Scottish & Southern Electricity Networks
TRANSMISSION

CONTENTS

4. SITE SELECTION PROCESS AND ALTERNATIVES

4.1 Introduction

4.1.1 This chapter outlines the site selection process and consideration of 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 main 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 studies undertaken to inform the strategic electricity transmission infrastructure requirements are explained in **Volume 2, Chapter 2: Proposed Development Need**.

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

- development considerations and design solutions;
- the approach to the site selection process;
- a summary of the outcomes of each site selection stage including the alternative sites considered and consultation responses, where relevant; and
- how alternatives have been considered through the EIA process.

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 As a transmission licence holder under the 1989 Act, when formulating relevant proposals, the Applicant has a statutory duty under paragraph 3 of Schedule 9 to the 1989 Act 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[18] (CDM Regulations) require that the Proposed Development design aims to minimise hazards and reduces risks during construction.

4.2.4 Taking account of these obligations, SSEN Transmission has considered environmental, technical and economic factors in evaluating the reasonable alternatives, 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 in proximity to the Proposed Development.

4.2.5 The following options were considered at a strategic level:

- the "Do Nothing" scenario – the "Do Nothing" scenario assumes that no options are taken forward. This would compromise both the needs as set out in **Volume 2, Chapter 2: Proposed Development Need,** and SSEN Transmission's ability to meet their licence obligations. Consequently, this option has not been considered further.
- alternative technical options – described in **Section 4.3 Design Solutions**.
- alternative site selection options for the Proposed Development – described in **Section 4.4 Approach to Site Selection**.

4.3 Design Solutions

4.3.1 **Volume 2, Chapter 2: Proposed Development Need**, describes the technical system design requirements that are the drivers for the Proposed Development. The particular characteristics of the design solution have to take into account

[18] The Construction (Design and Management) Regulations 2015. [Online] Available at: http://www.legislation.gov.uk/uksi/2015/51/contents/made.

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.

4.3.2 Following Ofgem's approval of SSEN Transmission's Pathway to 2030 projects, including the Accelerated Strategic Transmission Investment (ASTI) projects that make up the Netherton Hub, the Applicant considered design solutions that could mitigate likely significant environmental effects, and provide other benefits such as biodiversity net gain (BNG). Such solutions include the use of Gas-insulated Switchgear (GIS) for the 400 kV and 132 kV substations and converter stations. GIS substations and converter stations use a dense gas as the insulating medium, usually Sulphur Hexa-Fluoride (SF6) (however, alternative SF6 free technology solutions are available). Benefits of using GIS are that it allows substations to be enclosed to protect from the weather and reduce noise impacts. It also typically allows safe clearance distances between live conductors to be reduced resulting in a smaller footprint and land requirements compared to the more traditional substations comprising Air Insulated Switchgear (AIS).

4.3.3 To reduce the need for additional infrastructure in the form of reactive power compensation, and ultimately reduce the size and cost of the Proposed Development, it has been an objective to minimise to the greatest extent possible the distance between the High Voltage Direct Current (HVDC) converters and the alternating current (AC) connection point at the 400 kV substation. The optimal distance was considered to be less than 1 km, which supported the co-located arrangement at the Proposed Development.

4.3.4 Proximity to the existing transmission network was also considered in order to minimise the amount of new overhead lines or underground cables that would be required to connect the Netherton Hub to the existing network, and where possible reduce potential impacts associated with installing new connections.

4.3.5 Consideration was also given to the non-infrastructure elements of the site options to establish the total land requirement for the Site. These included BNG, screening and bunding to reduce potential visual and noise impacts, and all elements associated with water management and treatment both during construction and permanent operations.

4.4 Approach to Site Selection

4.4.1 Guidelines for the site selection of new high voltage overhead lines have been established within the electricity supply industry. These guidelines are known as the 'Holford Rules' and have been widely used throughout the UK since the 1960s. The Holford Rules set out a hierarchical approach to overhead line routeing which advocates avoiding areas of high amenity value, minimise changes in direction, take advantage of topography and minimise visual interaction with other transmission infrastructure. Whilst the Holford Rules principally apply to the development of overhead lines, they continue to inform best practice and contain supplementary notes on the siting of substations.

