2. PROJECT DESCRIPTION

2.1 Introduction

This Chapter provides a description of the physical characteristics of the elements of the Project and the main construction and operational activities associated with it for the purpose of identifying and assessing potential environmental effects.

2.2 Project Need

An increase in applications by developers of renewable generation seeking connection to the SSEN Transmission network in the Argyll and Kintyre area is driving the requirement for further reinforcement to the network.

The volume of contracted generation has significantly increased since 2019, with approximately 612 MW signing connection offers since October 2019. Since then other developers have submitted connection applications, and a large volume of scoping generation has been identified by local stakeholder engagement events that were held in 2021. This significant increase in the generation background requires reinforcement of the network in order for SSEN Transmission to maintain compliance with the National Electricity Transmission System Security and Quality of Supply Standard (NETS SQSS).

The key drivers for the project are the connection of the Earraghail Windfarm and Tangy IV Windfarm, both due to connect in April 2027.

2.3 Location

The site for the Project is located in Argyll and Bute, west Scotland, at National Grid Reference (NGR) 196140 697498. The Project is located approximately 1.6 km north west of Minard and upslope of the existing Crarae substation. The Project is located wholly within the ABC Local Authority and would be accessed from the A83 using existing tracks to the current Crarae substation.

The location plan (**Figure 1.1**) shows the Proposed Development within the red line boundary, comprising of the substation platform along with additional land take to accommodate the ancillary works. This location plan also shows the route of the associated overhead line works required to tie in with the new substation, identified as the Associated Development.

The Project ranges in topography from 230 m Above Ordnance Datum (AOD) on a downward slope towards the north eastern boundary to 170 m AOD.

The Project, including the entire extent of the substation, is located within an area of mature coniferous plantation with a small area of marshy grassland in the west. There is open moorland further up the slope to the north. The Project is also surrounded by mountainous landscapes. The river ‘Abhainn Bheag and Tunns’ is adjacent to the north and west of the Project with many minor rivers that meander off the main river. Crarae Burn is also located approximately 175 m from the red line boundary.

Ancient woodland is located to the south and the east of the site boundary and there are no other statutory or non-statutory ecology, heritage or landscape designations within the Project. The Project is located 1.6 km west of a locally designated landscape, West Loch Fyne (Coast) Area of Panoramic Quality (APQ) and 4 km west of the East Loch Fyne (Coast) APQ. There are no ecological sites within 5 km designated for habitat, although Craignure mine SSSI is located approximately 4.2 km to the northeast of the Project. The nearest Listed Building and Scheduled Monument is located approximately 3 km south and 1.4 km south west respectively. The Crarae Inventory Garden and Designed Landscape is also located 1 km to the east of the Project.

The wider surrounding area is sparsely populated with the nearest residential receptor being Strone Farm, located approximately 450 m south east of the Project. Access to the Project would be via the A83, approximately 2.1 km south west of Minard coming onto an unnamed road, leading to the existing Crarae substation.

There are two Scottish Water Assets in the vicinity of the site entrance, namely a potential asset pipe and a hydrant. Consultation with Scottish Water regarding these assets is discussed in **Section 1.8.3.**

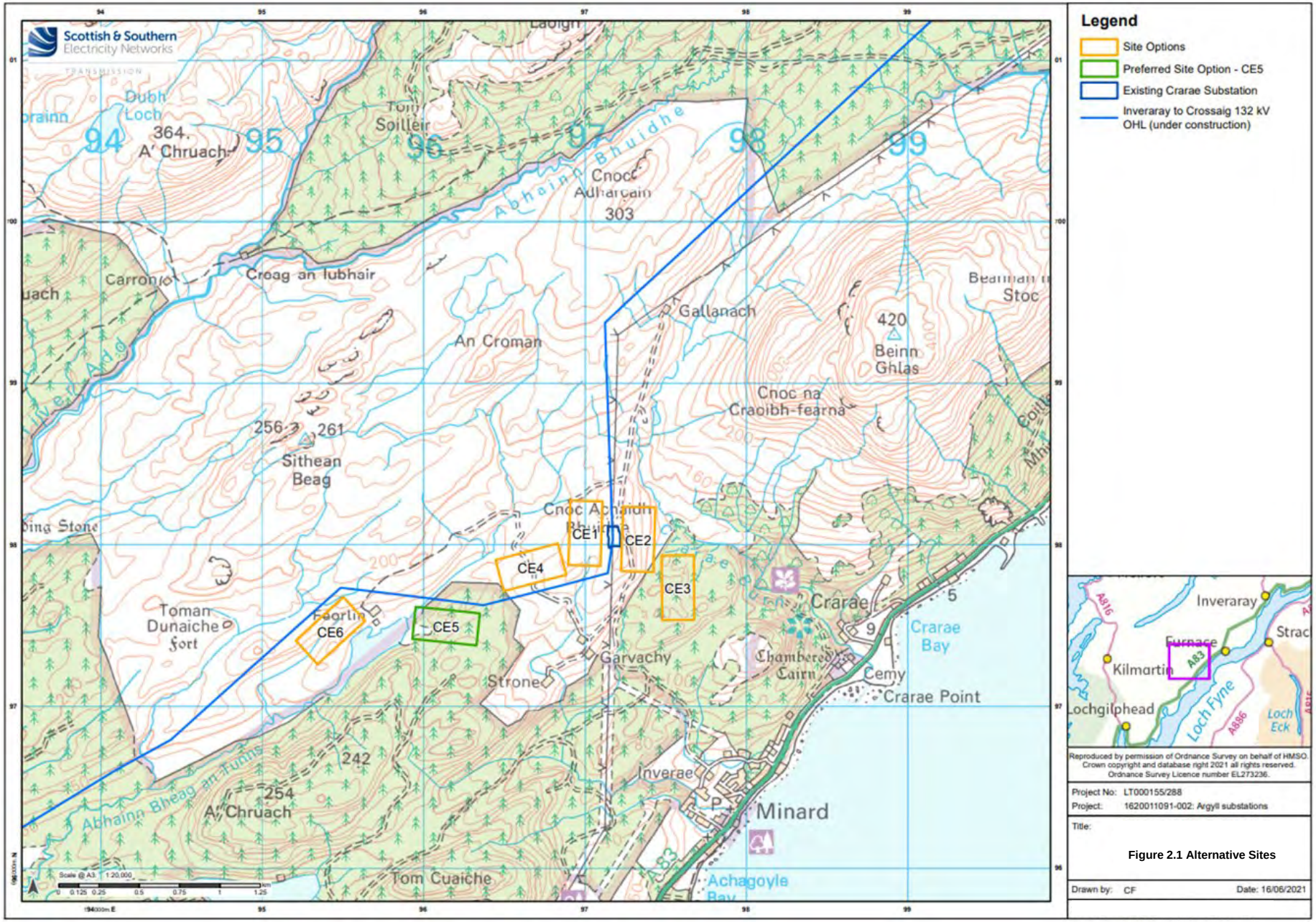
More detailed descriptions of the baseline environment associated with the Project are described in **Chapters 3 to 9** of this EA.

2.4 Alternatives

A total of six potential Site Options were identified, these are shown below in **Figure 2.1.**

Scottish & Southern Electricity Networks

TRANSMISSION



Project No: LT000155/288

Project: 1620011091-002: Argyll substations

Title:

Figure 2.1 Alternative Sites

Drawn by: CF Date: 16/06/2021

The selection of the preferred substation Site Option at Crarae was undertaken through an appraisal of operational, technical, health and safety, economic and environmental factors.

From an environmental perspective and based on the current information, Site Options CE4 and CE5 were originally preferred, on the basis that these sites have fewer environmental constraints and/or constraints could be easily mitigated in most circumstances.

Site Options CE1, CE2, CE3 and CE6 were less preferred overall.

CE5 was preferred site due to the fewer engineering and cost constraints when compared to CE4, which has the potential to be constrained by deep peat adjacent to the Proposed Development site and which represented an increased risk of constraints to geology, carbon footprint and unique hazards.

CE4 was also identified as having the potential to be impacted by operational noise due to the close proximity to nearby residential receptors.

