

Hurlie 400 kV Substation

Design & Access Statement

April 2025

Prepared for **Scottish and Southern Electricity Networks Transmission**

1. Introduction

- 1.1 This Design and Access Statement (DAS) has been prepared to support a planning application by Scottish Hydro Electric Transmission plc ("the Applicant"), operating and known as Scottish and Southern Electricity Networks Transmission ("SSEN Transmission") for planning permission to install and operate a new 400 kV substation at Hurlie in Fetteresso Forest in Aberdeenshire, with associated earthworks, the formation of platforms, landscaping, means of access, means of enclosure, site drainage, and temporary construction compounds ("the Proposed Development"). The area proposed for the construction and operation of the Proposed Development is here on referred to as "the Site".
- 1.2 In July 2022, National Grid, the Electricity System Operator (ESO), published the Pathway to 2030 Holistic Network Design (HND), setting out the blueprint for the onshore and offshore electricity transmission network infrastructure required to enable the forecasted growth in renewable electricity across Great Britain, including the UK and Scottish Government's 2030 offshore wind targets of 50 GW and 11 GW respectively.
- 1.3 The extensive studies completed to inform the ESO's Pathway to 2030 HND confirmed the requirement to increase the power transfer capacity of the onshore corridor from Kintore to Tealing. This requires a new 400 kV connection between these locations to enable the significant power transfer capability needed to take power from onshore and large scale offshore renewable generation which is proposed to connect at onshore locations on the East Coast of Scotland and transport it to areas of demand.
- 1.4 To achieve this, SSEN Transmission is proposing a new 400 kV overhead transmission line (OHL) between Kintore and Tealing. This new connection also requires two new 400 kV substations to be constructed near Tealing in Angus and in Fetteresso Forest in Aberdeenshire to enable future connections and export routes to areas of demand. In addition, two of the existing 275kV OHLs from the existing substation at Tealing, and Alyth and Westfield substations require to be upgraded to 400kV and connected to the new 400kV substation near Tealing. Additional short 275kV connections between the new 400kV and existing Tealing substation are also required. Planning applications under the Town and Country Planning (Scotland) Act 1997 are being submitted in respect of both substation applications, while consent is being sought for the new and upgraded OHL developments via applications under the Electricity Act 1989.
- 1.5 Submission of a DAS is required of all major and national planning applications, as set out in Regulation 13 of Town and Country Planning (Development Management Procedure) (Scotland) Regulations 2013. The application is submitted with an Environmental Impact Assessment Report, reference to which is made in this DAS.
- 1.6 This DAS explains and illustrates the principles and concepts which have determined the design and layout of the Proposed Development, taking account of specific site and locational circumstances.

2. The Site and Site Selection

Site Location and Setting

- 2.1 The Site is located near the existing Fetteresso 275 kV Substation, southwest of Stonehaven in Aberdeenshire. The Site comprises an area of relatively elevated land which lies within the eastern extent of the Highland Boundary Fault, a major fault zone which runs from Arran on the west coast to Stonehaven in the east. The Site is afforested and comprises a conifer plantation forming part of an active commercial enterprise. The Site is dominated by two bluffs with a steep valley between them containing the upper reaches of the Burn of Day. The bluffs have relatively level upper elevations, where the Proposed Development will be sited, however to the west the landform rises steeply. To the east and south-east the elevation drops sharply with the landform shaped by the Burn of Day and Burn of Baulks. There is little built infrastructure in the wider environment with exception of the existing Fetteresso Substation.

Site Selection

- 2.2 A detailed, two-stage site selection process was undertaken to determine the location of Hurlie 400kV substation, following the Applicant's internal guidance.
- 2.3 At Stage 1, the objective is to identify and compare technically feasible, economically viable and environmentally acceptable candidate site options within a defined area of search. Stage 2 seeks to identify, from the candidate site options considered at Stage 1, the least constrained site, which avoids where possible, physical, environmental and amenity constraints, is likely to be acceptable to stakeholders and which is economically viable taking account of the engineering and connection requirements.
- 2.4 Ultimately, sites need to be developable in technical terms and able to receive consent from an environmental, planning, and economic development policy perspective, taking into account national and local environmental and planning regulations and legislation. Securing ownership of land is a fundamental part of the process.
- 2.5 The objective of the site selection process is:
- "To facilitate the design, consenting and operation of new substations in a manner that is technical, feasible and financially viable which causing, on balance, the least disturbance during construction and operation to the environment and the people who live, work and use it for recreation."*
- 2.6 For stage 1, 14 sites were initially identified as being suitable for development within 5 km of the Fiddes grid connection point. Following site visits by the SSSEN Transmission project team, iterations of four original site options were subsequently included as part of the assessment. These 14 candidate site options were assessed in a second workshop where 11 of the 14 sites were discounted.
- 2.7 The remaining three sites were taken forward for further appraisal in Stage 2:
- > Site 5A - located adjacent to Upper Pitforthie Farm on relatively flat terrain, comprising open arable farmland. The site includes a single wind turbine which will have to be removed to accommodate the new substation.
 - > Site 5B - located north of Nether Craighill on relatively flat terrain, comprising open arable farmland. The site includes a single wind turbine which will have to be removed to accommodate the new substation.
 - > Site 8B - located north of Gobbs Farm on terrain rising to the west towards Upper Craighill and the site of a Scheduled Monument at Hillhead. The land-use broadly comprised open arable farmland crossed by some minor drains.

