

Rampion 2 Wind Farm

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Executive summary

This Design and Access Statement (DAS) has been prepared to provide details of the physical characteristics of the onshore substation at Oakendene and the National Grid Bolney substation extension works. This DAS includes information on the appearance, layout, access and equipment of the onshore substation and the National Grid substation at Bolney extension works.

This DAS includes the maximum parameters of the infrastructure which has informed the Environmental Impact Assessment (EIA) process. The outcomes of the EIA process have informed the development of design principles which are secured in this document and with which the detailed design shall be in accordance. These include landscape and visual, historic environment, ecology, flood risk and drainage, climate change and ground conditions.

This document should be read in conjunction with the **Outline Landscape and Environment Management Plan (Outline LEMP)** (Document Reference: 7.10). This provides further information on outline landscape design, habitat creation and monitoring and management.

The detailed design of the infrastructure will be provided to the relevant planning authority as per the requirements of the **draft DCO** (Document Reference: 3.1) and developed and submitted alongside the detailed landscape design. Where specific commitments or Design Principles are listed in this document, the relevant stage specific plan shall include detail on how that commitment or Design Principle is delivered where it is applicable to that stage of works.

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1. Introduction

1.1 Overview of the Proposed Development

- 1.1.1 Rampion Extension Development Limited (hereafter referred to as 'RED') (the Applicant) is developing the Rampion 2 Offshore Wind Farm Project (Rampion 2) located adjacent to the existing Rampion Offshore Wind Farm Project ('Rampion 1') in the English Channel.
- 1.1.2 Rampion 2 will be located between 13km and 26km from the Sussex Coast in the English Channel and the offshore array area will occupy an area of approximately 160km².
- 1.1.3 The key offshore elements of the Proposed Development will be as follows:
- up to 90 offshore wind turbine generators (WTGs) and associated foundations;
 - blade tip of the WTGs will be up to 325m above Lowest Astronomical Tide (LAT) and will have a 22m minimum air gap above Mean High Water Springs (MHWS);
 - inter-array cables connecting the WTGs to up to three offshore substations;
 - up to two offshore interconnector export cables between the offshore substations;
 - up to four offshore export cables each in its own trench, will be buried under the seabed within the final cable corridor; and
 - the export cable circuits will be High Voltage Alternating Current (HVAC), with a voltage of up to 275kV.
- 1.1.4 The key onshore elements of the Proposed Development will be as follows:
- a single landfall site near Climping, Arun District, connecting offshore and onshore cables using Horizontal Directional Drilling (HDD) installation techniques;
 - buried onshore cables in a single corridor for the maximum route length of up to 38.8km using:
 - ▶ trenching and backfilling installation techniques; and
 - ▶ trenchless and open cut crossings.
 - a new onshore substation, proposed near Cowfold, Horsham District, which will connect to an extension to the existing National Grid Bolney substation, Mid Sussex, via buried onshore cables; and
 - extension to and additional infrastructure at the existing National Grid Bolney substation, Mid Sussex District to connect Rampion 2 to the national grid electrical network.

- 1.1.5 A full description of the Proposed Development is provided in **Chapter 4: The Proposed Development, Volume 2** of the Environmental Statement (ES) [**APP-045**].

1.2 Purpose

- 1.2.1 This DAS has been prepared to provide details of the physical characteristics of the onshore substation at Oakendene and the National Grid Bolney substation extension works.
- 1.2.2 The proposals in the Development Consent Order (DCO) Application are based on maximum design parameters (or a “worst case”). These parameters have been developed following the advice in Planning Inspectorate Advice Note 9 ‘Rochdale Envelope’ (Planning Inspectorate, 2018). These maximum parameters are provided in this document and also secured in the **draft DCO [REP2-002]** (updated at Deadline 3) Requirement 8 and 9 which will ensure the final design will not exceed these parameters.
- 1.2.3 The further design information presented is indicative at this stage, the detailed design of which will be provided for approval to the relevant planning authority (Horsham District Council for the onshore substation and Mid-Sussex District Council for the National Grid Bolney substation extension works) subject to grant of the DCO and prior to the start of the relevant stage of construction.
- 1.2.4 The EIA process has identified embedded environmental measures based on assessment of the maximum design parameters to avoid, prevent or reduce any effects. These measures, insofar as relevant to the design of each site, are secured through this document and referred to as ‘design principles’ with which the detailed design shall accord. The design principles have been developed in response to an assessment of the environmental site context, setting and technical requirements of the Proposed Development.
- 1.2.5 The DAS provides information on the following:
- Use: what the facilities will be used for;
 - Amount: how much will be built on the site;
 - Layout: how the buildings and open spaces are anticipated to be arranged on the site;
 - Scale: how large the buildings and spaces are anticipated to be;
 - Environment: design principles and Indicative Landscape Plans;
 - Appearance: what the buildings and spaces will look like; and
 - Access: how access will be provided.
- 1.2.6 Further information related to **Appendix C: National Grid Bolney Substation Extension – Indicative Landscape Plan** and **Appendix D: Onshore Substation – Indicative Landscape Plan** is provided in the **Outline Landscape and Environment Management Plan (LEMP) [APP-232]** (updated at Deadline 3). This covers outline landscape design and habitat creation, monitoring and management and should be read in conjunction with this DAS.

- 1.2.7 The detailed landscape design shall be developed alongside the detailed design of the substation infrastructure and in accordance with the design principles in this document. The stage specific LEMPs for the onshore substation and National Grid Bolney substation extension works shall be developed for the relevant stage of works (stages to be defined in accordance with **draft DCO [REP2-002]** (updated at Deadline 3) Requirement 10). The early progression of onshore site preparation works including advance planting for landscape and ecological mitigation will seek to maximise the benefits of such works. Later submissions of the stage specific LEMPs would be delivered alongside the detailed design of the infrastructure at each site as per the requirements 8, 9, 12 and 13 of the **draft DCO [REP2-002]** (updated at Deadline 3).

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2. Design parameters and principles

2.1 Overview

- 2.1.1 This section describes the key components of the proposed onshore substation at Oakendene and the existing National Grid Bolney substation extension works, including description of the use, amount, scale, layout and indicative appearance of the equipment.
- 2.1.2 The onshore substation will be located in Horsham District at land south of the A272 and between Kent Street to the east and with Oakendene Manor (Grade II Listed Building) and Oakendene Industrial Estate to the west. The onshore substation is proposed to be made up of 275kV Gas Insulated Substation (GIS) and 400kV Air Insulated Substation (AIS) sections.
- 2.1.3 The existing National Grid Bolney substation is located approximately 1.2km south-west of the onshore substation and the proposed extension works will extend this site into the fields to the east. At this design stage the options of implementing either an AIS or GIS remain. The onshore substation will be connected via approximately 2km of underground 400kV cabling.
- 2.1.4 Indicative layouts and elevations at each site are presented in **Appendix A: Oakendene Substation - Indicative Layout and Elevation** and **Appendix B: National Grid Bolney Substation Extension - Indicative Layout and Elevation**. For the existing National Grid Bolney substation extension both options; AIS and GIS are provided. The design principles and footprints with which the detailed design shall accord are also provided.

2.2 Use

- 2.2.1 The onshore substation increases the voltage received from the offshore windfarm, to the 400kV required to connect to the National Grid. The extension works are required at the existing National Grid Bolney substation to facilitate this connection.
- 2.2.2 The onshore substation and the extension works will be designed to be unmanned during operation. The sites will have a main palisade security fence with an electric pulse fence installed behind and extending 1m above this fence.
- 2.2.3 CCTV will give remote observation capability 24 hours a day, thus the development will not require day to day access and will not be open to the public.

2.3 Layout

- 2.3.1 Indicative layouts have been derived based on maximum parameters for the onshore substation and the existing National Grid Bolney substation extension works. The design principles that have been employed to derive the indicative layout (and will be employed during detailed design) are detailed below in **Table 2-1**.

Table 2-1 Layout design principles

Reference	Principle	Substation
L1	The design, layout and installation of all plant and equipment within the fenceline will allow operation and maintenance in accordance with all relevant statutory requirements (for example, the Health and Safety at Work Act 1974).	Oakendene and National Grid Bolney
L2	As a requirement, based on National Grid Electricity Transmission (NGET) technical standards, equipment will be located a minimum of 3m from the fence line for security and safety reasons.	Oakendene and National Grid Bolney
L3	Fire Damage Zones (FDZ) for equipment containing oil will be considered when producing the layout to ensure there is adequate spacing between substation components. All equipment located within the substation compound will be positioned to comply with the appropriate horizontal and vertical design clearances for the relevant voltage level.	Oakendene and National Grid Bolney
L4	Equipment containing oil will have a bund type foundation with sufficient internal clearance at ground level between the equipment and the bund wall.	Oakendene and National Grid Bolney
L5	During detailed design, opportunities to optimise the use of space will be sought to minimise the final onshore substation and extension works footprints as far as technically possible. Opportunities to reduce the operational noise impact through equipment selection, shielding of equipment or location of equipment will be considered at detailed design. Further information on attenuation of noise is provided in Section 3.8: Operational Noise	Oakendene

2.4 Amount & scale

2.4.1 The onshore substation and existing National Grid Bolney substation extension works will contain a range of electrical equipment, including transformers, reactive compensation equipment and control buildings, all located within the boundary fence. The design principles including the parameters are provided in **Table 2-2**.

Table 2-2 Design principles and parameters

Reference	Principle	Substation
AS1	The main GIS building at the onshore substation may extend up to the maximum level of 28.75m AOD, with an expected building height of 12.5m above finished ground level and will be up to 70m in length by 20m in width.	Oakendene
AS2	Ancillary buildings at the onshore substation (buildings other than the main GIS building) are expected to be single storey height to house ancillary systems and equipment	Oakendene
AS3	<p>For the Bolney extension, buildings for the AIS and GIS options will not exceed 3m and 12m respectively in height above finished ground level. Building dimensions will be:</p> <ul style="list-style-type: none"> • AIS - maximum building height 3m (up to 12m allowing for maximum height of other infrastructure e.g. busbars), length 12m and width 3m • GIS – maximum building height 12m, length 35m and width 20m 	National Grid Bolney
AS4	The final finished ground level for both the onshore substation and the existing National Grid Bolney substation extension works will be confirmed in detailed design following detailed surveys of the area. The ground level used for the purposes of the environmental assessment and concept level design at this stage is based on a level that does not require material to be exported from or imported to the site.	National Grid Bolney
AS5	Lightning protection masts, where required at the onshore substation, will not exceed a height of 34.25m AOD.	Oakendene
AS6	The fenced compound area (excluding its accesses) for the onshore substation will not exceed 6 hectares.	Oakendene
AS7	The fenced compound area for the existing National Grid Bolney substation extension will not exceed 6,300m ² for the AIS option and 3,500m ² for the GIS option.	National Grid Bolney

2.4.2 The indicative key equipment within the onshore substation compound are as follows:

- 3 X ± 200 MVAr static synchronous compensator (STATCOM);
- 2 X 50MVAr filter bank;
- 6 X 100MVAr shunt reactor;
- 3 X Super Grid transformer;
- 275kV indoor GIS and building;
- 1 X Control room building;
- 400kV 7 bays double busbar AIS arrangement; and
- 3 X 33kV Indoor switchgear and building.

2.4.3 For the Bolney extension the existing AIS busbars will be extended to the gas insulated bushing to further extend the double busbars into the 400kV GIS indoor arrangement option or into the AIS arrangement option. Potential equipment to include low voltage auxiliary supplies, monitoring and protection systems. Metering systems and interface signal as with National Grid.

2.4.4 Set out below are more detailed descriptions of the appearance and approximate size of some of the key larger equipment to be installed at the onshore substation.

Super Grid Transformer (SGT)

2.4.5 The SGTs are used to step up the offshore wind farm transmission voltage to the 400kV required to export the offshore wind farm power to the transmission system at the existing National Grid Bolney substation. Transformers are typically painted grey.

Compensation equipment

2.4.6 Reactive compensation equipment is used to condition the wind farm power prior to export to the transmission system, to ensure it complies with the requirements set out by the transmission system operator. Typically, one set of reactive compensation equipment is required for each circuit connecting to the transmission system.

2.4.7 Reactive compensation equipment will typically consist of a STATCOM unit and separate sets of reactors and capacitors. The level of reactive power required from the reactors and capacitors (and therefore their size) will be determined at detailed design within the maximum parameters.

Busbars

2.4.8 The electrical busbars are used to connect the various pieces of electrical equipment within the substation together. Circuit breakers are placed at strategic points within the busbar system in order to allow sections of the wind farm electrical network to be switched out with minimum disruption to the wind farm operation.

Auxiliary transformers

- 2.4.9 In addition to the main SGTs, the onshore substation will also have a set of auxiliary transformers to provide a low voltage supply to the control buildings and auxiliary systems.

Control building & ancillary structures

- 2.4.10 A control room is allowed for in the Oakendene Substation and will contain the Supervisory Control and Data Acquisition (SCADA) equipment required to control the offshore network via the fibre optic cables that run along the export cables.
- 2.4.11 In addition to the control room, smaller switchroom buildings will be located within the substation compound adjacent to its associated equipment.