The final location for the substation platform at CE5 has been moved slightly to the southeast. If the original location was to be pursued, the OHL suspension tower numbers 81 and 82 would have to be demolished and erected in a new position. This is because the angle from the new terminal tower would infringe the electrical clearances on these towers and there would be additional ground disturbance for the new foundations of two affected towers. The foundations on tower number 80 would also need reassessed as the angle of deviation would change, with the potential for further ground disturbance if upgrades were required. The current design being pursued negates the need for the repositioning of any towers, and also reduces the need for extensive cut and fill to create the platform level that would be required if the location of the substation platform remained in the originally planned location, which was partly on steeply sloping ground.

CE1 presented higher risks of both environmental and engineering constraints when compared to the preferred site (CE5). The main environmental constraint to CE1 was the blanket bog located on the Proposed Development site, representing a sensitive Annex 1 habitat. Similar to CE4, CE1 has the potential to be constrained by deep peat, which is located onsite, and which represents an increased risk. Like CE4, CE1 was also identified as being high risk from a noise perspective due to the close proximity to nearby residential receptors.

Site Option CE2 also presented higher risks to environmental and engineering constraints compared to CE5. As CE2 is located on a steep slope, extensive cut and fill would be required to form a flat substation platform. These earthworks and the presence of operational infrastructure would be visible from a wide area, particularly to the east of Loch Fyne, and therefore its influence represented a high risk of constraints on landscape character. Although peat has been identified within the Proposed Development site, the increased risk was due to the topography, leading to the requirement of cut and fill operations. The slopes were greater than 15% gradient representing a high risk of constraint from topography. CE2 was also identified as being high risk from a noise perspective due to the close proximity to nearby residential receptors.

Compared to CE5, Site Option CE3 presented a higher risk of environmental constraints due to cultural heritage, with the Proposed Development site being located within 300 m of the Crarae Gardens, designated as a Gardens and Designated Landscape (GDL). Significant adverse visual effects were assessed as being more likely on the setting of the Crarae Gardens GDL when viewed from the east side of Loch Fyne. CE3 also presented higher risks of constraints from an engineering perspective with increased risks of constraints to future development possibilities, and interface with the local electricity distribution network operated by SSEN Distribution. In order to maintain the generation connection, a new cable circuit would be required from the existing wind farm crossing the access road and traveling downhill to the CE3 platform area. A cable circuit would be a challenge for installation in areas with little or no cover over the underlying rock formations. In addition, in peat areas the cable rating would be compromised by the thermal properties of the peat.

Site Option CE6 also presents higher risks of constraints from environmental and engineering perspectives. Constraints due to hydrology were identified as a watercourse crosses through the centre of CE6 and drains in a

westerly direction into the catchments of the River Add and Abhainn Bheag an Tunns. There were also constraints on non-designated heritage assets in that there was the potential for significant indirect impacts on the setting of Allt na Dubhair fort (regional importance and medium sensitivity), as well as direct impacts on a number of heritage assets that lie within CE6 itself. Given the density of cultural heritage assets on site option CE6, it is considered that even micro-siting would be likely to have a direct adverse impact on one or more of these. Similar to CE3, CE6 represented an increased risk of engineering constraints from the current interface with the local electricity distribution network. The distance from Site Option CE6 to the existing 33 kV switchboard is prohibitive and would require a new 33 kV switchroom to be built.

2.5 The Project

The Project comprises of the construction of a new 275 kV electricity substation which will connect into the recently completed overhead line between Inveraray and Crossaig which is capable of operation at 275kV but at present is routed into the existing substation, so the overhead line requires to be realigned to connect into the new substation. The project will support the export of renewable energy from the Argyll area.

2.5.1 The Proposed Development

The layout of the Proposed Development is shown in **Figure 2.2** and building elevations on **Figure 2.3 and 2.4** and comprises the following:

- A substation platform in the region of 1.43 ha at a height of 173 AOD;
- Gas insulated Switchgear (GIS) substation building, maximum height 22 m and single storey control building annexe;
- 275/33 kV grid transformer (SGT), rated at 120 MVA located in a ventilated building of maximum height 16 m;
- Two gantries and electrical apparatus to connect the OHL and the proposed substation;
- A temporary works area (TWA) adjacent to the Proposed Development Site, of approximately 0.67 ha;
- Diesel generator;
- Borehole for water;
- Turning and parking areas;
- Use and upgrading of existing forestry access track, approximately 4.7 km in length;
- Construction of a new access track, approximately 350 m long;
- A 2.4 m high security fence of palisade construction around the substation platform perimeter; and
- Foul and surface water drainage including Sustainable Urban Drainage (SUDS) pond and outfall pipe.

In addition, tree felling is required as detailed in **Chapter 5: Forestry and Appendix J**.

Buildings will comprise steel portal frames with metal cladding and roof. There would be some un-housed electrical switchgear and plant located within the platform area.

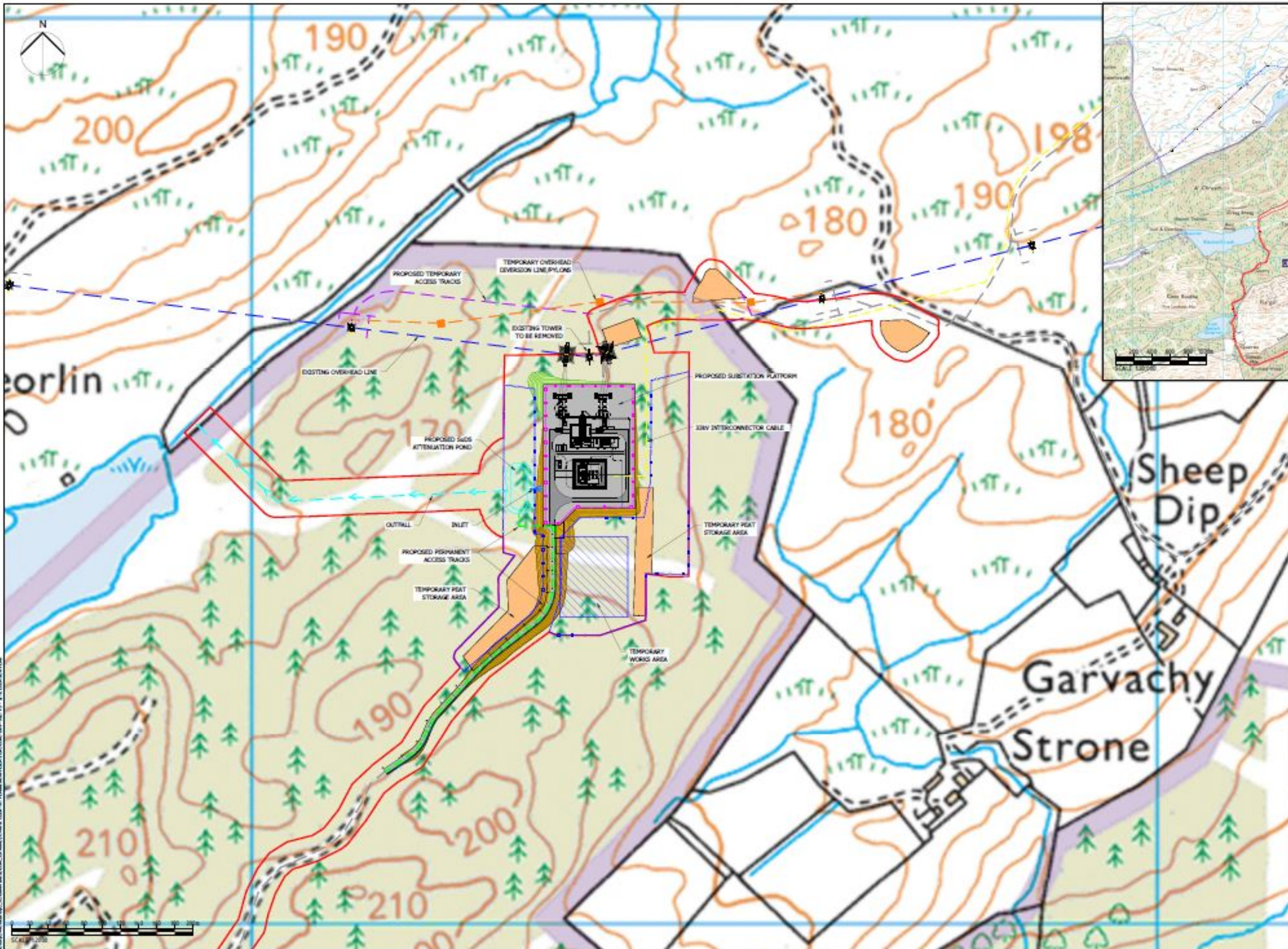
The substation would not be illuminated at night during normal operational activities. Flood lights would be installed but would only be used in the event of a fault during the hours of darkness; or during the over-run of planning works; or when sensor activated as security lighting for night-time access.