- 2.8 The site selection process was extended as a result of the initial requirement to accommodate an offshore grid connection being complicated by subsequent analysis determining that the offshore technology needed will comprise HVDC, thereby increasing the site size requirement. A further 23 candidate sites (in addition to the initial sites described and assessed above) were identified based on the extent of unobstructed or usable land, absence of nearby properties and settlements, topography, and absence of existing infrastructure.
- 2.9 Based on an initial assessment appraisal of site size, proximity to properties, presence of existing infrastructure and connection opportunities to existing and new OHL infrastructure, 14 candidate sites were discounted. Further assessment saw the suitable number of sites reduced to five, and then three, and then two, following consideration of landscape and visual impacts, proximity to watercourses, and close proximity to areas of prime agricultural land.
- 2.10 These final two sites, Banff Hill, and land at Fetteresso Forest (Hurlie), were taken forward for further assessment. Ultimately, from an environmental, engineering and cost perspective, it was concluded that Hurlie was the preferred option. Hurlie was deemed preferable with respect to impacts on cultural heritage, landscape, including the proximity to residential properties, and the absence of prime agricultural land within the Site.

Stakeholder Engagement and Pre-application Consultation

- 2.11 SSEN Transmission undertook public consultation on the overhead line corridors and routes and substation locations for the Kintore to Tealing 400 kV overhead transmission line (OHL), in May 2023, as well as direct engagement with statutory and non-statutory consultees, community councils, elected representatives, and landowners and occupiers.
- Public events were undertaken at the following dates and locations:
- > 2 May at Milne Hall, Kirkton of Skene, 2-7pm
 - > 3 May at Ardoe House Hotel in the Ogston Suite, 2-7pm
 - > 4 May at Dickson Hall, Laurencekirk, 2-7pm
 - > 9 May at Brechin City Hall, Brechin, 2-7pm
 - > 10 May at Westmuir Hall, Kirriemuir, 2-7pm
 - > 11 May at Tealing Village Hall, Tealing, 2-7pm
 - > A virtual consultation event took place on 17 May, 4-6pm
- 2.12 Supporting this consultation was an initial consultation document published in June 2023, detailing key project elements, the site selection process to date, and key questions for feedback. The consultation period was extended to allow stakeholders and members of the community more time to share their views on the initial proposals. The final Report on Consultation was issued in December 2023.
- 2.13 Formal Pre-Application Consultation (PAC) for the Proposed Development was initiated by the submission of a Proposal of Application Notice (PAN) on 31 January 2024, which was followed by extensive publicity of events and preparation of consultation materials. An additional period of public consultation commenced in February 2024, with the first PAC event held on 19th March at Drumlithie Village Hall, 2-7pm. Events were also held at Stonehaven Bowling Club on 11th March 2024 and Auchenblae Village Hall on 21st March. Stakeholders and members of the public were invited to provide feedback online or to complete a feedback form.
- 2.14 The second round of PAC consultation took place in June 2024, with face to face consultations taking place on:
- > Monday 10 June, 2-7pm at Auchenblae Village Hall, Auchenblae, AB30 1XQ

- > Tuesday 11 June, 2-7pm at Drumlithie Village Hall, Drumlithie, AB39 3YT
- > Thursday 13 June, 2-7pm at Stonehaven Town Hall, Stonehaven, AB39 2BU

2.15 The consultation feedback for the Hurlie 400kV substation project closed on the 23rd July 2024.

3. The Proposed Development

3.1 In summary, the Proposed Development comprises the construction and operation of a new 400 kV air insulated substation located on a level platform and the formation of associated earthworks, access, drainage, landscaping, security, and the creation of a temporary construction compound and set-down, equipment and material storage areas.

3.2 Site development will principally involve cut and fill earthworks to create a level platform of approximate dimensions 685 m x 300 m along a north-west orientation in the centre of the Site, to accommodate the electrical infrastructure. The platform has been located to maximise the degree of screening provided by the existing landform, which will be increased by cutting the platform into the higher ground to the west. Landscape planting around the platform will screen the electrical infrastructure. Access will be provided by upgrades and extensions to the existing forestry roads.

400 kV Substation Equipment and Technical Requirements

3.3 This comprises of the following:

- > Large, levelled platform area, sized approximately 685 m x 300 m.
- > 400 kV Control Building.
- > Switchgear Building.
- > 2 x Synchronous Condenser Buildings.
- > Solar Plant Plot.
- > 3 x Bus Couplers.
- > 2 x Bus Sections.
- > 2 x Feeder Bays to connect Kintore (OHL Connection).
- > 2 x Feeder Bays to connect Emmock (OHL Connection).
- > 2 x Feeder Bays for the SW_E3 Cluaran Deas Ear (Cable Connection).
- > 12 xn Future Feeder Bays for Future Connections.
- > 1 x mechanical switching capacitor (MSCDN).
- > 2 x 400 kV Synchronous Condenser.
- > 2 x 400kV Synchronous Compensation Transformers to change the voltage from one part of the network to another.
- > Support structures to construct, mount, and secure equipment.
- > 4 x Gantries Steel structures to receive and support OHL connections.
- > A switchgear.
- > Instrument transformers.

- 4.4 Key design principles and objectives followed in the design evolution of the Proposed Development included:
- > Optimise the development 'footprint' within the Site to limit the area required for development, to minimise visual impact in the wider landscape and to utilise existing topography afforded by landform.
 - > Minimise the disturbance or displacement of protected species.
 - > Utilise existing access and minimise need for land take with regard to reducing potential disturbance on natural and human environment.
 - > Minimise traffic required during construction.
 - > Minimise the potential impact on nearby sensitive human receptors during construction and operation.
 - > Propose appropriate architectural form, colour and materials.
 - > Maximise available land for additional planting and mounding to improve screening and provide habitat and biodiversity enhancement.
 - > Take advantage of, and minimise, changes to the existing ground form and levels.

