the proposed GSP substation will deliver a net improvement to biodiversity. Figure 4 outlines the area included in the site boundary within which planting or land management for BNG is proposed (as well as embedded landscape planting) which, once established, also contributes to filtering and softening views of the proposed GSP substation.
In development of the proposed GSP substation design, a previously curved shape of woodland planting has been modified to align with feedback provided by Natural England, Essex County Council and Essex Place Services.	The alteration of the planting design reflects existing and historical field patterns where possible and provides woodland connectivity between Butler’s Wood and Waldegrave Wood; two areas of ancient woodland that have historically been connected.

3.2 Landscape and Visual

- 3.2.1 A landscape and visual appraisal (LVA) of the proposed GSP substation is presented in Appendix 2 of the Environmental Appraisal.
- 3.2.2 The LVA comprises a description of the baseline conditions together with an appraisal of the likely landscape and visual effects of the proposed GSP substation during construction and operation. The LVA is supported by Annex 1 (Landscape and Visual Appraisal Methodology), Annex 2 (Viewpoint Appraisal) and Annex 3 (Figures).

Baseline

- 3.2.3 Informed by the type and scale of the proposed GSP substation, the study area is defined by a 2km radius from the site. The extent of the study area has also been informed by Zone of Theoretical Visibility (ZTV) mapping and professional judgement gained from similar scale projects which suggest that at distances greater than 2km, notable effects on landscape character and visual amenity are unlikely to occur.

Landscape

- 3.2.4 The study area comprises gently undulating landform at around 80m to 85m AOD (as illustrated in Figure A2.2). Medium to small scale, irregular arable fields are enclosed by hedgerows and interspersed with small to medium sized blocks of woodland and linear

belts of trees along roads and watercourses. These together with the undulating landform, frequently frame and filter views. The A131 runs in a broadly north-south orientation through the centre of the study area. Numerous local roads traverse the area, often sunken and bordered by hedgerows which restrict views.

- 3.2.5 A network of local Public Rights of Way (PRoW) connects properties and settlements. The Painters Trail promoted cycle route is located approximately 1.2km to the northeast. There are no other long distance trails within the study area.
- 3.2.6 There are a number of small settlements including Wickham St Paul, Bulmer and Twinstead. Isolated properties and small hamlets are scattered across the study area. The existing 400kV and 132kV overhead lines traverse the study area in a broadly east-west orientation. The overall character is of a well settled rural landscape.
- 3.2.7 There are no landscape designations within the study area.
- 3.2.8 The Stour Valley Project Area lies approximately 1.1km to the east of the site. While not a designated landscape in itself, the Stour Valley Project Area has been described as having similar picturesque landscape qualities to Dedham Vale Area of Outstanding Natural Beauty (AONB), which lies approximately 7.7km to the east of the site (Land Use Consultants, 2018). As a consequence of the limited intervisibility between the site and the Stour Valley Project Area, combined with distance, it is considered that there would be no effects on the Stour Valley Project Area which is not considered further within the appraisal.
- 3.2.9 Appendix 2 (LVA) describes the landscape character of the study area using published national, county and district scale Landscape Character Types (LCT) and/or Landscape Character Areas (LCA) and, given the age of the landscape character assessments, a detailed landscape analysis established through desk study and field work.
- 3.2.10 The site itself consists of arable farmland between two large blocks of ancient woodland (Butler’s Wood and Waldegrave Wood) which lie immediately to the north and south. The existing hedgerows are well developed and contain a mix of locally common tree species. Extensive belts of new vegetation, including shelterbelts, hedgerows and scattered trees, have been planted on the farmland immediately to the west of the site. Although the published landscape character area descriptions state that that tranquillity is a key characteristic of the wider LCAs, the proposed GSP substation site itself is heavily influenced by the proximity to the A131, which passes close to its eastern boundary, in addition to the existing 400kV overhead line which passes through site between the two blocks of woodland.

Visual

- 3.2.11 Site visits have been undertaken to verify the receptors in the ZTV that would likely experience views of the proposed GSP substation. Using analysis of the ZTV, site surveys and professional judgement, visual receptors have been identified as set out within Table 3.2 below.

Table 3.2: Visual Receptors

Receptor	Description and value
Local PRoW network	There are no National Trails or long distance footpaths in the study area. There are however a number of PRoW in the area, some of which have views towards the gap between Butler’s and Waldegrave Woods, particularly from PRoW in close vicinity to the west. Views towards the proposed

Receptor	Description and value
	GSP Substation from PRoWs to the north and south are generally restricted by woodland, although there are some views possible from PRoWs to the south.
Cycle Routes	There are no regional or National Cycle Networks in the study area. The Painters Trail promoted cycle route, which uses a mixture of quiet roads and well surfaced tracks, is located approximately 1.2km to the northeast of the site.
Local community - settlements	Small parts of the local community within northern extents of the hamlet of Twinstead Green lie approximately 300m southeast of the site. The nearest villages to the location of the proposed GSP substation, within the landscape and visual study area, are Wickham St Paul (to the southwest) and Twinstead (to the east), both approximately 1km away. Slightly further away to the north and northeast are the hamlets of Bulmer Tye and Great Henny and the small village of Little Henny (approximately 1.5 to 2km away). Views toward the proposed GSP substation from these locations are generally limited by intervening hedgerows and mature trees and also the existing large woodland blocks immediately to the north and south. The settlements of Gestingthorpe and Audley End are located to the north west outside the study area (approximately 2.9km).
Local community - scattered properties	Isolated and small groups of properties are scattered across the study area. The nearest are the few individual farmsteads and other groups of houses approximately 500m away to the northeast and northwest of the site.

3.2.12 A total of 13 viewpoints have been selected through desk study, site work and consultation with stakeholders as representative of the different types of receptors at a range of distances and viewing angles. These are presented in Table 3.5 of Appendix 2 (LVA).

Measures to Avoid or Reduce Impacts

3.2.13 Good practice measures that would avoid or reduce Landscape and Visual Environment impacts during construction are set out in Annex 1 (CoCP) of Appendix 1 (CEMP).

3.2.14 These include the following commitments:

- GG20: Construction lighting will be of the lowest luminosity necessary to safely perform each task. It will be designed, positioned and directed to reduce the intrusion into adjacent properties, protected species and habitats.
- LV03: A five-year aftercare period will be established for all reinstatement and mitigation planting.

3.2.15 Measures in Section 4 of Appendix 1 (CEMP) provide details regarding the reinstatement and additional planting. This will also take into account biodiversity net gain targets as detailed in Appendix 4 (BNG Report) of the Environmental Appraisal.

3.2.16 The avoidance or reduction of landscape and visual effects during the operational phase of the proposed GSP substation is predominantly the result of the embedded measures described in Section 3.1 of the Environmental Appraisal. This is part of an iterative design process avoiding sensitive features such as larger settlements and woodlands through the options appraisal. Embedded measures relevant to the LVA are as follows:

- The location and design of the proposed GSP substation has been developed in order that the existing woodlands of Butler's and Waldegrave Woods screen, filter and soften views of the proposed GSP substation. Unrestricted views of the fields which form the site are generally limited by these woodlands. No felling of trees is required within the boundary of these woodlands as part of the proposed GSP substation.
- Embedded landscape planting is included within the area illustrated within Figure 4 of the Environmental Appraisal. Offsets between embedded landscape planting and components of the proposed GSP substation, accompanying works and the existing 400kV overhead line are required to protect equipment.
- Landscape mounding is also proposed within the design and this will help integrate the proposed GSP substation into the landscape and soften views from the west. The western mound is approximately 2.5m tall with graded west facing slopes (approximately 1:11 gradient) while the eastern mound is approximately 1.5m tall with graded east facing slopes (approximately 1:4 gradient).

Potential Impacts

3.2.17 The following potential impacts have been identified taking into account the measures identified in paragraphs 3.2.13 to 3.2.16.

Construction

Landscape

3.2.18 With respect to potential impacts on landscape character during construction, the grouping of construction operations and machinery near to Butler's and Waldegrave Woods would introduce increased levels of activity within the landscape. Construction would require machinery and possibly cranes; these would be different to those typically notable in the landscape as part of regular farming practice.

3.2.19 Construction operations are considered to be temporary effects and activity would be focused on one part of the landscape to enable construction. As such, the proposed GSP substation is not expected to result in notable effects on the landscape designations or landscape character during construction (or decommissioning).

Visual

3.2.20 People living and moving within and around local communities whose views are most likely to be affected during the construction of the proposed GSP substation are those that are located close to the site. Due to the positioning of the proposed GSP substation between Butler's Wood and Waldegrave Wood, views of the construction of the proposed GSP substation would be screened or filtered to some extent from the majority of the local community.

3.2.21 There are some existing views from nearest properties at Twinstead Green; however, mature vegetation to garden curtilages filters these views. There are also some views towards the proposed GSP substation from the individual farmsteads and other small groups of scattered houses but intervening vegetation is again expected to limit these. Views from Wickham St Paul would likely be limited and filtered by intervening hedgerows and mature trees. Views from Twinstead, Great Henny and Little Henny, Gestingthorpe and Audley End would be more distant and likely filtered again by intervening vegetation. It is unlikely that there would be views of the construction from Bulmer Tye.

- 3.2.22 The local community travelling along the A131 may have views of the construction of the GSP substation from a very short section of the road immediately adjacent. Views from the local community travelling along other roads in the area would be generally limited as minor roads and lanes are characteristically sunken and hedge-lined and the two adjacent woods screen most views.
- 3.2.23 People engaged in outdoor recreation who are likely to have views of the construction of the proposed GSP substation include people using PRowS in the area, particularly to the west in closer proximity to the site. It is also considered likely that also there would be visual effects on recreational receptors within close proximity to the proposed GSP substation due to the presence of construction traffic, equipment and storage of materials and construction activities including earthworks, these would be short term and temporary in nature.
- 3.2.24 Construction operations are considered to be temporary effects and activity would be focused on one part of the landscape to enable construction. Given the short term, temporary nature of the construction works together with the presence of intervening vegetation and, the siting of much of the works between two woodlands the construction of GSP substation is not expected to result in notable visual effects.

Operation

Landscape

- 3.2.25 The location of the proposed GSP substation is between two areas of mature woodland and is adjacent to an existing 400kV overhead line. It would not be necessary to remove any vegetation from these woodlands to accommodate the GSP substation. The proposed GSP substation would be integrated into the landscape through the pattern of existing vegetation, including hedgerows with trees and woodland. Landscape proposals include planting and landscape mounding to the west and east of the proposed GSP substation site and would further assist in integrating the proposed GSP substation into the landscape.
- 3.2.26 As proposed planting establishes, the proposed GSP substation would become more integrated into the landscape, reducing impacts over time. Therefore, the proposed GSP substation is not expected to result in notable landscape effects during operation.

Visual

- 3.2.27 In the short term (at year 1), whilst planting establishes, there are likely to be visual effects on recreational receptors within close proximity to the proposed GSP substation. These relate to people using the PRow within close proximity to the proposed GSP substation; albeit the people using these routes already have close up views of the existing 400kV overhead line. The greatest effects would be seen from the PRow between Butler's Hall Farm and Old Road as represented by Viewpoint 9.
- 3.2.28 With the combination of intervening existing vegetation and the proposed planting and landscape mounding forming part of the proposed GSP substation, the operational visual impacts are unlikely to have notable visual effects on people living and moving around the local community.
- 3.2.29 The proposed GSP substation is unlikely to result in notable visual effects during operation (appraised as year 15). This is because embedded measures would limit visibility in the long term.

3.3 Biodiversity

Baseline

- 3.3.1 The full baseline for biodiversity is reported in Appendix 3 (Biodiversity Baseline), which detail the results of desk study and field survey for the proposed GSP substation but also a wider survey area for accompanying works as required. The feature biodiversity specific study areas are described along with methodology of field survey and includes figures showing the locations of important biodiversity features.

Statutory and Non-Statutory Designated Sites

- 3.3.2 There are no Special Areas of Conservation (SAC) within 30km of the site for which bats are a qualifying feature. There are no SACs, Special Protection Areas (SPA) or Ramsar sites within 2km of the site or have any hydrological connection with the proposed GSP substation. There are no National Nature Reserves, Sites of Special Scientific Interest (SSSI) or Local Nature Reserves within 2km of the site.
- 3.3.3 Butler's Wood and Waldegrave Wood, immediately adjacent to the site are both Local Wildlife Sites (LoWS) designated for their ancient woodland habitat.
- 3.3.4 Additional LoWS are located within 2km of the site (Appendix 3: Biodiversity Baseline) but there are no pathways to effect between these and the site.

Habitats

- 3.3.5 Butler's Wood, Waldegrave Wood, Parsonage Wood and Almshouse Wood are all listed on the Ancient Woodland Inventory (AWI) and located within 2km of the site. Within 2km there are additional area of deciduous woodland which have the potential to be Habitats of Principal Importance (HPI) and small areas of Traditional Orchard HPI.
- 3.3.6 The site comprises arable land bordered by the Butler's Wood LoWS and ancient woodland to the north and the Waldegrave Wood LoWS and ancient woodland to the south. Further arable land lies to the west and to the east of the A131. Grass dominated dry ditches run adjacent to the woodland boundaries and run in a north-south direction through the site. A priority habitat hedgerow runs parallel to the west of the A131 running north to south between Butler's and Waldegrave Wood. This hedgerow is not considered important for biodiversity reasons according to the under the Hedgerow Regulations 1997. Its importance with respect to the historic environment is considered in Section 3.4.

