



Scottish & Southern
Electricity Networks

Orkney Transmission Connection and Infrastructure Project FAQs



Background of the project

a. Why is the project needed?

Orkney is not currently connected to the GB transmission system and there is currently no spare capacity to connect new electricity generation on the local distribution network. The transmission link is therefore required to accommodate the long-standing need to reinforce the network to facilitate the needs of the numerous renewable electricity developers across Orkney looking to connect.

b. What is SSEN's role in the project?

As the licenced electricity transmission owner and electricity distribution network operator for the north of Scotland, in line with our regulatory obligations we are responsible for providing connections for electricity generation developers looking to connect to our networks.

Where those connections require new major infrastructure, such as the need to build a subsea transmission connection from Orkney to the main GB transmission system, we are also responsible for the planning and delivery of this infrastructure, as well as the individual connections for renewable developers.

c. What do SSEN consider when planning major infrastructure projects, such as the Orkney link?

In line with our licence obligations as a coordinated, economic and efficient transmission owner; we must consider several factors when planning and designing our major infrastructure projects, such as the proposed transmission link to Orkney.

These can generally be captured under the following headings:

- **Economic** – as a regulated business, the costs of investing in electricity networks are recovered from electricity consumers through their energy bills or from electricity generators through their network charges, who themselves will pass these costs through to consumers through their energy prices.

Specific to the Orkney project, any increased costs will have a direct bearing on Ofgem's assessment of the regulatory Needs Case process, the volume of generation required to justify the investment and will also directly impact Orkney renewable developers through increases in their connection costs and network charges.

We therefore have an obligation to ensure costs are kept to a minimum, and where additional spend is required, this can be robustly defended and justified.

- **Engineering/technical** – as the operator of critical national infrastructure, we must ensure our infrastructure complies with various technical specifications and standards. It is also important that due consideration is provided to the operational phase from an engineering and technical perspective.
- **Environmental** – we recognise we have a responsibility to manage the impact of our activities on the environment in which we operate. To do this, we work closely with key statutory bodies throughout the development of our projects to ensure we don't have any adverse impact on protected species or planning designations.

Specific to Orkney, this work has a particular focus on mitigating the impact of the project on Orkney's historical and archaeological heritage as well as protecting Orkney's rich biodiversity, such as the various protected species of birds and mammals.

- **Local feedback** – throughout the development of our major infrastructure projects, we work in close consultation with the local community, carrying out public consultation to provide interested parties the opportunity to help shape the project design.

Whilst it will never be possible to factor in all feedback received, where possible, we will always look to enact the views of the local community received during our consultations, in line with the economic, engineering and environmental factors we must consider.

Specific to Orkney, there are numerous examples where local feedback has had a direct bearing on the project's design, from our early commitment not to use steel lattice tower and, our work to minimise the visual impact of Finstown substation, to some of the commitments we have made to underground infrastructure in areas of local and environmental sensitivity.

d. What does the project consist of?

As well as the transmission subsea cable from Orkney to Caithness, the main components of the project consists of a new 220 / 132kV substation at Finstown, a 220kV underground land cable from Finstown to the subsea cable landing point at Warebeth, and onshore 132kV infrastructure to connect the various Orkney renewable developers to Finstown substation.

Due to the size and complexities of the overall project, we have split the work internally into two distinct projects:

- Orkney Transmission Connection covers - Finstown substation, the land cable from Finstown to Warebeth and the subsea cable from Warebeth to Dounreay.
- Orkney Infrastructure Project covers all the onshore infrastructure and subsea island connections required to connect Orkney's renewable energy developments to Fintown.

Due to the way in which we have structured the overall project, and the different planning / construction timelines required for the different elements, this explains why not all consultations have covered the overall project.

e. What are the timelines for the project?

We are currently working to an energisation date of April 2023. This has moved from our previous energisation date of October 2022, following some delays to the project.

In order to maintain the timeline for the project, planning permission for Finstown substation will be applied for first, in early 2019, with planning permissions and s.37 consents for the onshore infrastructure being applied for in the middle of 2019.

The reason Finstown substation is submitted first is due to the longer time required to construct it, plus the need for more time to order the specialist equipment (for example transformers) required.

f. Will the project definitely proceed?