Harmonic filters

- 2.4.12 Harmonic filters are used at the onshore substation to ensure that the power exported to the grid complies with the quality of supply requirements set out by the transmission system operator.

2.5 Appearance

- 2.5.1 The appearance of the onshore substation structures and buildings primarily derives from the functional need and the safety requirements of this development. Therefore, the design of the substation must be appropriate to that use. As per **Section 3.3: Landscape and visual**, principles of an Architectural Strategy are included to inform the appearance of visible structures to soften their appearance including consideration of the colour and roofline. Other structures / buildings will be finished in grey shades, or left as material finish, such as concrete and steel.
- 2.5.2 The existing National Grid Bolney substation extension works will be in keeping with the style of the existing National Grid Bolney substation.

Security

- 2.5.3 By using an industrial style design for the structures and including security style fencing it is clear that the Oakendene substation and the existing National Grid Bolney substation extension are not public facilities. The indicative site elevations and the structures that exceed the height of the fencing are required for the operation of the substation, and again derive from the functional needs of the site. Indicative elevations are shown in **Appendix A: Oakendene Substation - Indicative Layout and Elevation** and **Appendix B: National Grid Bolney Substation Extension - Indicative Layout and Elevation**.
- 2.5.4 A visible feature of the site will be the security fencing along the external boundary. The Oakendene onshore substation will require permanent CCTV equipment and external fencing to safeguard personnel and prevent unauthorised access. The site will have a main palisade security fence with an electric pulse fence installed behind and extending 1m above this fence. Signage will be located in conspicuous positions along this perimeter fence. The security systems and

fencing already in use at the existing National Grid Bolney substation site will be extended to cover the existing National Grid Bolney substation extension.

- 2.5.5 All of the security style fencing (including the main security fence and electric pulse fence) will be contained within perimeter landscaping as shown in the Indicative Landscape Plans: **Appendix C: National Grid Bolney Substation Extension – Indicative Landscape Plan** and **Appendix D: Onshore Substation – Indicative Landscape Plan**.

Lighting

- 2.5.6 Permanent light fittings will be installed around and within the onshore substation and Bolney extension. Under normal operating conditions illumination at night is not required. Lighting will be used only when required for maintenance outages or emergency repairs occurring at night. The lights will be directed downward and shielded to reduce glare outside the facility. The design principles for lighting at each site are provided in **Table 3-1**, LV-14.

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3. Environmental design principles

- 3.1.1 Further context and description of the key environmental constraints at the onshore substation at Oakendene and existing National Grid Bolney substation extension works are provided in this section.
- 3.1.2 The EIA process has identified embedded environmental measures based on assessment of the maximum design parameters to avoid, prevent or reduce any effects. These measures are secured through this document and the key objectives governing the embedded environmental measures are referred to as 'design principles' with which the detailed design shall accord.
- 3.1.3 The design principles relevant to each environmental topic (landscape, historic environment, ecology, flood risk and drainage, climate change and resilience, operational noise and ground conditions) are described under separate headings in this section.
- 3.1.4 An Indicative Landscape Plan has been developed for each site (including the AIS and GIS footprint for the extension works) in accordance with these design principles and provided in **Appendix C National Grid Bolney Substation Extension - Indicative Landscape Plan – GIS and AIS Option and D Oakendene onshore substation - Indicative Landscape Plan**. The **draft DCO [REP2-002]** Requirement 12 (3) secures that the detailed landscape design, to be produced in accordance with the design principles in this DAS, will be provided for the approval of the relevant planning authority. The authority will be Horsham District Council for the onshore substation and Mid-Sussex District Council for the National Grid Bolney substation.
- 3.1.5 The detailed landscape design at the National Grid Bolney substation extension will be developed in agreement with NGET.

3.2 Environmental site context and key constraints

Onshore substation

- 3.2.1 The onshore substation will be located in Horsham District at land south of the A272 and between Kent Street to the east and with Oakendene Manor (Grade II Listed Building) and Oakendene Industrial Estate to the west. Site access will be provided off the A272 to the north.
- 3.2.2 The onshore substation site is located within the Eastern Low Weald county Landscape Character Area (LCA) and at a local level within the Cowfold and Shermanbury Farmlands LCA. It is a gently undulating, rural landscape of low ridges and valleys and the site context for the onshore substation is tightly contained by the surrounding topography, vegetation and built development at Oakendene Industrial Estate.
- 3.2.3 The site area is predominantly made up of agricultural fields (mainly pasture) with hedgerows and scattered trees along the internal field boundaries. Existing mature

roadside tree lines and woodland contain the site boundary to the north along the A272 and east along Kent Street. A lake and tributary of the Cowfold Stream, along with associated riparian woodland and trees, contain the southern boundary of the site with Taintfield Wood and raising ground further containing the site, further to the south. Woodland at Oakendene Manor and the Oakendene Industrial Estate provide further visual containment to the west and northwest.

- 3.2.4 The nearest settlement is at Cowfold, approximately 1.1km to the west and has no visual connection with the site. The closest residential properties include Oakendene Manor which has partial views across the site. Other properties including those along the A272 and Kent Street at Southlands Farm and West Ridge Farm are well screened by intervening mature trees and woodland and have no visual connection with the site.
- 3.2.5 Public access is limited to Public Right of Way (PRoW) 1786 which crosses the southwest corner of the site and is routed over high ground to the north of Taintfield Wood and along the northern side of the lake to the south of Oakendene Manor.
- 3.2.6 The site is located approximately 180m to the east and south of the Grade II listed Oakendene Manor (NHLE 1027074) and within land which has been historically linked to the listed building through ownership and within the extent of historic parkland which was attached to the house. Whilst no longer in parkland use, surviving elements of the historic parkland are considered to contribute to the historic setting of Oakendene Manor. Further detail on the historical development, character and setting of Oakendene Manor and its associated parkland is contained within [Appendix 25.5: Oakendene historic parkscape assessment, Volume 4](#) of the ES [APP-211].
- 3.2.7 Field surveys have identified two European Protected Species (EPS) for which embedded environmental measures are described under **Section 3.5: Terrestrial ecology**. Hazel dormouse were found to be present in the vegetation on the western boundary in the northern portion of the onshore substation site. Bats have also been recorded using the existing tree lines within the onshore substation site for foraging corridors.
- 3.2.8 The onshore substation footprint includes areas subject to medium to high risk from surface water flooding (one percent to 3.33 percent Annual Exceedance Probability (AEP)). Surface water flood risk is primarily associated with a surface water flowpath intersecting the site from north to south and along Kent Street. The southern boundary of the site borders an ordinary watercourse (tributary of the Cowfold Stream), for which the risk of flooding (as defined in the Environment Agency Risk of Flooding from Surface Water mapping (Environment Agency, 2023)) is medium to high along the southern site boundary.
- 3.2.9 The site is within a rural context and baseline noise levels are generally low and typical of a rural environment, being influenced by road traffic (mainly from A272 and local roads) with additional anthropogenic sources closer to areas of habitation and the Oakendene Industrial Estate.

Existing National Grid Bolney substation extension

- 3.2.10 The existing National Grid Bolney substation is located approximately 1.2km south-west of the onshore substation and the extension works will extend the site area into the field to the east.
- 3.2.11 The existing National Grid Bolney substation extension is also located within the Eastern Low Weald county Landscape Character Area (LCA) and at a local level within the Hickstead Low Weald LCA within Mid Sussex. The site context is well wooded and also tightly contained by the surrounding mature vegetation, although there are glimpses of the existing National Grid Bolney substation through the trees from the surrounding roads and PRow. In plan view, the site is contained by the existing National Grid Bolney substation to the west and north, and by the existing Rampion 1 substation approximately 140m to the east. Successive layers of mature perimeter vegetation along field boundaries and roads (Bob Lane to the south and Wineham Lane to the west) provide further screening and containment. Although the existing National Grid Bolney substation extension works are proposed in an existing industrial / substation setting, the high levels of perimeter screening ensure that the wider landscape area, beyond, retains its rural character.
- 3.2.12 The existing National Grid substation at Bolney is accessed from Wineham Lane to the west of the site and the extension works will also be accessed from this location.
- 3.2.13 The nearest settlement is at Hickstead, approximately 2.5km to the west and the closest residential properties along Wineham Lane and Bob Lane have no visual connection with the site. Other properties including Coombe House to the north, Coombe Farm to the east and Twineham Grange Farm to the south are well screened by intervening mature trees and woodland and have no visual connection with the site.
- 3.2.14 There is no public access and the nearest PRow (including 1T and 36Bo to the north, 8T to the east and 14T to the south) are all set back beyond existing vegetated boundaries and existing substation sites and consequently have no visual connection with the site.
- 3.2.15 The land proposed for the extension works is currently a mix of neutral/semi-improved grassland habitat, broadleaved woodland, and scattered scrub. The layers of existing vegetation which are to be retained will provide screening for the proposed extension and construction compound.
- 3.2.16 Intervening vegetation, topography and built infrastructure provide screening from the nearest listed building, Twineham Court Farmhouse (Grade II).
- 3.2.17 There is a small area within the extension footprint of 3.33 percent AEP and a high risk from surface water flooding.
- 3.2.18 Noise sources in the area are the existing elements of the existing National Grid Bolney substation and the Rampion 1 onshore substation.

3.3 Landscape and visual

- 3.3.1 This section provides the Landscape Strategy for each substation site (including the AIS and GIS options for the existing National Grid Bolney substation extension). Further information on planting, monitoring and maintenance are provided in the [Outline LEMP \[APP-232\]](#).
- 3.3.2 The [draft DCO \[REP2-002\]](#) Requirement 12 secures detailed landscape design, produced in accordance with the design principles in this DAS and the [Outline LEMP \[APP-232\]](#) (updated at Deadline 3). These will be provided for the approval of the relevant planning authority.

Landscape Strategy for Onshore Substation

- 3.3.3 The Landscape Strategy is illustrated in **Appendix D Oakendene onshore substation – Indicative Landscape Plan** and accompanied by the landscape design principles within this document which are summarised in **Table 3-1**. The following describes the Landscape Strategy in more detail.
- 3.3.4 A key design principle is the intention that the Oakendene substation will be screened by existing vegetation and proposed landscape planting from the majority of views into the site from the surrounding landscape and in most cases will present with limited or no visibility. Where visible, the appearance of structures will be considered as part of an Architectural Strategy to soften their appearance. Otherwise views towards the onshore substation will be designed to maintain the existing rural landscape character as follows:
- A272: except for the proposed access, the rural character of this road corridor, lined with trees and hedgerows will be maintained and strengthened with hedgerows managed to increase in height and increased native woodland planting provided beyond the hedgerow. The appearance of the access off the A272 will be designed to appear low key, matching the style of existing farm / estate access with limited signage. The site access road will incorporate a curve, with planting to prevent views along a ‘straight’ access road into the substation, maintaining the rural appearance of views from this road.
 - Kent Street: existing mature trees and hedges along this wooded road corridor will be retained and strengthened with additional native woodland planting provided to ensure limited views of the substation even in winter. Where there is temporary loss during construction along Kent Street required for vehicle accesses for the cable corridor and at the junction with the A272, these areas will be reinstated. The wooded, rural character of Kent Street will therefore be retained.
 - Cowfold Stream and PRow 1786 Taintfield Wood: views of the onshore substation from PRow 1786 where it crosses high ground to the north of Taintfield Wood; and where it is routed near the lake to the south of Oakendene Manor are likely unavoidable. Whilst landscape planting has been maximised, the rural character and views across the parkland landscape at Oakendene Manor from part of PRow 1786 will be adversely affected and the Architectural Strategy (determining building colour and roofline) will be required to soften this effect.

- Oakendene Manor: principle, designed views from the manor house to the lake within the parkland landscape at Oakendene Manor will be retained and unaffected. Southeast views from the house towards the onshore substation will be partly screened by existing mature trees and woodland. Tree planting (native parkland trees, woodland and shrub planting) will be undertaken to provide further screening, whilst respecting the parkland character. The Architectural Strategy (determining building colour and roofline) will also be required to soften the visual appearance of the onshore substation in any remaining views.

3.3.5 To conclude, the appearance of the Oakendene substation in the wider landscape setting will be limited to views from part of PRoW 1786 and private views from Oakendene Manor. For the vast majority of visual receptors (people viewing the site from the surrounding landscape including settlements, residential properties, roads and PRoW) there will generally be no view of the substation and the existing rural character of the landscape will be retained.

3.3.6 An Architectural Strategy will inform the detailed design based on the principles in LV12 in Table 3-1. At the onshore substation some of the structures such as the main buildings will be coloured to reduce their visibility from the wider landscape. For example, photomontages for Years 1, 5 and 10 during the operation and maintenance period illustrate views of the indicative substation (**Figures 18.10-13a-h, Volume 3** of the ES **[APP-098]** which is coloured in a combination of greys (as dictated by materials) and greens which help to break up the mass and scale of the development and provide a better accommodation into the surrounding landscape, particularly during the summer months. The photomontages indicate the maximum design parameters, and the Architectural Strategy will consider the roof line and visible components of the onshore substation in order to further soften the appearance of the substation when viewed from the surrounding area in its landscape setting.