Species

- 3.3.7 No protected or notable species have been recorded within the site. Desk study has identified the presence of great crested newt (GCN) (*Triturus cristatus*), badger (*Meles meles*) and breeding birds within 1km.
- 3.3.8 Floral species of interest are restricted to woodland habitats, where bluebell (*Hyacinthoides non-scripta*) and wood sorrel (*Oxalis acetosella*) have been recorded.
- 3.3.9 A programme of protected species survey was undertaken in 2021 with results report in Appendix 3 (Biodiversity Baseline). Habitat suitable to support reptiles and roosting bats is present within the study area, associated with the adjacent woodland habitat. The hedgerows on site and adjacent woodland habitat have potential to support dormice. In summary, no protected species or notable species were identified within the site during the surveys. However, protected species are present in the wider environment, some in close proximity to the proposed GSP substation. Results from field surveys within their respective survey areas comprised:

- eDNA GCN surveys: confirmed presence of GCN within 250m of the site;
 - Bat roost surveys: trees with the potential to support roosting bats were identified within 50m of the site. Bat surveys identified two bat roosts within Waldegrave Wood: one roost supporting a minimum of two Natter's bat (*Myotis nattereri*) within 10m of the site; and a second roost supporting a single soprano pipistrelle (*Pipistrellus pygmaeus*) approximately 200m southeast of the site.
 - Badger survey: although badger setts were identified within 30m of the site, these were either disused or were outlier setts with entrances and tunnel directions heading into the woodland away from the site.
- 3.3.10 Previous dormouse surveys undertaken by Suffolk Wildlife Trust in 2012 of Butler's Wood, Waldegrave Wood and the hedgerow that connects the two areas of woodland adjacent to the A131 did not record any dormouse presence. The nearest positive survey result was located 2km east at Loshes Meadow. A precautionary approach is therefore being taken and dormice are assumed to be present within the hedgerow adjacent to the A131 and woodland adjacent to the site.

Invasive Non-Native Species

- 3.3.11 No Invasive Non-Native Species (INNS) were identified within the site. Variegated yellow archangel (*Lamium galeobdolon subsp. argentatum*) was recorded in Waldegrave Wood during field surveys in 2021.

Measures to Avoid or Reduce Impacts

- 3.3.12 Good practice measures that would avoid or reduce Biodiversity impacts during construction are set out in Annex 1 (CoCP) of Appendix 1 (CEMP). This includes training on environmental issues (GG05), details on construction lighting to reduce luminosity and intrusion into adjacent habitats (GG20), measures related to vegetation removal (B02 and B05), measures to reduce the risk of entrapment (B03) and measures to control the spread of invasive weeds (B04).
- 3.3.13 CoCP measures to be implemented during construction include dust suppression, and vehicle emissions are considered negligible. These would reduce potential impacts on the adjacent woodlands. CoCP measures relating to dewatering controls are also listed in Annex 1 (CoCP) of Appendix 1 (CEMP) to reduce any potential hydrological impact from construction activities on the adjacent woodlands.
- 3.3.14 Section 5 of Appendix 1 (CEMP) also explains that a preconstruction walkover survey will be undertaken to check the site for any change in protected species presence (e.g. badger setts) or newly established invasive non-native plant species and the measures to be taken if their presence were found.
- 3.3.15 A finger-tip search of the hedgerow section to be removed would be undertaken by an experienced dormouse ecologist and subsequent supervision of vegetation removal would be undertaken to avoid any potential offence being committed in relation to dormouse.
- 3.3.16 The planning application includes the Great Crested Newt District Level Licencing Impact Assessment and Conservation Payment Certificate. The final licence payment will be submitted to Natural England in Autumn 2022.
- 3.3.17 As noted in Table 3.1, following pre-application feedback from Braintree District Council, the proposed GSP substation has been moved approximately 3m south and the perimeter

fence, which requires foundations, has been moved south of the access road. As such, the distance at the nearest point between the perimeter fence and its foundations and the nearest edge of the ditch at Butler's Wood is 16.68m (based upon the topographical data). It is noted that the OS base mapping is less accurate and shows a greater distance between the fence and Butler's Wood at 24.58m. Meanwhile, the proposed access road is a distance of 3.38m at its nearest point (based upon the topographical data), whereas the OS base mapping shows a greater distance between the access road and Butler's Wood at 8.76m. Therefore, for assessment purposes, the more accurate topographical data has been used. This now represents the largest possible separation distance between Butler's Wood and the proposed development, having regard to the required electrical clearances between the existing tower (4YL80) and the gantry which the downloads from this tower connect to. The design change to relocate the proposed GSP substation reduces the risk of damage to tree roots and removes the need for trimming trees on the southern boundary of Butler's Wood that are not currently subject to management under existing wayleaves for the existing 400kV overhead line.

- 3.3.18 The distance at the nearest point between the perimeter fence and the nearest edge of the ditch at Waldegrave Wood is 43.73m and the distance at the nearest point between the single circuit CSE compound and the western edge of Waldegrave Wood is 24.46m (based upon topographical data). No felling of trees is required within Butler's Wood or Waldegrave Wood to facilitate the construction or operation of the proposed GSP substation.

Potential Impacts

- 3.3.19 The following potential impacts have been identified taking into account the measures identified in paragraphs 3.3.12 to 3.3.16.

Construction

Statutory and Non-Statutory Designated Sites

- 3.3.20 No potential impacts on statutory designated sites are anticipated.
- 3.3.21 Butler's Wood LoWS and Waldegrave Wood LoWS are designated for their ancient woodland habitats. No tree felling is required within Butler's Wood or Waldegrave Wood due to the proposed GSP substation. In addition Appendix 5 (Arboricultural Assessment) explains that tree root protection areas are not expected to extend into the arable field where the proposed GSP substation is proposed. The presence of dry ditches in excess of 1m depth on the boundaries of the woodlands will constrain root growth to within the woodland. Some tree pruning may be required for the site access, however this activity would be restricted to the canopy and the highway boundary.
- 3.3.22 CoCP measures to be implemented during construction would also reduce potential impacts on the adjacent woodlands during construction..

Habitats

- 3.3.23 Habitats within the site are predominantly under arable land use with grassland margins. There would be permanent loss of this habitat only.
- 3.3.24 A gap would be required in the hedgerow on the eastern edge of the site for the access road from the A131 to the proposed GSP substation. The remaining hedgerow would be enhanced by supplementary planting and a new habitat connection would be provided between Butler's and Waldegrave Woods to the west of the proposed GSP substation as part of the embedded landscape planting shown on Figure 4.

3.3.25 Short term indirect effects to general habitats, such as pollution and air quality impacts during construction would be managed through the good practice measures set out within the CoCP.

Species

3.3.26 National Grid has an agreement with Natural England to apply the District Level Licence approach to GCN and this has been submitted for the planning application. Therefore, there is no further consideration of the potential impacts for this species.

3.3.27 Hazel dormouse are assumed to be present within suitable habitats in the site but potential impacts are limited to the removal of a short section of hedgerow for the access road from the A131. This habitat loss would not result in habitat fragmentation as the gap created would be traversable by dormouse and a new habitat connection would also be provided to the west of the proposed GSP substation with the embedded landscape planting shown on Figure 4. A finger-tip search and subsequent supervision of vegetation removal at the access point with the A131 would also avoid any potential offence being committed in relation to dormouse.

3.3.28 Suitable habitat for reptiles is found within the site in the form of grassland margins of arable fields, hedgerows and vegetated banks of the dry ditches. As such, common reptiles species are assumed to be present. Although no specific reptile surveys have been completed, the proportionately small size and extent of suitable habitat present suggests a low number of reptiles would be affected. It is anticipated that harm to reptiles can be avoided by implementation of staged vegetation clearance as per B05 in Annex 1 (CoCP) of Appendix 1(CEMP) and individuals would naturally disperse into adjacent habitat.

3.3.29 The hedgerow requiring a small section of removal provides suitable habitat for nesting birds. To reduce the risk that birds, their nests and/or eggs are not affected by the works, appropriate timing of vegetation clearance and implementation of a nesting bird check prior to removal will be implemented, as per B02 in Annex 1 (CoCP) of Appendix 1(CEMP).

3.3.30 No other protected or notable species have been identified within the site.

3.3.31 Piling activities generating in excess of 65dB may generate short term disturbance to species during construction located beyond the site in adjacent woodland, specifically breeding birds and bat roosts. There is a confirmed bat roost of two to three Natterer's bat in a tree (Appendix 3: Biodiversity Baseline, Figure A3.5, TC27) located less than 10m from the site where the single circuit CSE compound to west of Waldegrave Wood is located.

3.3.32 The bat roost is set 10m back from the edge of the woodland and is away from the main works. It is likely that the line of trees would attenuate some of the noise generated. It is also anticipated the tree structure of the roost itself would also provide some degree of sound attenuation. Considering this and the short term nature of the works in this location, it has been assessed that a licence for disturbance from Natural England will not be required. The piling works, although potentially disturbing within the timeframe of activity, will be short term (e.g. the construction of the foundation for the gantry within the single circuit CSE compound is expected to take less than a month).

3.3.33 There is a confirmed bat roost of one soprano pipistrelle (*Pygaemus pipistrellus*) in tree T16 is located over 200m from the site. It is not anticipated that this roost would be disturbed by construction noise given the distance.

3.3.34 Numerous bat species were recorded within 50m foraging and commuting in the woodland habitats, including barbastelle bat (*Barbastella barbastellus*), one of the UK rarer species. Additionally, badger surveys and incidental sightings confirmed presence of badger in the adjacent woodland areas. To reduce the risk of potential disturbance to nocturnal wildlife, any artificial light used would adopt a sensitive lighting scheme (CoCP measure GG20).

3.3.35 The disused/outlier badger setts recorded on the boundary of Butler's Wood adjacent to the site would not be impacted by the project. Furthermore, the sett tunnel direction is away from the arable field edge and into the woodland while the dry ditch on the woodland edge would create a barrier effect.

Invasive Non-Native Species

3.3.36 No INNS were identified within the site during the field survey. A pre-construction ecological walk over survey would be undertaken should consent be granted to check whether conditions have changed. In the unlikely event INNS are identified within the site then a method statement would be developed to detail management and/or treatment to reduce risks that the species are spread during the works.

Operation

3.3.37 The proposed GSP substation would be located within arable land of limited nature conservation value. No additional or new edges of woodland are expected to require trimming during operation. Post-construction security lighting will be used outside of daylight hours but their use would require trigger (i.e. not continuous) and would be on a timer. Such security lighting would be low lux level light-emitting diode (LED) type luminaires with directable light output and passive infrared sensor (PIR) motion activated lighting.

3.3.38 The inclusion of the noise enclosures around the SGTs would reduce potential disturbance to sensitive species and as maintenance activities would be limited it is unlikely there is a feasible pathway to generate disturbance. Operational noise and emissions to air are detailed in Sections 3.9 and 3.10 respectively. There is limited potential for emissions of air pollutants to be generated by routine inspection and maintenance of the proposed GSP substation while the embedded noise enclosures included around the transformer the assessment would reduce noise impacts such that they are assessed to be low during operation.

3.4 Historic Environment

Baseline

3.4.1 The primary study area for physical and setting impacts has been defined as 250m from the site and has been used for data collection of all heritage assets (designated and non-designated).

3.4.2 To coincide with the landscape and visual assessment, a secondary study area for designated cultural heritage assets where the setting could be affected has been defined as 2km from the site.

3.4.3 The 2km study area is primarily restricted to designated cultural heritage assets as they are typically of a higher sensitivity than non-designated heritage assets and changes within their setting would be more likely to result in a greater impact. However, the 2km study area also includes non-designated protected lanes. These are historic lanes within

Essex that have been identified for protection within local planning policy. The 2km study area has been used for protected lanes as both physical and setting impacts have the potential to be present beyond the extent of the 250m study area.

- 3.4.4 All heritage assets within the baseline are presented in Appendix 6 (Historic Environment Baseline) and designated heritage assets and non-designated protected lanes are presented in Figure 3.

Archaeological Remains

- 3.4.5 Designated archaeological remains within the 2km study area comprise two scheduled monuments:

- ‘Roman villa 480m southeast of Hill Farm’ (NHLE 1011806) situated almost 2km to the northwest of the site; and
- ‘Remains of church and churchyard, 80m southeast of The Ryes’ (NHLE 1019664) situated almost 2km to the northeast of the site.

- 3.4.6 Within the Historic Environment Record (HER), one non-designated archaeological feature is situated within the 250m study area comprising the cropmarks of former field boundaries (‘Bulmer’ (MEX1031722)). Some of the former field boundaries have been mapped during aerial investigation and mapping undertaken for the proposed GSP substation. The eastern edge of this non-designated archaeological remain also marks the parish boundary between Bulmer and Twinstead, though the field system had already been altered by the time of the 1st Edition Ordnance Survey map (6-inch, sheet 12, published 1880). The edge which has been retained equates to a small section of the north western boundary of Waldegrave Wood and a dry ditch which extends through site northward between Waldegrave Wood and Butler’s Wood.

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- 3.4.7 No archaeological anomalies were identified during archaeological Geophysical Survey undertaken for the proposed GSP substation.