Due to the level of investment required for the project, we first require approval from our regulator, Ofgem, before we can proceed with the investment. For Ofgem to grant final funding approval for the reinforcement they must be satisfied the project is needed and that it represents value for GB energy consumers. We also need full planning consents from the relevant planning authorities before work can proceed.

g. How much renewable generation is required before the project will proceed?

In its recent publication of the Orkney Needs Case Consultation, Ofgem has indicated that a total of 135 MW of new renewable generation is required before Ofgem will grant full approval. However, in our Needs Case, we proposed that no more than 70MW of new generation is required to justify the investment in the project. Crucially, our figure is based on well-established, industry best practice, used to assess similar transmission investments across GB.

Therefore, whilst we disagree with Ofgem's tipping point of 135 MW and will address this in our response to their consultation, the volume of new generation required before Ofgem will grant full approval will likely be between 70MW and 135MW.

h. How does the proposed scheme align with the Orkney Sustainable Energy Strategy?

In its Sustainability Energy Strategy, the Orkney Island Council make it clear that existing grid constraints act as a significant barrier to achieving their energy objectives and therefore, support the requirement for investment in new electricity grid infrastructure.

As the proposed transmission reinforcement will provide significant additional capacity to accommodate the needs of new renewable energy projects on Orkney, the proposed scheme clearly aligns with the Orkney Sustainable Energy Strategy and its objectives.

Link to strategy :

http://www.orkney.gov.uk/Files/Consultations/Sustain-Orkney-Energy-Strat-1725/Sustainable_Orkney_Energy_Strategy_Accessible.pdf

Finstown substation

a. Why has Finstown been chosen as the location for the substation?

Due to its relatively central location on Orkney, the Finstown area was chosen as the optimal location for the substation as it will reduce the volume of associated infrastructure required to connect those renewable energy projects currently in development and likely to come through in the future.

Having carried out initial assessments to confirm the viability of hosting a substation in the area, a number of technical and environmental parameters were considered in selecting the actual site of Finstown Substation. This included ensuring that the site could facilitate the various connections for individual contracted developers across Orkney, as well as facilitate the existing Distribution network at Finstown.

Its location was also selected as it would not have any significant adverse impacts on local planning and environmental designations as well as having minimal impact on the wider Orkney community.

b. What has SSEN done to minimise the visual impact?

Throughout the development of our plans for a potential substation at Finstown, from the earliest round of consultation back in February 2017 through to our most recent consultation in September this year, we have refined the design in line with guidance received from both statutory consultees and feedback from the local community.

Statutory consultees recommended that rather than one large building, we house the substation components in a number of smaller buildings in keeping with existing agricultural structures already existing in Orkney. We have developed this further by designing the buildings to varying heights and shapes, colouring the structures in a selection of different natural tones in keeping with a group of agricultural buildings.

We have also worked hard to minimise the visual impact of the substation by lowering the platform height to an appropriate level, using the excavated materials to construct new landscaping (landform) around the substation to help screen its view.

In response to comments received at the most recent public consultation events in September, our Contractor and landscape architects have been working on reducing the visual impact further by dropping the platform level 1 metre from that shown at recent events and increasing the land form around the substation, particularly on the north side.

We have also committed to reducing the cumulative visual effect of Finstown substation by undergrounding the OHL's that connect in to the substation. As the connecting infrastructure to the north of the substation would be more visible due to the natural landscape and topography of the land, this section will be undergrounded for a distance of approximately 1km. This will avoid the OHL being sky-lined when viewed from the World Heritage Site monuments. From the south, the OHL are being undergrounded for approximately 70m as there are less sensitive receptors and cabling is more detrimental to the habitat in the Heddle LNCS.

We believe we have worked hard to balance the visual impact of the substation against the various engineering, environmental and economic considerations that we have to factor in to our project design.

c. Why can't the substation platform height be reduced further?

Following feedback received from the local community, we have explored the feasibility of further reducing the platform height at Finstown substation. This work, carried out in conjunction with expert external consultants, has concluded that reducing the height below that currently proposed would introduce drainage issues and potential flood risk.

In addition, the estimated earthworks costs of further reducing the platform height, together with those associated with mitigating the risk of flooding, are considered to be cost prohibitive for the project from a regulatory perspective.