The main noise source within the substation during operation would be the single 120 MVA grid transformer. A noise assessment has been carried out to estimate the noise levels emitted from the Proposed Development and to understand the future operational impacts at noise sensitive receptors (NSRs) (see **Chapter 8 Noise Appraisal** and **Annex B**).

Small scale alterations to the existing FLS access track off the A83 may be required. Subject to survey, and to satisfy the requirements of ABC Roads Department, works may include widening of the existing bellmouth, increasing turning radii and improving visibility splays. Between the access point and the Proposed Development site, works may include widening at bends/road strengthening to accommodate the long and heavy construction vehicles. A Construction Traffic Management Plan will be submitted post application as part of the discharge of conditions along with a delivery and transport assessment (including swept path analysis and abnormal loads assessment).

To illustrate the appearance of the Proposed Development in situ, three visualisations have been produced at **Annex E**. Each visualisation includes a baseline photograph, terrain model view, and two visualisations, one on completion (including any proposed earthworks) and the other after 12 years (including any proposed earthworks and planting). The visualisations have been prepared in accordance with NatureScot visualisation guidance.

Within a GIS substation, live electrical equipment uses a dense gas as the insulating medium, usually Sulphur Hexa-Fluoride (SF6); however, SSEN Transmission are reviewing an alternative SF6 free technology solution in support of their commitments and responsibilities to the decarbonisation of the electricity network. GIS typically allows safe clearance distances between live conductors to be reduced. This results in a smaller footprint compared to the more traditional substations comprising Air Insulated Switchgear (AIS).



KEY

- SITE BOUNDARY
- PROPOSED SUBSTATION PLATFORM
- EXISTING ACCESS TRACK
- EXISTING OVERHEAD LINE
- PROPOSED PERMANENT ACCESS TRACKS
- PROPOSED PALISADE FENCING
- PROPOSED DEER FENCING
- PROPOSED AREAS OF CUT
- PROPOSED AREAS OF FILL
- TEMPORARY PEAT STORAGE AREA
- PROPOSED SuDS ATTENUATION POND
- INLET
- OUTFALL
- TEMPORARY WORKS AREA

PERMITTED DEVELOPMENT

- PROPOSED 33kV INTERCONNECTOR CABLE

APPLICATIONS UNDER S.37 OF THE ELECTRICITY ACT 1989

- TEMPORARY OVERHEAD DIVERSION LINE
- PROPOSED TEMPORARY ACCESS TRACKS

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Project Title: CRARAE SUBSTATION

Drawing Title: FIGURE 2.2 SITE LOCATION PLAN

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-	SR	RC	RC

Arcus Internal Project No.: 4534

Scale @ A1: AS SHOWN

Date: 11/11/22

Arcus Consultancy Services

Drawing Number: 4534c-DR-P-0017

Rev: 3

Rev	Revision Details	By	Check	Date

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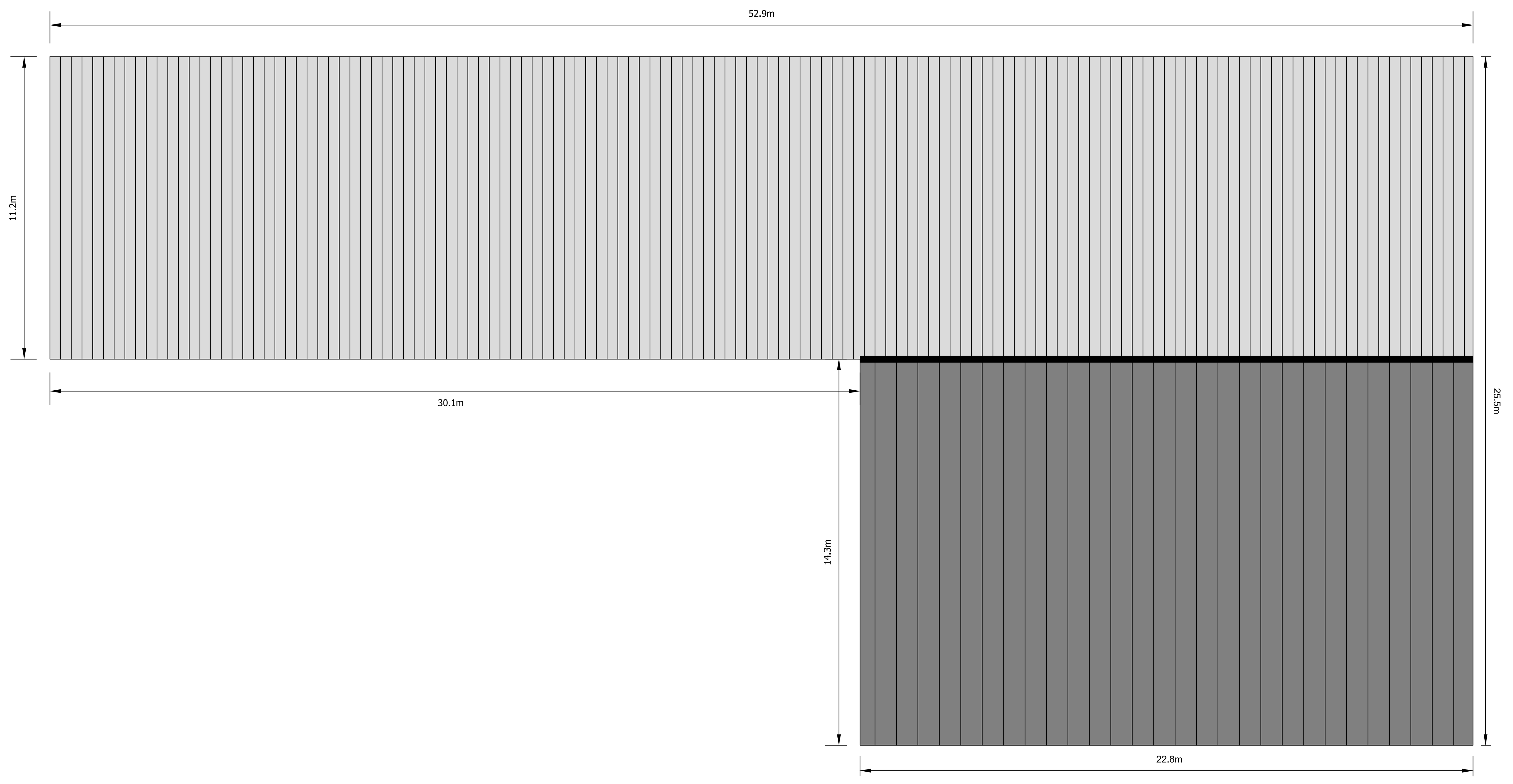
RAL 8008: OLIVE BROWN



ROOF PLAN

REAR ELEVATION

WEST ELEVATION

FRONT ELEVATION

EAST ELEVATION

0 1 2 3 4 5 6 7 8 9 10m
SCALE 1:100

Plot Date : 07/09/2022 10:07:14
File Name :Y:\CAD\4534 ARGYLL SUBSTATIONS\01-WORKING\01_01-DRAWINGS\...

