Scottish & Southern Electricity Networks
TRANSMISSION

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Volume 3, Figures

Figure 4.1: Site Alternatives

4. SITE SELECTION PROCESS AND ALTERNATIVES

4.1 Introduction

4.1.1 This Chapter outlines the reasonable alternatives studied by the Applicant, in accordance with Regulation 5(2)(d) and schedule 4, paragraph 2 of the EIA Regulations. It discusses the reasons for selecting the Site for the Proposed Development, and the design and layout options that have been considered.

4.1.2 The need for the Proposed Development and the work undertaken by SSEN Transmission to assess the strategic electricity transmission infrastructure requirements to identify the most appropriate, viable, and long term, enduring technical design solution is explained in **Volume 2, Chapter 2 – Project Need and Strategy**.

4.1.3 The following stages are described in this Chapter, along with their respective outcomes:

- development considerations for the Proposed Development;
- the approach to the site selection process of the Proposed Development;
- the site selection process and consultation responses;
- design solutions considered; and
- further consideration of alternatives to avoid or reduce likely significant effects.

4.2 Development Considerations

4.2.1 SSEN Transmission has obligations under section 9 of the 1989 Act to 'develop and maintain an efficient, co-ordinated and economical system of electricity transmission'.

4.2.2 SSEN Transmission, operating under licence held by Scottish Hydro Electric Transmission plc under the Electricity Act 1989, 'when formulating proposals to generate, transmit, distribute or supply electricity' is required, under Section 9 to:

- "have regard to the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features of special interest and of protecting sites, buildings and objects of architectural, historic or archaeological interest"; and
- "do what [it] reasonably can to mitigate any effect which the proposals would have on the natural beauty of the countryside or on any such flora, fauna, features, sites, buildings or objects".

4.2.3 Furthermore, the requirements of the Construction (Design and Management) Regulations 2015[1] (CDM Regulations) require that the project design aims to minimise hazards and reduces risks during construction.

4.2.4 Taking account of these obligations, SSEN Transmission has considered technical, economic and environmental factors in evaluating the reasonable alternatives for the Proposed Development, with the objective of identifying a proposed site which is technically feasible and economically viable, and which causes the least disturbance to the environment and to the people who live, work, visit and enjoy recreation within it.

4.3 Approach to Site Selection

Procedures and Guidance

4.3.1 Guidelines for the site selection of new high voltage substations have been established within the electricity supply industry. These guidelines are known as the 'Holford Rules'[2] and have been widely used throughout the UK since the 1960s. The Holford Rules principally apply to the development of OHLs, however they continue to inform best practice as they also contain supplementary notes and principles on the siting of substations. The Holford Rules set out a hierarchical approach to site selection which advocates avoiding areas of high amenity

[1] UK Government (2015) The Construction (Design and Management) Regulations 2015. Available at: http://www.legislation.gov.uk/uksi/2015/51/contents/made [Accessed June 2024]

[2] Scottish Hydro Electric Transmission Limited (SHETL). (2004). *The Holford Rules: Guidelines for the Routeing of New High Voltage Overhead Transmission Lines with NGC 1992 and SHETL 2003 Notes.*

value, take advantage of topography and minimise visual interaction with other transmission infrastructure. These principles of the Holford Rules are discussed in greater detail below.

4.3.2 SSEN Transmission has developed its own guidance, Substation Site Selection Procedures for Voltages at or above 132kV[3] (referred to as 'Substation Site Selection Procedures'), based on the principles set out in the Holford Rules. This guidance broadens the basis for site selection decisions to reflect contemporary practice and to provide a framework to ensure environmental, technical and economic considerations are identified and appraised at each stage of the site selection process.

4.3.3 The selection of the Preferred Site Option has been undertaken through Multi-Criteria Analysis (MCA) of environmental, engineering and cost considerations for each Site Option.

4.3.4 The site selection process, alternatives selection and MCA for the Proposed Development has been undertaken in accordance with Substation Site Selection Procedures[3]. The guidance splits the site selection stage of a project into three principal stages, as follows:

- Stage 0: Pre-Site Selection Activities;
- Stage 1: Initial Site Screening; and
- Stage 2: Detailed Site Selection.
- Post Site Selection Activities: Consenting Process.

4.3.5 Each stage is an iterative process and involves an increasing level of detail and resolution, bringing cost, technical and environmental considerations together in a way which seeks to achieve the best balance at each stage. The stages that are carried out can vary depending on the type, nature of and size of a project and consultation is carried out at each stage of the process.