4.4.2 The Holford Rules, supplementary notes on the siting of substations are listed below:

a) 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.

b) Take advantage of ground form with the appropriate use of site layout and levels to avoid intrusion into surrounding areas.

c) Use space effectively to limit the area required for development, minimising the effects on existing land use and rights of way.

d) Alternative designs of substations may also be considered, e.g., 'enclosed', rather than 'open', where additional cost can be justified.

e) Consider the relationship of towers and substation structures with background and foreground features, to reduce the prominence of structures from main viewpoints.

f) When siting substations take account of the effects of line connections that will need to be made.

4.4.3 SSEN Transmission has developed its own guidance[19], based on the principles set out in the Holford Rules but broadening 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. The guidance document is intended to inform substation site selection. The site selection process for the Proposed Development has been completed in compliance with SSEN Transmission's guidance document.

4.4.4 The principal site selection stages undertaken have been:

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

4.4.5 Each stage is an iterative process and involves an increasing level of detail and resolution, bringing technical, environmental and economic considerations together in a way which seeks to achieve the best balance. Consultation has been carried out to further inform the process at Stage 1, Stage 2 and during the Post Site Selection Activities: Consenting Process.

4.4.6 In consideration of the principles outlined in the guidance document, the method of identifying a Preferred Site involved the following four key tasks:

- identification of the baseline situation;
- identification of site options;
- environmental, technical and economic analysis of site options; and
- identification of a Preferred Site.

4.4.7 Following the identification of a Preferred Site, stakeholder consultation is undertaken to present the site options and the rationale for, and approach to, the selection of the Preferred Site. Any feedback from stakeholders on the sites is then reviewed and, if required, amendments or further analysis is undertaken to address any concerns or alternatives put forward. This is a feedback loop, so may in some instances require earlier stages to be revisited. Following the completion of the consultation process, a Proposed Site to be taken forward to the consenting process is selected.

4.5 Stage 0: Strategic Options Assessment

4.5.1 At Stage 0, the following requirements were identified as essential for the new site:

- proximity to the existing 400 kV network to minimise the amount of new overhead lines or cabling required to connect to the network;
- large enough to accommodate the proposed individual or joint substation/converter station footprints, together with associated landscaping, contractor compounds, access and new connection routes;
- additional space for future expansion;
- in areas which do not contain environmental designations and minimise impacts on local environmental receptors; and
- enable connection routes for the proposed new 400 kV overhead lines and HVDC cables.

4.6 Stage 1: Initial Site Screening

4.6.1 Initially 13 potential sites were identified, as shown on **Plate 4-1**. With nine taken through to a full Stage 1 evaluation (sites 1 to 9), the remaining four sites (sites 10 to 13) were located to the south of existing and future New Deer 1 and New Deer 2 overhead lines, which was deemed a hard constraint for the 400 kV substation and therefore these sites were excluded from further consideration. Although Site 9 was also located south of the overhead line corridors, it was

[19] Substation Site Selection procedures for Voltages at or above 132 kV (document reference: PR-NET-ENV-502).

taken forward as a potential site to locate direct current (DC) infrastructure given its close proximity to Site 7 and Site 8 on a contingency basis if it was deemed advantageous to the DC infrastructure design.

4.6.2 A comparative appraisal of the identified sites was informed by a desk-based appraisal and supported by site walkovers undertaken in August 2022 by representatives from the SSEN Transmission Onshore and Offshore Development, Consents and Environment, Land and Engineering teams. Following this, a workshop was undertaken in October 2022 to discuss the options to be taken forward to Stage 2.

4.6.3 An initial public consultation event was held during Stage 1 (January 2023) to introduce the project to the community and to present all of the potential Stage 1 sites, as well as the four Preferred Sites (out of the nine that were appraised) that were anticipated to be taken forward to Stage 2 following the comparative analysis exercise. Feedback from the consultation included comments and queries primarily related to (but not limited to) visual impacts, noise from the site and traffic along the A950. A consultation response was also received from Historic Environment Scotland (HES) providing comments and considerations on each of the Stage 1 site options. This feedback was incorporated and considered as part of the Stage 2 site selection; however, it should be noted that overall, the nature and comments of the feedback from the Stage 1 consultation exercise did not lead to any of the sites being reconsidered, either to be taken forward or excluded from further assessment. However, Site 9 was subsequently discounted due to engineering issues with connectivity, and constraints surrounding existing underground utilities and therefore was not considered further at Stage 2.