Landscape Design Evolution and Vegetation Retention and Removal

3.3.7 As a result of the EIA process and iterative design evolution, the maximum footprint of the onshore Oakendene substation has been located to retain the existing hedgerows and mature trees that currently exist on southern, eastern and western edges of the site to maintain the existing screening they provide. The maximum footprint has also been sited to reduce the loss of hedgerows and mature trees within the proposed DCO Order Limits. The retention of these hedgerow and tree lines is secured through the **Outline Vegetation Retention and Removal Plan** (VRRP, Document Reference: 8.87) (provided at Deadline 5).

3.3.8 In order to facilitate vegetation retention, trenchless crossings have been included (and secured in the **Outline CoCP Appendix A – Crossing Schedule [PEPD-033]** (updated at Deadline 3)) where the onshore cable corridor enters the substation to the south and where the corridor exits to the east towards the existing National Grid Bolney substation. The hedgerow, tree lines and areas of woodland to be retained at both the onshore substation and the existing National Grid Bolney substation are shown in the VRRPs.

Indicative Landscape Plan and LEMP

- 3.3.9 The design principles (illustrated in the **Appendix D Oakendene onshore substation - Indicative Landscape Plan**) include landscape strategies to reduce landscape impacts on landscape character and elements, manage and contain views through the retention of existing vegetation and the provision of new landscape planting, Architectural Strategy, attention to details such as site access, signage and lighting provision, landscape specification including planting and advance planting (in accordance with LV13) of native trees, woodland, hedgerows, understorey planting and grassland and the subsequent maintenance and management requirements.
- 3.3.10 The **draft DCO [REP2-002]** (updated at Deadline 3) Requirement 12 requires that a stage specific LEMP is produced for the relevant stage in accordance with the design principles in this DAS and will be provided for the approval of the relevant planning authority. In particular it will include detailed landscape plans, planting specifications, plant schedules (detailing number of plants / density / size and species), landscape phasing plan and programme of works (including targeted planting seasons and advance planting opportunities) and a landscape management plan (including maintenance and monitoring) to cover Years 1-10 to ensure the establishment of the landscape proposals.
- 3.3.11 The landscape design principles for the Oakendene substation are listed in **Table 3-1** at the end of this section. The table includes a summary of where the principles apply to Oakendene and / or National Grid Bolney substation extension works for which the landscape strategy is described below.

Landscape strategy for National Grid Bolney substation extension works

- 3.3.12 The Landscape Strategy is illustrated in **Appendix C National Grid Bolney Substation Extension - Indicative Landscape Plan – GIS and AIS Option** for the existing National Grid Bolney substation extension works (allowing for both AIS and GIS options) and includes additional native tree planting along Bob Lane to reinforce existing mature roadside vegetation in this location. A key design principle is the intention that the National Grid Bolney substation extension will be largely screened from public view in all directions by combinations of the existing National Grid Bolney substation, the existing Rampion 1 substation and existing mature vegetation comprising trees, woodland and hedgerows. As a result, the existing wooded character of the surrounding landscape will be retained.
- 3.3.13 A stage specific LEMP will be provided for the works as per the description in paragraph 3.3.10. The landscape design principles relevant to the National Grid Bolney substation extension works are provided in **Table 3-1**

Table 3-1 Landscape design principles

Reference	Principle	Substation
LV1	Continued Detailed Design Evolution: the Landscape Strategy, including detailed landscape design of the Indicative Landscape Plan will be developed by landscape	Oakendene and National Grid Bolney

Reference	Principle	Substation
	architects in collaboration with technical and environmental disciplines to further the landscape design (see below) and embedded environmental measures, maintaining or advancing the current standard of design and reviewing opportunities to optimise the design within the maximum design parameters.	
LV2	Retention and Protection of Landscape Elements: existing vegetation will be protected and retained as indicated on the Indicative Landscape Plan and in accordance with the Outline Vegetation Retention and Removal Plan.	Oakendene and National Grid Bolney
LV3	Landscape Design: Indicative Landscape Plan: <ul style="list-style-type: none"> the Oakendene substation will be screened by existing retained vegetation and proposed landscape planting from the majority of views into the site, from the surrounding landscape, and in most cases will have limited or no visibility. 	Oakendene
LV4	Eastern boundary: <ul style="list-style-type: none"> along Kent Street: Existing perimeter vegetation (mature trees and understorey) will be maintained¹ and supplemented with additional native woodland and understorey planting. Temporary internal screen fencing will be provided to screen construction works; it will demarcate advance planting (see LV13) and existing woodland and allow small mammal passage. Attenuation basins will be planted with wet woodland species such as willow and alder. Eastern boundary: the existing perimeter vegetation along Kent Street will be maintained by providing a trenchless crossing (see Outline CoCP 	Oakendene

¹ Vegetation temporarily lost to provide access to the cable corridor from Kent Street during construction and at the junction of the A272 will be reinstated.

Reference	Principle	Substation
	<p>Appendix A – Crossing Schedule crossing reference TC-28) for the onward cable connection to Bolney. Native shrubs will be planted within the cable easement.</p>	
LV5	<p>Southern boundary:</p> <ul style="list-style-type: none"> the existing perimeter vegetation along the southern boundary will be maintained by providing a trenchless crossing (see Outline CoCP Appendix A – Crossing Schedule crossing reference TC-27) for the onshore cable connection into the onshore substation site. Native shrubs / scrub will be planted within the cable easement to the north of the tributary of Cowfold Stream. Existing perimeter vegetation (mature trees and understorey) will be maintained and supplemented with additional native woodland and understorey planting. Attenuation basins will be planted with wet woodland species such as willow and alder. 	Oakendene
LV6	<p>Western boundary: Existing perimeter vegetation (mature trees and hedgerows) will be maintained and supplemented with additional native woodland planting, understorey, hedgerows and individual native parkland trees. See also LV13 regarding advance planting. Attenuation basins will be planted with wet woodland species such as willow and alder.</p>	Oakendene
LV7	<p>Views from Oakendene Manor / parkland, to and from the lake, across associated landscape parkland, west of the substation will be retained.</p>	Oakendene
LV8	<p>Views from PRow 1786 near Taintfield Wood, towards Oakendene Manor and associated landscape parkland, will be retained and onshore substation screening maximised.</p>	Oakendene

Reference	Principle	Substation
LV9	A272 and Site Access: outwith visibility splays and access requirements, existing roadside vegetation (trees and hedgerow) will be maintained, and hedgerow height managed to infill any gaps and allow it to grow to an increased height. Increased native woodland planting will be provided to the south of the existing hedgerow along the A272 to increase roadside screening. Beyond this, internal screen fencing will be provided to further screen construction works, demarcate advance planting (see LV13) and existing vegetation and allow small mammal passage.	Oakendene
LV10	The site access road will include a curve with planting to prevent a direct line of sight from the A272 into the onshore substation.	Oakendene
LV11	Site entrance signage and gates will be designed to be attractive, 'low key' and set back to preserve the rural character of the A272 road corridor.	Oakendene
LV12	<p>Architectural Strategy: To be developed by architects in collaboration with technical and environmental disciplines to further the landscape design and embedded environmental measures, maintaining or advancing the current standard of design and reviewing opportunities to optimise the design within the maximum design parameters.</p> <ul style="list-style-type: none"> • Positioning and orientation of the built form and hard surfaced areas of the substation to be designed considering both the functional requirements and to reduce the visual impact of the substation; • The architectural form of the substation buildings and roofline are to be designed for its functional requirements along with its visual appearance in order to soften and reduce the visual impact of the substation from nearby receptors; 	Oakendene

Reference	Principle	Substation
	<ul style="list-style-type: none"> Choice of colour scheme and materials / rendering of the building façades and roof to reduce the contrast with existing features in surrounding views and help integrate the substation into its landscape setting; and The substation security fence design to be considered for its aesthetic and visual qualities along with its functional requirements. Appropriate material and colours to be used to reduce the impact of the fence on nearby receptors. 	
LV13	<p>Advance planting (see also TE2 in Table 3-3 for ecology)</p> <ul style="list-style-type: none"> Planting of the site perimeter shall be provided in the first available planting season following commencement of the onshore substation works, external to the temporary internal screen fence required to secure the works; Historic parkland tree planting to screen views from Oakendene Manor shall be provided in the first available planting season following commencement of the onshore substation works; and Further planting will be undertaken prior to completion of construction as areas of the site works are completed. 	Oakendene
LV14	<p>Lighting:</p> <ul style="list-style-type: none"> lighting requirements (for scheduled maintenance outages or emergencies) within the onshore substation will be directed downward and shielded to reduce glare outside the facility. the principles of lighting design will be informed by the joint guidance provided by the Bat Conservation Trust and Institution of Lighting Professionals (2018). the lighting design will account for the potential effects on people (residents, 	Oakendene and National Grid Bolney

Reference	Principle	Substation
	road users, walkers and tourists) and biodiversity by taking measures to minimise lighting use, minimise light spill, use most appropriate wave lengths of light and locate lighting in the most appropriate locations.	
LV15	<p>Landscape Design: Indicative Landscape Plan</p> <ul style="list-style-type: none"> The existing National Grid Bolney substation extension will be screened by retention of existing vegetation and proposed landscape planting. Additional planting of individual native trees / shrubs / hedging will be provided adjacent to Bob Lane to provide screening of the existing National Grid Bolney substation extension, and the existing hedgerow and trees will be managed to enhance their screening potential. 	National Grid Bolney
LV16	<p>Wineham Lane and Site Access:</p> <p>Existing access to the existing National Grid Bolney substation will be used and no further works are required.</p>	National Grid Bolney

3.4 Historic environment

- 3.4.1 The maximum footprint of the onshore substation (see **Appendix A: Oakendene onshore substation - Indicative Layout and Elevation**) will be located to the south and east of Oakendene Manor. This ensures that it is only partially within the fullest extent of the former parkland, and within that part which has experienced the greatest loss of historic parkland features.
- 3.4.2 The onshore substation will be located to the east of a retained mature tree line, between the onshore substation and Oakendene Manor. It will also ensure that the substation will not feature in views directly south from the manor, toward the former boating lake and Taintfield Wood. The access has also been located to the east of this retained mature tree line.
- 3.4.3 In addition, the landscape design principles are illustrated in **Appendix D: Oakendene onshore substation - Indicative Landscape Plan** and in **Table 3-1**. In summary, the key embedded environmental measures to reduce effects on Oakendene Manor and its associated parkland are:
- LV1: continued detailed design evolution in collaboration with technical and environmental disciplines;

- LV2: retention and protection of landscape elements as indicated on the Indicative Landscape Plan and in accordance with the VRRPs.
- LV6: strengthening of existing line of woodland on western edge of the onshore substation site;
- LV5: wet woodland planting south of the onshore substation to provide partial screening in views from the south, in which Oakendene Manor will feature; and
- LV13: advance planting of native parkland trees.

3.4.4 Further design principles for the onshore substation for historic environment are outlined in **Table 3-2**.

Table 3-2 Historic environment design principles

Reference	Principle	Substation
HE1	The detailed design of the onshore Oakendene substation layout, scale and appearance shall seek to maximise the opportunities to reduce effects on the character and setting of the Grade II listed Oakendene Manor including through optimising the location and height of equipment.	Oakendene
HE2	The detailed design will utilise surviving elements of the historic parkland in the design, including mature tree lines, and to reflect the former parkland in new planting.	Oakendene
HE3	The detailed design will seek to maximise the opportunities to retain existing longer distance views of and from the manor which contribute positively to its significance. In particular, the locally elevated position within the historic parkland occupied by the house affords views south across the former parkland toward Taintfield Wood and former boating lake and there are longer distance views of the house from the higher ground around Taintfield.	Oakendene
HE4	Planting will include individual native parkland trees to filter southwestern views from Oakendene Manor as well as compensating for loss of trees within the former parkland. These will be provided in the first available planting season following commencement of the onshore substation works as per LV13. Provision has been made within the proposed DCO Order Limits in the area of Works No. 17 (see Onshore Works Plans [PEPD-005]) to	Oakendene

Reference	Principle	Substation
	implement historic parkland style tree planting, the extent of which is to be confirmed at detailed design.	

3.4.5 The Bolney substation extension is sited adjacent to the existing National Grid substation, within the existing substation infrastructure setting. Existing intervening vegetation and built infrastructure provide screening of the extension works from surrounding heritage assets, including the nearest, the grade II listed Twineham Court Farmhouse. As per the Landscape Design Principle reference LV15, the existing vegetation which provides screening will be retained with additional planting provided to the south adjacent to Bob Lane (see **Appendix C: National Grid Bolney Substation Extension - Indicative Landscape Plan – GIS and AIS Option**).

3.4.6 No further design principles for historic environment are necessary for the existing National Grid Bolney substation extension works.