Sensitive Receptors

- 4.5 The layout and design of the Proposed Development has examined the potential impacts on sensitive receptors and features within the surrounding environment. This information has been embedded into the iterative design process to minimise the potential for permanent effects on the sensitive receptors. Potential sensitive receptors within the study area are those where physical or perceptual effects may result as a consequence of the Proposed Development. These receptors can be defined from the following measures:
- > Physical Features:
 - Perceptible physical features (e.g. topographic features; woodland, hedgerows, field enclosure) which could be lost or altered through the introduction of the Proposed Development.
 - > Landscape:
 - Landscape Character Types (LCTs) which display both physical and perceptual characteristics which could be affected by the Proposed Development.
 - Designated Landscape Areas: Areas of landscape which are principally designated for their scenic quality or rarity and considered of particularly increased value. Often defined by a number of key characteristics and/or special qualities informed by the underlying character of the landscape, consideration is given to how these may be affected and how the designated area may be altered by the Proposed Development.
 - > Ecology:
 - Direct and indirect effects during construction and operation on protected and notable species as a result of loss or fragmentation of habitats, specifically pine marten, red squirrel, water vole, mountain hare, brown hare, hedgehog amphibians and reptiles this could be via lighting, noise, pollution or visual disturbance.
 - > Noise impact on residential receptors during construction and operation of the Proposed Development. Residential Noise Sensitive receptors (NSRs) are deemed to be representative of nearby residences in the Study Area. If the noise criteria can be met at the closest NSRs, then any property at a greater distance will also meet the criteria as noise will reduce to a smaller value at a greater distance.

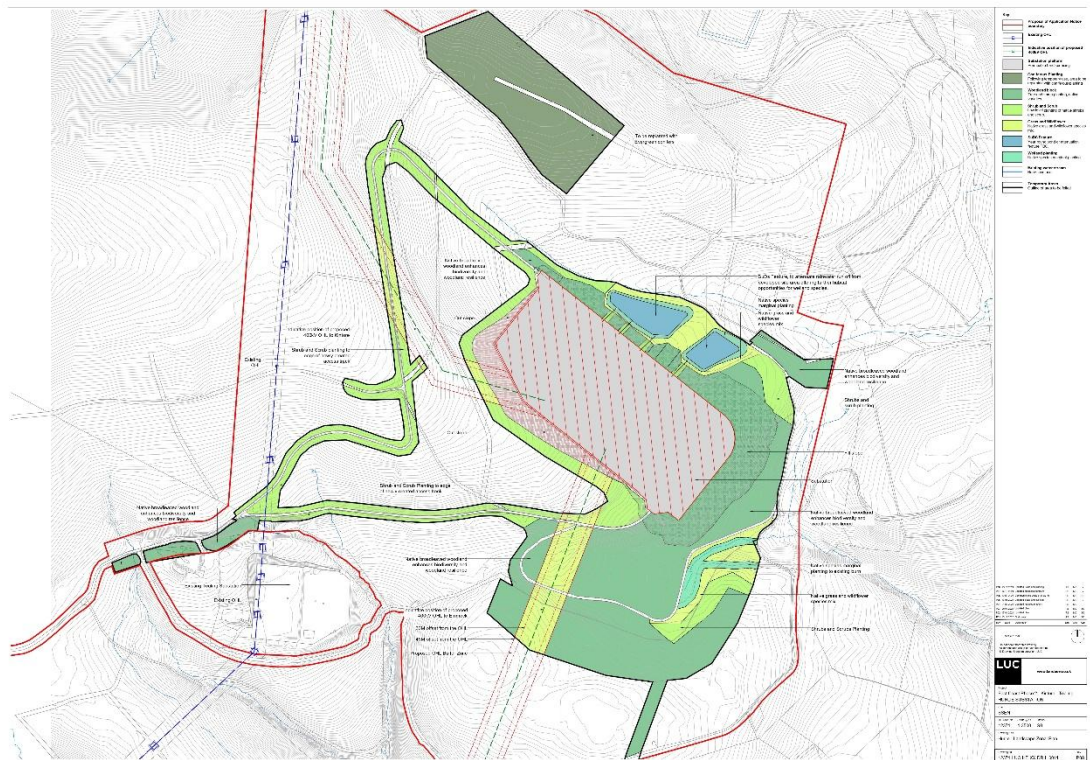
Design Evolution

- 4.6 The substation design has evolved iteratively, integrating ongoing work to optimise electrical, civil engineering, and environmental features. The design aims to minimise significant environmental impacts of the Proposed Development through embedded mitigation, considering site topography, slope, drainage, existing land uses, and vegetation. Figure 1 above illustrates the substation design.
- 4.7 Refinement in the design of the electrical elements and substation platform have allowed a reduction in Site area and optimisation of cut and fill operations, which in turn has reduced its environmental impact. Consequently, the Site area has been decreased from about 45 ha to 24.5 ha. The main platform width has been slightly reduced from 760 m to 685 m, narrowing the western edge, and rounding the north-east corner. These design evolutions have increase new planting and allowed the SuDS ponds to be repositioned allowing areas of new planting eastwards, increasing screening of the Proposed Development. These reductions have helped the Proposed Development reduce environmental impacts, meet landowner requirements, and respond to consultee feedback.
- 4.8 The access road into the site and west of the platform has been optimised to enable areas of new woodland and scrub/shrub planting. This planting has now been extended further south and along the southern edge of the substation. As for the western, north and eastern edges of the platform, woodland block planting has wrapped the area, comprising specifically of a mix of deciduous and evergreen species, which will add both biodiversity and strengthen visual screening to what is already a well-screened platform as a result of the topography of the site.