Plate 4-1 Stage 1 Site Locations

4.6.4 Following the Stage 1 appraisal four sites were taken forward to Stage 2. A summary of the site options and potential issues identified at this stage is provided below:

- Site 4 – this site is located approximately 7.5 km west of Peterhead, adjacent to the A950. This site has no environmental designations or recreational use identified on it. It has favourable topography, with good accessibility from the A950. Though it is within 500 m to 1 km of existing residential properties, and approximately 40% of the site is Land Classification for Agriculture (LCA) Grade 3.1 (prime agricultural land). The site provides an opportunity for screening and visual mitigation, as well as improving biodiversity in the area.
- Site 7 – this site is located approximately 2.5 km west of Peterhead, adjacent to and west of the A90. This site has no environmental designations and is within close proximity for both AC and DC connectivity. It has good access to the A90. However, as the site is on gently rising land, it is likely to have a high impact on visual receptors in the area as it is less than 300 m to a large housing development on the western edge of Peterhead and from the Peterhead

Bypass. This site would also be visible on the horizon, and critically there is insufficient space to incorporate landscape mitigations.

- Site 8 – this site is located approximately 2.7 km southwest of Peterhead. The site has no environmental designations. It occupies a relatively low lying and partially developed area on the south of Peterhead with good access to the A90 and existing AC and DC connections. Approximately 80% of the site is located on LCA Grade 3.1 (prime agricultural land). The site has planning and policy constraints relating to protected land, playing fields and commercial allocation, and there is also the potential for contaminated land within the site. Consultation with the Scottish Environment Protection Agency (SEPA) and Scottish Water identified that there is the potential to impact on hydrological receptors including nearby watercourses and the underlying groundwater body. There would be insufficient space onsite to accommodate all elements of the Proposed Development.
- Site 7 and 8 combined – this site combines Site 7 and Site 8 into one larger site, as described above. This option is favourable for construction access, operation, and maintenance access, it is unable to support the hub approach as it has insufficient space for plant and/or construction of it. Site 8 also has potential contamination issues.

4.7 Stage 2: Detailed Site Selection

4.7.1 Stage 2 involved the further appraisal of the environmental and planning, technical and economic factors of the four sites taken forward from Stage 1. The Stage 2 site locations are shown on **Plate 4-2**.

Plate 4-2 Stage 2 Site Locations

4.7.2 The Stage 2 site appraisal was undertaken following desk-based review and site walkovers, giving due consideration to the principles set out in the Holford Rules and SSEN Transmission guidance, as set out in **Section 4.4** of this chapter. Appraisal of sites involved systematic consideration against the topic areas noted below:

- 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.
- technical:
  - construction access;
  - operation and maintenance;
  - existing circuits/networks;
  - future development possibilities;
  - interface with SSEN Distribution and generation;
  - Distribution Network Operator (DNO) connection;
  - technology;
  - adjacent land use;
  - space availability;
  - unique hazards;
  - existing utilities and installations;
  - topography;
  - geology;
  - elevation;
  - salt pollution;
  - flooding;
  - carbon footprint;

  - sulphur hexafluoride (SF6);
  - contaminated land; and
  - noise.
- economic:
  - capital; and
  - operational costs.

4.7.3 The following part of this section summarises the site selection options appraised during Stage 2. It includes a summary of the main environmental, planning, technical and economic factors identified during the appraisal, an overview of factors in comparison with other sites, confirmation of the Preferred Site following the detailed analysis, a summary of consultation responses, and confirmation of the Proposed Site to be taken forward to the next stage – Post Site Selection Activities: Consenting Process.

Detailed Site Selection Appraisal Overview

4.7.4 A summary of the Preferred Site for differentiating factors is provided below, with reasoning provided for the choice.