- 3.4.8 Archaeological trial trenching was undertaken within the site in February and March 2022. In accordance with an agreed Written Scheme of Investigation (WSI), eighteen trial trenches were excavated within the vicinity of the proposed GSP substation. No dateable artefacts were recovered and the evaluation confirmed that there was no widespread evidence of archaeological activity within the site. Fifteen trenches recorded no archaeological features. A total of four archaeological features were recorded in the remaining three trenches as shown in Image 3.1. These heritage assets comprise:

- one post-medieval boundary ditch which appears to mark the former eastern edge of the woodland section which has been removed (trench 01 in Image 3.1);
- one field boundary ditch which equates to a previously known linear feature recorded through the Aerial Investigation and Mapping work conducted for the proposed GSP substation and is within the area of the field boundary site recorded within the HER (‘Bulmer’; MEX1031722). This boundary ditch has therefore not been included within the baseline as a unique heritage asset (trench 02 in Image 3.1); and
- one potentially prehistoric pit with evidence of burning situated to the west of Waldegrave Wood near to the proposed single circuit CSE compound (trench 02 in Image 3.1).

3.4.9 The fourth feature, a potentially prehistoric ditch, was recorded outside of the site (trench 03 in Image 3.1), but in combination with the pit (trench 02 in Image 3.1), may be indicative of a low level of prehistoric activity in the area of these two trenches.

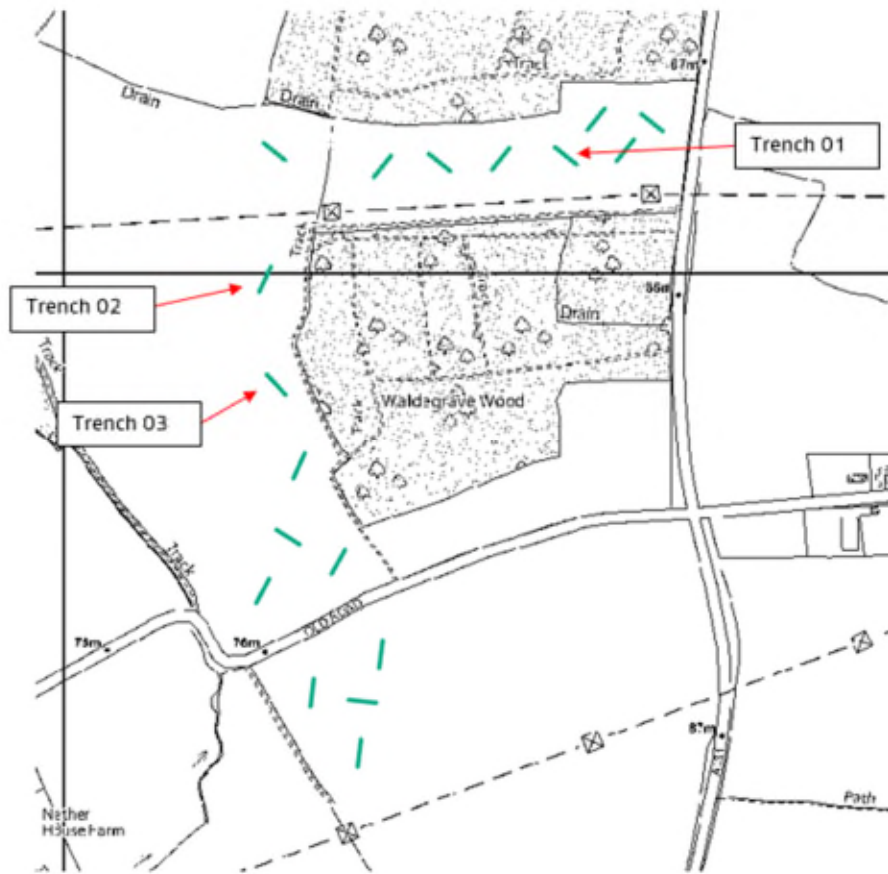


Image 3.1: Archaeological Trial Trench Locations

3.4.10 The nature of the archaeological remains and the very low density of features indicates that there is a low potential for complex archaeological remains to be present within the site. If found, further archaeological remains are likely to be similar in character to those recorded during trial trench evaluation; i.e. comprising agricultural boundary ditches with some isolated earlier deposits, predominantly situated near to the single circuit CSE compound in the southwest of the site.

Built Heritage

3.4.11 There are no Conservation Areas within 2km of the site.

3.4.12 There are 53 listed buildings within 2km of the site, comprising four Grade II* listed buildings and 49 Grade II listed buildings. Of these, the nearest to the site comprise:

- four Grade II listed buildings associated with Gentry's Farm (Gentry's Cottage (NHLE 1337894), Cart Lodge at Gentry's Farmhouse (NHLE 1337883), Gentry's Farmhouse (NHLE 1169822), and Barn, 20 Metres South West of Gentry's Farmhouse (NHLE 1123269)). This group of buildings comprise two timber framed houses and two barns which date between the 15th to 18th centuries. They are situated linearly along Gentry's Farm Road protected lane within the wider agricultural landscape;

- Butler’s Hall Farmhouse (Grade II*; NHLE 1169693) – a timber framed house with elements that date from the 15th-17th centuries. The house is set within a small plot of land with surrounding vegetation and neighbouring agricultural outbuildings, within the wider agricultural landscape; and
- Nether House Farmhouse (Grade II; NHLE 1123031) – a timber framed house which dates to the 17th century or earlier. The house is set in an agricultural landscape on the outskirts of Wickham St Paul and near to the Old Road protected lane.

3.4.13 The majority of the designated historic buildings within the baseline represent the rural nature of the area and include farmhouses, barns and other outbuildings, cottages, and churches.

3.4.14 No non-designated historic buildings, as identified within the HER or during heritage walkover survey, are situated within the 250m study area.

Historic Landscapes

3.4.15 There are no designated historic landscapes (Registered Parks and Gardens) within 2km of the site.

3.4.16 There are three protected lanes within 2km, comprising Gentry’s Farm Road; Tymperley Farm Road; and Old Road. The nearest protected lane is Old Road, approximately 270m south of the site. Walkover survey has identified that Old Road is characterised by roadside hedgerows and ditches, dotted with the occasional mature trees.

3.4.17 A priority habitat hedgerow runs west of the A131 running north to south between Butler’s and Waldegrave Wood. This follows the alignment of the A131 which is present in maps dating to the 18th century (such as Moll 1724, Chapman and Andre 1777, and Cary 1793). It is partially situated within a small piece of land that was not vegetated as ancient woodland within the map for Bulmer dating to 1840 (Peyton, 1840) and extends northwards along the eastern boundary of the woodland. This hedgerow qualifies as ‘important’ for archaeology and history criteria under The Hedgerow Regulations 1997 as the section of hedgerow which extends along the eastern boundary of the woodland is representative of the edge of the ancient woodland historic landscape type (HLT) and mirrors the boundary between the parishes of Twinstead and Bulmer.

3.4.18 The non-designated HLT within the 250m study area predominantly comprises fields of post-1950s boundary loss due to mechanisation and changes in agricultural practices. The surviving edges of this type are the element which holds the most historic importance but overall this HLT may reflect several periods of field systems and is a common type within the region. One of the land parcels of 1950s Boundary Loss HLT also equates to the site recorded in the HER as containing cropmarks of former field boundaries (‘Bulmer’ (MEX1031722)). This land parcel is bounded to the east by a ditch noted during heritage walkover surveys that demarks the parish boundary between Bulmer and Twinstead as well as the extent of the former woodland in this area.

3.4.19 There are also two parcels of ancient woodland HLT which border the site, one land parcel of ‘Irregular Enclosure’ which is pre-18th century, and one land parcel of Piecemeal Enclosure by Agreement which is 18th century or later. The ancient woodland type is more rare, Piecemeal Enclosure is considered occasional, and Irregular Enclosure is common regionally.

Measures to Avoid or Reduce Impacts

- 3.4.20 Good practice measures that would avoid or reduce Historic Environment impacts during construction are set out in Annex 1 (CoCP) of Appendix 1 (CEMP).
- 3.4.21 A large number of the general good practice measures outlined within the CoCP (indicated by a 'GG' reference) would also avoid or reduce impacts on the setting of heritage assets during construction. These include the following commitments:
- work is undertaken with an awareness of environmental issues and in line with all relevant legislation, consents, and permits (GG01, GG05, GG06, GG07);
 - proper controls are established for activities which may produce a noticeable nuisance such as dust, noise, vibration, lighting, and vehicle movements (GG10, GG11, GG12, GG24, NV01); and
 - the reinstatement and proposed planting is established appropriately (LV03).
- 3.4.22 A walkover survey of the site has been undertaken which has informed the design measures to avoid or reduce impacts such as vegetation planting and landscape mounding shown on Figure 4.
- 3.4.23 A programme of archaeological evaluation has been conducted comprising archaeological geophysical survey and trial trenching.
- 3.4.24 Measures to reduce impacts on archaeological remains during construction will include an area of archaeological watching brief during construction. The watching brief will be completed under a WSI which will detail the scope of works, methodology, archiving, and dissemination. The WSI will also include the provision for establishing suitable measures in the event of unexpected archaeological discoveries during construction which are more extensive than predicted.
- 3.4.25 The WSI will be submitted to the archaeological curator(s) for Essex County Council for agreement prior to commencement of construction.

Potential Impacts

- 3.4.26 The following potential impacts have been identified taking into account the measures identified in paragraphs 3.4.20 to 3.4.25.

Construction

- 3.4.27 The potential impacts during construction can be divided into physical impacts and impacts on heritage assets due to changes within their setting.
- 3.4.28 Potential physical impacts on heritage assets during construction comprise:
- partial or complete removal of archaeological remains or historic landscape elements (such as hedgerows) within the site through groundworks associated with construction such as excavation or topsoil stripping; and
 - damage to archaeological remains within the site through their compression during construction, such as through the movement of machinery or within laydown or spoil storage areas.
- 3.4.29 Potential impacts on heritage assets through changes to their setting during construction comprise:
- the physical removal of, damage to, or severance of associated archaeological remains which form the setting of a heritage asset;

- the alteration to the setting of archaeological remains, historic buildings, or HLT through the removal of vegetation or associated elements during construction; and
- temporary noise and visual intrusion within the setting of archaeological remains, historic buildings, or HLT during construction activities and / or from increased traffic.

Archaeological Remains

- 3.4.30 Due to the distance involved and only the potential for oblique intervisibility with the proposed GSP substation and the single circuit CSE compound, no designated archaeological remains (scheduled monuments) would be affected by the proposed GSP substation either physically or through changes to their setting during construction.
- 3.4.31 There is the potential for direct adverse physical impacts on:
- currently unknown archaeological remains, which, if present, are likely to be of a similar character to those recorded during archaeological trial trenching;
 - the non-designated potential prehistoric pit recorded during trial trenching (not fully excavated);
 - the likely Post-medieval boundary ditch feature demarcating former extent of the woodland, recorded during trial trenching; and
 - the non-designated archaeological site that retains former field boundary ditches ('Bulmer' (MEX1031722)), one of which was recorded during archaeological trial trenching.
- 3.4.32 Implementation of the archaeological watching brief would 'preserve by record' these archaeological remains and any further currently unknown archaeological remains which may be revealed during construction.

Built Heritage

- 3.4.33 Due to the distance involved, no direct physical impact on listed buildings is anticipated during construction.
- 3.4.34 Section 3.6 (Geology and Hydrogeology) outlines how the potential for changes to the baseline groundwater environment are limited and no indirect physical impact on designated heritage assets is anticipated.
- 3.4.35 Section 3.10 (Noise and Vibration) outlines how the nature of potential impacts due to vibration would not extend beyond 100m from the construction activity. No listed buildings are situated within close enough proximity to the construction works to be adversely affected by vibration.
- 3.4.36 In terms of setting, the closest listed buildings are situated approximately 250m away from the site to the northeast. Butler's Wood and Waldegrave Wood would largely filter views of the proposed GSP substation. While potential impacts on heritage assets through changes to their setting are not restricted to intervisibility with the proposed GSP substation site, there is limited potential for other impacts:
- temporary noise intrusion during construction is anticipated to be limited due to the distance and the baseline setting of a working agricultural environment;
 - no severance is anticipated between heritage assets and any elements of their setting which contributes to their cultural value; and
 - no removal of vegetation is anticipated which contributes to the character of the setting.

3.4.37 No listed buildings would have direct visibility of the proposed works. Butler's Hall Farmhouse (NHLE 1169693, Grade II*) and Nether House Farmhouse (NHLE 1123031, Grade II) would have the most potential for oblique intervisibility with the proposed GSP substation and the single circuit CSE compound, however:

- Butler's Hall Farmhouse is situated approximately 600m to the northwest of the site. The house fronts to the southwest, which is facing away from the site, and is situated within a small land parcel bounded by vegetation. The house is further screened from the site by the intervening agricultural outbuildings which are immediately adjacent to it; and
- Nether House Farmhouse is situated approximately 500m to the southwest of the site. It is screened from the site by the agricultural outbuildings which are immediately adjacent to it and the general nature of the intervening topography and vegetation.

3.4.38 Due to the limited potential for intervisibility with the site, no impact on the cultural value of these heritage assets from visible development within their setting is anticipated during construction.