3.5 Terrestrial ecology

3.5.1 The maximum footprint of the onshore substation has been sited to reduce the loss of vegetation and vegetation will be retained as shown in the VRRPs as secured by **draft DCO** Requirement 40. However, the loss of vegetation within the maximum footprint provides contiguous habitat for dormice and will require compensation under a European Protected Species Licence (EPS). The advance planting shown in **Appendix D: Oakdene onshore substation - Indicative Landscape Plan** at the western edges of the onshore substation site is provided to strengthen the habitat for dormice in this location and will be required to be delivered prior to construction of the onshore substation, including onshore site preparation works, to support the licence application. When allied with the focus on habitat retention and the provision of additional suitable habitat following construction the medium to long term outcome will be a greater provision of suitable dormouse habitat.

3.5.2 The proposed pre-commencement planting provides a dual benefit in terms of EPS licencing including:

- provision of additional habitat for dormice; and
- provision of a buffer from current dormouse nesting locations next to temporary construction work areas thereby reducing the potential for significant disturbance.

3.5.3 The retention and strengthening of the existing tree lines including along the eastern boundary at Kent Street provides mitigation for bats using this habitat for commuting and foraging. In the medium to long term the level of habitat suitable for bats in the locality will be an increase over the current baseline, with the focus on habitat retention and pre-commencement provision managing the short term effects.

- 3.5.4 The biodiversity enhancements overall (habitats established both pre- and post-construction of the onshore substation) provide the necessary mitigation and compensation for bats and dormouse. They provide an increase overall in extent of suitable habitats and ensure that fragmentation is minimised. Compensatory habitat is proposed for woodland and scrub features lost in the locality and this will provide breeding habitat for nightingale as a species of interest in areas associated with the Cowfold Stream catchment.
- 3.5.5 Further embedded environmental measures (including scheduling of vegetation removal) for both dormouse (C-232) and bats (C-211) and employment of an Ecological Clerk of Works (C-207) are secured in the [Outline CoCP \[PEPD-033\]](#) (updated at Deadline 3) . The design principles for ecology are provided in **Table 3-3** below.

Table 3-3 Terrestrial ecology design principles

Reference	Principle	Substation
TE1	Habitat retention through avoidance and minimisation will be a key consideration and maximised during the detailed design process (e.g., where the maximum footprint may reduce and present an opportunity to reduce loss).	Oakendene and National Grid Bolney
TE2	Prior to commencement of the onshore substation site preparation works, advance planting will be provided along the western extent of the Oakendene onshore substation site to provide mitigation for the loss of dormouse habitat. This will include a 15m wide strip of woodland and scrub planting and plugging of hedgerow gaps as shown on the Appendix D Oakendene onshore substation - Indicative Landscape Plan . This advanced planting will also provide opportunities to a range of other species including foraging bats and reptiles.	Oakendene
TE3	Habitat created following construction will provide woodland, wet woodland (within SuDS features) and scrub in greater abundance than currently present at the onshore substation. The habitats created will provide suitable habitat for many of the notable species known to be present in the area. This includes breeding nightingale (through provision of damp scrub and woodland for nesting and foraging), great crested newts (provision of additional terrestrial habitat to known	Oakendene

Reference	Principle	Substation
	populations within 250m of the substation), bats (particularly for foraging and commuting), dormice, badger and reptiles (e.g., grass snake).	
TE4	Ten bat boxes will be provided in suitable retained mature trees at the onshore Oakendene substation.	Oakendene
TE5	Additional planting at the existing National Grid Bolney substation extension will strengthen existing wildlife movement corridors within the area.	National Grid Bolney

3.5.6 For the existing National Grid Bolney substation extension works, habitat loss is minimised, and the temporary losses will be reinstated with further planting of individual native trees to the south of the extension works adjacent to Bob Lane as per the landscape design principle reference LV15. See **Table 3-3** above for design principles for ecology.

3.6 Flood risk and drainage

- 3.6.1 The maximum footprint for the onshore substation has been sited in Flood Zone 1 and avoiding flood risk associated with the ordinary watercourse to the south as defined in the Environment Agency (2013) Risk of Flooding from Surface Water mapping. Detailed design will accord with the National Grid target guidance defined in the design principles below.
- 3.6.2 Surface water flood risk at the onshore substation and Bolney substation extension during operation has been addressed in **Appendix 26.2: Flood Risk Assessment, Volume 4**, of the ES [APP-216].
- 3.6.3 The **Outline Operational Drainage Plan [APP-223]** provides the strategies to address the risk of increased surface water run-off. The strategies and principles therein demonstrate how surface water run-on and runoff can be managed sustainably on site, with the incorporation of SuDS where appropriate.
- 3.6.4 The **draft DCO [REP2-002]** (updated at Deadline 3) includes Requirement 17 and 18 to provide the detailed drainage design at each site shall be developed in accordance with the **Outline Operational Drainage Plan [APP-223]**, and approved by the lead local flood authority (West Sussex County Council) in consultation with the relevant planning authority, the Environment Agency and Southern Water.
- 3.6.5 **Appendix D: Oakendene onshore substation - Indicative Landscape Plan** shows indicative locations of SuDS features identified to manage surface water run-on and provide sufficient attenuation for surface water run-off.
- 3.6.6 Several options for drainage of the existing National Grid Bolney substation extension site are provided in the **Outline Operational Drainage Plan [APP-223]**,

retaining flexibility for the detailed design of the AIS or GIS option. These include connection to the existing drainage system at the existing National Grid Bolney substation or discharge to an Ordinary Watercourse. The detailed design will be subject to agreement with NGET prior to seeking approval in accordance with the DCO requirement.

3.6.7 The design principles for flood risk and drainage are provided in **Table 3-4** below.

Table 3-4 Flood risk and drainage design principles

Reference	Principle	Substation
FR1	In order to meet national policy and guidance, surface water attenuation is required to limit discharge to the greenfield (undeveloped) QBAR rate (mean annual flood) and/or 2 litres per second (l/s), whichever is greater at the onshore substation.	Oakendene and National Grid Bolney
FR2	The onshore Oakendene substation detailed design will adhere to the National Grid target guidance for flood protection, providing flood resilience for safety critical infrastructure to a level equivalent of the 0.1% AEP flood level plus an allowance for climate change and 300mm freeboard.	Oakendene
FR3	Strategies to minimise water use, such as water harvesting or recycling, will be employed at the onshore substation, to be specified at the detailed design stage. Any residual negligible water use will be further mitigated as part of a multi-tiered approach to achieve water neutrality. Dedicated multitiered commitments to water neutrality are presented in Chapter 26: Water Environment.	Oakendene
FR4	The onshore Oakendene substation will contain welfare facilities, therefore, foul drainage connections will be required and developed at detailed design.	Oakendene
FR5	The onshore substation footprint will be sited outside of the 0.1% Annual Exceedance AEP flood extent associated with the southern watercourse (defined by the Environment Risk of Surface Water mapping).	Oakendene

3.7 Climate change and resilience

- 3.7.1 Climate change trends towards increased annual mean temperatures and an increase in the frequency and intensity of hot spells, increases in incidents of extreme precipitation, as well as the increase in frequency and intensity of storm events. As per the flood risk and drainage principles, the onshore substation design will comply with National Grid's target guidance. Further detailed design will take account of any residual risks, such as structural or geotechnical instability.
- 3.7.2 Increased annual mean temperatures, especially in the summer months, and an increase in the frequency and intensity of hot spells and the increase in frequency and intensity of storm events may cause replacement planting at the substations to fail which will require further consideration in the detailed landscaping design and management plans.
- 3.7.3 The detailed designs will be resilient to climate change and able to withstand all foreseeable weather conditions during the operational life of the project. To achieve this, the substations will be finished to a high standard of design with appropriate material selection, utilising best practice guidance and relevant standard including consideration for potential impacts of climate change. Concepts within relevant international and national guidance for embedding climate change into technical standards will be employed during the detailed design of all assets e.g., CEN/CENELEC GUIDE 32: Guide for addressing climate change adaptation in standards (2016).
- 3.7.4 Design principles for both the Oakendene substation and existing National Grid Bolney substation extension works are provided in **Table 3-5** below.

Table 3-5 Climate change design principles

Reference	Principle	Substation
CC1	The basis of the structural design for the proposed onshore cable corridor and onshore substation infrastructure will be completed in general accordance with design standards to minimise the risk of structural or geotechnical instability. The structural design of onshore substation buildings will give due consideration to minimum design requirements for ambient design temperatures, wind pressures and snow loads, including climate change allowances where appropriate.	Oakendene and National Grid Bolney
CC2	Landscape planting will be characteristic of the area and selected to be resilient to climate change. Species selection and location will be undertaken carefully at detailed design stage with appropriate management and maintenance techniques established to support	Oakendene and National Grid Bolney

Reference	Principle	Substation
	the development of these species in line with the environmental requirements.	
CC3	All aspects of the Proposed Development will be finished to a high standard of design with appropriate material selection, utilising best practice guidance and relevant standard including consideration for potential impacts of climate change. Concepts within relevant international and national guidance for embedding climate change into technical standards will be embedded within the further design of all assets e.g., CEN/CENELEC GUIDE 32: Guide for addressing climate change adaptation in standards (2016). This will ensure the design is resilient to climate change and able to withstand all foreseeable weather conditions during the operational life of the project. The design will use quality materials that are resilient to climate change to avoid deterioration and minimise the need for maintenance.	Oakendene and National Grid Bolney

3.8 Operational noise

3.8.1 **Chapter 21: Noise and vibration, Volume 2** of the ES **[PEPD-018]** of the ES includes a noise assessment for the onshore substation based on baseline surveys and modelled noise levels using the maximum design parameters. The findings have identified the design principle detailed in **Table 3-6** below.

Table 3-6 Noise and vibration design principles

Reference	Principle	Substation
NV1	<p>The onshore substation design will be built and operated such that the rating levels (noise emissions plus any character correction) do not exceed the following noise levels at the private amenity space associated with the closest residential receptors as outlined below:</p> <p>Southlands, Kent Street, RH13 8BA (assessment location at OSGB East 523168.9635, North 122661.931): Daytime limit of 38 dB(A), night-time limit of 35 dB(A);</p> <p>Westridge, Kent Street, RH13 8BB (assessment location at OSGB East 523193.0601, North 122661.931): Daytime limit of 35 dB(A), night-time limit of 35 dB(A);</p> <p>Taintfield Farmhouse, Kings Lane, RH13 8BD (assessment location at OSGB East 522570.7123, North 122015.784): Daytime limit of 35 dB(A), night-time limit of 35 dB(A);</p> <p>Oakendene Manor, Bolney Road, RH13 8AZ (assessment location at OSGB East 522771.0714, North 122524.3422): Daytime limit of 39 dB(A), night-time limit of 35 dB(A).</p>	Oakendene

3.8.2 The detail including any attenuation measures shall be provided as part of the Operational Noise Management Plan as per the **draft DCO [REP2-002]** (updated at Deadline 3) Requirement 29.

3.8.3 The existing National Grid Bolney substation extension works will not introduce any additional sources of noise that could affect sensitive receptors and therefore do not require additional design principles. The equipment associated with the switchgear is the only potential source of noise, this is limited to a 'click' noise during the switching process. The switching process occurs infrequently and is unlikely to be audible outside of the existing substation.

3.9 Ground conditions

3.9.1 In order to meet national planning policy guidance, ground investigation will be required to demonstrate that the site is suitable for the proposed use and that risks from land contamination have been appropriately managed.

3.9.2 The Phase 1 Desk Study included as part of **Chapter 24: Ground conditions, Volume 2** of the ES **[APP-065]** includes a preliminary risk assessment to identify locations in which further risk-based assessment, including ground investigation, is

required prior to construction. Based on the preliminary risk assessment, ground investigation is recommended at both the onshore substation at Oakendene and the existing National Grid Bolney substation extension works.

- 3.9.3 The **draft DCO [REP2-002]** (updated at Deadline 3) includes Requirement 25 for this further risk-based assessment to be undertaken and submitted to the relevant planning authority for approval.
- 3.9.4 Design principles for both the Oakendene substation and existing National Grid Bolney Substation extension areas are provided in **Table 3-7** below.

Table 3-7 Ground conditions design principles

Reference	Principle	Substation
GC1	RED will ensure that the land used for the Proposed Development is suitable for the proposed use with respect to the potential for soil and groundwater contamination and, where necessary, risk-based remediation is undertaken in line with Environment Agency (2020) guidance (Land Contamination: Risk Management). The precise design of any remediation strategy will be confirmed in the detailed design after consent has been granted.	Oakendene and National Grid Bolney
GC2	The basis of the structural design for the proposed onshore cable corridor and onshore substation infrastructure will be completed in general accordance with design standards to minimise the risk of structural or geotechnical instability. The structural design of onshore substation buildings will give due consideration to minimum design requirements for ambient design temperatures, wind pressures and snow loads, including climate change allowances where appropriate.	Oakendene and National Grid Bolney
GC3	Any tanks and associated pipe work containing oils, fuels and chemicals will be double skinned and provided with leak detection equipment. There will be a bunded capacity of 100% of the maximum tank volume for non-hazardous fluids. For hazardous chemicals, fuels or oils bund capacity will be the larger of 110% of the largest tank volume for single tank bunds, (or, in the case of multi- tank bunds, 110% of the largest tank capacity or 25% of the combined tank capacity, whichever it is the largest). Fuel storage will be in accordance with the Control	Oakendene and National Grid Bolney

Reference	Principle	Substation
	of Pollution (Oil Storage) (England) Regulations 2001 and other Pollution Prevention Guidelines (PPGs). All stores of fuel will be located at least 20m from any watercourses and away from areas at risk of flooding.	