Landscape Design

- 4.9 The proposed landscape design includes the establishment of several belts of tree and shrub planting.
- 4.10 Low-lying native shrubs and scrub to be planted along the main access roads to the Site inside the planning application boundary. Native broadleaved woodland will be planted on the lowland slope to the south and east of the platform, including tree and shrub planting on the fill slope adjacent to the platform. To the north-east of the platform native species will be planted around the SuDS ponds transitioning into native grass and a mix of wildflower species in the immediate vicinity with shrub and scrub planting to the south-east of the existing access road. The proposed satellite compound area adjacent to and north of the access road will be replanted with native broadleaf woodland to enhance woodland resilience. Tributaries of the Burn of Baulks will be buffered with native species marginal planting transitioning to native grass and wildflower species. The cut slope to the west will be reinstated and wrapped in woodland block planting, comprising a mix of deciduous and evergreen species, which will add both biodiversity and strengthen visual screening.
- 4.11 Where existing and proposed OHL lines are shown, no landscaping bunds or vegetation of significant height will be included. This is to ensure that the minimum safety standards for clearances beneath OHL are maintained and to ensure that mature vegetation does not pose a safety risk were trees to fall.

Figure 2: Landscape Zonal Plan (Excerpt/Not to scale)



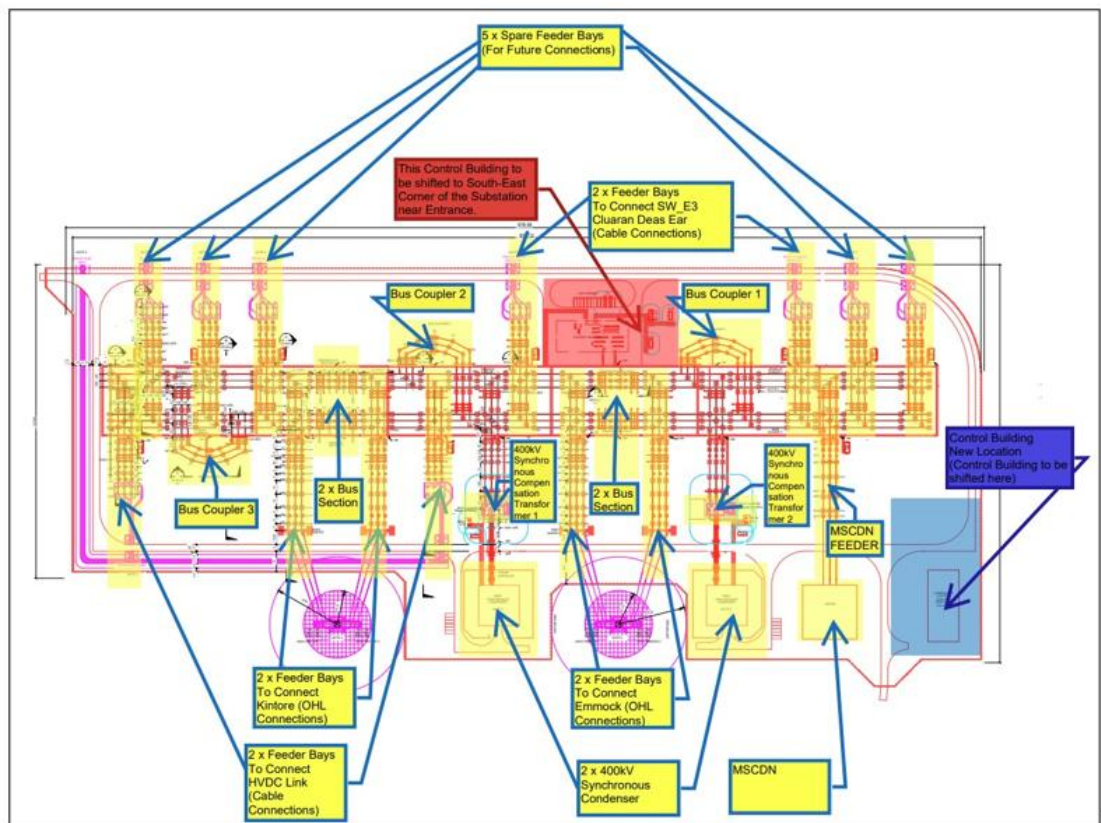
- 4.14 The proposed satellite compound area adjacent to and north of the access road will be replanted with native broadleaf woodland to enhance woodland resilience. Tributaries of the Burn of Baulks will be buffered with native species marginal planting transitioning to native grass and wildflower species. The cut slope to the west will be reinstated and wrapped in woodland block planting, comprising a mix of deciduous and evergreen species, which will add both biodiversity and strengthen visual screening

Substation Platform

- 4.15 The platform dimensions are 685 m x 300 m and at an elevation of 220.3 m AOD. The substation platform will be formed by excavating into the slope of the Site. Excavated material will be used to form the platform where the Site slopes away and to form screening bunds around the perimeter of the platform. The platform will comprise a flat, rectangular area accommodating the electrical and built infrastructure. A number of concrete foundations will be installed to support the electrical equipment, with a stoned finish to the compound. Curbed tarmac surfaced roads will be installed.