3.4.39 There are no non-designated historic buildings within the baseline (up to 250m from the site).

Historic Landscapes

3.4.40 As there are no designated historic landscapes (Registered Parks and Gardens) within the baseline (up to 2km from the site), there would be no impacts on designated HLT.

3.4.41 There is the potential for adverse physical impacts on non-designated HLT through part removal of vegetation or landscape elements which mark the surviving edges or borders some HLT. This includes:

- The partial removal of a hedgerow which is considered to be 'important' under the Hedgerow Regulations to accommodate site access to the A131. Removal of part of this hedgerow would have a permanent adverse impact on this low value HLT; however, the overall legibility of the edge of the land parcel, the historic routeway, and the parish boundary would not be substantially altered.
- Potential for physical impact on the ditch element which forms the eastern boundary for a land parcel of 1950s Boundary Loss HLT, the former field boundary archaeological site of 'Bulmer' (MEX1031722), and the parish boundary between Bulmer and Twinstead which would reduce the legibility of this boundary within the landscape.

3.4.42 Temporary noise intrusion within the setting on non-designated HLT including protected lanes is anticipated to be short term and generally comparable to the baseline of a working agricultural environment.

3.4.43 Effects to historic landscapes through minor temporary changes within their setting during construction (e.g. from increased noise, dust, or visual intrusion) would be managed through the good practice measures in Annex 1 (CoCP) of Appendix 1(CEMP).

Operation

3.4.44 The site would be screened by existing vegetation and through the planting and mounding shown on Figure 4. As the proposed planting shown on Figure 4 establishes, views of the proposed GSP substation would become softened, reducing impacts on the setting of archaeological remains, historic buildings and the historic landscape over time.

- 3.4.45 As outlined in Paragraphs 3.4.36 – 3.4.38, due to the limited potential for intervisibility with proposed GSP substation, no impact on the cultural value of listed buildings from development within their setting is anticipated during operation.
- 3.4.46 At the location of the nearest protected lane (Old Road (BTELANE84)), the operational noise generated during normal operation would be below the background sound level for both day and night (Appendix 10: Noise Assessment). The nearest listed buildings (near to Gentry's Farmhouse to the northeast and Butler's Hall Farmhouse to the northwest) are situated further away and would therefore have a similar negligible impact resulting from noise intrusion during operation.
- 3.4.47 During operation the site would be unmanned. As such the potential for impacts resulting from maintenance would be low.

3.5 Water Environment

Baseline

- 3.5.1 The study area for the water environment includes land and water features within 500m of the site.
- 3.5.2 There is a minor watercourse, approximately 180m southwest of the site. This minor watercourse drains to the Belchamp Brook approximately 3km downstream of the site. The Belchamp Brook is a tributary of the River Stour, both are Main Rivers.
- 3.5.3 There are also numerous ditches which drain the study area and a number of small ponds. There is an agricultural drain/ditch that crosses the site and flows along its northern boundary, in a westerly direction. There are also drainage ditches that run along the edge of Butler's Wood and Waldegrave Wood, connected to the drainage ditch that crosses the site. The drainage ditch that crosses the site and the minor watercourse southwest of the site are 'ordinary watercourses.'
- 3.5.4 There is one active licenced discharge approximately 465m northeast of the site boundary at a property on Watery Lane and a private water supply at Butler's Hall Farm, approximately 500m northwest of the site. No other licenced discharges or extractions are within the study area.
- 3.5.5 Appendix 7 (Flood Risk Assessment (FRA)) explains that the site is located entirely within Flood Zone 1 on the Flood Map for Planning (Environment Agency, 2021) and there are no records of flooding from rivers at the site according to the Environment Agency's 'Historic Flood Map' (Environment Agency 2018). The watercourses in the vicinity of the site are inland and are not tidally influenced.
- 3.5.6 The Risk of Flooding from Surface Water Map (Environment Agency, 2019) indicates that the majority of the site is at 'very low risk' of surface water flooding, equivalent to an annual chance of flooding less than 1 in 1,000 (0.1%). However, parts of the site are shown to be at higher risk of flooding from this source as detailed in Appendix 7 (FRA). The FRA concludes the site is at risk of flooding from groundwater, sewer and artificial sources.

Measures to Avoid or Reduce Impacts

- 3.5.7 Good practice measures that would avoid or reduce water environment impacts during construction are set out in Annex 1 (CoCP) of Appendix 1 (CEMP) and are outlined below.

- Runoff across the site will be controlled through a variety of methods including header drains, buffer zones around watercourses, on-site ditches, silt traps and bunding (GG15).
- Where new or additional surfacing is required on any access tracks and compound areas, these will be permeable surfaces where ground conditions allow (W07).
- Land used temporarily will be reinstated where practicable (bearing in mind any restrictions on planting and land use) to its pre-construction condition and use. Boundary features will be reinstated to a similar style and quality to those that were removed, with landowner agreement. Existing land drainage regimes would also be reinstated following construction (GG07).
- The drainage design will be in accordance with the requirements of the Essex County Council Sustainable Drainage System (SuDS) Design Guide (2020) and will include allowances for climate change in accordance with current Environment Agency requirements. The drainage infrastructure would provide the storage necessary to achieve discharges at greenfield rates (W12).

3.5.8 The proposed GSP substation will include permanent surface and foul drainage systems for permanent areas of impermeable land, such as the access road and SGT bunds. For example, water collected from the SGT bunds and the roofs of buildings in western part of the proposed GSP substation shown on Figure 2 will be routed to a soakaway. These would be protected from accidental oil discharges from the site by interceptor units. All remaining areas are likely to contain porous surfacing to allow surface water to naturally infiltrate without the need for formal drainage.

Potential Impacts

3.5.9 The following potential impacts have been identified taking into account the measures identified in paragraphs 3.5.7 to 3.5.8.

Construction

3.5.10 During construction, earth moving and stockpiling of soil and other materials have the potential to cause deterioration of surface water quality through silted or polluted runoff. Good practice measures within the CoCP would reduce the risk of pollution to the water environment during construction by removing the pathway between the source and the receptors identified in the baseline.

3.5.11 There is potential for temporary impacts on the flow regime of the drainage ditch that crosses the site when the underground cables, which part of the accompanying works and which do not form part of the planning application, are laid during construction. Once the cables are installed, they will be below bed and the drainage ditch would be retained. The access road, shown in Figure 2, adjoins the existing track as it crosses the drainage ditch. The construction works will be undertaken in accordance with a method statement, approved under temporary land drainage consent under the Land Drainage Act (1991).

3.5.12 Due to their distance, there would be no effect on private water supplies or active discharges.

3.5.13 As the proposed GSP substation is not located in Flood Zone 2 or 3, there is limited potential for it to increase flood risk during construction through the creation of soil stockpiles and temporary works.

3.5.14 The good practice measures within the CoCP would also reduce effects on the existing land drainage network during construction.

Operation

3.5.15 During operation, pollution impact pathways to surface water receptors would be very limited. This is because land would be reinstated following completion of construction works, there would be no operational discharges to surface watercourses and maintenance activities would be undertaken in locations distant from watercourses. There would be no permanent discharges required but a waste/foul water system would be used on site, comprising short pipes from the amenities building to a cesspool that would be periodically emptied as required. Waste-water generated would be very limited given the site would be unmanned during operation and the waste-water would only come from occasional use of facilities in the amenity buildings.

3.5.16 There would also be no effects on private water supplies or existing discharges.

3.5.17 Landscape mounding is proposed to the east and west of proposed GSP substation and areas of planting are proposed within the site as part of the landscape plan and to achieve Biodiversity Net Gain (Figure 4). These areas of landscape mounding and planting will not impact any of the existing drainage ditches and would be located in areas generally shown to be at 'very low/low risk' of flooding on the Risk of Flooding from Surface Water Map (Environmental Agency, 2019). Therefore, no impacts on surface water flood risk are associated with these works.

3.5.18 In accordance with the National Planning Policy Framework (NPPF), the site is appropriate, on flood risk grounds, for the type of development proposed. No sources of flooding are considered to pose an onerous risk to the site in the context of the proposed GSP substation. This includes rivers, the sea, surface water, groundwater, sewers, reservoirs, canals and other artificial sources.

3.5.19 There are limited areas of hardstanding for the access road and SGTs. Where new areas of impermeable land cover are created, the drainage design will be in accordance with the requirements of the Essex County Council SuDS in accordance with commitment W12 in the CoCP in Annex 1 of Appendix 1 (CEMP). Existing land drainage regimes would be reinstated following construction.

3.6 Geology and Hydrogeology

Baseline

3.6.1 The study area is based on the site and the baseline is informed by information in Appendix 8 (Phase 1 Contaminated Land Assessment).

3.6.2 There are no sites designated for geological importance (e.g. Sites of Special Scientific Interest (SSSIs) designated for their geological importance) and no groundwater dependent terrestrial ecosystems (GWDTes) within the study area.

3.6.3 The superficial geology underlying the site comprises the Lowestoft Formation, which is found to typically comprise a chalky diamicton, together with outwash sands and gravels, silts, and clays.

3.6.4 Underlying the Lowestoft Formation, the Kesgrave Catchment Subgroup is likely to be present which is typically found to comprise moderately sorted sands and gravels.

- 3.6.5 London Clay Formation underlies the superficial deposits, and is described by the British Geological Survey (BGS) as comprising laminated, blue-grey, pyritic, bioturbated, silty and fine-grained sandy clay with common seams or nodules of calcareous 'cement stone'. Glauconite is also known to be present in some of the sand and clay layers.
- 3.6.6 Underlying the London Clay Formation is likely to be the Lambeth Group, overlying the Thanet Sand formation and the White Chalk Subgroup.
- 3.6.7 The hydrogeology is classified by the Environment Agency (Defra, 2021) as Secondary A and Secondary (undifferentiated) aquifers. The study area does not cross any groundwater inner source protection zones and is located within Zone III (Total Catchment) (Defra, 2021). Groundwater vulnerability is mapped as medium-low or low across the study area (Defra, 2021). There are no groundwater abstractions within the study area. Private water supplies are considered in Section 3.5 (Water Environment).
- 3.6.8 Appendix 8 (Phase 1 Contaminated Land Assessment) explains that no potentially contaminative land uses either on or in the immediate vicinity of the site have been identified and the contamination potential at the site is considered to be Very Low. Other than the existing 400kV overhead line, there is no evidence of the site being used for landfill, sewage treatment, industry or infrastructure.
- 3.6.9 The Essex Minerals Local Plan Review (2021) identifies large parts of Essex, including the study area, as a Mineral Safeguarding Area (MSA) for sand and gravel. There are no mineral reserves in the study area.

Measures to Avoid or Reduce Impacts

- 3.6.10 Good practice measures that would avoid or reduce Geology and Hydrogeology impacts during construction are set out in Annex 1 (CoCP) of Appendix 1 (CEMP). This includes training with regards to working with potentially contaminated materials (GG05), storage of fuels, oils and chemicals (GG14), and those related to pollution events (GG22 and W10).
- 3.6.11 Commitment GH02 states that excavation materials identified as being potentially contaminated and unsuitable for reuse will be segregated from other material and transported off-site in suitable vehicles for off-site testing and subsequent disposal. Vehicles will contain and cover the materials to prevent loss of leachate, dust or other material during transport. Ground arisings deemed unsuitable for reuse within the project will be disposed of appropriately, for example to a soil treatment centre or landfill.

Potential Impacts

- 3.6.12 The following potential impacts have been identified taking into account the measures identified in paragraphs 3.6.10 to 3.6.11.
- 3.6.13 No impacts are predicted on designated sites, GWDTE or mineral reserves during construction or operation. The potential for impacts on other geology and hydrogeology receptors are considered below.

Construction

- 3.6.14 New areas of hardstanding would be designed to meet drainage standards (see Section 3.5: Water Environment). Any dewatering required for construction would be short-term and shallow in nature and direct discharge of untested water to water bodies would be avoided. Water discharges would also be disposed of in accordance with any agreements made with the relevant authorities.

- 3.6.15 Ground disturbance during construction has the potential to create new groundwater flow pathways, where permeable materials or flow routes are introduced. In contrast, installation of impermeable structures or backfill can impede groundwater flow. The scale and nature of the planned works are such that no new pathways are likely to be created and no barriers to flow are envisaged.
- 3.6.16 The qualitative risk assessment presented in Appendix 8 (Phase 1 Contaminated Land Assessment) did not identify any notable source of contamination currently present at the site or within the immediate vicinity based on the current and historical land uses. Therefore the contamination potential of the site is considered to be Very Low. As no current source has been identified a source-pathway-receptor linkage has also not been identified and therefore there is not considered a risk to proposed GSP substation.
- 3.6.17 Any risks from spills or accidents involving construction plant, would be managed through the good practice measures in Annex 1 (CoCP) of Appendix 1 (CEMP).

Operation

- 3.6.18 There would be no dewatering during operation, and no operational discharges are required. The proposed GSP substation is therefore not expected to result in impacts on geology or hydrogeology during operation.
- 3.6.19 The proposed GSP substation affects a very small percentage of the overall MSA, since the county-wide safeguard areas are very large and also include substantial buffers around minerals.