Revision Details	By / Check	Date	Suffix

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Project Title: CRARAE SUBSTATION

Drawing Title: PLANNING FIGURE 004b SUBSTATION BUILDING ELEVATIONS

Designed	Drawn	Checked	Approved
-	SR	RC	DB

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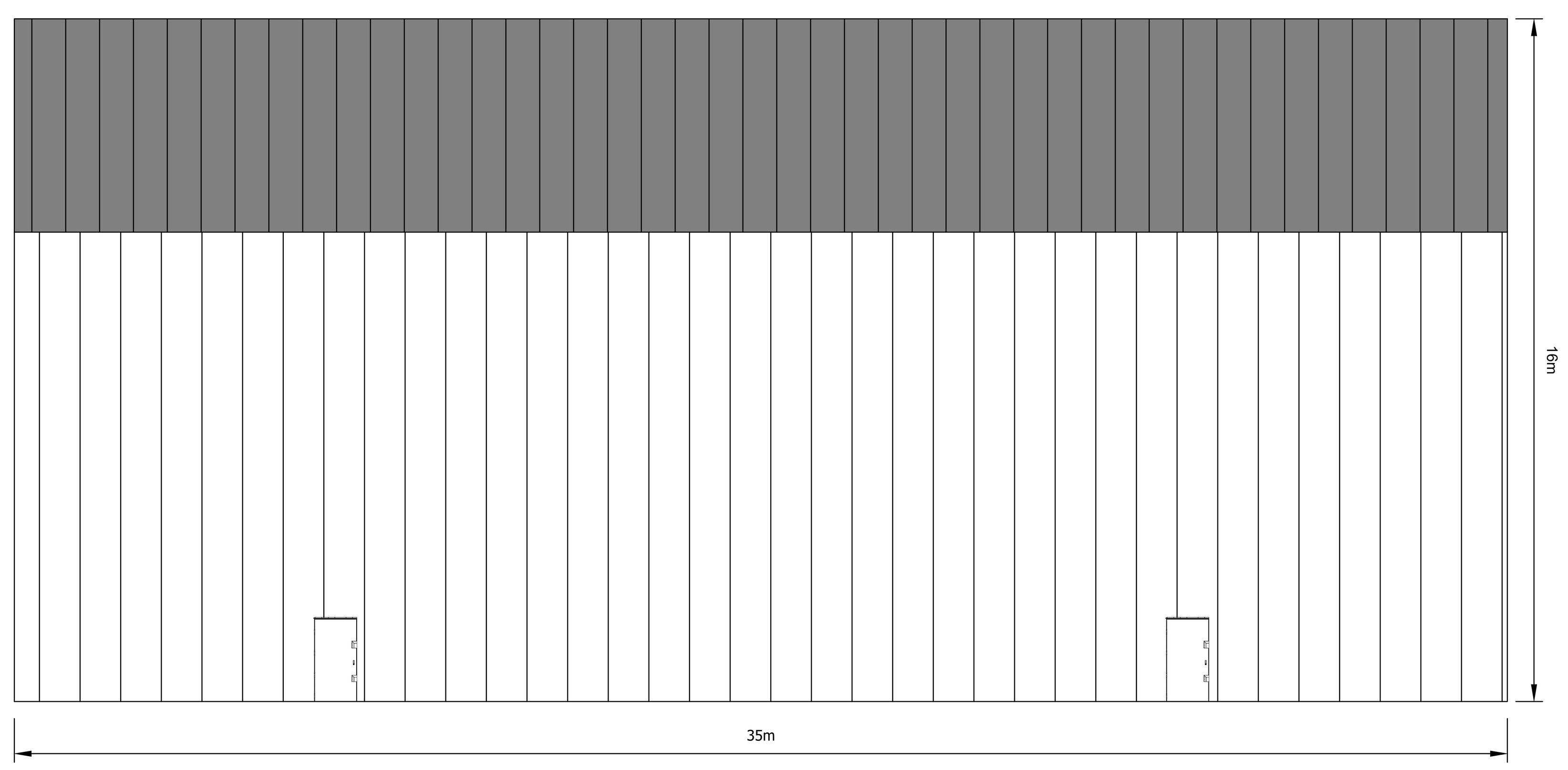
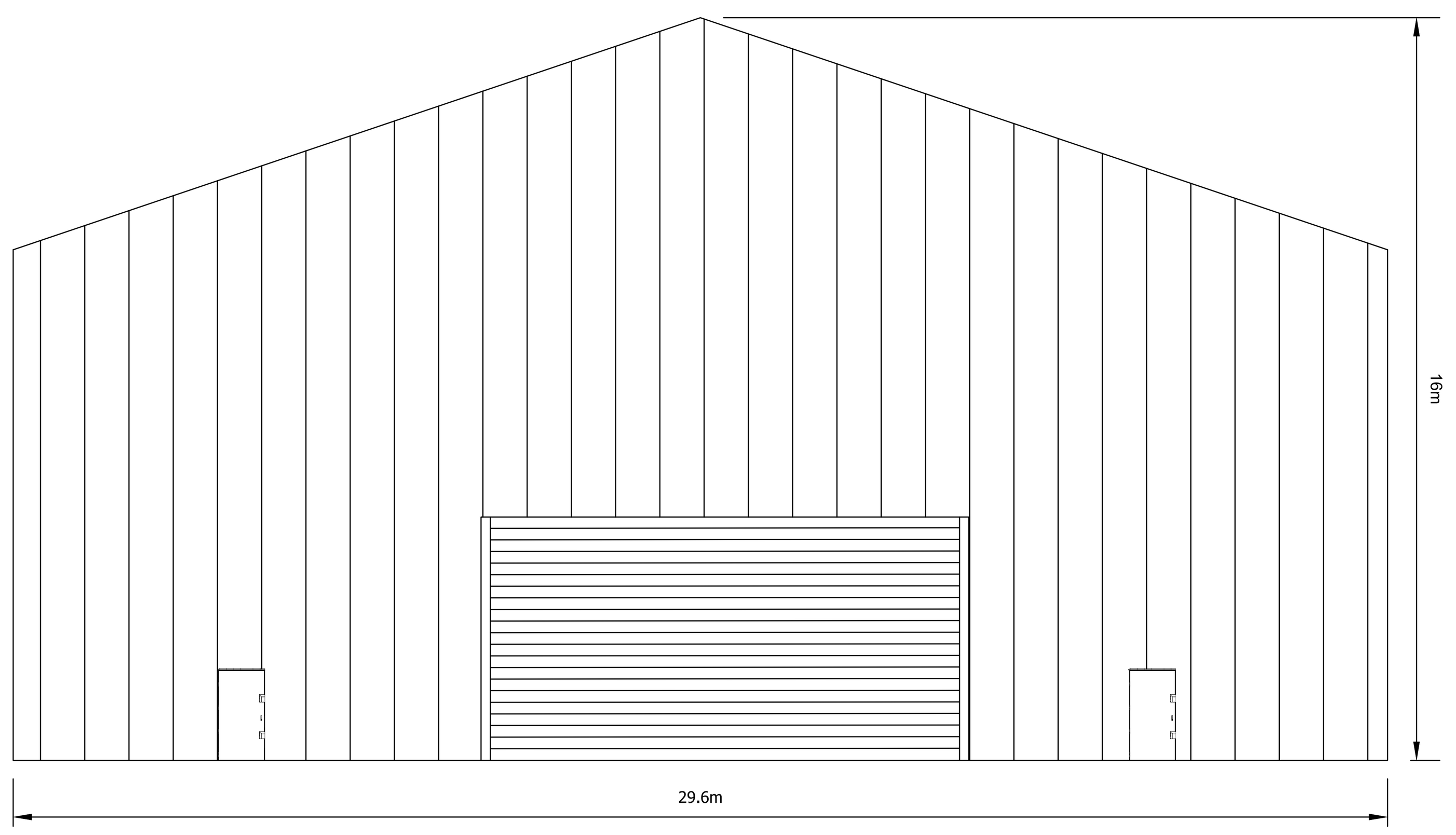
RAL 8008: OLIVE BROWN