- 4.16 Drainage will be provided by a network of surface drains with interceptor traps, which will drain to the SuDS (see EIA Report Chapter 12).
- 4.17 A control building and a switchgear building will be located on the platform.
- 4.18 The platform will be formed largely from site won excavated material although it is anticipated that engineered stone will need to be imported to form the upper drainage layer.
- 4.19 The substation would use new 400 kV Air Insulated Switchgear (AIS) equipment with an approximate height of 15 m above platform level, including shunt reactors, transformers, connection bays and gantries.

Figure 3: Substation Layout



Building Design and Form

- 4.20 Two buildings will be located on the substation platform. A switchgear building, and a control building. Both buildings will be steel framed and clad and will be required to house equipment to monitor, control and protect electrical systems. The exact colour palette will be determined during detailed design and through agreement with Aberdeenshire Council and will likely be consistent with other SSEN Transmission infrastructure.
- 4.21 The switchgear building will have a footprint no greater than 18 m x 9 m, and an elevation no higher than 6.5 m. The control building will have a footprint no greater than 53 m x 23 m with an elevation no higher than 7 m.
- 4.22 The switchgear building will contain the switchgear equipment necessary to protect and isolate electrical equipment from the power supply, enabling testing, maintenance and fault clearing work to be undertaken.

- 4.23 The control building, which SSEN Transmission will use to manage the maintenance and operation of the substation, will contain welfare facilities and likely be located on the southern boundary of the Site. The substation will be controlled remotely and not permanently staffed.
- 4.24 The proposed elevations of the switchgear building is shown in Figure 4 and 5 below. The control building elevations, roof, and floor plans are shown in Figures 7 and 8 respectively.