3.7 Agriculture and Soils

Baseline

- 3.7.1 The study area is the land within the site. The land use within the site is arable, with large woodland blocks to the north and south.
- 3.7.2 An Agricultural Land Classification (ALC) assessment is presented in Appendix 9 of this Environmental Appraisal. The desk-based and field survey data shows that the entire site comprises Grade 3a land, which is categorised as 'Good Quality Agricultural Land' and is one of the three grades (Grades 1 to 3a) considered to be the best and most versatile. Soils present at the site comprise soils of the Oak 2 Soil Association. These are described as slowly permeable seasonally waterlogged fine loamy over clayey and fine silty over clayey soils. It is also noted that some soils will have a chalky subsoil. The ALC survey confirmed these general characteristics. Topsoil thickness ranged from 32cm to 42cm and is likely to represent the general plough depth. All profiles taken as part of the ALC survey exhibited evidence of gleying in the subsoil, with one profile also showing evidence of gleying in the topsoil. The topsoil had a clay loam texture, with one profile recorded as having a silty clay loam texture, with the subsoil texture ranging from clay loam to heavy silty clay loam.

Measures to Avoid or Reduce Impacts

- 3.7.3 Good practice measures that would avoid or reduce Agriculture and Soils impacts during construction are set out in Annex 1 (CoCP) of Appendix 1 (CEMP). This includes providing a record of condition of the working areas affected (GG06, reinstatement of land used temporarily, bearing in mind the planting proposals shown on Figure 4 of the Environmental Appraisal (GG07), soil management measures (AS01) and maintaining access to and from agricultural land uses (AS03).

- 3.7.4 Further measures related to site preparation, soil stripping, stockpiling and reinstatement are provided in Sections 4 and 9 of Appendix 1 (CEMP). In particular, the soil stripping method will follow the guidance set out in Defra's Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (Defra, 2009) and where land is reinstated or where habitat is created according to Figure 4 of the Environmental Appraisal, the appropriate soil conditions (for example through the replacement of stripped layers and the removal of any compaction) will be created. This will be achieved to a depth of 1.2m (or the maximum natural soil depth if this is shallower).

Potential Impacts

- 3.7.5 The following potential impacts have been identified taking into account the measures identified in paragraphs 3.7.3 to 3.7.4.

Construction

- 3.7.6 Effects on land drainage are considered in Section 3.5 (Water Environment).
- 3.7.7 During construction there would be a loss of Best and Most Valuable land (ALC Grade 3a) from agricultural productivity. There would also be disturbance to soils due to excavation and soil stripping as well as the potential for impacts on the ecosystem services the soils provide. In addition, there would be potential impacts on agricultural operations due to disturbance and access restrictions. The good practice measures set out within the CoCP would reduce these effects. All land required temporarily would be reinstated.

Operation

- 3.7.8 Areas of agricultural land that would be lost permanently in terms of business would be dealt with through compensation agreements and are not considered further within this Environmental Appraisal.
- 3.7.9 During operation, there would be a permanent loss of a small area of agricultural land (approximately 7 hectares). As noted in Braintree District Council's screening response, Braintree is primarily a rural district with many sites of high agricultural classification. As such, while there would be a degree of harm caused by the loss of the site land, the loss would be small in the context of the amount of such agricultural land in the district. It is not considered that the impact would be more than local.
- 3.7.10 Any maintenance or repair works required which would result in disturbance to soils during operation would be undertaken in accordance with good practice soil handling methods.

3.8 Traffic and Transport

Baseline

- 3.8.1 The A120, the A12 and the A14 are all part of the Strategic Road Network managed by National Highways and provide strategic connections to the rest of the east of England and beyond. The site is bounded to the east by the A131, which links Sudbury and Halstead to the A120 and A12 to the south. The remainder of the roads near to the site comprise of B-roads and lanes providing access to towns, villages and individual properties and farms.
- 3.8.2 The study area for the assessment for National Cycle Network (NCN) and Public Right of Way (PRoW) is 500m from the site. There are no NCNs in the study area. There are a

approximately 10 interlinked PRow within the study area, including a system of PRowS extending eastwards from the A131 opposite the entrance to the proposed access road and there are PRow to the west of the site, the nearest of which is 185m from the site, these cross the existing 400kV line. The PRow are shown on Figure 3.

Measures to Avoid or Reduce Impacts

- 3.8.3 Good practice measures that would reduce Traffic and Transport impacts during construction are set out in Annex 1 (CoCP) of Appendix 1 (CEMP). This includes plant and vehicles conforming to applicable standards (GG12) and washdown of vehicles (GG16 and GG17).
- 3.8.4 Section 10 of Appendix 1 (CEMP) also explains measures associated with construction traffic using the local road network, traffic management during construction of the proposed bellmouth and that an Abnormal Indivisible Load (AIL) Access Study is being undertaken to assess the suitability of the road network for the vehicles delivering the SGTs. The outputs of the AIL Access Study, including any alterations required to the road network and the timing of the AIL movements, will be agreed with National Highways and Essex County Council prior to construction.

Potential Impacts

- 3.8.5 The following potential impacts have been identified taking into account the measures identified in paragraphs 3.8.3 to 3.8.4.

Construction

- 3.8.6 Roads that may be affected are expected to be located within the area bounded by the A120 (Braintree to Marks Tey), the A12 (Marks Tey to Copdock) and the A131 (Sudbury to Braintree).
- 3.8.7 The construction of the proposed GSP substation would require the delivery of materials, plant and equipment. This includes AIL movements for the delivery of the super grid transformer(s) to the site.
- 3.8.8 Estimated total monthly construction vehicle numbers based on the peak month (to ensure a worst-case scenario) have been converted into average daily construction and staff vehicles. Construction traffic vehicle numbers are expected to be low, with a one-way daily average of 10 construction vehicles (one heavy goods vehicle (HGV)) per day (i.e. 10 inbound and 10 outbound). The daily workforce is expected to be fewer than 20 workers. A worst-case assumption that each worker drives their own car to and from the site would consequently give a daily total of less than 30 inbound and 30 outbound vehicles per day.
- 3.8.9 To date, the Covid-19 pandemic has prevented collection of up to date baseline traffic data. Due to changes in traffic patterns, it is anticipated that any data collected within the past two years would be unlikely to provide an accurate reflection of the baseline conditions within the area. In lieu of any 2021 highways traffic data, twelve hour, 2013 traffic counts have been growthed to 2021 levels using TEMPro growth factors for Braintree, Babergh and Mid Suffolk.
- 3.8.10 Table 3.3 shows the predicted impact of construction traffic on the A131 for a 12-hour weekday, based on the assumptions above. As shown, this would be less than 1% of baseline A131 traffic flow. Furthermore, construction vehicle timings are unlikely to follow normal traffic patterns, as peak hours are usually avoided. Weekday construction worker

trips are also likely to be outside conventional network peaks (08:00 to 09:00 and 17:00 to 18:00) as Core Working Hours are assumed to be 07:00 to 19:00, meaning that many trips to and from site will be made before 07:00 or after 19:00.

Table 3.3: A131 Traffic Flows

2013 A131 Baseline 12-hour flows (two-way traffic)	2021 A131 Baseline 12-hour flows (two- way traffic)	Daily Average Construction Traffic (two-way traffic)	Impact on A131 (%)
5,712	6,248	60	0.96

3.8.11 This means that construction traffic numbers, including those associated with worker numbers is low.

3.8.12 A permanent access road with a new bellmouth junction would be constructed from the A131 as shown on Figure 2. This would be designed to highways standards.

3.8.13 There are no PRoW affected by the proposed GSP substation and no closures or diversions would be required. Potential impacts on views from these receptors is considered in Section 3.2 (Landscape and Visual).

Operation

3.8.14 There are no changes anticipated to the transport network or PRoW during operation. The proposed GSP substation would be unmanned during operation. Therefore, operation traffic movements would be very low, for example one light good vehicle per month to inspect the site.

3.9 Air Quality

Baseline

3.9.1 The air quality study area is based on an area up to 500m from the site. Air Quality Management Areas (AQMAs) are also considered within the wider road network which may be used by construction traffic. The nearest AQMA is on the A131 in the centre of Sudbury approximately 4km north of the site (Braintree District Council, 2020).

3.9.2 The nearest residential property to the site is approximately 325m to the southeast, located off Whitelands Road, while the nearest non residential property is approximately 270m east of the site.

3.9.3 Ecological air quality receptors within the study area comprise Butler’s Wood LWS and Waldegrave Wood LWS, to the north and south of the site boundary respectively. Twinstead Marsh LWS lies at the eastern extent of the accompanying works on the existing 400kV line.

Measures to Avoid or Reduce Potential Impacts

3.9.4 Good practice measures that would avoid or reduce Air Quality impacts during construction are set out in Annex 1 (CoCP) of Appendix 1 (CEMP). This includes locating equipment within the construction compound that may produce a noticeable nuisance

away from sensitive receptors where practicable (GG10), appropriate site layout and housekeeping measures (GG11), conforming to applicable standards for vehicle types (GG12), wash down of vehicles (GG16), wheel washing (GG17) and soil management measures (AS1).

3.9.5 Section 9 of Appendix 1 (CEMP) describes the construction methods associated with soil stripping, creation of stockpile and stockpile maintenance including measures to protect stockpiles and reduce the risk of dust generation from soils. Section 11 of Appendix 1 (CEMP) also sets out the below measures that will be implemented to reduce dust:

- Monitoring of weather forecasts and registration to weather warnings will aid preparation for earthwork operations. In dry conditions, appropriate water and dust suppression equipment will be available. In wet conditions, the site will be prepared with suitable cleaning equipment and silt controls.
- Large earthworks and exposed areas or soil stockpiles will be managed to prevent windborne dust. For example, this could include covering, sealing with an excavator bucket or using water suppression.
- During reinstatement, methods such as loosening the top of subsoil will be used to limit decompaction of the subsoil; this activity will avoid windy conditions and use water to damp down the surface.
- Where possible, subsoil and topsoil will be returned at the earliest suitable time of year after construction has been completed. In the circumstances that work is delayed due to an unforeseen event, the measures listed above will be implemented.

3.9.6 In relation to the backup diesel generator, it is expected that any diesel generating equipment used would use biodiesel and meet the minimum Stage V engine type requirements.

Potential Impacts

3.9.7 The following potential impacts have been identified taking into account the measures identified in paragraphs 3.9.4 to 3.9.6.

Construction

3.9.8 Dust is generated from construction activities from the handling of waste, movement of earth, the handling of materials and the tracking of vehicles. Dust can affect human health, local amenity or ecological receptors (through deposition) within the locality of the activities being undertaken. The concentrations of suspended dust particles reduce with increased distance from the construction works and the nearest property is 250m from the site. Appendix 1 (CEMP) includes a number of good practice measures that would reduce the generation of dust during construction.

3.9.9 Construction vehicles and plant would also generate emissions from vehicles delivering materials and construction workers to and from the construction site. Emissions could affect receptors located close to the working area and also along construction routes along the local road network. The emissions would be short-term at any given location within the construction period and there would be no construction traffic through the centre of Sudbury, where there is an AQMA. Air emissions would also be reduced through the implementation of good practice measures outlined in the previous paragraphs and set out in Appendix 1 (CEMP).

Operation

- 3.9.10 During operation there is limited potential for emissions of air pollutants to be generated by routine inspection and maintenance of the proposed GSP substation.
- 3.9.11 Emissions to air may be generated through the use of generator equipment. However the backup diesel generator will be installed for use during emergency conditions to ensure the proposed GSP substation systems remain operational, for example during an unforeseen outage. This would only occur during exceptional circumstances. Backup generators are also run briefly on a monthly basis to test their operation. This varies from manufacturer to manufacturer but is typically for around 5-10 mins approximately once a month during a daytime period.

3.10 Noise and Vibration

Baseline

- 3.10.1 A noise and vibration assessment is presented in Appendix 10 of this Environmental Appraisal and has been conducted in accordance with good practice guidance and in line with current planning policy. The study area for assessing the potential for noise impacts on Noise Sensitive Receptors (NSR) is 300m for construction and 1km for operation. The study area for construction vibration impacts is based on 100m from the closest construction activity. Noise Important Areas (NIA) (areas identified based on strategic noise maps of England, prepared under the Environmental Noise (England) Regulations, 2006 (as amended)) are also considered within the wider road network which may be used by construction traffic.
- 3.10.2 There are relatively isolated receptors located in all directions from the proposed GSP substation. The closest residential NSRs to the site are:
- approximately 325m to the southeast located off Whitelands Road;
 - approximately 420m to the northeast off Watery Lane;
 - approximately 460m to the southwest located off Old Road; and
 - approximately 550m to the northwest at Butler's Hall Farm.
- 3.10.3 There is a NIA on the A131 southwest of Twinstead Green (NI_12016) on the A131, a route which may be used for construction traffic. NIA are determined via strategic noise maps and highlight the residential areas experiencing the highest 1% of noise levels from road and rail sources in England. There are additional NIA in the wider area on main transport routes (e.g. A13, A14, A131).
- 3.10.4 With regards to the vibration baseline, it is assumed that existing vibration levels are negligible in the study area.
- 3.10.5 A baseline noise survey has been conducted to inform the assessment as detailed in Appendix 10 (Noise Assessment). The noise climate in the vicinity of the proposed GSP substation and at nearby NSR is typical of a rural area, being generally quiet with the exception areas close to main roads. The main noise source in the area is road traffic on the A131, which is a moderately busy road running between Sudbury to the north and Halstead to the south. Other sources of noise include rustling foliage, birdsong, local road traffic, and general rural ambient sounds.