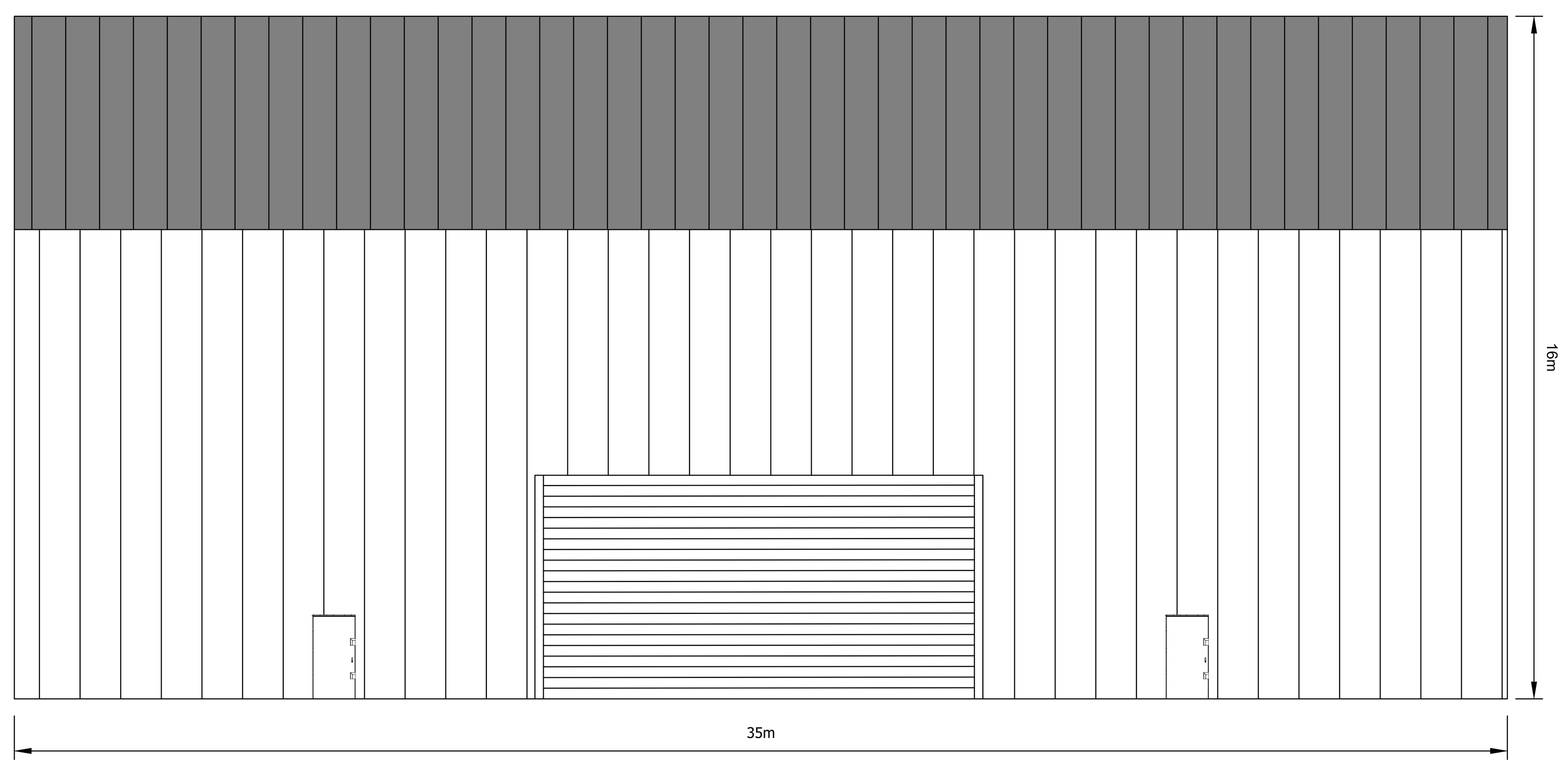
ROOF PLAN



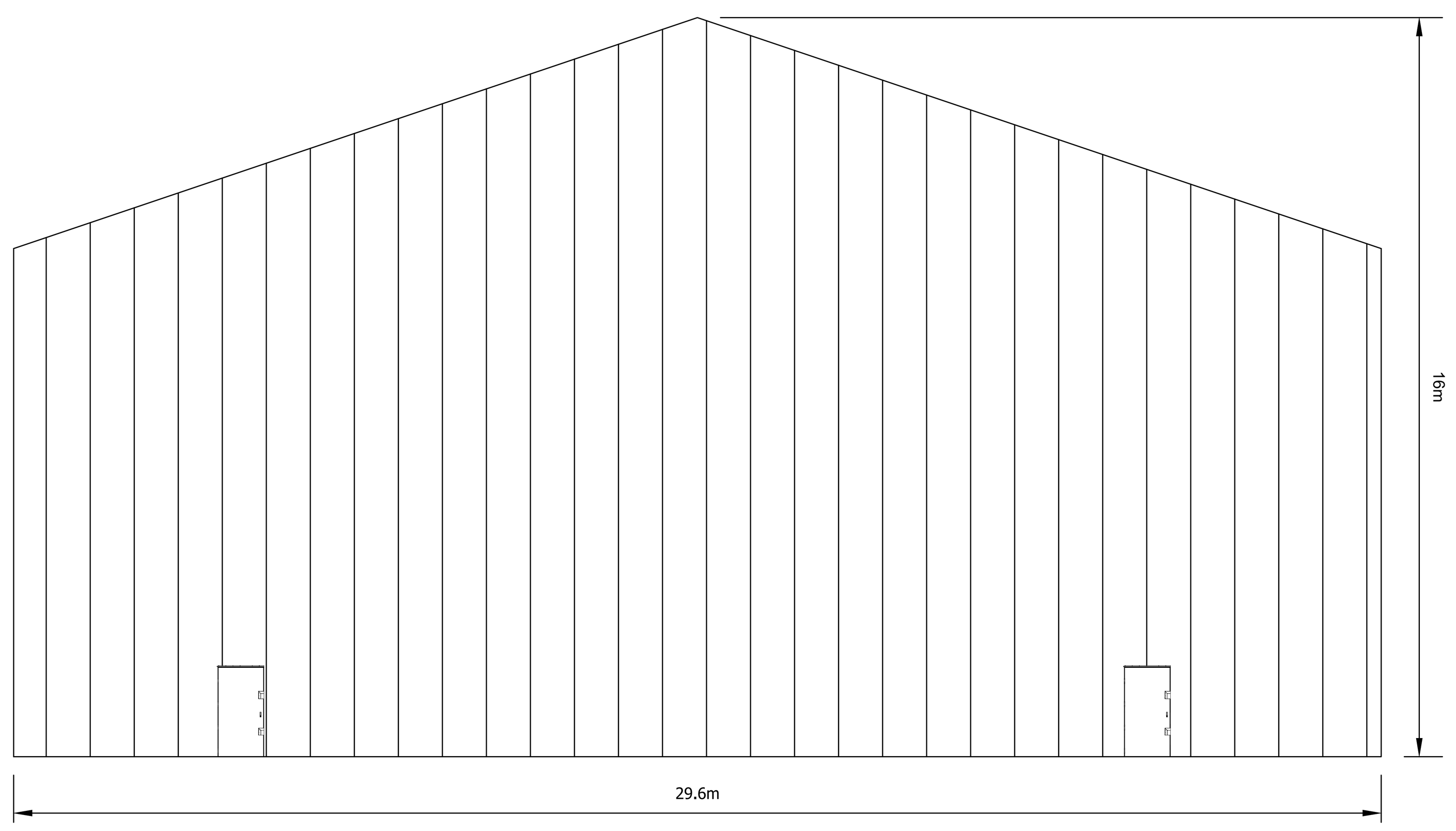
NORTH ELEVATION



WEST ELEVATION



SOUTH ELEVATION



EAST ELEVATION

0 1 2 3 4 5 6 7 8 9 10m

SCALE 1:100

Revision Details	By / Check	Date	Suffix

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Client: Scottish & Southern Electricity Networks TRANSMISSION

Project Title: CRARAE SUBSTATION

Drawing Title: PLANNING FIGURE 004d TRANSFORMER BUILDING ELEVATIONS

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Drawing Number: 4534c-DR-P-0019

Rev: 1

Plot Date : 25/10/2022 13:51:34

2.5.2 The Associated Development

The Associated Development comprises the construction of a new OHL section and associated towers in order to connect the Proposed Development to the recently constructed 132 kV OHL between Inveraray and Crossaig. This will replace the section of overhead line that currently connects into the existing 132kV substation.