Environmental and Planning Summary

- Natural Heritage – Sites 4 and 7 were identified as having a lower risk of impacts to ornithology and geology/hydrology than Site 8 and Site 7 and 8 combined. The latter two sites have a higher risk of compromising the quality and quantity of groundwater in relation to Groundwater Dependent Terrestrial Ecosystems.
- Cultural Heritage – no direct impacts were predicted for any of the sites on cultural heritage assets. Potential indirect impacts were identified at Site 7 and Site 7 and 8 combined on the Category C Listed Cocklaw Mains (LB16391), which is located within 50 m of the sites. For this reason, Site 4 and Site 8 were considered lower risk options.
- Landscape – Site 4 was the least preferred option for landscape character, as it would extend industrial development into an agricultural landscape, however, it was noted the site offers opportunities for large-scale landscape mitigation. The other sites were considered as equal for potential impacts to landscape character.
- Visual – Site 8 would have the lowest potential impact from a visual amenity perspective, due to having relatively few sensitive receptors nearby. Site 4 would be the second preference due to being located in extensive agricultural landscape, also with relatively few sensitive receptors nearby.
- Land Use – Site 7 was considered the lowest risk. The other sites were considered higher risk due to potential impacts to agricultural land.
- Planning – Site 8 and Site 7 and 8 combined were considered higher risk than Site 4 and 7, due to containing multiple development allocations within the site areas.

4.7.5 Overall, following comparison of all the environmental and planning factors, Site 4 was considered the Preferred Site. There is relatively little tree cover within the site, with the majority of the site used as agricultural land, and therefore containing a relatively low habitat diversity and proportion of suitable habitats to support protected and/or notable species. Of the 13 sites appraised during the site selection process, only four of the sites were considered less constrained by agriculture than Site 4. However, due to environmental and technical constraints these sites were not taken forward.

4.7.6 Other favourable factors identified at Site 4 included ornithology, cultural heritage, geology/hydrology, planning and the low potential for impacts to recreation due to the absence of core paths and National Cycle Network routes. Visually, the site would be clearly visible from the A950 and nearby residential receptors, however, the site offers opportunities for large scale landform and planting mitigation to screen views and integrate the Proposed Development into the landscape when compared to the other sites which are more constrained as well as opportunities to enhance biodiversity.

Technical and Economic Summary

- Future Development Possibilities – Site 4 was identified as being partly constrained by roads to the south and north but having the best future development possibilities within the site boundary. All the other sites are constrained.
- Site Footprint Requirement – Site 4 is the only site that can support the construction of the proposed infrastructure and has sufficient area onsite to accommodate the required construction areas.
- Hazards – although there is a high-pressure gas main on Site 4, it does not interfere with the potential site layout or construction. Other site options would require the undergrounding of existing transmission infrastructure.
- Ground Conditions – Site 4 is expected to be less constrained than the other sites with respect to the extraction of bedrock.
- Environmental Conditions – the environmental conditions at Site 4 are considered the lowest risk as it is further from the coast (lower risk from salt pollution), outside the 1:1000-year flood zone, on land with no previous contamination (this also applies to Site 7) and is considered lowest risk from a noise perspective.

4.7.7 Overall, the appraisal identified Site 4 as the technical and economic Preferred Site. Site 4 was assessed as the only site capable of supporting the construction of the Proposed Development including all the required infrastructure on a single site, as well as BNG and screening requirements. The site can accommodate the proposed plant, keeping the converter stations within 1 km and negate the need for additional voltage control plant. It also supports the construction requirements (including laydown and compound) without the need to extend beyond the boundary, this is not the case for the other options.

Preferred Site

4.7.8 The Stage 2 appraisal determined that overall Site 4 is the preferred choice for environment and planning, and from a technical and economic perspective, and was therefore identified as the Preferred Site to be taken forward to Stage 2 consultation.

Stage 2 Consultation

4.7.9 A further round of consultation was undertaken in April 2023 to present the four Stage 2 sites and the rationale for, and approach to, the selection of the Preferred Site. During this consultation Site 4 was presented as the Preferred Site due to its optimum balance of environmental, technical, and economic considerations. The consultation sought views of anyone who had an interest in the Proposed Development, and comments from all were invited, this included:

- statutory consultees;
- non-statutory consultees;
- community members and local organisations; including local elected members; and
- landowners and occupiers.

4.7.10 A range of responses was received from stakeholders, including concerns about the potential environmental impacts, particularly on local biodiversity and wildlife, impacts to the local community including visual impacts and the loss of agricultural land. A pre-existing flooding issue at the Site 4 was also highlighted through the Stage 2 consultation.