4. Access

- 4.1.1 A new access (A-63) is required for the onshore substation at Oakendene for both construction and operation and maintenance. This is shown on the plan in **Appendix A Oakendene onshore substation - Indicative Layout and Elevation**. The access will be designed to provide access for Abnormal Indivisible Loads (AIL) and this function will be retained during operation and maintenance in order to allow for any AILs required.
- 4.1.2 An outline design has been developed for the new access proposed for the onshore substation in accordance with the guidance and standards set out in DMRB (Standards for Highways 2020 and 2021) including the visibility standards for the speed limit of the A272. The **draft DCO [REP2-002]** (updated at Deadline 3) Requirement 15 secures that the detailed access design be submitted to and approved by West Sussex County Council as the highway authority.
- The access plan must include details of the siting, design, layout, visibility splays, access management measures and a maintenance programme relevant to the access it relates to.
 - The highway accesses (including visibility splays) must be constructed and maintained in accordance with the approved details.
- 4.1.3 The existing operational accesses (A-69) at the existing National Grid Bolney extension works will be used for operational use, no additional works are planned. A-68 will be used during construction. The design principles are provided in **Table 4-1** below.

Table 4-1 Access design principles

Reference	Principle	Substation
AC1	The temporary construction and operational access at the onshore substation will be designed to the standards as detailed in Section 4.4 of the Outline Construction Traffic Management Plan (CTMP) [REP1-010] . At the onshore substation (A-63), some or all elements of the access design will be retained, to enable access during operation and maintenance.	Oakendene and National Grid Bolney
AC2	The Equality Act 2010 will be accounted for in the detailed design.	Oakendene and National Grid Bolney

Access for all

- 4.1.4 The onshore substation and existing National Grid Bolney substation extension works will not be open to members of the public and will not have permanent staff on site. However, for the purposes of all staff required to go to the site for operational and maintenance reasons, the relevant legislation and guidance will be considered in relation to access for all as per AC2 in **Table 4-1**..

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5. Glossary of terms and abbreviations

Term (acronym)	Definition
AEP	Annual Exceedance Probability
AIL	Abnormal and Indivisible Loads
Outline Code of Construction Practice (COCP)	The code sets out the standards and procedures to which developers and contractors must adhere to when undertaking construction of major projects. This will assist with managing the environmental impacts and will identify the main responsibilities and requirements of developers and contractors in constructing their projects.
CTMP	Outline Construction Traffic Management Plan
Development Consent Order (DCO)	This is the means of obtaining permission for developments categorised as Nationally Significant Infrastructure Projects, under the Planning Act 2008.
DCO Application	An application for consent under the Planning Act 2008 to undertake a Nationally Significant Infrastructure Project made to the Planning Inspectorate who will consider the application and make a recommendation to the Secretary of State, who will decide on whether development consent should be granted for the Proposed Development.
Environmental Impact Assessment (EIA)	The process of evaluating the likely significant environmental effects of a proposed project or development over and above the existing circumstances (or 'baseline').
EPS	European Protected Species Licence
FDZ	Fire Damage Zone
Horizontal Directional Drilling (HDD)	An engineering technique avoiding open trenches.
HGV	Heavy Goods Vehicle
HVAC	High Voltage Alternating Current
LCA	Landscape Character Area
LEMP	Landscape and Ecology Management Plan
LGV	Light Goods Vehicle

Term (acronym)	Definition
MHWS	Mean High Water Springs
NGET	National Grid Electricity Transmission plc
NHLE	National Heritage List for England
Outline Construction Workforce Travel Plan	A plan provided with the DCO application to outline the principles for management of travel by personnel during construction of the Proposed Development.
Outline Operational Travel Plan	A plan provided with the DCO application to outline the principles for the management of travel by personnel during the operation of the Proposed Development.
Proposed Development	The development that is subject to the application for development consent, as described in Chapter 4: The Proposed Development, Volume 2 of the ES [APP-045].
PRoW	Public Rights of Way
Q_{bar}	Also known as mean annual flood, this is the value of the average annual flood event recorded in a river. This flow rate is used to provide a measure of the Greenfield runoff performance of a site in its natural state to enable flow rate criteria to be set for post development surface water discharges for various return periods.
Receptor	These are as defined in Regulation 5(2) of The Infrastructure Planning ‘Environmental Impact Assessment’ Regulations 2017 and include population and human health, biodiversity, land, soil, water, air, climate, material assets, cultural heritage and landscape that may be at risk from exposure to direct and indirect impacts as a result of the Proposed Development.
RED	Rampion Extension Development Limited (the Applicant)
SCADA	Supervisory Control and Data Acquisition
SGT	Super Grid Transformer
STATCOM	Static synchronous compensator
SuDS	Sustainable Drainage Systems
TRG	Transport Review Group
VRRP	Vegetation Retention and Removal Plan
WSCC	West Sussex County Council

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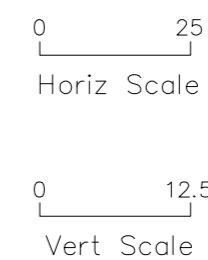
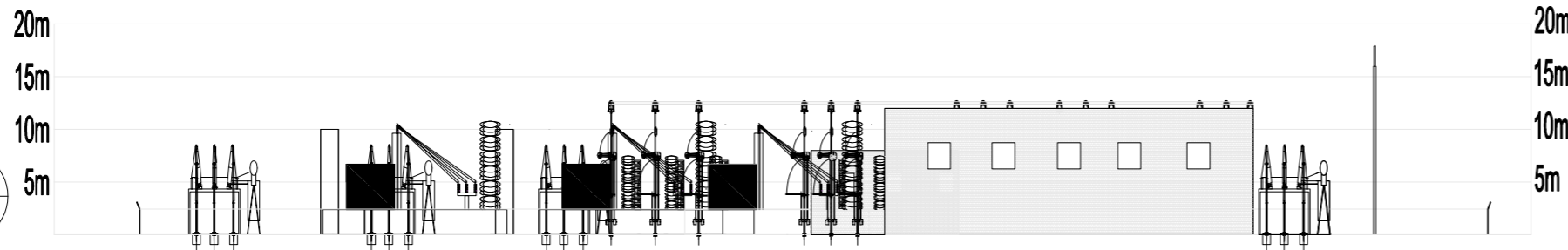
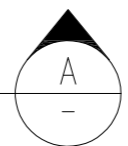
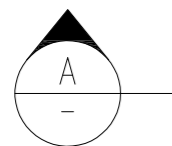
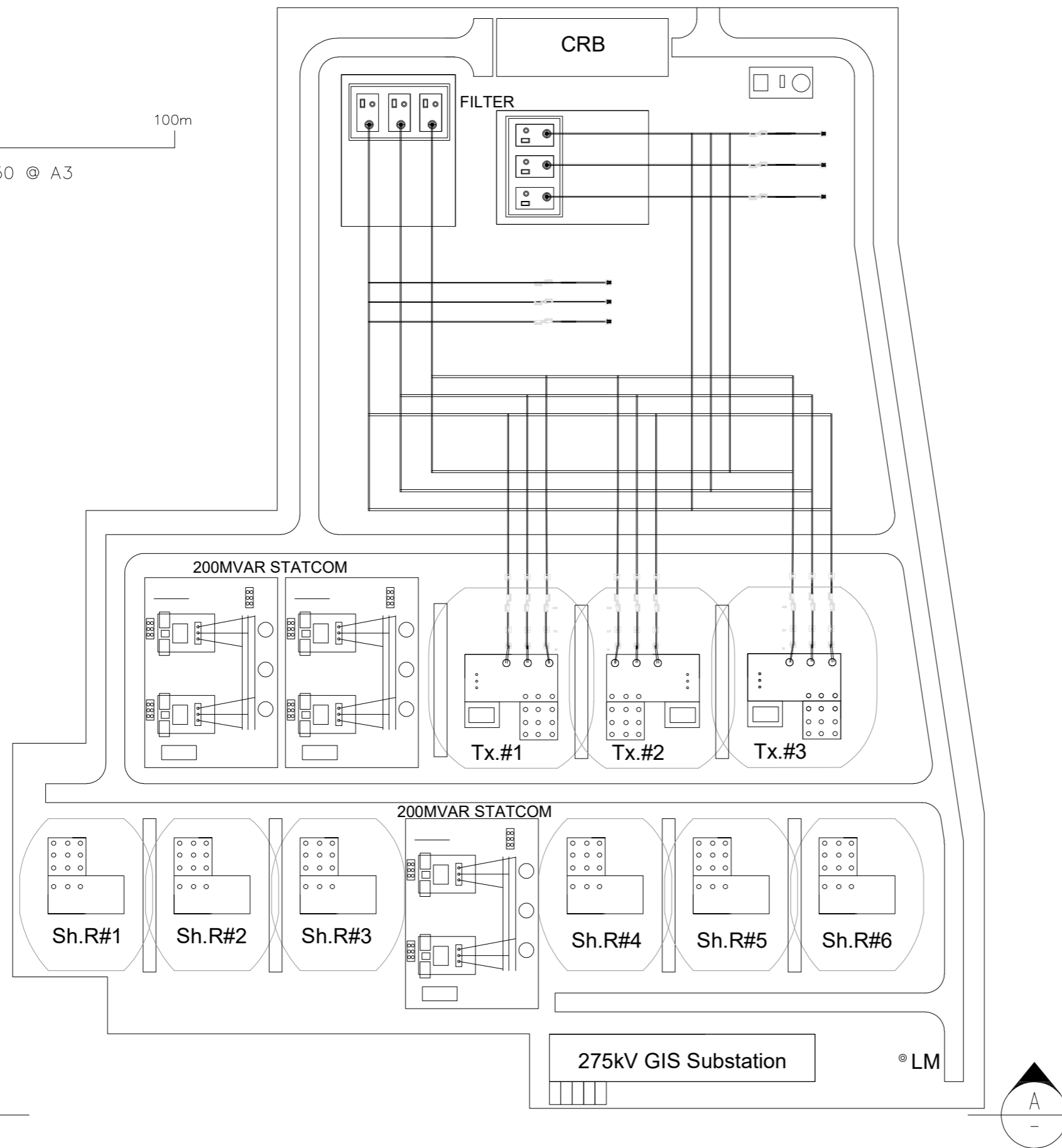
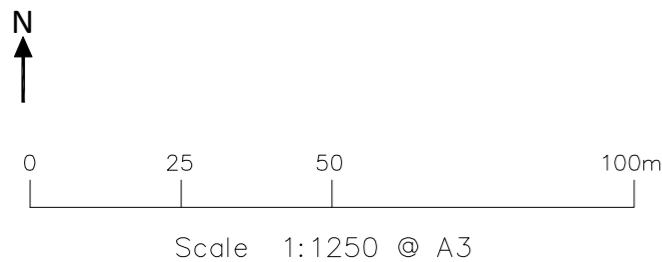
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Appendix A

Oakendene onshore substation - Indicative Layout and Elevation

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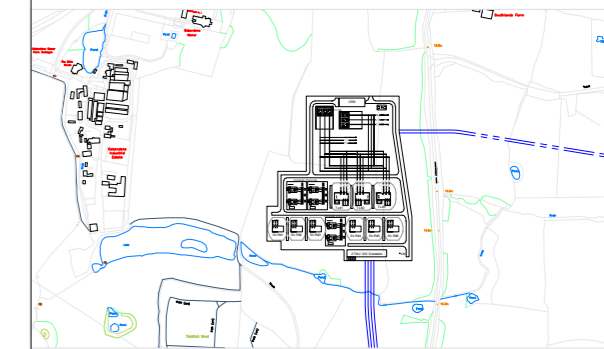
SECTION A-A

NOTES

1. LAYOUT IS INDICATIVE ONLY AND SUBJECT TO CHANGE FOLLOWING DETAIL DESIGN.
2. FOR SUBSTATION LEVELS SEE DRAWING 42285-WOOD-CO-ON-DR-MD-0001.
3. FOR DRAINAGE RELATED INFORMATION, PLEASE SEE REPORT 42285-WOOD-PE-ON-RP-MD-0014.
4. LAYOUT BASED ON GIS AND AIS FOR THE 275kV AND 400kV CONNECTIONS RESPECTIVELY.