4.3.6 In accordance with the steps outlined in the Holford Rules and Substation Site Selection Procedures[3], the following principles have been considered during the site selection process (where practicable) of the Proposed Development:

- respect areas of high amenity value and take advantage of the containment of natural features such as woodland, fitting in with the landscape character of the area;
- take advantage of ground form with the appropriate use of site layout and levels to avoid intrusion into surrounding areas;
- use space effectively to limit the area required for development, minimising the effects on existing land use and rights of way;
- alternative designs of substations may also be considered, e.g., 'enclosed', rather than 'open', where additional cost can be justified;
- consider the relationship of towers and substation structures with background and foreground features, to reduce the prominence of structures from main viewpoints; and
- when siting substations take account of the effects of line connections that will need to be made.

4.3.7 Whilst the guidance document is intended to inform substation site selection, there can be a significant interface with SSEN Guidance for OHLs PR-NET-ENV-501 (Procedures for Routeing Overhead lines and Underground Cables of 132kV or above)[4], where the required development includes the provision of a new OHL. In this case, it is important to take account of potential OHL routes and the impact this may have on the siting of a new substation. In addition, the consultation process will also require an integrated approach.

[3] SSEN Transmission (July 2022), Substation Site Selection Guidelines for Voltages at or above 132kV
[4] SSEN Transmission (March 2018), Procedures for Routeing Overhead Lines of 132kV and above (updated in September 2020 to include underground cables of 132 kV and above)

Site Selection Appraisal

4.3.8 The site selection stage involves the identification of site options, and an appraisal of the environmental, technical, and economic constraints of these site options, prior to arriving at a preferred site option for the purposes of consultation.

4.3.9 Site options were identified following desk-based review and site walkovers, giving due consideration to the principles set out in the Holford Rules and SSEN Transmission Substation Site Selection Procedures[3], as set out above.

4.3.10 Appraisal of site options involved systematic consideration against the topic areas noted below:

Table 4-1 Topic areas and subtopics

Discipline	Topic Area	Sub Topic
Environmental / Consenting	Natural Heritage	• Designations; • Protected Species; • Habitats; • Ornithology; and • Hydrology / Geology.
	Cultural Heritage	• Designations; and • Cultural Heritage Assets.
	Landscape and Visual	• Designations; • Landscape Character; and • Visual Amenity.
	Land Use	• Agriculture; • Woodland/Forestry; and • Recreation.
	Planning	• Policy; and • Proposals.
Engineering	Connectivity	• Construction Access (substation access road and transformer delivery route); • Operation and Maintenance; • Existing Circuits / Networks; • Future Development Possibilities; and • Interface with SSEN Distribution and Generation and DNO Connections.
	Footprint Requirements	• Technology; • Adjacent Land Use; and • Space Availability.
	Hazards	• Unique Hazards; and • Existing Utilities and Installations.
	Ground Conditions	• Topology; and • Geology.
	Environmental Conditions	• Elevation; • Salt Pollution; • Flooding; • Carbon Footprint;

Discipline	Topic Area	Sub Topic
		• SF6; • Contaminated Land; and • Noise.
Cost	Capital Cost	• Construction Costs; • Diversion Costs; • Public Road Improvement Costs; • Felling Costs; • Land Assembly Costs; • Consent Mitigations Costs; and • No. of Landowners.
	Operational Cost	• Inspections costs; and • Maintenance costs.

4.4 Description of Site Selection Appraisal

Stage 1: Initial Site Screening

4.4.1 Using MCA, a Geographic Information System (GIS) tool and a resultant constraints map, a total of 14 potentially suitable sites within a 5 km radius of the existing New Deer Substation were identified. The 5 km radius corresponds to the maximum feasible length for a direct connection between the Proposed Development and the existing New Deer Substation.

4.4.2 The potential site options were evaluated using a combination of MCA, site walkovers and desk top information to identify site options to take forward to Stage 2.

4.4.3 Six site options were then taken forward to Stage 2: Detailed Site Selection. The six site options carried forward from Stage 1 were Site Options 1, 8, 9, 10, 12 and 13, as shown on **Volume 3, Figure 4.1: Site Alternatives**.