4.7.11 Overall, Site 4 remained the Preferred Site from an environmental and technical perspective following the completion of the Stage 2 consultation as the feedback did not change the overall outcomes appraised during the site selection process. Consequently, it was decided to progress with Site 4 (the Preferred Site) as the Proposed Site to be taken forward to the next phase of development. The feedback from stakeholders during the consultation has been further considered in the design during the EIA process at the consenting stage (see **Section 4.8**).

4.7.12 Further information on consultation undertaken is reported in **Volume 2, Chapter 6: Scope and Consultation**.

4.8 Further Consideration of Alternatives in the EIA Process

4.8.1 Changes to the design of the Proposed Development during the EIA process have been minimised 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 overhead lines and underground cables.

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

4.8.3 The design strategy has brought the proposed infrastructure elements closer together within the Site to maintain a natural buffer around the boundary of the Site for landform and bunds that help screen views and reduce potential noise from the Proposed Development, as well as providing greater opportunity to provide habitats and BNG. Design changes have included, where practicable, the careful siting of infrastructure away from receptors near to the Proposed Development. The layout design also minimises the internal road network required within the Site and associated areas of hardstanding. The evolution of the layout of the Site between April 2023 and May 2024 is shown on the **Plate 4-3** and **Plate 4-4**.

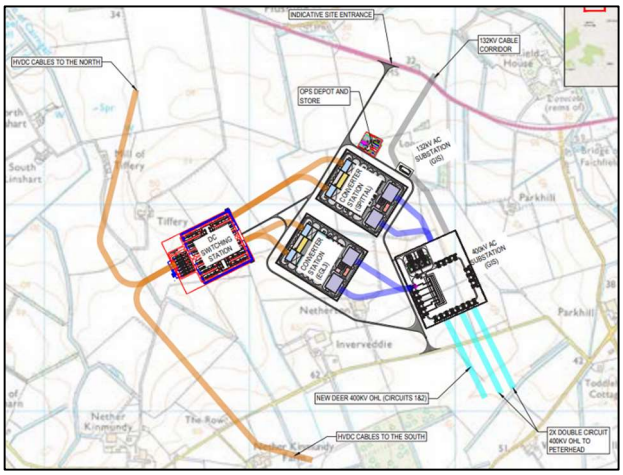

Plate 4-3 Layout Design April 2023

Plate 4-4 Layout Design May 2024

4.8.4 The surrounding context was a key factor in determining the heights of the proposed buildings within the landscape. Extensive design work was undertaken between the landscape and engineering teams in relation to alternative building heights. As a result, the development platforms where buildings would be sited have been designed to sit within the landscape, partially hiding the Proposed Development from surrounding visual receptors.

4.8.5 Design development has also been undertaken to balance the cut and fill and minimise the material and waste required to be imported and exported during construction of the Proposed Development, with the aim of minimising construction vehicle movements and optimising material re-use.

4.8.6 Through consultation at Stage 2 and reviews of online flood mapping it was identified that there is an area within the northwest part of the Site that is at high risk of pluvial flooding (10% chance of flooding annually). The area is located at the northern boundary of the Site, near to the A950 highway. Topographic survey information indicates this area is a low point which coincides with an existing discharge point off site. The design of site drainage options to reduce flooding in this location have been considered and assessed during the design process, with a solution identified which proposes to significantly reduce the catchment size upstream of the potential flooding zone as well as provide an attenuation feature to formally contain flows for the 1 in 200-year plus climate change event. This is expected to reduce pluvial flooding to

the existing area and ease the demand on the Burn of Faichfield further downstream that is shown to be at risk from fluvial flooding.

4.8.7 A building colour study has also been undertaken to examine alternative use of colour to reduce the landscape and visual impact of the Proposed Development buildings. This included comparison of natural colour palette characteristics of the local landscape during the different seasons of the year, as viewed from a number of chosen landscape viewpoints. To allow identification of a final selection of colour palettes with supporting imagery for use within a Design Code for the individual station developers.

4.8.8 Analysis of design options for the Site Boundary, with design input from the landscape and ecology teams, has led to the retention of an area of woodland to the northeast of the Site which was initially within the Site Boundary during the site selection stages, but has now been excluded. Several hedgerows and lines of trees around the perimeter of the Site and other existing vegetation have also been retained following consideration of design options.