We believe we have worked hard to balance the visual impact of the substation against the various engineering, environmental and economic considerations that we have to factor in to our project design.

Overhead vs undergrounding

a. Why are overhead lines SSEN's preferred option?

As we set out in question 1c, we are obliged to develop our network in a coordinated, economic and efficient transmission, to ensure the GB energy consumer receives value for money. The key tenets that we must consider when we propose new transmission infrastructure are cost, environment and technical. A balance must be sought between all three.

As part of the development of all our projects a Cost Benefit Analysis is carried out to help demonstrate the economic viability of the scheme. As overhead line is the most economical solution, it is generally always our starting point when planning our major projects.

However, as we have made clear throughout the process, we recognise that there will be sections of the onshore infrastructure where OHL poses significant impacts to designated areas, habitats and key views. Undergrounding can then be considered to mitigate these impacts to ensure that our designs are consentable.

b. What is the difference in cost between overhead and underground?

No two projects are the same and the costs will ultimately be determined by a range of factors, including the voltage rating of the electricity infrastructure. Typically, there is a difference of five times more expensive with under-grounding vs overhead.

Examples of where the cost difference materialises include (but are not limited to) the following:

- Underground cables need to be protected (physically, thermally and electrically). This is provided by encasing the bare conductor in an insulated armoured sheath. The same degree of protection is not required when the conductor is placed overhead on a wooden pole.
- Establishing a haul road along the entire route of an underground cable circuit and excavating a trench is significantly more expensive than installing poles for an overhead line circuit at intervals along the identified route.
- The cost to underground is heavily dependent on the ground conditions that the circuit must cross. If for example rock was encountered, and/or other environmental or archaeological constraints, then this would have a direct impact on the construction cost as there would be a requirement to take mitigation measures (which may mean deviating and increasing the length of the circuit) which may add to the overall cost.

Furthermore, the impact on the local environment of undergrounding is often considered to be more damaging due to the significant trenching required to bury and protect the cabling, that has potential negative environmental impacts on groundwater dependent habitats and archaeology.

c. Why can't the entire project be undergrounded?

The cost of undergrounding all the renewable generator connections to the new transmission grid infrastructure is a significant challenge and could impact the economic viability of these projects due to higher connection and use of system costs. It is our legal obligation to try and balance the visual, environmental, technical, and commercial impact, which we recognise can be difficult and will often divide opinion.

However, as previously mentioned, underground cable is approximately five times the cost of the wood pole overhead line and requires significant trenching that has potential environmental impacts on habitats and archaeology.

Excessive volumes of underground cabling can also result in the need for more specialised equipment to be installed at substations and switching stations to ensure the network can function technically and efficiently, further increasing the costs.

As we set out in question 1c, any increased costs will have a direct bearing on the volume of generation required to justify the investment through the regulatory Needs Case process (i.e. the 'tipping point') and will also directly impact Orkney renewable developers through increases in their connection costs and network charges.

We therefore have an obligation to ensure costs are kept to a minimum, and where additional spend is required, this can be robustly defended and justified.

d. Why has SSEN decided to underground at Hoxa Head?

This decision to underground at Hoxa Head was taken due to environmental and engineering factors.

This includes the risk of collision of an overhead solution with protected bird species, the visual impact on the Sands of Wright and the Hoxa peninsula, the proximity to homes in the area at the exposed location increasing the risk that spray from the sea could damage to overhead transmission infrastructure.

The feedback received from the local community regarding the potential visual impact on the peninsula helped to highlight its sensitivity and was also a contributing factor in the decision to underground.

e. What is SSEN's policy for overhead lines near homes?

We operate a policy for all our projects whereby we will not install new overhead transmission lines within 100m of residential properties. This is designed to minimise the impact of our activities on the local community.

f. How much of the project will be undergrounded?

The onshore element of the project is still in development with further public consultation planned for spring 2019. It is therefore too early to say what the final design will look like, but we continue to work closely with the local community and statutory bodies as we further develop this part of the project.

Based on our latest design, which we are still refining following September and October's public consultations, of the total infrastructure required for the onshore element approximately 60km will be overhead and 20km underground.

We have also committed to underground the entire land cable from Finstown substation to the subsea cable landing point at Warebeth, covering a distance of a further 14.5km.