Stage 2: Detailed Site Selection

4.4.4 Site 13 was identified as the Preferred Site Option from an environmental perspective, primarily due to the potential for reduced impacts on landscape character and visual amenity and lower potential for impact on protected species, prime agricultural land, and the quality and quantity of groundwaters in the area in comparison with the other options.

4.4.5 All site options scored equally against the cost assessment criteria and Site 13 was the Preferred Site Option from an engineering perspective, so the overall Preferred Site Option was Site 13.

4.4.6 Full details on the site selection stage can be found in the Consultation Document (February 2024)[5].

The Site

4.4.7 The Site is situated in the Aberdeenshire Council Local Authority area, approximately 5 km to the west of New Deer, and 2.5 km to the south of Cuminestown (National Grid Reference NJ 819 476), and adjacent to Mains of Greens close to the B9170 to the east. The Site covers an area of approximately 115 ha and has a favourable topography. The Site is located on agricultural land that is primarily used for pasture and / or arable farming, with a predominantly rural character. There is an area of commercial forestry within the northwest of the Site. There are a number of neighbouring residential areas, private properties and farms within close proximity to the Site.

[5] SSEN Transmission (February 2024) New Deer 2 (Greens) Substation Pre-Application Consultation. Available at: https://www.ssen-transmission.co.uk/projects/project-map/greens-400kv-substation/

4.4.8 The Site Boundary has been extended since the site selection stage in response to the need to provide access to the Site from the C29S and to provide sufficient space for construction compounds, laydown areas, the watercourse diversion, landscaping proposals and OHL and cable connections.

4.5 Design Solutions Considered

4.5.1 The particular characteristics of the design solution have to take into account compliance with the Applicant's statutory and licence obligations, and the delivery strategy that is designed to ensure that the drivers for the Proposed Development can be met.

4.5.2 Following identification of the Preferred Site Option, consideration was given to different design solutions that could mitigate likely significant environmental effects or provide another benefit.

AIS and GIS

4.5.3 AIS technology requires a larger site footprint than the alternative of GIS, so AIS can have implications for landscape and local visual amenity, ecological impacts and surface drainage. However, these considerations are balanced against the need to maintain network operability and service continuity, feasibility and speed of maintenance / repair of the infrastructure and cost (as a business regulated by Ofgem) to determine whether AIS or GIS is the more appropriate solution.

4.5.4 The starting point in selecting the Site for the Proposed Development was to locate site options large enough to accommodate the larger-scale AIS technology, while meeting the other site requirements. Should this process be unable to identify a site capable of meeting the requirements of technical suitability, suitability in planning terms and economic feasibility for an AIS solution, GIS technology would be considered more explicitly. GIS is often employed in more exposed locations, such as those closer to the coast, where the need to utilise buildings to protect the main switchgear is more prevalent.

4.5.5 The Site was suitable for the AIS solution and, as detailed in paragraph 3.3.3, this has the benefit over GIS by offering a SF6 free technology solution, which is a key part of the Applicant's commitments and responsibilities to the decarbonisation of the electricity network.

4.6 Further Consideration of Alternatives during the EIA Process

4.6.1 Changes to the design of the Proposed Development during the EIA process have been minimal due to the work undertaken during the site selection stage to carefully consider and minimise site constraints, whilst giving cognisance to the technical requirements for constructing and operating the Proposed Development and the connecting BBNP 400kV OHL and underground cables.

4.6.2 The consideration of alternatives during the EIA process has focussed on the siting of infrastructure, landform and screening, considering the availability of more detailed environmental and engineering information including surveys and further studies (such as for ecological species and habitats, landscape and visual receptors, cultural heritage and ground investigation results).

4.6.3 The surrounding context was a key factor in determining the landscape mitigation strategy for the Site. Extensive design work was undertaken between the landscape and engineering teams in relation to the overall layout of the Proposed Development. The design strategy has optimised the infrastructure layout for the Proposed Development to minimise the size of the substation platform and maintain a natural buffer around the boundary of the Site for landform and bunds that help screen views and provide mitigation for habitat loss. Design changes have included, where practicable, the careful siting of the highest elements of the substation to take advantage of the screening provided by the proposed earthworks to minimise impacts on receptors near to the Site.

4.6.4 Design development has also been undertaken to optimise the height of the substation platform in order to achieve the ideal balance of cut and fill material, thereby minimising the material import and waste export

requirements for construction of the Proposed Development. The aim of this was to minimise construction vehicle movements and maximise onsite material re-use.