Figure 4: Switchgear and Busbar elevations and floor plan

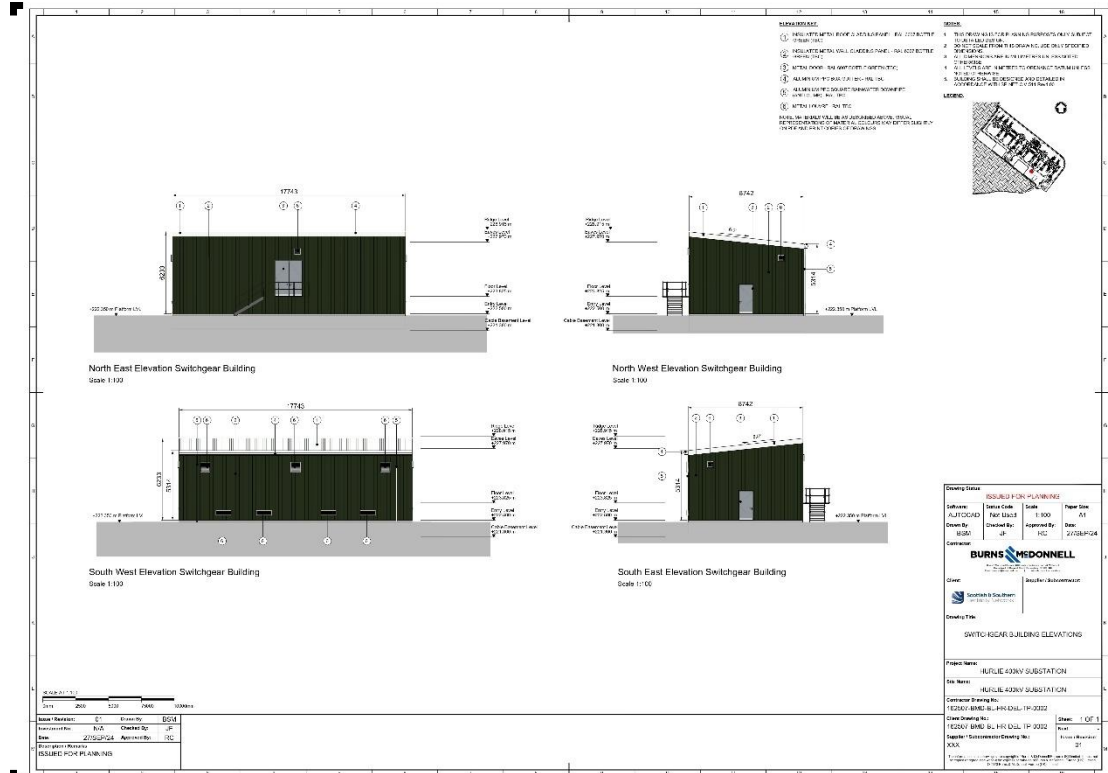


Figure 5: Switchgear Building Floor Plan

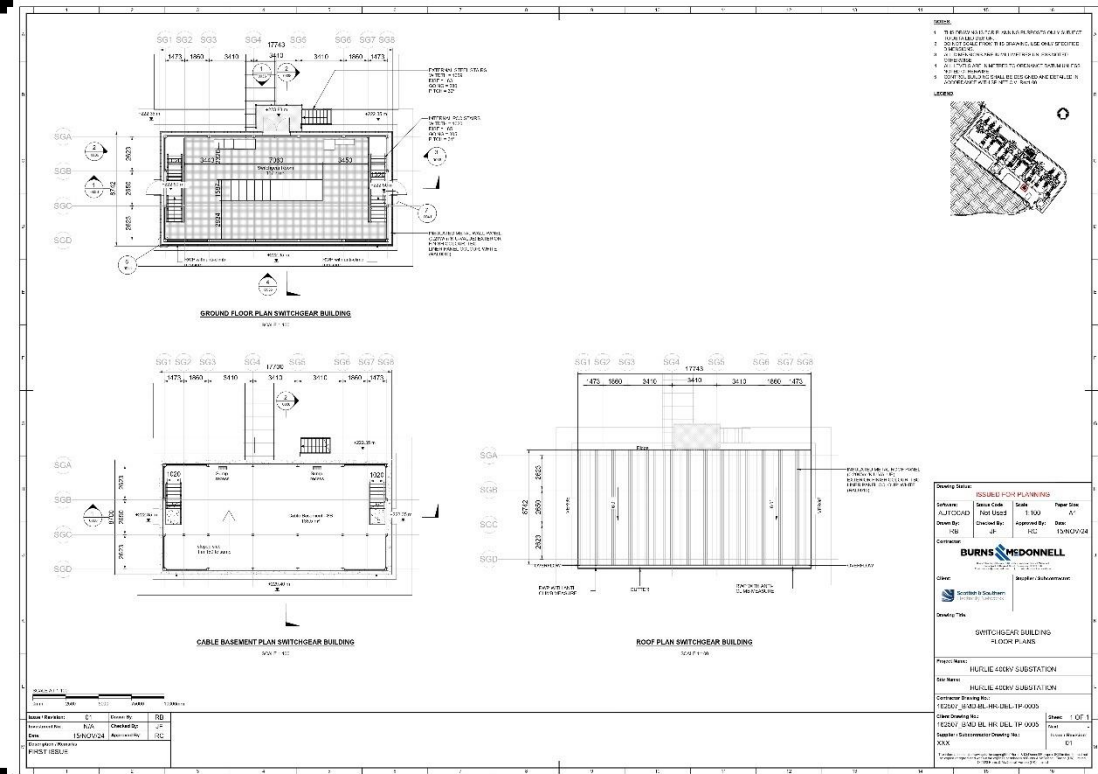


Figure 6: Control Building Elevations

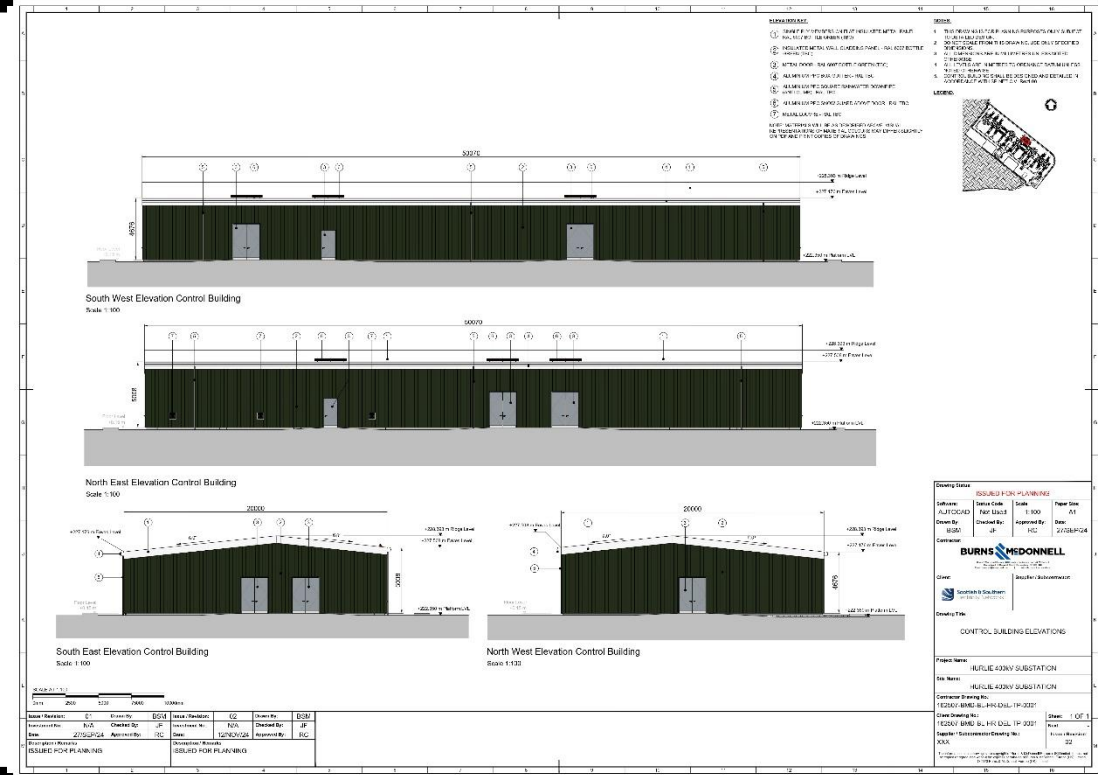


Figure 7: Control Building Roof Plan

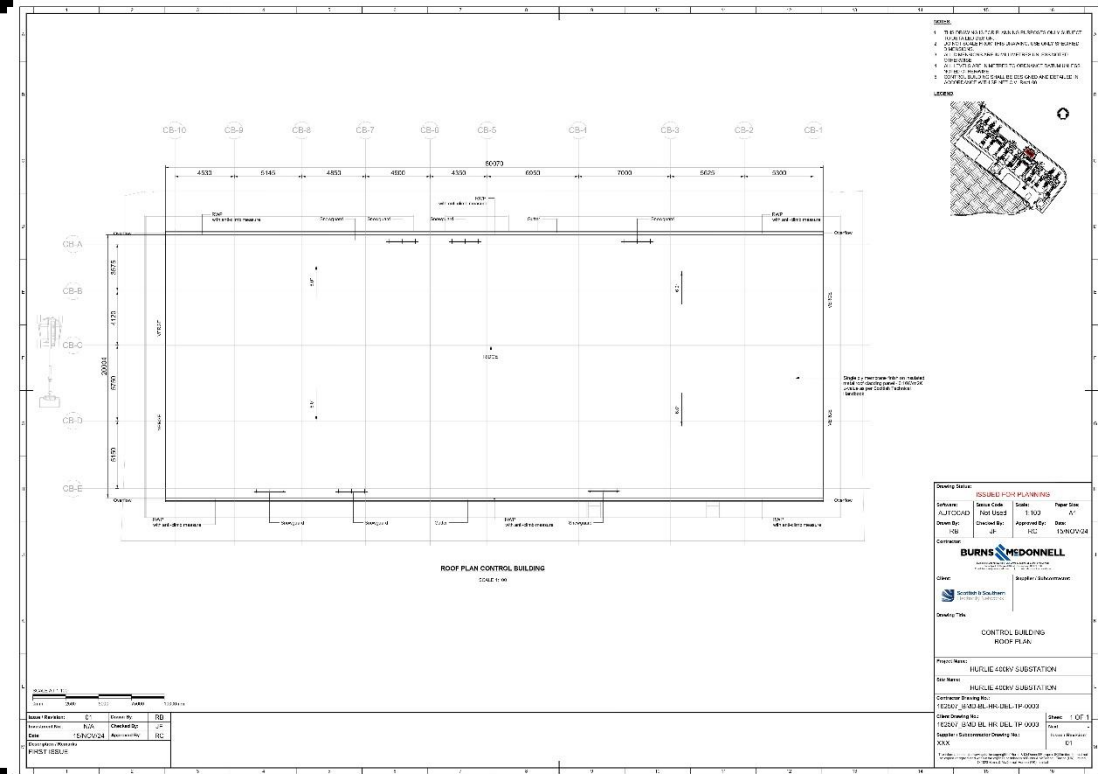
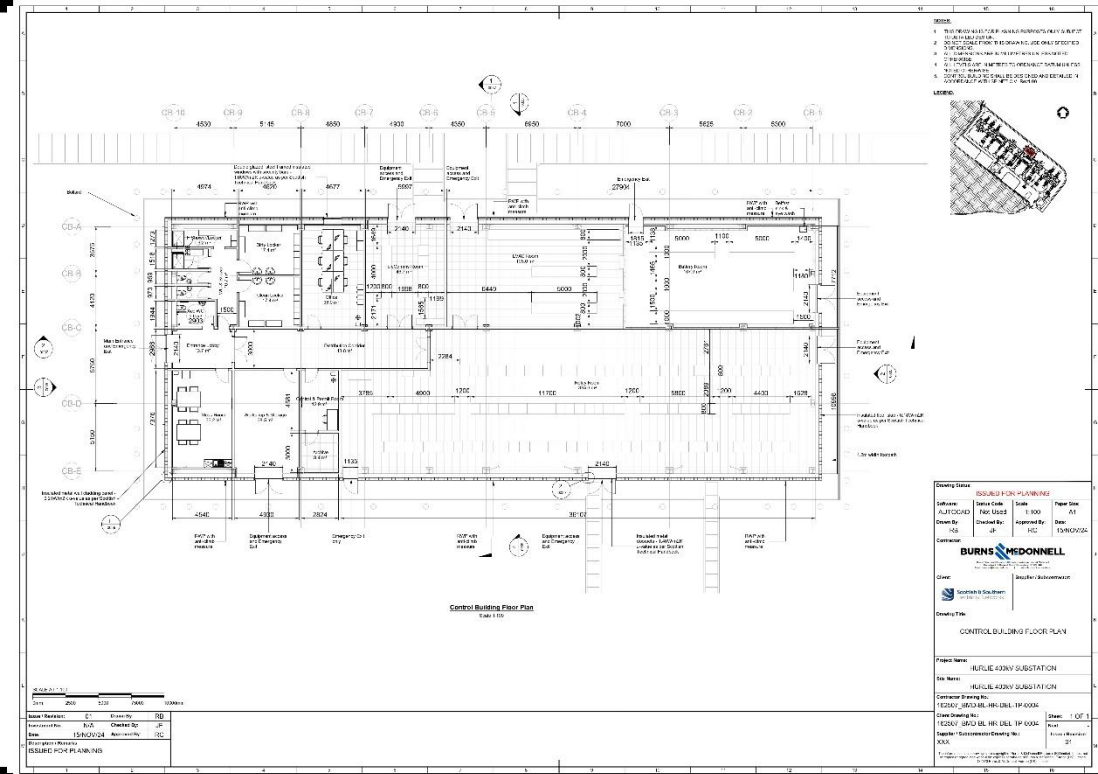


Figure 8: Control Building Floor Plan



Temporary Construction Compound and Welfare Area

4.25

During construction, the following temporary facilities will be required:

- > An initial site establishment compound located inside the substation platform area.
- > A Substation platform perimeter area for plant access, drainage, and installation of fences.
- > A Security gatehouse, vehicle marshalling and laydown areas.
- > A satellite compound area located to the north-east of the platform area between the access road and the Site boundary.
- > A principal soils storage area (ca. 11 ha) located to the north and adjacent to the Site boundary.
- > A secondary set-aside materials storage area located to the south, below and following the contour of the construction haul route adjacent to the main works compound area (ca. 11 ha).
- > Downslope areas to the south and east of the Site to provide construction access, materials handling, storage and drainage controls.
- > Working areas around new and upgraded tracks, requiring 25 m minimum clear cutting of existing forestry. These working access areas also require the establishment of safe areas for the movement of vehicles, local cut and fill of slopes, and the installation of drainage.
- > Temporary use of the permanent SUDS basin areas for drainage controls during substation platform excavation and construction, e.g. settlement lagoons.