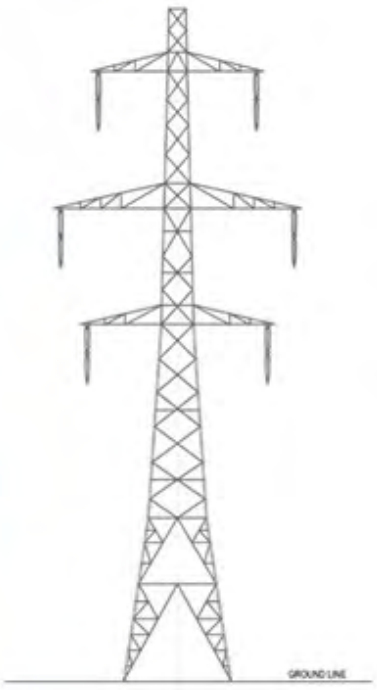
The Associated Development would comprise the following:

- Construction of two new terminal lattice steel towers to support the connection into the new 275 kV Crarae substation including new downlead terminations;
- Construction of one angle lattice steel tower to replace the existing terminal tower at the existing 132 kV Crarae substation including realignment of the OHL;
- Five temporary towers or masts and associated temporary OHL diversion to facilitate the build of the new towers to avoid long network outages;
- Approximately 622 m of temporary access tracks providing access to the existing Inveraray to Crossaig overhead line (OHL);
- Dismantling of one lattice steel tower located between the two new terminal towers at the new 275 kV Crarae substation.

The existing terminal tower at the existing 132 kV substation will also be removed however this is located within the existing ownership boundary.

In addition, the proposed 33 kV interconnector cable as seen in **Figure 1.1** would be undergrounded to facilitate a connection back to the windfarm generation owner and can be carried out under Permitted Development rights.

The transmission tower design is illustrated on **Figure 2**.5



Proposed L8 (c)
Tower Suite

Figure 2.5: Transmission Tower Design

The Proposed Alignment as shown in **Figure 1.1** has been determined based on the environmental assessments, engineering analysis and stakeholder consultation undertaken to date. Following the grant of consent, the investigation of sub-surface and geotechnical conditions at proposed tower locations would be undertaken and may result in the requirement for additional adjustments (micro siting) in the tower locations or tower heights.

The Associated Development will utilise the same access and temporary works area as the Proposed Development, however there will be additional tracks required from the Proposed Development to the tower locations for maintenance purposes.

The S37 application seeks consent for the construction and operation of the proposed OHL with a prescribed horizontal and vertical Limit of Deviation (LOD), to allow flexibility in the final siting of individual towers to reflect localised land, engineering, and environmental constraints:

- Horizontal LOD: Allows towers to be relocated up to 100 m either side of the proposed alignment. A 50 m LOD applies to proposed access tracks.
- Vertical LOD: It is possible that further engineering analysis at the detailed design stage might alter the proposed heights, and therefore would be subject to a vertical limit of deviation, provisionally up to 20% variation based on the tower schedule.

2.6 Construction Works Programme

The construction of the Project will follow the key stages identified below. There will be overlap between the civil construction work and electrical construction, with a total construction programme lasting approximately 30 months.

2.6.1 Phase 1: Enabling Works and Civils Construction

For the Proposed Development, this phase is anticipated to take up to 15 months, and is expected to comprise of the following:

- New permanent access tracks within the Proposed Development site, approximately 350 m in length, with a 5 m wide running surface. Works to widen the existing track may also be required to create a 5 m running surface and 10 m service corridor, however the exact locations of any upgrades will be calculated by the Principal Contractor;
- Temporary works drainage (clean and dirty water systems);
- An infiltration basin to receive all surface water runoff generated within the platform area (and runoff from the construction compound). The basin will be constructed during the construction phase and thus provide appropriate storage facility for surface water runoff during excavation and earth works (to capture and reduce suspended solids);
- A temporary works area containing storage, control building (office and welfare facilities) and septic tank to receive foul drainage from the compound. The exact specification of the septic tank will be confirmed once the contractor has been appointed. The septic tank will be emptied by a licensed contractor for off-site disposal at regular intervals dependent upon usage. Anticipated size is 18 m^3 giving an interval between emptying of 45 days;
- Cut and fill engineering works to form a level platform of 0.94 ha for the Crarae Substation infrastructure located at approximately 173 m AOD;
- Individual concrete foundation slabs situated within the finalised platform to support essential electrical components, and substation control building;
- Erection of a GIS building and transformer building of a steel portal frame design;

- Subsurface platform drainage in the form of suitably sized perforated pipes to drain runoff from internal hardstanding areas and incident rainfall landing on the permeable formations. Suitable gradients for pipe runs will be achieved within the total depth of the formalised platform layers; and
- Filter trench (or similar mechanisms) located parallel to the outside of the platform perimeter access track which will intercept runoff from the track and receive flow from the internal platform drainage before being routed towards the proposed Infiltration Basin via an open swale / pipe or similar.

For the Associated Development, this phase is anticipated to take up to 3 months, and is expected to comprise the installation of the following:

- Creation of level platforms at each tower location through processing of site won materials and import of commercial aggregates, as required;
- Concrete foundations/bases for new tower and electrical equipment; and
- Erection of temporary OHL diversion infrastructure, if required.

The Associated Development is situated within areas of commercial forestry and broadleaved woodland, and in these areas a clear operational corridor would be required. The width of the corridor would be variable depending on the nature of the woodland, with an average corridor of 80 m required (40 m either side of the tower centre line), subject to the Limits of Deviation mentioned previously. In addition, minor vegetation management and felling would be required around the existing access track network for the Project to provide sufficient width. Further detail is available in the **Annex J: Forestry Appraisal.**

Foundation types and designs for each tower would be confirmed following detailed geotechnical investigation at each tower position, although it is currently anticipated that most tower foundations are likely to be of a concrete pad and chimney type. Individual tower foundations and associated construction activities would require a working area of approximately 2500 m2 (50 m x 50 m) around each individual tower location. The exact dimensions of the working area around each tower would/will be confirmed following micrositing.

It should be noted that the Associated Development will utilise the same access track and temporary works area as the Proposed Development, however there will be additional tracks to be constructed to the tower locations for maintenance purposes.

2.6.2 Phase 2: Electrical Construction

This phase is anticipated to take 18 months for the Proposed Development and would comprise:

- Installation of electrical infrastructure; and
- Commissioning of the substation.

For the Associated Development, the following would take place during this phase:

- Existing OHL network diversion;
- Installation of electrical plant e.g., cable sealing ends and tower. Scaffolding will be required for cable jointing; and
- Removal of temporary OHL diversion.

2.6.3 Phase 3: Commissioning

The Project would be subject to an inspection and snagging process. This allows the Principal Contractor and SSEN Transmission to check that the works have been built to specification and are fit to energise. The Project would also go through a commissioning procedure for the switchgear, communications, and protection controls. The circuits would then be energised.

2.6.4 Phase 4: Reinstatement

Following commissioning of the Proposed Development, all temporary construction sites will be reinstated with the exception of an area to be retained for operational purposes. Reinstatement will form part of the contract obligations for the Principal Contractor and will include removal of buildings and materials from the construction compound and revegetation.

2.7 Description of Construction Works

2.7.1 Formation of Substation Platform

The Proposed Development slopes moderately to the north east, with the topography ranging from 230 m AOD in the south east of the Site to 170 m AOD in the north east. Cut and fill would be required to create a level substation platform. The proposed finished platform level would be at approximately 173 m AOD.

Peat probing surveys undertaken and updated in 2021 confirmed the Project is located on areas of peat ranging from 0 m deep to 6 m deep. Peat depths vary across the Project Site with 43.1 % of recorded depths being 1 m or less. However, given the presence of peat, and particularly deeper peat associated with the Associated Development, a Peat Management Plan (PMP) has been prepared and can be seen in **Annex O**.

Substation platforms will comprise a balanced cut and fill construction, which will use imported material where the excavated on-site material does not meet the requirements of the SSEN Transmission substation earthworks specification. The final cut and fill design would be based on a detailed ground investigation and site-specific topographic survey to be undertaken by a Principal Contractor once appointed.

2.7.2 Formation of Track

Access track work consists of constructing one permanent access track associated with the Proposed Development, construction of temporary access tracks for the Associated Development and the potential requirement to upgrade existing forestry tracks.