Measures to Avoid or Reduce Potential Impacts

- 3.10.6 Good practice measures that would avoid or reduce noise and vibration impacts during construction are set out in Annex 1 (CoCP) of Appendix 1 (CEMP). This includes locating equipment within the construction compound that may produce a noticeable nuisance away from sensitive receptors where practicable (GG10), appropriate site layout and housekeeping measures (GG11), construction working within agreed working hours and applying best practicable means to reduce construction noise (NV1). Section 12 of Appendix 1 (CEMP) sets out the best practicable means that will be implemented
- 3.10.7 As set out in Table 3.1, the proposed GSP substation would include noise enclosures around the SGT transformers and these are built into the designs submitted with the planning application. The noise enclosures would provide a barrier around the transformers and reduce the operational noise levels.

Potential Impacts

- 3.10.8 The following potential impacts have been identified taking into account the measures identified in paragraphs 3.10.6 to 3.10.7.

Construction

- 3.10.9 During construction, exceedance of the Lowest Observed Adverse Effect Level (LOAEL) would be exceeded at nearby NSR at distances of approximately 800m. This is an indication that construction noise would generally be perceptible above the existing noise climate at nearby NSR. In the context of the NPPF, such impacts would be managed and reduced through the best practicable means in Section 12 of Appendix 1 (CEMP).
- 3.10.10 Construction vibration calculations indicate vibration is not likely to be perceptible at nearby NSR due to the distance from the works.
- 3.10.11 As reported in Section 3.8, construction traffic numbers would also be low and would not notably change the baseline noise and vibration levels.

Operation

- 3.10.12 The main source of noise from the proposed GSP substation during operation will be from the two SGTs. With the embedded noise enclosures included around the transformer the assessment indicates that a low impact is expected during normal operation. It is also assessed to be low during atypical situations, such as during the use of SGT cooling plant or when back-up generators may be required during emergency conditions. Furthermore, as explained in Section 3.9, these scenarios would be infrequent and exceptional.
- 3.10.13 Maintenance of the proposed GSP substation would be infrequent and localised.

3.11 Other Issues

- 3.11.1 A number of other issues were scoped out of the screening assessment in the Request for an EIA Screening Opinion (Application No. 21/03343/SCR), as they would not have potential for likely significant effects. These are set out below for reference.

Socio-economics

- 3.11.2 Compensation payments lie outside of the environmental assessment process. The proposed GSP substation lies on agricultural land. There are no nearby socio-economic receptors and the works are unlikely to disrupt access to businesses in the wider area.

Furthermore, the workforce numbers are expected to be below 20 per day at their peak. Therefore, the project is unlikely to result in effects on socio-economic receptors.

Health and Electromagnetic Fields (EMF)

- 3.11.3 GSP substations do not produce significant EMFs outside of their boundary. Nevertheless, the proposed GSP substation will be designed in accordance with National Grid design standards and will be compliant with the guidelines and policies relating to EMF stated in NPS EN-5, including the International Commission on Non-Ionizing Radiation Protection guidelines (1998) which developed health protection guidelines in 1998 for both public and occupational exposure to EMF. UK Government policy is that exposure of the public should comply with the International Commission on Non-Ionizing Radiation Protection (1998) guidelines and the electricity industry has agreed to follow this policy.
- 3.11.4 There are also three DECC Codes of Practice relating to demonstrating compliance with EMF public exposure:
- Power Lines: Demonstrating compliance with EMF public exposure guidelines. A Voluntary Code of Practice (DECC, 2012a);
 - Optimum Phasing of high voltage double-circuit Power Lines. A voluntary Code of Practice (DECC, 2012b); and
 - Power lines: Control of microshocks and other indirect effects of public exposure to electric fields. A voluntary Code of Practice (DECC, 2013).
- 3.11.5 National Grid's policy, as set out in its Public Position Statement (National Grid, 2018), states that '*...as a minimum we comply with EMF regulations, guidelines or practices in force... in which we operate*'. This policy will apply to the proposed GSP substation and all the equipment installed will comply with guidelines. Given that EMFs resulting from electrical equipment must comply with the relevant exposure guidelines as specified by Government and with the additional precautionary policies set out within the DECC Codes of Practice, the proposed GSP substation is unlikely to result in effects to health in relation to EMF.

Major Accidents and Disasters

- 3.11.6 The proposed GSP substation would be designed, constructed and operated in accordance with applicable health and safety legislation. It would comply with design safety standards including NETS SQSS. The proposed GSP substation also falls under the Construction (Design and Management) Regulations 2015. As the proposed GSP substation would be managed under many existing health and safety and risk assessment regimes, it is therefore not expected to result in likely effects relating to major accidents and disasters.

Climate

- 3.11.7 The proposed GSP substation is located outside of Flood Zones 2 and 3 and will be constructed to withstand extreme climatic events and will comply with design safety standards including NETS SQSS. Therefore, the proposed GSP substation is considered to be resilient to climate change over the design life.
- 3.11.8 In relation to contribution to climate change, the proposed GSP substation provides a beneficial opportunity to help realise the Government's ambitions for 40GW of offshore

wind by 2030. Further details on the need for the proposed GSP substation are presented in Section 3 of the Planning Statement.

- 3.11.9 National Grid also employs procedures on the use and management of assets which contain Sulphur Hexafluoride (SF₆), a greenhouse gas, which is required in the circuit breakers at the proposed GSP substation. National Grid is undertaking research and development to find a suitable alternative to SF₆, however, there is no suitable alternative at the present time.

3.12 Cumulative Effects

- 3.12.1 Two categories of cumulative effects are considered: ‘intra-project’ and ‘inter-project’ effects (IEMA, 2011):
- Intra-project effects occur when a resource, receptor or group of receptors are potentially affected by more than one source of direct environmental impact resulting from the same development (IEMA, 2011). Environmental receptors are identified in Sections 3.2-3.10 of this report.
 - Inter-project effects occur when a resource, receptor or group of receptors are potentially affected by more than one development at the same time (IEMA, 2011).

Baseline

- 3.12.2 The study area is 2km from the site to coincide with the study areas for the landscape and visual and setting of heritage assets assessments. A review of major planning applications on Braintree District Council’s planning portal, the Planning Inspectorate’s Programme of Projects and development allocations was undertaken. Major developments are defined under Development Management Procedure (England) Order 2010 (as amended).
- 3.12.3 The review was undertaken on 14 April 2022, and applications dating back to 2014 have been considered to take into consideration submitted or approved planning applications that may have a temporal overlap with the proposed GSP substation. Withdrawn applications have not been considered. There are no development allocations within 2km of the proposed GSP substation.
- 3.12.4 A search for minor non-EIA developments (e.g. farm building conversions, erection of farm buildings, house extensions and changes of land-use) within the site boundary with none present. Other minor non-EIA developments are not considered further as their small scale nature is not expected to result in inter-project cumulative effects.
- 3.12.5 The review identified two major planning applications within 2km of the proposed GSP substation:
- Application 16/00323/FUL: Feed and Straw Storage Building at Broomhills Farm. Approximately 1.9km south of the site.
 - Application 18/01159/FUL: Conversion and alteration of part of The Ryes to form two units of holiday accommodation. Approximately 1.9km northeast of the site.
- 3.12.6 The wider reinforcement project described in Section 1.3 of this report and the accompanying are also considered in the inter-project effects. It is expected that the measures in the Annex 1 (CoCP) of Appendix 1(CEMP) would also be applicable to the wider reinforcement project and accompanying works.

Potential Impacts

3.12.7 The following potential impacts have been identified taking into account the measures identified in the preceding environmental topic assessments.

Construction

Intra-project

3.12.8 During construction the closest residential properties, users of the PRowS and Protected Lanes may be subject to temporary disturbance through a combination of visual, air quality and noise and vibration impacts. However, the measures in Appendix 1 (CEMP) would reduce these.

Inter-project – Wider Reinforcement Project

3.12.9 The Preliminary Environment Information Report (PEIR) for the wider reinforcement project was submitted to the Planning Inspectorate in January 2022 and the application for Development Consent is provisionally due in Winter 2022/23. As explained in Section 1.4, the proposed GSP substation is also currently being progressed as part of development consent for the wider reinforcement project. However, with regard to this assessment, the proposed GSP substation is a temporally separate development as the construction of the proposed GSP substation is programmed to commence earlier than the wider reinforcement project. As such, their construction programmes and associated traffic are unlikely to overlap with the exception of the second SGT which may be delivered and installed once construction of the wider reinforcement project has commenced.

3.12.10 The nearest section of the wider reinforcement project involves removal of a section of the existing 400kV overhead line south of Twinstead Tee, a CSE compound and a section of underground cable and is over 2km from the site at its closest point. When considering this alongside the localised nature of the impacts associated with the proposed GSP substation there is limited potential for intra-project cumulative effects as a result of the construction of the proposed GSP substation in combination with the wider reinforcement project.

Inter-project – Accompanying Works

3.12.11 Potential impacts during construction of the accompanying works in combination with the proposed GSP substation, are considered in Table 3.4 below.

Table 3.4: Potential impacts of accompanying works in combination with the proposed GSP substation during construction.

Topic	Potential Cumulative Impacts
Landscape and Visual	<p>During construction the accompanying works would introduce increased levels of construction activity across a wider part of the landscape than the proposed GSP substation in isolation and some elements may be visible from different receptors. However, the construction activities between the proposed GSP substation in isolation and the accompanying works would be localised and temporary.</p> <hr/> <p>The proposed 132kV underground cable to the west of Waldegrave Wood would affect a narrow swathe of land through arable and pastoral fields adjacent to the proposed GSP substation. During construction, short term impacts on these</p>

Topic	Potential Cumulative Impacts
Biodiversity	<p>landscape features are anticipated; however, vegetation removal is likely to be limited to sections of hedgerow on field boundaries or roadsides.</p> <p>The temporary 400kV overhead line diversion would introduce up to two additional but temporary lattice towers between Butler’s Wood and Waldegrave Wood. These towers would be seen in context with the existing 400kV overhead line and effects would be short term and reversible on their removal at the end of construction. Following completion of construction works, features would re-establish quickly and return primarily to the character of the existing landscape.</p>
Historic Environment	<p>Construction of the accompanying works could potentially lead to some additional disturbance through the generation of noise and dust. However, construction activities would be localised, temporary and controlled by CoCP measures set out in in Annex 1 of Appendix 1 (CEMP).</p> <p>An additional small length of hedgerow may require removal and there may be additional vegetation loss associated with temporary works such as access tracks. Reinstatement and planting is proposed on completion of works.</p> <p>During construction the accompanying works would have the potential to introduce additional noise and visual intrusion within the setting of heritage assets. However, construction activities would be localised and temporary.</p> <p>The construction of the proposed 132kV underground cable could have the potential for direct adverse physical impacts on Old Road protected lane (BTELANE84), which would also be indirectly affected by the proposed GSP substation through construction noise.</p> <p>Old Road would be crossed by the 132kV underground cables which is likely to require closure during construction as cable trenches are excavated, ducts laid and trenches backfilled. Old Road may also experience increased traffic during construction. The proposed underground cable route crosses Old Road where there is an existing gap through the hedgerows that allows for a farm access track. Crossing at this location reduces the removal of associated vegetation and avoids impacts on sloped verges.</p> <p>Section 3.5 of the Environmental Appraisal explains that the indirect effects resulting from noise associated with construction of the proposed GSP substation are anticipated to be short term and generally comparable to the baseline of a working agricultural environment. In combination with temporary and localised nature of the impacts of the accompanying works on Old Road protected lane, there is limited potential for cumulative effects.</p> <p>During construction, there could be short term impacts on other non-designated HLT features due to vegetation removal. However, vegetation removal is likely to be limited and reinstatement and additional planting is proposed. Following completion of construction works, features would re-establish and return primarily to the character of the existing landscape.</p>
Traffic and transport	<p>The estimated construction traffic numbers in Section 3.8 are inclusive of those associated with the accompanying works.</p>

Topic	Potential Cumulative Impacts
	<p>There are a number of PRoW which are crossed by the accompanying works that may require a diversion while construction activities occur. 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. Users of these PRoW may also experience views of the construction of the proposed GSP substation. However, the construction activities between the proposed GSP substation in isolation and the accompanying works would be localised and temporary. Any temporary diversions of PRoW would be reinstated post-construction.</p>

3.12.12 In summary, given the nature of the potential impacts associated with the accompanying works, there is limited potential for cumulative effects during construction either alone or in combination with the proposed GSP substation.

3.12.13 Similarly, the potential impacts of the proposed GSP substation on the Water Environment (Section 3.5), Geology and Hydrogeology (3.6), Agriculture and Soils (Section 3.7), Air Quality (Section 3.9), Noise (Section 3.10) and Other Issues (Section 3.11) described above have limited potential for inter-project cumulative effects with the accompanying works.

Inter-project – Other Proposed Developments

3.12.14 Given the nature of the works required for the other developments within 2km of the proposed GSP substation and the distance to them, there is limited potential for cumulative effects resulting from the proposed GSP substation with other proposed developments during construction.

Operation

Intra-project

3.12.15 Given the nature of potential operational impacts of the proposed GSP substation, there is limited potential for intra-project cumulative effects. .

Inter-project – Wider Reinforcement Project

3.12.16 The localised impacts resulting from operation of the proposed GSP substation are not likely to contribute to notable inter-project cumulative effects in combination with the wider reinforcement project during operation.