- 4.26 A Temporary Construction Compound and Welfare Area (Main Works Compound Area) is also required as per the Health and Safety legislation and the CDM Regulations for welfare facilities on site. This is to be located to the south-east above and adjacent to the access road.
- 4.27 The Principal Contractor (PC) will be responsible for the design and construction of hardstanding areas that obtain sufficient load-bearing capacity. If deemed necessary, a geotextile layer will also be included within the design to facilitate effective stone removal upon the compound's dismantling.
- 4.28 The PC will provide a plan showing the location of the compound area which will also be displayed in the Site office. This compound area will provide adequate space for the facilities listed below and parking for employees and visitors.
- 4.29 Facilities to be provided in the temporary Site compound will typically include the following:
- > Site office, of portacabin type construction.
 - > First aid facilities.
 - > Employee parking.
 - > Potable water supply.
 - > Bunded fuel storage area.
 - > Water tanker.
 - > Contractor lock-up facility.
 - > Toilets.
- 4.30 These temporary facilities will be removed on completion of the construction phase and the areas will be reinstated to comply with the proposed site layout plan and landscaping plan.

Access

- 4.31 Given the nature of the Proposed Development, once operational access to the Site will be limited to authorised persons only and access by members of the public will not be permitted, as such, while important, access is given lesser precedent in the design of the Proposed Development.
- 4.32 Authorised personnel will require access into to the Site during both the construction and operational periods. As required by regulation, the Site has been designed to ensure security from all unauthorised persons including the use of palisade fencing around the platforms. The wider Site will be surrounded by a post and wire perimeter fence and will be controlled at the Site entrance by gate access, to prevent unauthorised vehicle access across the Site.
- 4.33 The likely principal access route, from both north and south, would be the A90 Aberdeen Western Peripheral Route (AWPR), exiting at the Peterculter Junction, and joining the B9077, then joining the A957 (Slug Road) at Crathes, and arriving at the principal access to the Site from the north. Abnormal Indivisible Loads (AILs) are proposed to use the A93 from the A90 to its junction with the A957 at Crathes. From Slug Road, access to the Site would be along the existing forest tracks which are used currently for commercial forest operations. Some LGV deliveries and construction staff may access the Site from the south of Slug Road, via west Stonehaven, and from the unclassified Auchenblae Road to the south of the Site. Some widening of the bellmouth as the track joins the Slug Road may be necessary. Existing forest tracks will be surveyed and assessed for plant and large load equipment delivery vehicle swept paths and loads, and upgraded, widened or realigned where necessary.
- 4.34 Some of the existing forest tracks are used for recreation. Where temporary closure or diversions of tracks are necessary, these will be notified to the community in advance and clearly communicated, in the same way as currently to accommodate logging activities.
- 4.35 The largest plant items for the substation will be the transformer and reactor loads. To enable the delivery of the transformer to Site, minor modifications to the existing public road network may be required. These, along with a detailed structural review of the route will be undertaken post consent once the exact dimensions of the transformer have been established.
- 4.36 The Applicant will prepare a Construction Traffic Management Plan (CTMP) for approval by Aberdeenshire Council, secured through a suitably worded planning condition to any planning permission. The CTMP will identify the design and location of access roads including any upgrades, surface finishing, drainage proposals, and approaches to environmental management which Aberdeenshire Council deems to be required.
- 4.37 The detailed design pack will include swept path assessments at constrained locations and a full mitigation design pack will be provided along with ecological and drainage reviews of the proposed works.
- 4.38 The Abnormal Indivisible Load (AIL) movement will be escorted by the police at the Applicant's cost and will avoid peak network times as far as is possible. A detailed Transport Management Plan (TMP) will be prepared to assist in the operational planning of the movement of AILs.
- 4.39 A Transport Assessment (Appendix 12.1 of the EIA Report) has been prepared which includes consideration of construction traffic and implements measures during construction phase to reduce traffic flows, mud and debris associated with construction vehicles and ensure the safety of all road users.
- 4.40 On completion, the Site will be accessed for maintenance and inspection purposes only. It is assumed this will be required at regular intervals (monthly) however this will be dependent on specific operational requirements in reality. Maintenance on the bays is likely to be required annually in some form and this will require presence on Site for the duration of one week.

5. Conclusions

- 5.1 The Applicant has given careful consideration to the siting, design, layout and access of the Proposed Development to ensure it is designed sensitively within the existing infrastructure and the environment it is located. The proposal seeks to fit a functional development which avoids significant impacts on nearby receptors. The design has been progressed to fit sustainably into the environment in which it sits whilst satisfying technical requirements and functionality. The development as a whole seeks to deliver sustainable development via facilitating net zero targets and increased transmission of renewable energy.
- 5.2 The site has been designed to be accessible to authorised persons with clearance to access a live substation only. No public access is authorised and the design, and appropriate fencing reflects that requirement such that the site is designed to be secure from public access. This is in accordance with the Electricity Safety, Quality and Continuity Regulation 2002 (as amended). Site access and construction traffic routes have been designed to minimise impact on the existing road network and ensure accessibility in the local road network is retained throughout the construction period.