DEFINITIONS

- AIS AIR INSULATED SUBSTATION
- CRB CONTROL ROOM BUILDING
- GIS GAS INSULATED SUBSTATION
- LM LIGHTNING MAST
- Sh.R SHUNT REACTOR
- Tx TRANSFORMER



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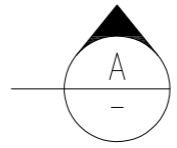
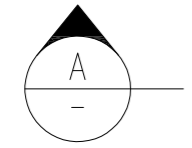
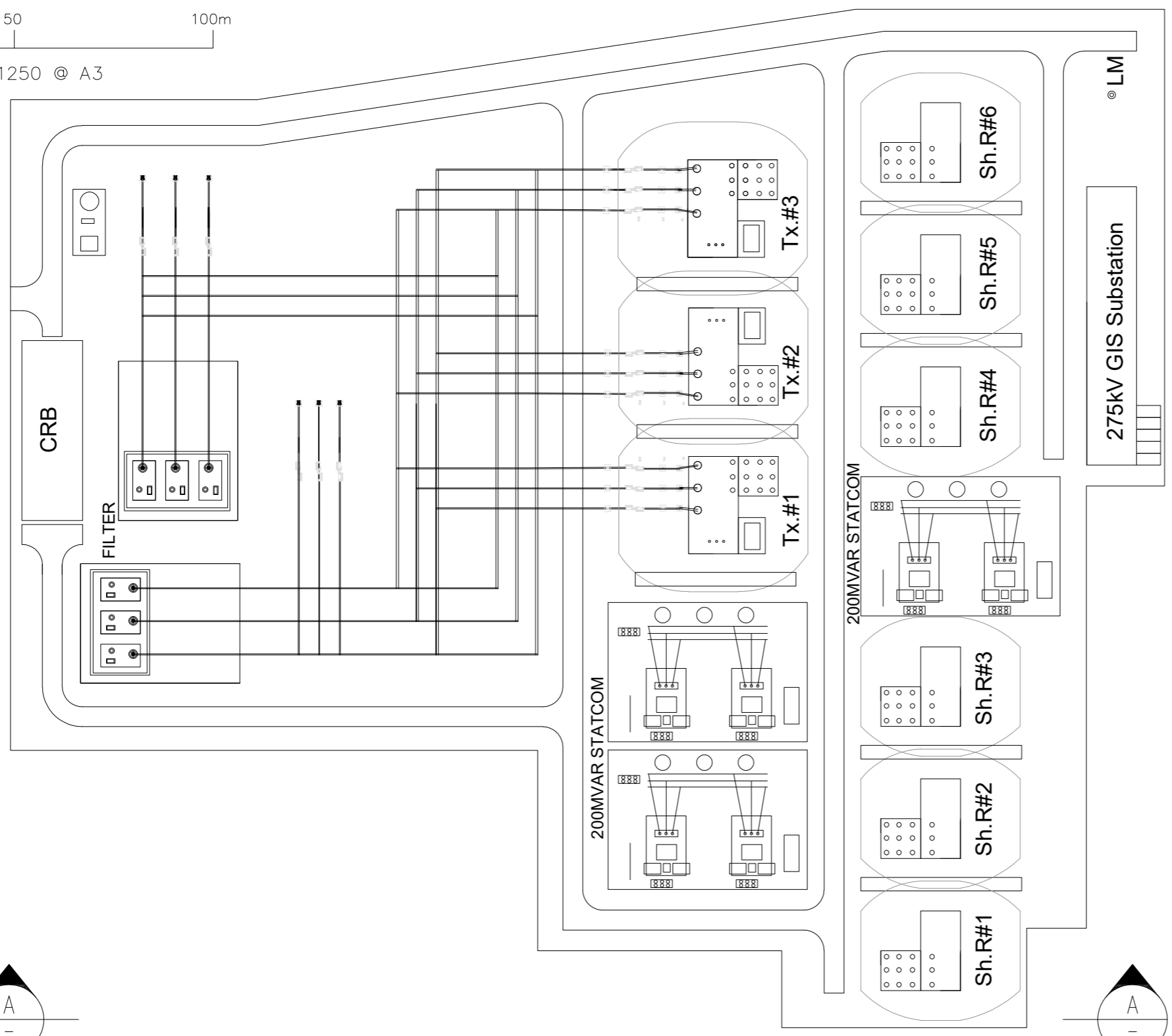
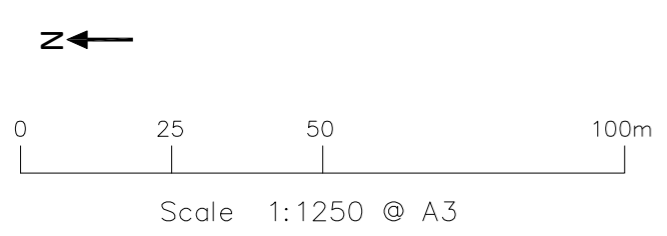
Rampion Extension Development Limited



Rampion 2 Offshore Wind Farm

**OAKENDENE SUBSTATION
INDICATIVE PROFILES
SHEET 1 of 2**

System Identifier: 42285-WOOD-ES-ON-DR-MD-0001				Version: 2.0
Company: WOOD	Drawn By: J.PARKER	Chk/Aprvd: S.NAGLE	Drawn Date: 20-Mar-23	Status: FOR USE

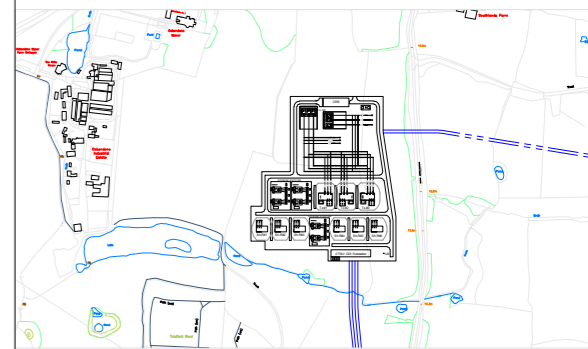


NOTES

1. LAYOUT IS INDICATIVE ONLY AND SUBJECT TO CHANGE FOLLOWING DETAIL DESIGN.
2. FOR SUBSTATION LEVELS SEE DRAWING 42285-WOOD-CO-ON-DR-MD-0001.
3. FOR DRAINAGE RELATED INFORMATION, PLEASE SEE REPORT 42285-WOOD-PE-ON-RP-MD-0014.
4. LAYOUT BASED ON GIS AND AIS FOR THE 275KV AND 400KV CONNECTIONS RESPECTIVELY.

DEFINITIONS

- AIS AIR INSULATED SUBSTATION
- CRB CONTROL ROOM BUILDING
- GIS GAS INSULATED SUBSTATION
- LM LIGHTNING MAST
- Sh.R SHUNT REACTOR
- Tx TRANSFORMER



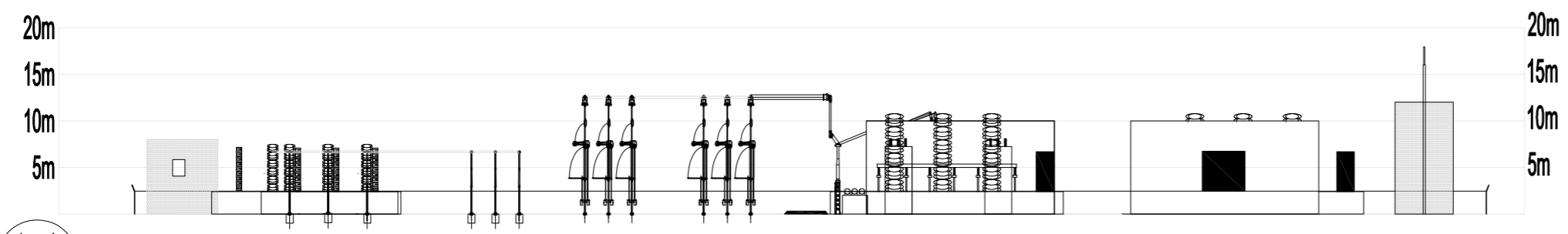
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Rampion Extension Development Limited



Rampion 2 Offshore Wind Farm

**OAKENDENE SUBSTATION
INDICATIVE PROFILES
SHEET 2 of 2**



SECTION A-A

System Identifier: 42285-WOOD-ES-ON-DR-MD-0001		Version: 2.0
Company: WOOD	Drawn By: J.PARKER	Chk/Aprvd: S.NAGLE Drawn Date: 20-Mar-23 Status: FOR USE

Appendix B

National Grid Bolney Substation Extension - Indicative Layout and Elevation

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NOTES

1. INDICATION OF PERMANENT AREA OF BOLNEY SUBSTATION FOOTPRINT EXTENSION, SUBJECT TO NGET DESIGN.
2. THE FENCED COMPOUND AREA FOR THE BOLNEY EXTENSION WILL NOT EXCEED 3,500 SQUARE METRES FOR THE GIS OPTION.

DEFINITIONS

GIS GAS INSULATED SUBSTATION



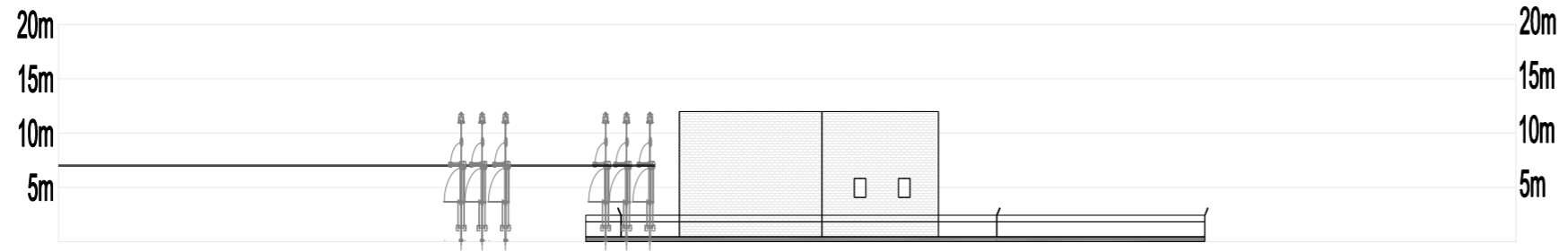
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Rampion Extension Development Limited

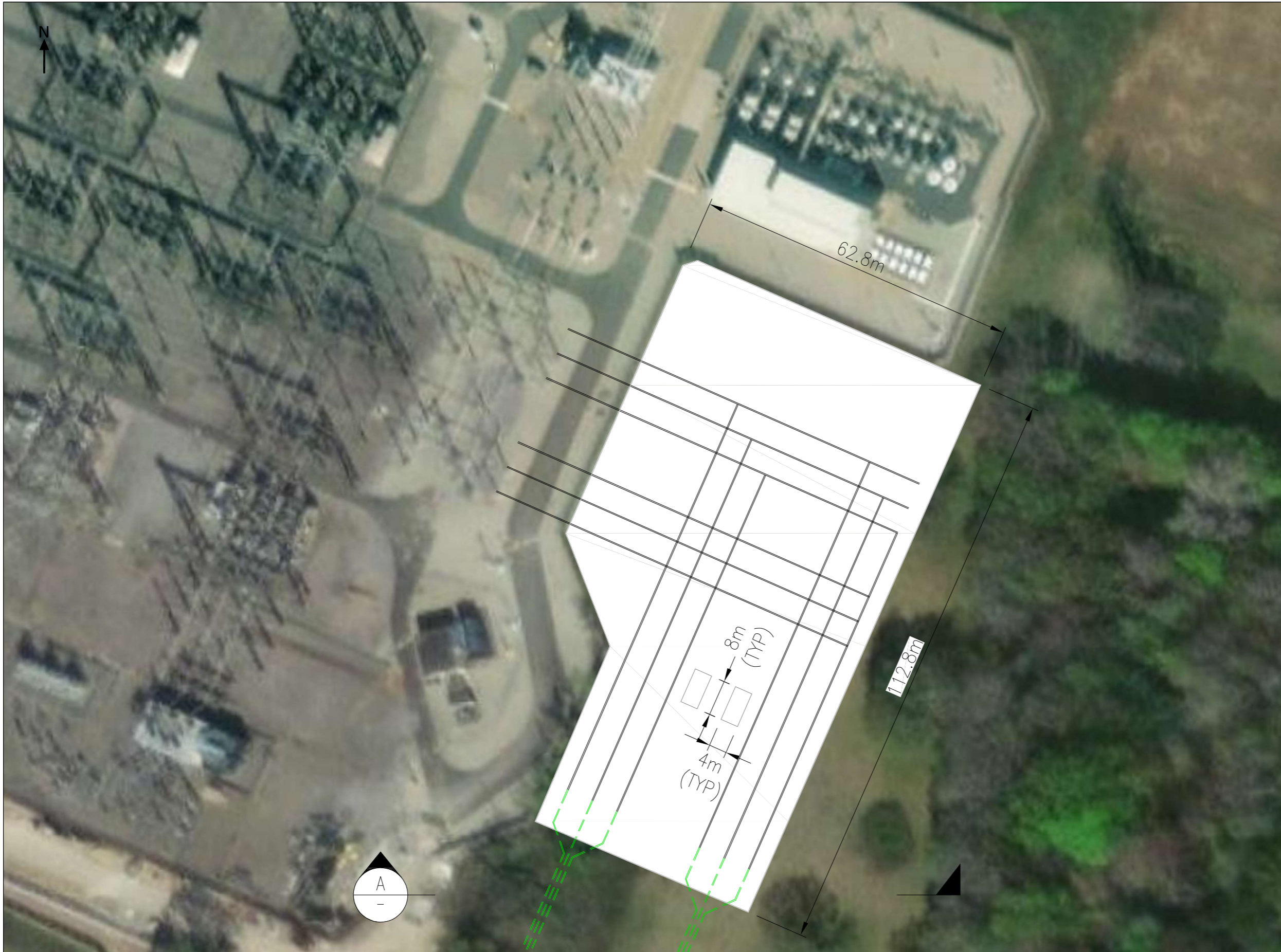


Rampion 2 Offshore Wind Farm

**BOLNEY SUBSTATION EXTENSION
GIS OPTION
SHEET 1 OF 2**



System Identifier: 42285-WOOD-ES-ON-DR-MD-0001-001				Version: 2.0
Company: WOOD	Drawn By: J.PARKER	Chk/Aprvd: S.NAGLE	Drawn Date: 26-July-23	Status: FOR USE



NOTES

1. INDICATION OF PERMANENT AREA OF BOLNEY SUBSTATION FOOTPRINT EXTENSION, SUBJECT TO NGET DESIGN.
2. THE FENCED COMPOUND AREA FOR THE BOLNEY EXTENSION WILL NOT EXCEED 6,300 SQUARE METRES FOR THE AIS OPTION.