Inter-project – Accompanying works

3.12.17 During operation, although the 132kV CSE platform pylon and replacement 400kV pylon would be slightly different in form to the removed pylons, they would be perceived as replacements of existing pylons in the landscape and in views, therefore would not materially change the baseline.

3.12.18 Given the nature of the accompanying works and potential impacts of the proposed GSP substation during operation described above, there is limited potential for inter-project cumulative effects for other topics.

Inter-project – Other Proposed Developments

3.12.19 Given the small scale nature of the works required for the other developments within 2km of the proposed GSP substation and the distance to them, the proposed GSP substation

is not expected to result in likely inter-project cumulative effects with other proposed developments during operation.

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Acronyms

Acronym	Full Reference
AIA	Arboricultural Impact Assessment
AIL	Abnormal indivisible load
AMS	Arboricultural Method Statement
ALC	Agricultural Land Classification
AQMA	Air Quality Management Area
AWI	Ancient Woodland Inventory
BGS	British Geological Survey
BNG	Biodiversity net gain
BPM	Best practicable means
BS	British Standard
CEA	Cumulative effects assessment
CEMP	Construction Environmental Management Plan
CoCP	Code of Construction Practice
CSE	Cable Sealing End
Defra	Department for Environment, Food and Rural Affairs
DNO	Distribution Network Operator
EIA	Environmental Impact Assessment
EMF	Electromagnetic field
FRA	Flood Risk Assessment
GCN	Great crested newt
GSP	Grid Supply Point (substation)
GW	Gigawatt (1,000 million Watts)
GWDTE	Groundwater dependent terrestrial ecosystem
HER	Historic Environment Record

Acronym	Full Reference
HPI	Habitats of Principal Importance
HGV	Heavy Goods Vehicle
HLT	Historic Landscape Type
IEMA	Institute of Environmental Management and Assessment
INNS	Invasive and non-native species
kV	Kilovolt (1,000 Volts)
LED	Light-emitting Diode
LOAEL	Lowest observed adverse effect level
LoWS	Local Wildlife Site
MSA	Mineral Safeguarding Area
NCN	National Cycle Network
NETS	National Electricity Transmission System
NHLE	National Heritage List for England
NIA	Noise important area
NPPF	National Planning Policy Framework
NSIP	Nationally Significant Infrastructure Project
NSR	Noise and vibration sensitive receptor
PEIR	Preliminary Environmental Information Report
PIR	Passive Infrared Sensor
PRoW	Public Right of Way
PWMS	Precautionary Working Method Statement
SAC	Special Area of Conservation
SF6	Sulphur Hexafluoride
SGT	Super Grid Transformer
SQSS	Security and Quality of Supply Standards
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage Systems
TCPA	Town and Country Planning Act
TPO	Tree Preservation Order

Acronym	Full Reference
WSI	Written Scheme of Investigation

FIGURES

Figure 1: Location Plan

Figure 2: Site Layout and Accompanying Works

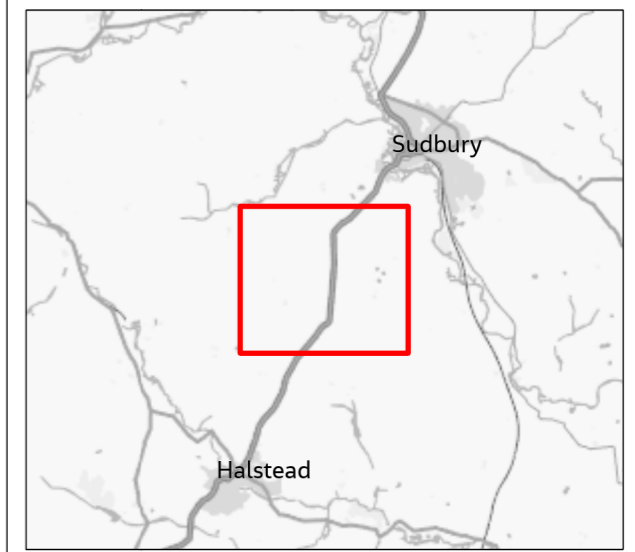
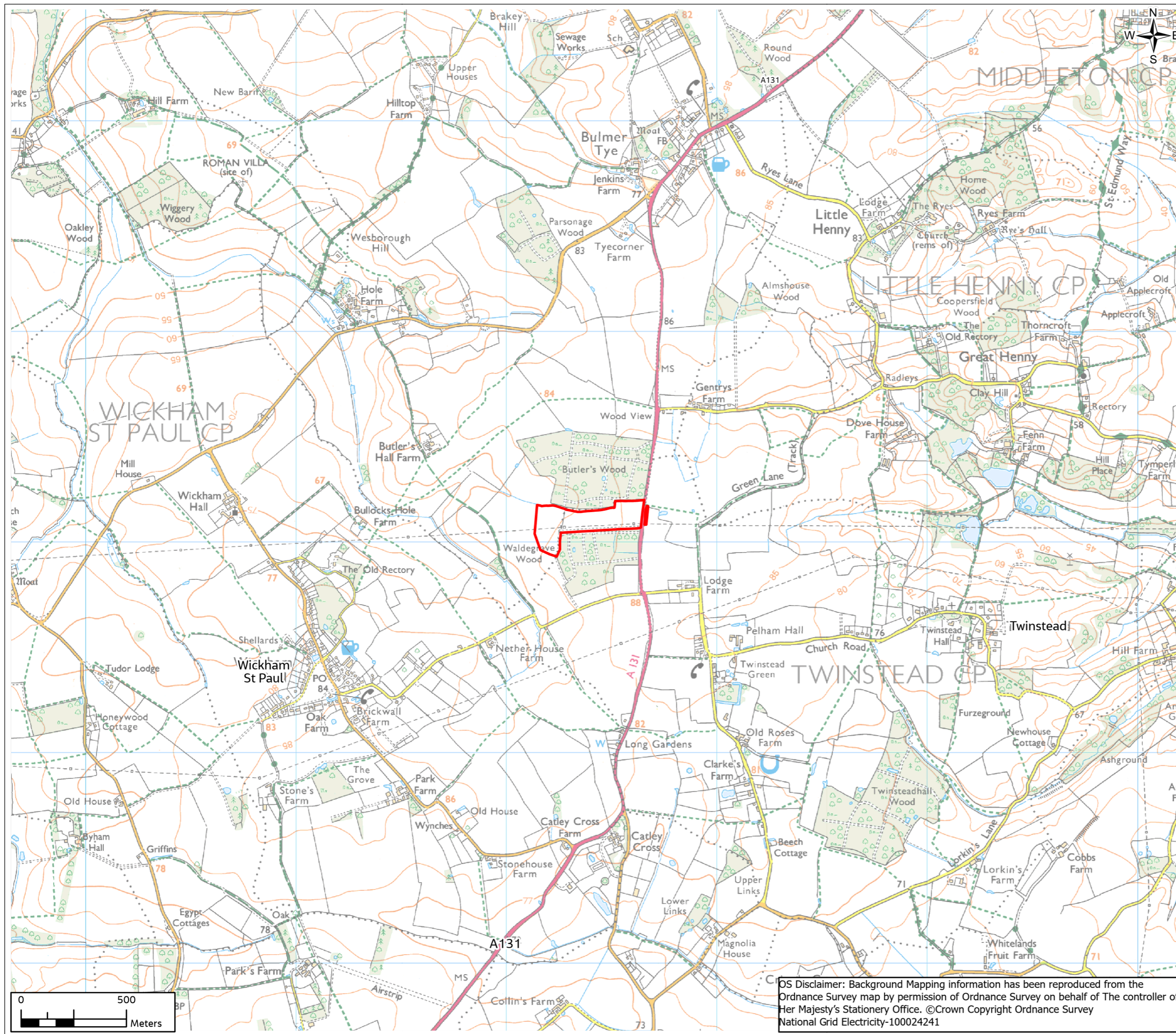
Figure 3: Constraints Plan

Figure 4: Planting Plan

FIGURE 1

Legend

 Site Boundary



0	04/2022	Final	PM	RC	RC	RuC
Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd

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Environmental Appraisal
Location Plan
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Drawing Status
Final

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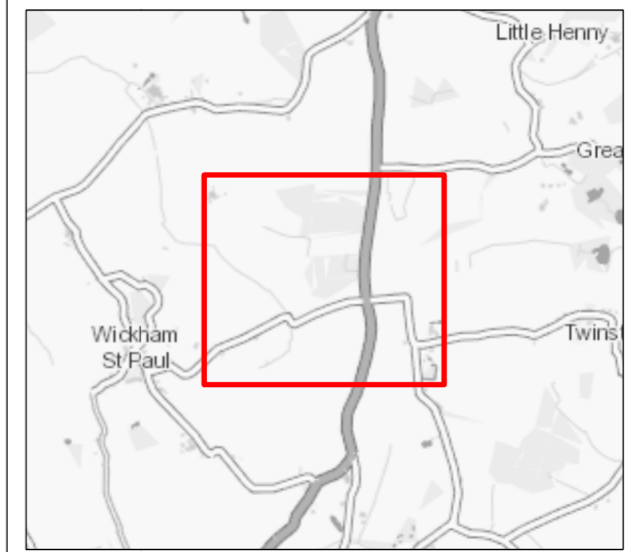


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FIGURE 2



- Legend**
- Site Boundary
 - Section 37 Consent
 - Planning Permission under TCPA
 - Permitted Development under GPDO
 - Permitted Development Under GPDO and Exempt from Section 37
 - Permitted Development Under GPDO in combination with the Exemption Regulations
 - Existing Overhead Lines



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Environmental Appraisal
Site Layout and Accompanying Works
Page 1 of 1