The new permanent access tracks will be constructed at the beginning of the construction period to enable use during the construction phase. The access tracks would be capable of accommodating the substation equipment deliveries, and other heavy plant and vehicles required for the construction, including cranes and concrete deliveries. All tracks would be constructed to good practice working methods[1,2,3,4,5], with watercourse crossings designed and constructed to comply with legislation set out in The Water Environment (Controlled Activities) (Scotland) Regulations 2011, as amended.

Given the new proposed track route is located on peat of varying depths, the following principles would be applied, which would be developed at the pre-construction stage based on the detailed site investigation work completed prior to construction commencing:

- In areas of shallow or no peat (0 m to 1 m), a ‘cut track’ design would be utilised, for which any vegetation, topsoil and peat would be stripped to expose a suitable foundation on which to build the track. Surplus excavated soil, together with any vegetation, would be used for landscaping and reinstatement work around the track shoulders following construction. The track would then be constructed by laying and compacting crushed rock to the level required using a combination of tracked excavators and vibratory compacting rollers. Road aggregate will either be sourced from site won “cut”

[1] Forestry Commission (2011). Forests and Water. UK Forestry Standard Guidelines. Forestry Commission, Edinburgh. i–iv + 1– pp.
[2] Scottish Natural Heritage (2015) Good Practice During Wind Farm Construction, A joint publication by Scottish Renewables, SNH, SEPA, Forestry Commission Scotland and Historic Scotland, 3rd Edition.
[3] CIRIA Publications 2006: Control of Water Pollution from Linear Construction Projects. Site Guide (C649)
[4] Scottish Natural Heritage (2013) Constructed Tracks in the Scottish Uplands, 2nd Edition
[5] Forestry Commission Scotland and Scottish Natural Heritage (2010) Floating Roads on Peat

material, on site borrow pits or from an off-site licensed quarry. The volume of aggregate required would be confirmed following detailed ground investigation.

- Where peat depth is greater than 1 m (See **Annex O** for information on peat depth on-site), a 'floating track' design would generally be used. This would incorporate geotextile material laid onto the surface at a width to suit the road width, which would greatly increase the resistance to prevent the tracks settling into the ground. A layer of crushed stone would then be laid on the geotextile to form the track, which produces a steep stone batter with the edges of the site track raised above the surface. Where ground conditions are found to be saturated, and potentially supporting ground water dependent ecosystems, the track construction would incorporate drainage measures to maintain groundwater flows and levels, such as using perforated pipes wrapped in free draining geotextile membrane incorporated into the floating track.

When upgrading the existing forestry track between the A83 and the new substation a sacrificial stone layer will be added to the existing road construction, where considered necessary. Road aggregate will either be sourced from site won "cut" material, on site borrow pits or from an off-site licensed quarry. The volume of rock aggregate required would be confirmed following detailed ground investigation.

2.7.3 Construction Compound/Facilities

A temporary works area (TWA) would be located on the Proposed Development site (as shown in **Figure 1.1**). The TWA would provide storage for materials and welfare facilities for both the Proposed Development and the Associated Development. The TWA would include storage cabins, waste disposal skips, toilet units with washing facilities, a changing / drying room, a mess cabin, a parking area and a small storage area.

2.7.4 Tower Foundations

Different approaches to forming foundations may be used, subject to ground conditions at each tower location. These would/are likely to comprise:

- spread type e.g., concrete pad and chimney;
- rock anchor; or
- piled type e.g., driven concrete, tube, and micro pile; or augered.

Foundation types and designs for each tower would be confirmed following detailed geotechnical investigation at each tower position, although it is currently anticipated that most tower foundations are likely to be of a concrete pad and chimney type.

Dimensions of each foundation would be confirmed following micrositing. For the purposes of this assessment however it has been assumed that each foundation would be buried to depths estimated up to 2.5 m below ground level (bgl) although extending up to 4 m depth where ground conditions require. They would extend over an area suitable to deliver the loading characteristics required (which would be a function of the underlying ground conditions and the weight of the structures to be supported). Piled foundations may be required where low strength ground conditions exist, particularly where peat is encountered at over 1 m depth.

For the purposes of the EA it has been assumed that individual tower foundations and associated construction activities would require a working area of approximately 2,500 m^2 (50 m x 50 m) around each individual tower location. The exact dimensions of the working area around each tower would/will be confirmed following micrositing.

Where encountered, topsoil (including peat) would be stripped from the tower working area to allow installation of tower erection pad(s) as necessary to accommodate construction plant as per the Soil Management GEMP provided in **Annex A**. Concrete will be brought to site ready-mixed with no requirement for concrete batching at individual tower locations. Once the concrete has been cast and set, the excavation would be backfilled, using the

original excavated material where possible. The Working with Concrete GEMP provided in **Annex A** will inform concrete works.

It is anticipated that formation of each tower foundation would take approximately four weeks.

2.7.5 OHL Construction

Tower construction can commence two weeks after the foundations have been cast, subject to weather conditions and concrete curing rates. Tower steelwork would be delivered to each tower construction site either as individual steel members or as prefabricated panels, depending on the method of installation and the available access.

Each tower would be assembled on site into panels by a team of up to eight people. The lower tower panels may be erected using a telehandler, but upper panels would normally be erected into position using an all-terrain crane. Where access is not available for a crane, a derrick would be used. Most towers would be assembled within about five days each and erected by crane in one to two days depending on weather conditions and tower type. Large angle or terminal towers, or towers within restricted sites may take longer.

2.7.6 Conductor Stringing

The conductor would be delivered to site on wooden drums in pre-determined pulling section lengths. Typical drum lengths for conductors are up to a maximum 2,400 m (approximate weight of 4 tonnes) but would depend on the specific length of section to be strung.

Prior to stringing the conductors, temporary protection measures, (e.g. netted scaffolds) would be erected across public roads and existing access tracks.

Conductor stringing equipment including winches, tensioners and ancillary equipment would be set out at either end of pre-selected sections of the OHL. Pilot wires would be pulled through the section to be strung. These would be hung in blocks (wheels) at each suspension tower in the section and connected to a winch and tensioner at the respective end of the section. The winch, in conjunction with the tensioner would be used to pull the pilot wires which would be connected to the conductor at the tensioner end. The conductor would be pulled via the pilot wires through the section and under controlled tension to avoid contact with the ground and any under-running obstacles including protection scaffolds. Once the conductor has been strung between the ends of the section it would then be tensioned to provide the necessary sag and then permanently clamped at each tower.

Dependent on terrain or site constraints pilot wires can be pulled through either with the use of all-terrain vehicles, tractors, or helicopters.

2.7.7 Construction and Contracting Strategy

The Project would be constructed by an experienced construction contractor with a proven track record working on similar projects in accordance with UK and international standards in respect of quality, health, safety and environmental management.

The contract to construct the Project would be a design and build contract based on the pre-consent designs included in this EA. This procedure allows the final design to take account of any consent conditions. It also allows the contractor to adapt design and construction proposals to address specific issues relating to actual ground conditions and limitations found onsite, as well as allowing for advances in technology and construction methodology.

2.7.8 Construction Employment

The number of construction workers employed on-site would vary throughout the different phases of construction works. Employment of construction staff will be the responsibility of the Principal Contractor but SSEN Transmission encourages the Principal Contractor to make use of suitable labour and resources from areas local to the location of the works. There will be multiple contractors working on sites across Argyll and so it will be difficult to give an accurate figure with regard to the number of workers that will be required per site. The peak

number of workers is likely to occur during the final phase of civil engineering works and commencement of the electrical equipment installation where these phases overlap.

2.7.9 Hours of Work

Construction activities would in general be undertaken during daytime periods. This would involve work between approximately 07:00 to 19:00 on weekdays and 07:00 to 18:00 on Saturdays. Construction works will only take place during these agreed hours and in planning the works, contractors will look to minimise the impact of construction noise on neighbours and the public. There may be times that construction works require to take place outwith these agreed hours due to time critical activities - this would only be done with the prior agreement of ABC. Works outwith of daylight hours requiring illumination would be undertaken in accordance with relevant guidance to avoid light spill.

The Principal Contractor will develop a construction noise management plan as part of the Construction Environmental Management Plan (CEMP).

2.7.10 Construction Traffic and Plant

Access to the Project during construction and operation would be via the A83 and existing forestry access tracks.