DEFINITIONS

AIS AIR INSULATED SUBSTATION



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Rampion Extension Development Limited



Rampion 2 Offshore Wind Farm

**BOLNEY SUBSTATION EXTENSION
AIS OPTION
SHEET 2 OF 2**



0 25
HORIZ. SCALE

0 12.5
VERT. SCALE

SECTION A






System Identifier: 42285-WOOD-ES-ON-DR-MD-0001-002				Version: 2.0
Company: WOOD	Drawn By: J.PARKER	Chk/Aprvd: S.NAGLE	Drawn Date: 26-July-23	Status: FOR USE

Appendix C

National Grid Bolney Substation Extension – Indicative Landscape Plan – GIS and AIS Option

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-  Maximum extension works footprint (indicative Gas Insulated System layout)
-  Retained woodland/vegetation
-  Retained existing trees
-  New trees
-  Onshore cable route (indicative)



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Scale 1:4000 @ A3

Rampion 2 Offshore Wind Farm
 National Grid Bolney Substation
 Extension Works
 Indicative Landscape Plan: GIS Option
 Sheet 1 of 2

System Identifier: 42285-WSPE-CO-CC-FG-O-9080	Version: 1.1
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Company: WSP	Drawn By: S. VIAN	Chk/Aprvd: R. RYLO	Drawn Date: 16-06-23	Status: FINAL
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-  Maximum extension works footprint (indicative Air Insulated System layout)
-  Retained woodland/vegetation
-  Existing vegetation to be retained where possible, subject to detailed design
-  Retained existing trees
-  New trees
-  Onshore cable route (indicative)



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0 m 200 m

Scale 1:4000 @ A3

Rampion 2 Offshore Wind Farm
 National Grid Bolney Substation
 Extension Works
 Indicative Landscape Plan: AIS Option
 Sheet 2 of 2

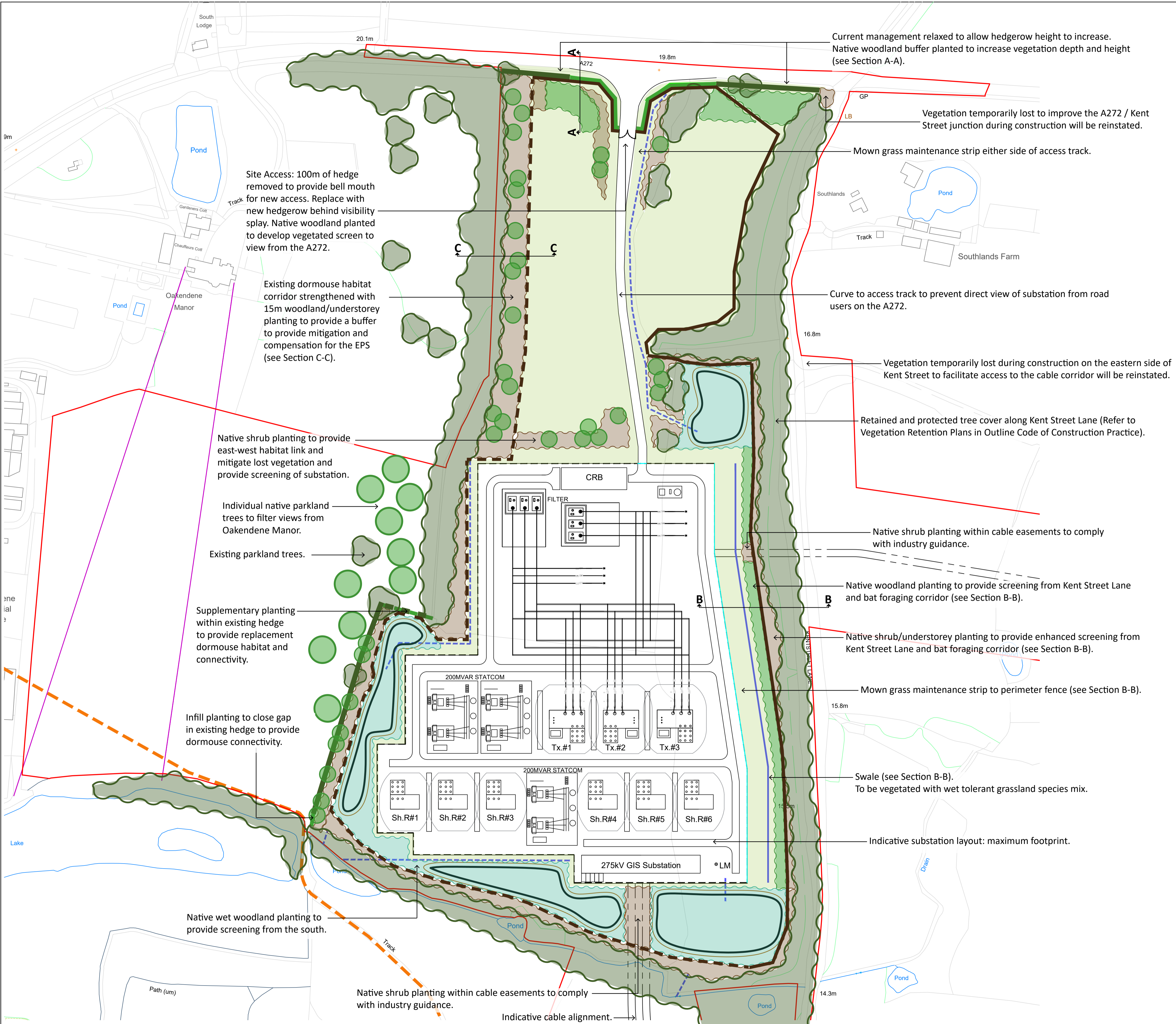
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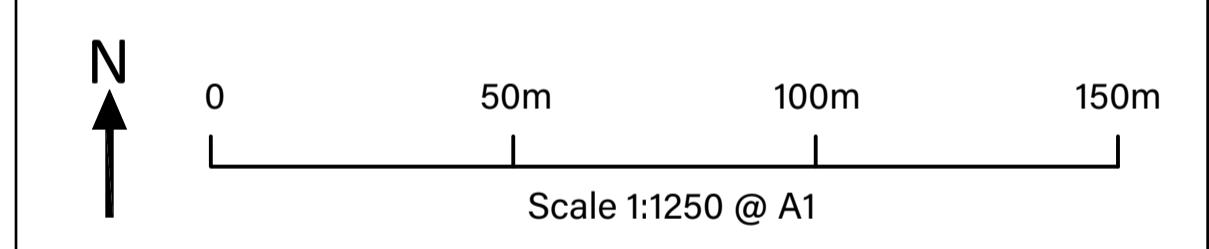
Appendix D

Oakendene Onshore Substation – Indicative Landscape Plan

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- Key**
- Existing parkland/standard trees retained
 - Existing intact hedgerow retained
 - Existing gappy hedgerow retained
 - Existing woodland/vegetation retained
 - Proposed parkland trees (provided as semi-mature trees)
 - Proposed standard trees (provided as a mix of extra heavy-light standards)
 - Proposed native species hedge
 - Proposed supplementary native species hedge planting within existing hedge
 - Proposed native woodland planting
 - Proposed wet woodland planting
 - Proposed native shrub/understorey planting
 - Grass/Maintenance Strip
 - Attenuation basin extent and 1m contour (Max. 1:3 slope)
 - Swale
 - Filter drain (1m width)
 - Temporary close boarded screen fence around perimeter of Site to north and east
 - Construction boundary fence (Heras or similar) around perimeter of Site to west and south
 - Retained view from Oakendene Manor
 - Onshore cable route (indicative)



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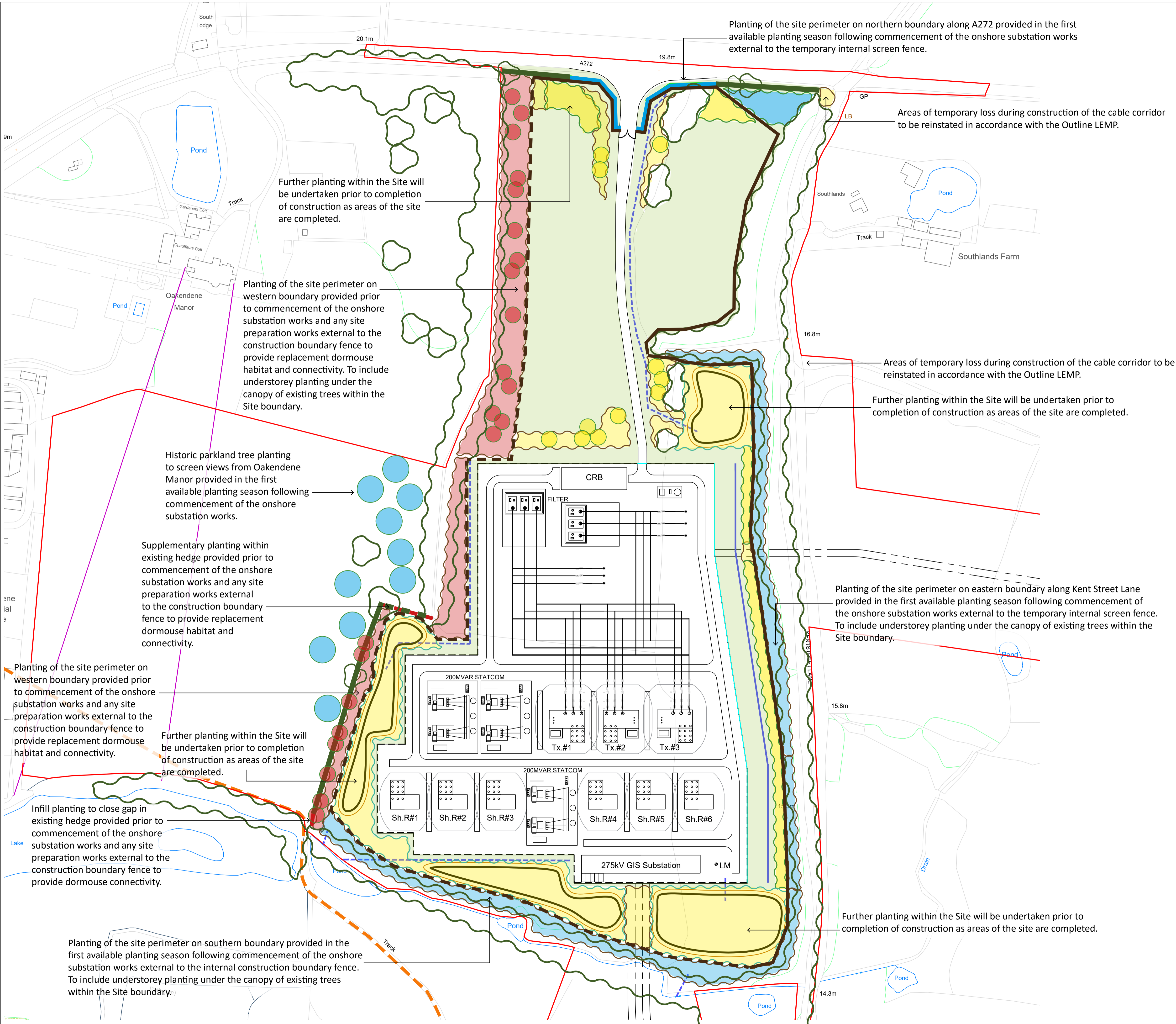
Rampion Extension Development Limited

Rampion 2 Offshore Wind Farm

OAKENDENE SUBSTATION INDICATIVE LANDSCAPE PLAN

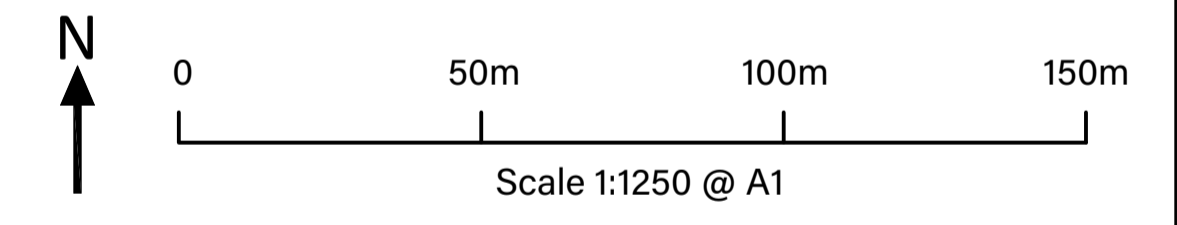
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Company: WSP	Drawn By: N.Bunn	Chk/Apvd: R.Ryloc	Drawn Date: 03/07/24	Status: FINAL
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Key to Phasing of Planting

- Pre-commencement of the onshore substation works and site preparation works.
- First available planting season following commencement of the onshore substation works.
- Prior to completion of construction as areas of the site are completed.
- Grass areas existing retained or re-seeded as required.
- Temporary close boarded screen fence around perimeter of Site to north and east.
- Construction boundary fence (Heras or similar) around perimeter of Site to west and south.