Drawing Status
Final

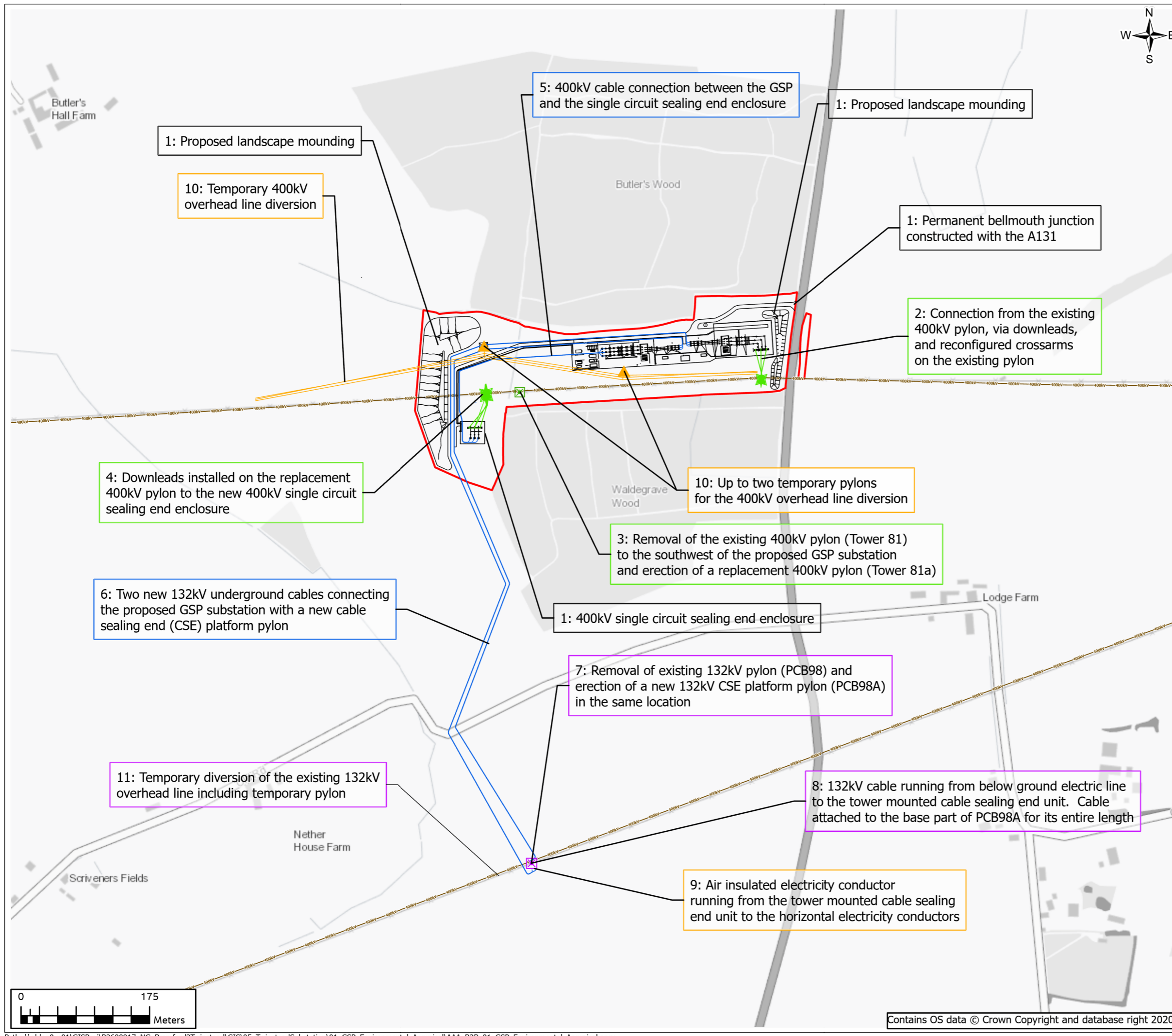
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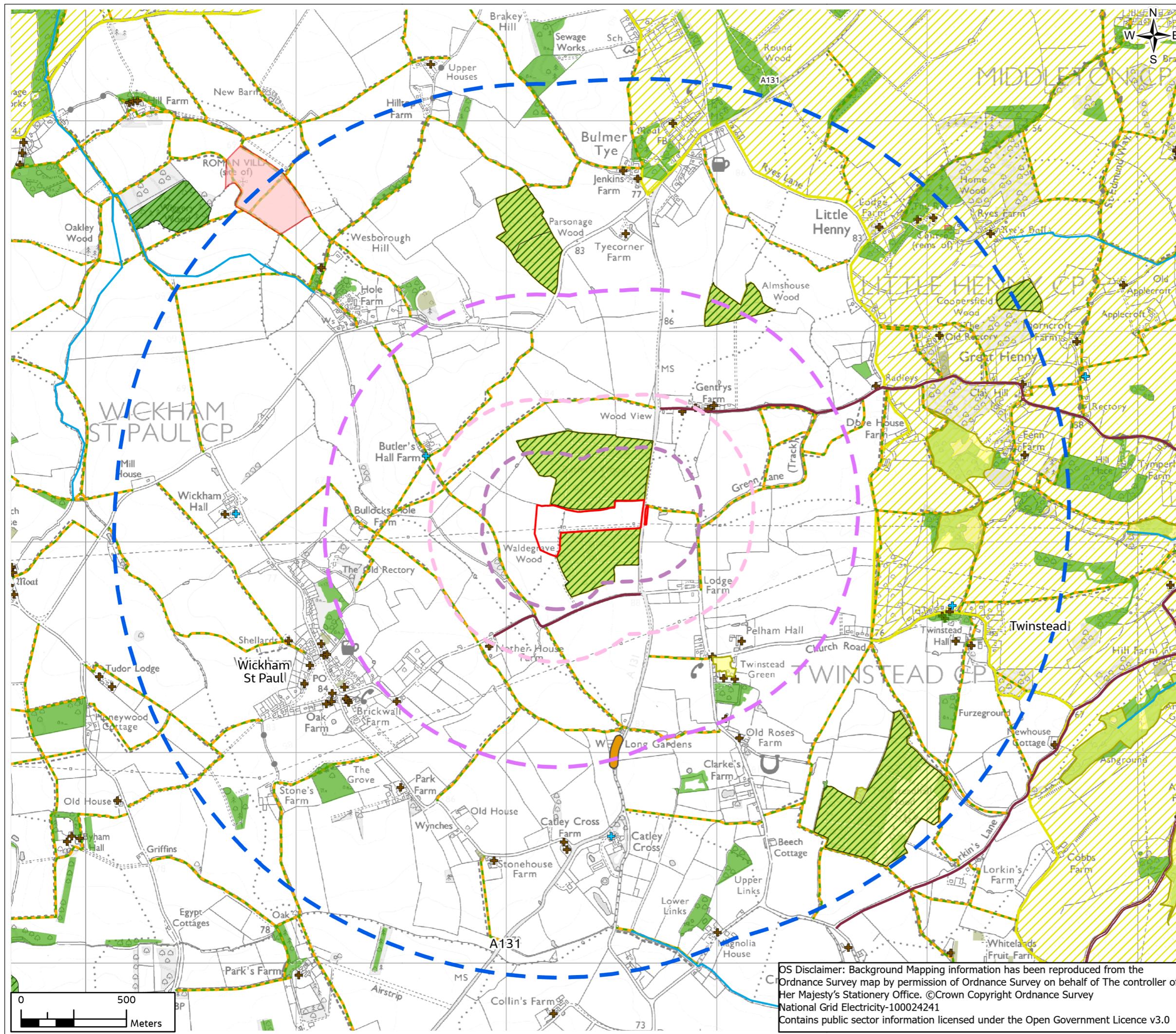
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FIGURE 3



- Legend**
- Site Boundary
 - 250m Study Area
 - 500m Study Area
 - 1km Study Area
 - 2km Study Area
 - Watercourses
 - Public Rights of Way
 - Stour Valley Project Area
 - Ancient Woodland
 - Local Wildlife Site (LWS)
 - Deciduous Woodland
 - Traditional Orchard
 - Protected Lanes
 - + Grade II* Listed Buildings
 - + Grade II Listed Buildings
 - Scheduled Monuments
 - Noise Important Area (NIA)



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Drawing Title **Environmental Appraisal Constraints Plan**
 Page 1 of 1

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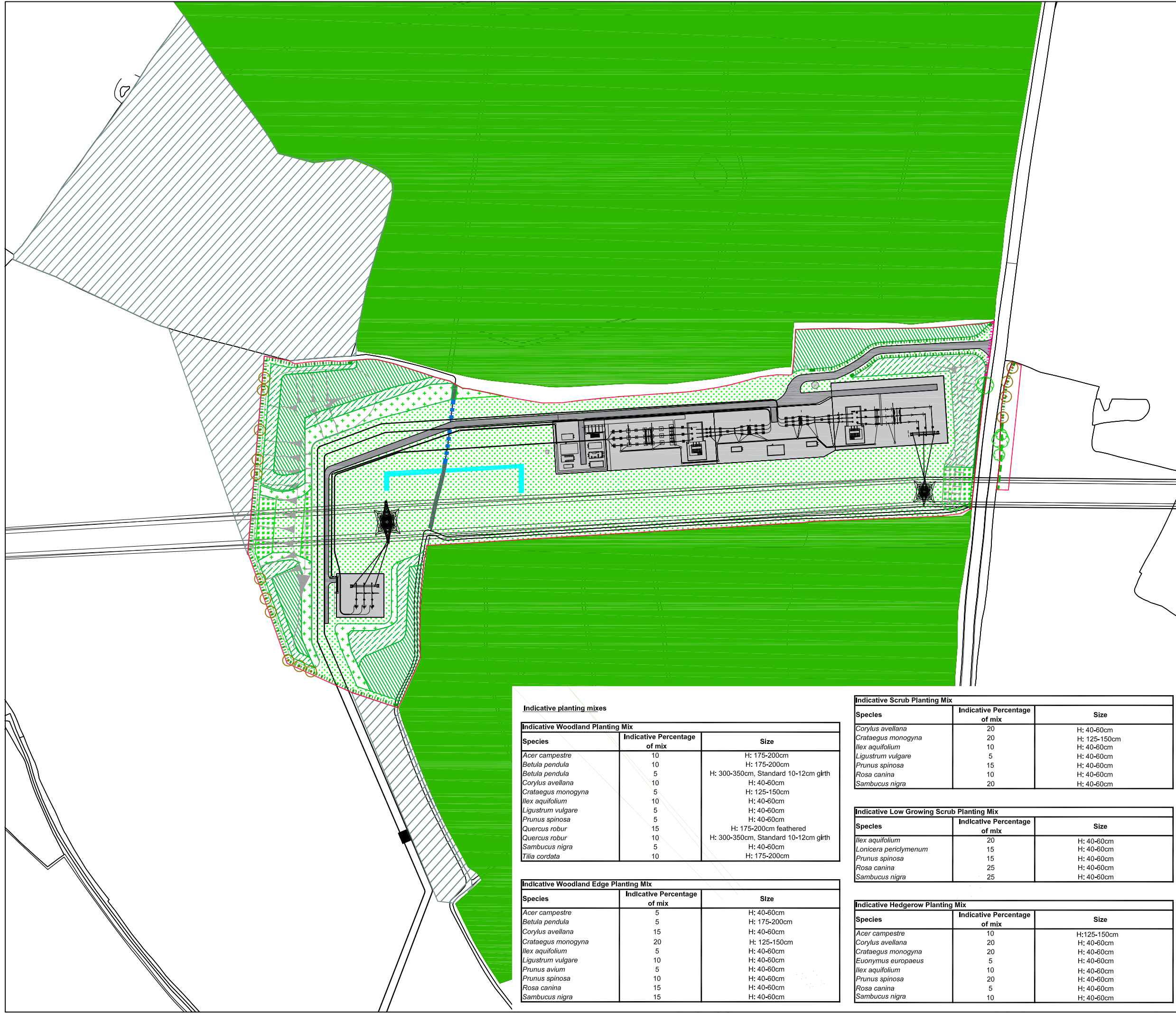
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


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FIGURE 4



LEGEND

-  SITE BOUNDARY
-  EXISTING ANCIENT WOODLAND
-  PROPOSED WOODLAND MIX
-  PROPOSED WOODLAND EDGE MIX
-  PROPOSED SCRUB MIX
-  PROPOSED LOW GROWING SCRUB MIX
-  PROPOSED SPECIES RICH GRASSLAND (EM2 - Standard General Purpose Meadow Mix or similar)
-  PROPOSED HEDGEROW
-  REINFORCED HEDGEROW
-  EXISTING HEDGEROW RETAINED
-  EXISTING HEDGEROW TO BE REMOVED
-  PROPOSED HEDGEROW TREE
-  HEDGEROW TREE RETAINED
-  HARD SURFACING/ ACCESS ROAD
-  PROPOSED GSP SUBSTATION
-  RETAINED DITCH
-  EXISTING DITCH TO BE REINSTATED
-  PROPOSED DITCH
-  PROPOSED DCO BIODIVERSITY NET GAIN FOR WIDER REINFORCEMENT PROJECT
-  PROPOSED MOUNDING

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Indicative planting mixes

Indicative Woodland Planting Mix		
Species	Indicative Percentage of mix	Size
<i>Acer campestre</i>	10	H: 175-200cm
<i>Betula pendula</i>	10	H: 175-200cm
<i>Betula pendula</i>	5	H: 300-350cm, Standard 10-12cm girth
<i>Corylus avellana</i>	10	H: 40-60cm
<i>Crataegus monogyna</i>	5	H: 125-150cm
<i>Ilex aquifolium</i>	10	H: 40-60cm
<i>Ligustrum vulgare</i>	5	H: 40-60cm
<i>Prunus spinosa</i>	5	H: 40-60cm
<i>Quercus robur</i>	15	H: 175-200cm feathered
<i>Quercus robur</i>	10	H: 300-350cm, Standard 10-12cm girth
<i>Sambucus nigra</i>	5	H: 40-60cm
<i>Tilia cordata</i>	10	H: 175-200cm

Indicative Woodland Edge Planting Mix		
Species	Indicative Percentage of mix	Size
<i>Acer campestre</i>	5	H: 40-60cm
<i>Betula pendula</i>	5	H: 175-200cm
<i>Corylus avellana</i>	15	H: 40-60cm
<i>Crataegus monogyna</i>	20	H: 125-150cm
<i>Ilex aquifolium</i>	5	H: 40-60cm
<i>Ligustrum vulgare</i>	10	H: 40-60cm
<i>Prunus avium</i>	5	H: 40-60cm
<i>Prunus spinosa</i>	10	H: 40-60cm
<i>Rosa canina</i>	15	H: 40-60cm
<i>Sambucus nigra</i>	15	H: 40-60cm

Indicative Scrub Planting Mix		
Species	Indicative Percentage of mix	Size
<i>Corylus avellana</i>	20	H: 40-60cm
<i>Crataegus monogyna</i>	20	H: 125-150cm
<i>Ilex aquifolium</i>	10	H: 40-60cm
<i>Ligustrum vulgare</i>	5	H: 40-60cm
<i>Prunus spinosa</i>	15	H: 40-60cm
<i>Rosa canina</i>	10	H: 40-60cm
<i>Sambucus nigra</i>	20	H: 40-60cm

Indicative Low Growing Scrub Planting Mix		
Species	Indicative Percentage of mix	Size
<i>Ilex aquifolium</i>	20	H: 40-60cm
<i>Lonicera periclymenum</i>	15	H: 40-60cm
<i>Prunus spinosa</i>	15	H: 40-60cm
<i>Rosa canina</i>	25	H: 40-60cm
<i>Sambucus nigra</i>	25	H: 40-60cm

Indicative Hedgerow Planting Mix		
Species	Indicative Percentage of mix	Size
<i>Acer campestre</i>	10	H: 125-150cm
<i>Corylus avellana</i>	20	H: 40-60cm
<i>Crataegus monogyna</i>	20	H: 40-60cm
<i>Euonymus europaeus</i>	5	H: 40-60cm
<i>Ilex aquifolium</i>	10	H: 40-60cm
<i>Prunus spinosa</i>	20	H: 40-60cm
<i>Rosa canina</i>	5	H: 40-60cm
<i>Sambucus nigra</i>	10	H: 40-60cm

Rev	Description	Created	Checked	App'd	Date
04	UPDATED DITCH LOCATION	BF	RG	RG	27/04/2022
03	UPDATED RED LINE BOUNDARY	BF	RG	RG	26/04/2022
02	UPDATED TO CLIENT COMMENTS	BF	RG	RG	19/04/2022
01	UPDATED TO CLIENT COMMENTS	BF	RG	RG	14/04/2022
00	DRAFT	BF	RG	RG	01/04/2022



Scheme Name: PROPOSED GSP SUBSTATION OFF THE A131

Document Title: ENVIRONMENTAL APPRAISAL: PLANTING PLAN

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