It is anticipated that Heavy Goods Vehicles (HGVs) and Light Goods Vehicles (LGVs) will access the Project Site on a daily basis throughout the duration of the construction period to deliver materials and construction plant such as excavators, dump trucks, cranes and deliveries of machinery and scaffolding. All materials would be delivered to the construction compound. The transformers will be delivered by a small number of abnormal indivisible loads.

Further details of the anticipated volume and type of construction traffic are provided within **Chapter 9: Transport Appraisal**. A Traffic Management Plan (TMP) will be developed by SSEN Transmission, which will be agreed with the ABC Roads team in advance of construction, as part of the CEMP. The CEMP will include traffic management measures to ensure that the Project will not have an unacceptable impact on the public road network or nearby road users.

It is unlikely that construction lighting would be required during summer months. Should lighting be required in the winter, these would either be mobile of fixed temporary lighting. Any lighting would be located and directed to avoid impacts to sensitive receptors.

2.8 Construction Environmental Management

The Applicant adopts a consistent approach to the construction of all developments. It is standard practice that, following receipt of approval for development, a Construction and Environmental Management Plan (CEMP) is prepared by the Applicant's Principal Contractor. This would be provided as part of a condition to any planning consent. The key objective of the CEMP is to ensure that commitments to mitigate environmental impacts that may arise during construction are delivered. Compliance with the CEMP will be required as part of the Principal Contractor's contract terms.

The CEMP will include the following General Environmental Management Plans (GEMPs):

- Oil Storage and Refuelling
- Soil Management
- Working in or Near Water
- Working in sensitive habitats
- Working with concrete
- Watercourse crossings
- Waste Management
- Contaminated Land
- Private Water Supplies

- Forestry
- Dust Management
- Biosecurity (on land)
- Restoration
- Bad weather

The CEMP will also include development-specific plans developed by the Applicant, including Species Protection Plans (SPPs), as well as the Stage 1 Peat Management Plan prepared in accordance with the requirements of the 'Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste', Scottish Renewables and SEPA, Version 1, January 2012. Outline Species Protection Plans (bird, bat, red squirrel, otter, pine marten, badger, wildcat) are provided in **Annex H** and the outline PMP is provided in **Annex O** of this EA. The PMP sets out the general principles for the management and re-use of excavated peat.

A Construction Site Licence would be required and obtained in accordance with the Controlled Activity Regulations (CAR) from SEPA prior to any construction works commencing on-site. The Licence would specify the control measures that would be used at the Project Site to safeguard the water environment.

2.8.1 Forestry

The Project is located within a region of felled plantation forest; however, some felling will be required to remove immature trees which have recolonised the area, as well as any remaining mature trees. Further details of the long-term effect of the Project on forestry and woodland are provided in **Annex J: Forestry Appraisal**. It is possible that some localised felling and pruning will be required along the existing access road. This will be confirmed by the principal contractor and will be subject to mitigation identified in this EA.

2.8.2 Surface Water Drainage Proposals

It is proposed that the impermeable areas within the Development will be connected to an attenuation pond to the north west of the Site via a piped filter drain system. The pond will enable surface water to be intercepted in accordance with existing topography and flow routes from west to east at the location of the Development. For further information on surface water drainage see **Annex K: Drainage Strategy and Drainage Plans**.

2.8.3 Watercourse Crossings

Possible watercourse crossing upgrades, including the upgrade to the existing culverted watercourse, may be required on the access track from the public road during the construction of the Project. As above, watercourse crossings would be designed and constructed to comply with legislation set out in The Water Environment (Controlled Activities) (Scotland) Regulations 2011, as amended. These measures would be carried out in line with the Water Construction Management Plan (WCEMP), as outlined in **Annex N**.

2.8.4 Private Water Supplies

A PWSRA has been undertaken for the Project. The PWSRA identified all PWS within a 2 km radius of the Project and confirms the location of source water supplies. **Annex M** informs the risk assessment of the effects of the Project on the private water supply, source water and associated distribution infrastructure. Where new access tracks or upgrades to existing tracks are required, within 100 m of supplies, mitigation measures are proposed. Potential effects and mitigation measures are discussed in detail within **Chapter 6: Hydrology, Hydrogeology and Geology Appraisal** and associated technical appendices.

2.9 Operational Phase

2.9.1 Life of the Project

It is anticipated that the Proposed Development will be operational for 45 years.

2.9.2 Operational Activities and Employment

The Proposed Development would not be staffed on a full-time basis. Operations would be controlled remotely from the network operation centre in Perth. Maintenance activities would be managed from the Applicant's Highlands and Islands depot in Inverness.

2.9.3 Operation and Maintenance Programme

Once operational, it is likely that monthly site visits would be made by maintenance personnel to undertake routine checks and operational switching. More specialist works, such as maintenance repairs or environmental management, may be subcontracted to specialists as required.

Planned maintenance is completed approximately once every four to six years on each circuit. This work would last for approximately one week. During this time up to four or five LGV site vehicles may access the Project Site per day and this may include a small crane. Further limited maintenance would be required for the Associated Development.

The O&M manual would ensure an environmental management / maintenance programme is in place to prevent any adverse impacts on the environment during operation and will confirm the frequency of maintenance visits etc.

Measures to be included in the O&M manual would include (but not be limited to) the following:

- Inspection / maintenance of site infrastructure including bunds, oil / water interceptor and SUDS facilities;
- Inspection / maintenance of oil filled / Non SF6 insulated electrical equipment; and
- Landscape maintenance.

The O&M manual would be developed by the Applicant and Principal Contractor for handover to the SSEN Transmission O&M team.

2.9.4 Waste Management

During operation, it is anticipated that very small volumes of waste would be produced. Waste generation would be limited to waste-water from maintenance only arising in the control building from visiting contractors, and from routine maintenance activities. Waste generated during routine operations and maintenance would not be stored on-site and would be removed at the time by SSEN Transmission staff/contractors, under the appropriate waste carrier's licence.

2.9.5 Emissions to Air / Land / Water

Emissions to water would be limited to rainwater run-off and discharge from the foul sewage treatment system. Foul sewage and rainwater run-off will be managed in accordance with the drainage management system.

Routine emissions to land and air are not anticipated.

2.9.6 Operational Noise

Noise emissions generated by the Proposed Development would originate primarily from transformers in the form of low-frequency tonal noise in the range of 63 Hz to 2k Hz. There would be limited noise generated from the Associated Development once operational.

2.9.7 Substation Lighting

Lighting would be restricted to times when the Project Site is being accessed after dark. A complete floodlighting scheme would be designed to achieve a maintained average of 6 lux illumination throughout the HV substation compound. The maintained minimum point illumination would be 2.5 lux.

2.9.8 Electrical and Magnetic Fields (EMFs)

The UK Health Protection Agency (HPA) is the government body responsible for policy and guidance on Electric and Magnetic Fields (EMF)[6]. Exposure guidelines have been developed by the International Commission on Non-Ionising Radiation Protection (ICNIRP) to ensure protection of human health in different situations, occupational exposure and public exposure, which have been adopted by the HPA for application in the UK.

Whilst substation equipment is known to generate EMFs, these have been observed to drop away to background levels quickly with distance from source. In addition, EMF generated by substation infrastructure has been consistently recorded to be lower than that associated with incoming/outgoing overhead line or underground cables associated with the substation[7].

All EMF generating infrastructure is located at least 100 m from the site boundary. It is therefore anticipated that EMF would be at, or close to background levels at the site boundary. No significant EMF emissions are therefore expected and the Project will adhere to the relevant regulations and guidance for EMF limits.

2.10 Decommissioning Phase

Should the Project be decommissioned the site would be restored as follows:

- The substation infrastructure would be removed;
- Where removal of the infrastructure such as substation foundations would result in more damage than leaving them in place, they would be left in-situ; and
- Disturbed ground would be reinstated.

Full details of the decommissioning plan would be agreed with the appropriate authorities and the landowners prior to any decommissioning works commencing.

[6] Health Protection Agency. URL: http://www.hpa.org.uk/Topics/Radiation/UnderstandingRadiation/UnderstandingRadiationTopics/ElectromagneticFields/ElectricAndMagneticFields/ExposureGuidelinesForElectricAndMagneticFields/

[7] http://www.emfs.info/Sources+of+EMFs/Substations/National+Grid+substations/