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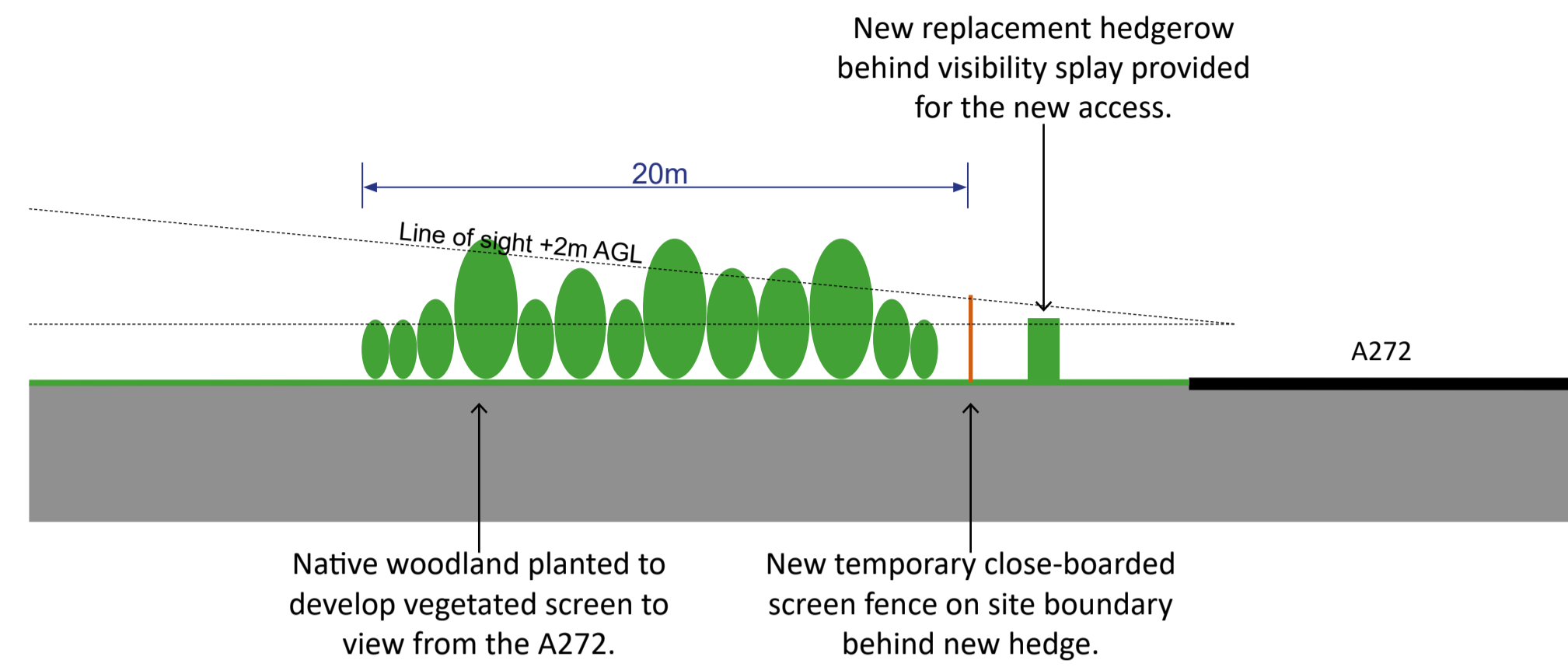
Rampion 2 Offshore Wind Farm

**OAKENDENE SUBSTATION
INDICATIVE PLANTING PHASING PLAN**

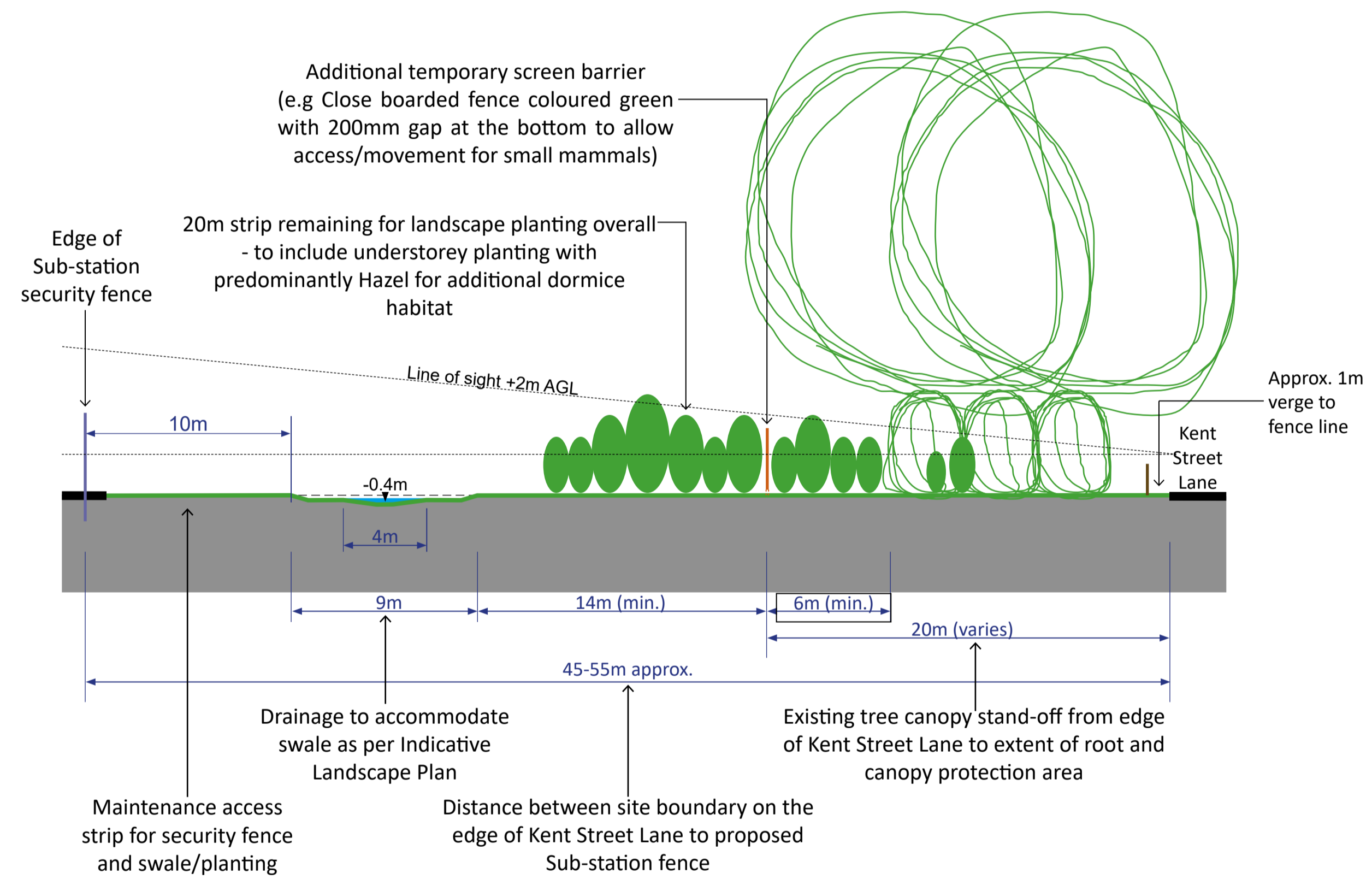
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Company: WSP	Drawn By: N.Bunn	Chk/Apvd R.Ryloc	Drawn Date: 03/07/24	Status: FINAL
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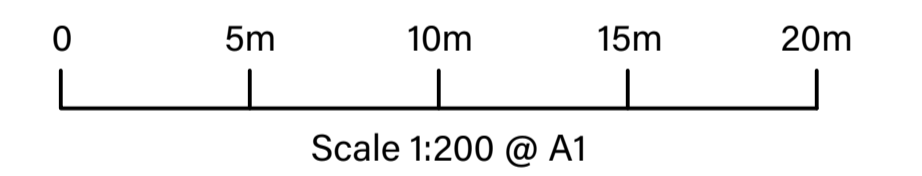
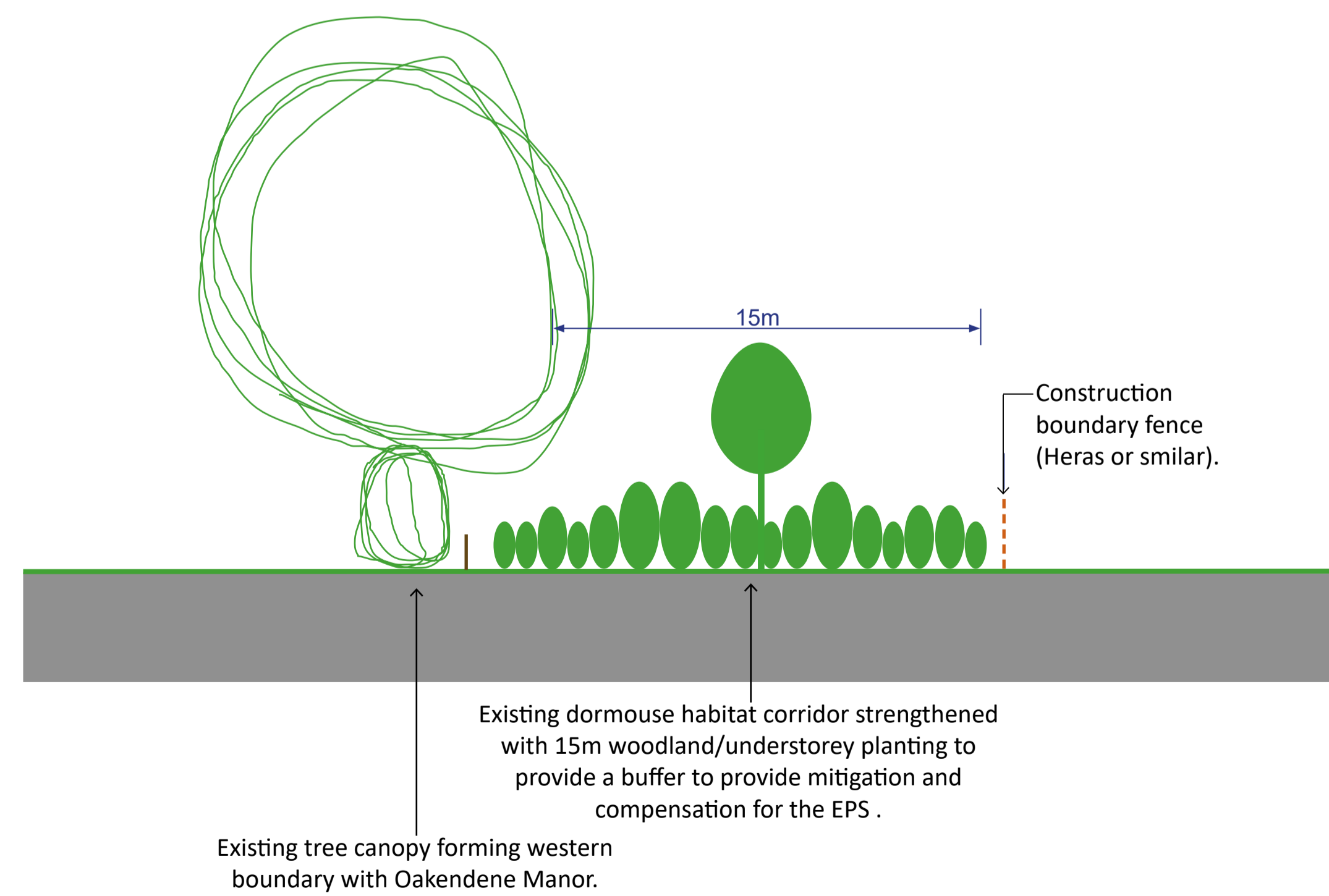
Northern boundary with A272 (A-A)



Eastern boundary with Kent Street Lane (C-C)



Western boundary with Oakendene Manor (C-C)



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Rampion Extension Development Limited



Rampion 2 Offshore Wind Farm

**OAKENDENE SUBSTATION
INDICATIVE LANDSCAPING SECTIONS**

System Identifier: 42285-WSPE-EX-ON-FG-OL-4762
Version: 0

Company: WSP	Drawn By: N.Bunn	Chk/Apvd: R.Ryloc	Drawn Date: 25/04/24	Status: FINAL
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