Taken collectively, based on our latest design for all elements of the project, over a third of the cabling required for the project will be underground.

g. Why is the cable from Warebeth to Finstown being undergrounded?

Steel lattice towers would normally be our preferred technology for transmission infrastructure operating at 220kV or above, which is the rating of the cable that connects from Finstown substation to the subsea cable landing point at Warebeth.

However, when planning this part of the project, we consulted with the local community and statutory consultees on the various technical solutions possible for this part of the project. Throughout this consultation, it became clear that there was significant local opposition to steel transmission towers in Orkney, not least due to the current absence of any such infrastructure on the Orkney Islands.

As the costs associated with undergrounding at this voltage are not dissimilar to that of steel towers and due to the strong feeling expressed by the local community, we made a clear commitment not to progress steel towers for any part of the project.

h. Why can't SSEN cross Scapa Flow?

Following feedback from the local community asking us to consider crossing Scapa Flow as an alternative route to take power from renewable generators looking to connect on Hoy, we commissioned subsea survey work to explore whether this would be a viable alternative.

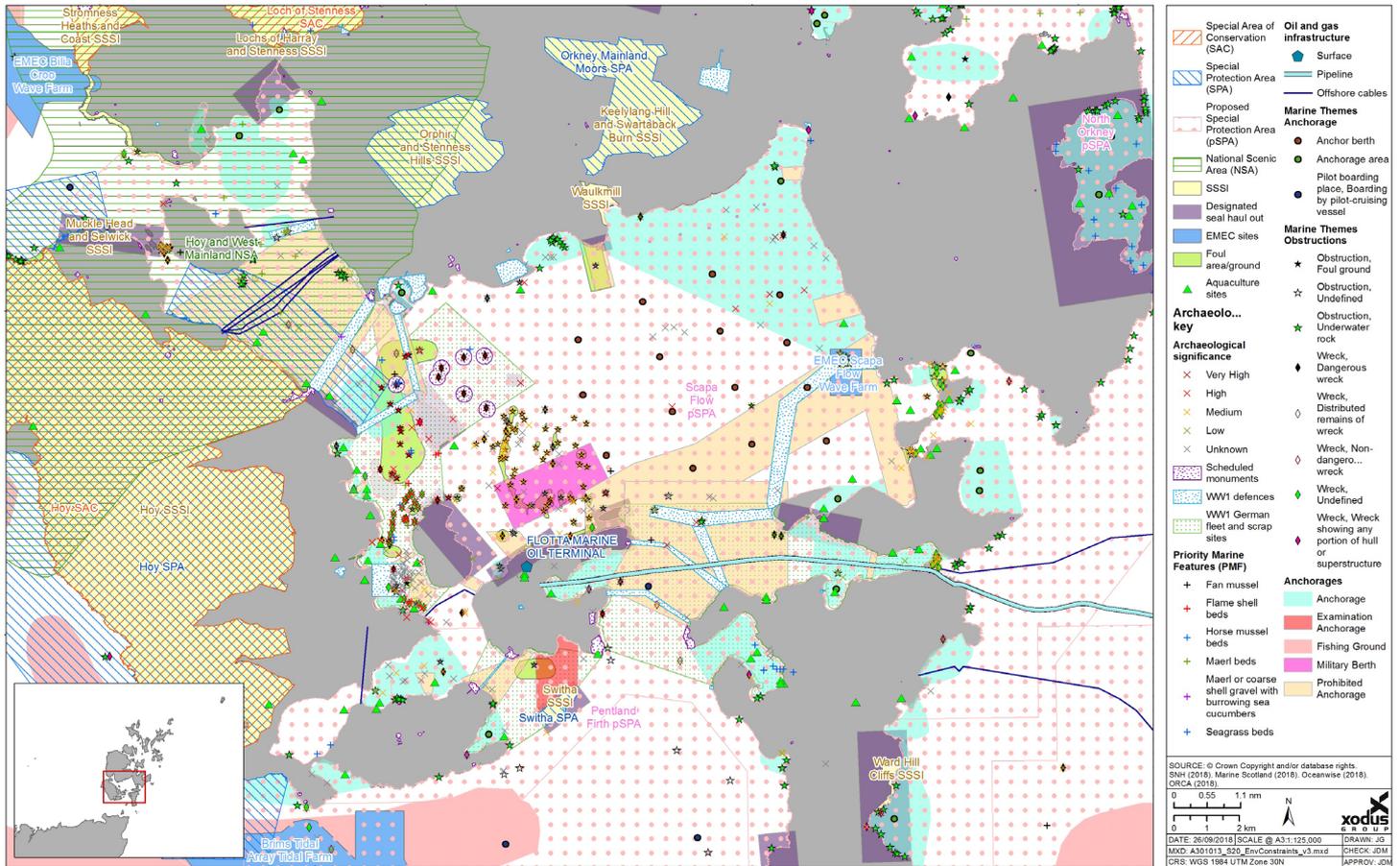
Installing a subsea cable through Scapa Flow would require developing a cable route through:

- A major anchorage and Ship to Ship transfer site;
- Numerous areas of significant cultural heritage, such as the second world war wreckage sites;
- Challenging seabed conditions;
- Oil pipelines; and
- Areas of environmental significance.

Having completed the survey work and associated engineering studies, the installation of a subsea cable across Scapa Flow would be extremely challenging and costly, if not impossible, due to the extent of constraints and designations that would need to be overcome.

Furthermore, we also need to consider the operational phase of the project and the same challenges associated with the ongoing inspection and maintenance of a subsea cable through Scapa Flow.

We have therefore concluded that we will not be able to install a cable through Scapa Flow and will instead continue to progress with an onshore route.



i. Will all the current proposed infrastructure be required?

Our current plans are based on the contracted position of the numerous renewable energy developers looking to connect in Orkney. However, we recognise that there is some uncertainty surrounding the progress of certain renewable projects and we therefore continually keep our options under review.

We will continue to plan our investment based on the current contracted position of our generation customers and any changes to this contracted position will inform the design of this part of the project.

Finally, it is important to note that the infrastructure will only be built once there is confirmation from those developers that they are looking to progress their connection.

j. Some comparisons have been made with Denmark, where a decision was taken to underground all network infrastructure. Why can't you do this for Orkney?

As a regulated business, the amount we invest in our network is ultimately governed by Ofgem through what's known as a Price Control. This effectively sets out how much we can invest, what we can charge users of our network and how much money we make in return.

The Danish Parliament passed a law in 2008 which will see the gradual undergrounding of most of the country's transmission infrastructure as and when their existing network is up for renewal. However, the costs associated with this are significant, estimated to run into the billions.

To underground all transmission infrastructure in Great Britain, including Orkney, would need to be a political and regulatory decision, not least due to the significant costs associated with this, which under the current regulatory and policy arrangement, would be ultimately passed through to energy consumers via their energy bills

Environmental considerations

a. What has SSEN done to mitigate the impact of the project on protected bird species?

We recognise our responsibilities to minimise the impact of our activities on the Islands' bird life and have captured a wealth of data on bird flight activity for all key species and breeding sites over the past 15 months. This data provides us with the basis for informing and risk assessing our design.

We have consulted with Scottish Natural Heritage (SNH) and Royal Society for the Protection of Birds (RSPB) at every step of our routeing and alignment process to ensure our proposals will not pose an unacceptable level of collision risk or breeding disturbance to protected species.

We are still consulting with these two bodies on several key sections of the proposed overhead lines and their guidance will be incorporated into our final design before it is submitted for s.37 consent.

b. Has SSEN taken into consideration the potential impact of the project on Orkney's Otter population?

We recognise our responsibilities to minimise the impact of our activities on Orkney's otter population and other local wildlife. Environmental baseline surveys for all terrestrial species along the land cable, including the landfalls, and overhead line routes have been carried out to identify any constraints to both the cable routeing and construction activities.

We operate under specific guidance in the form of Species Protection Plans, (SPPs), which we developed with SNH, to protect otters and other protected species. The findings of our baseline surveys and the assessment of any impacts will be presented in detailed Environmental Assessment reports which will be issued in 2019 as part of our planning and s.37 consent applications.

Although the land cable (Finstown to Warebeth) works are to be carried out under Permitted Development rights and therefore are not subject to planning, we are committed to providing the same level of environmental assessment and mitigation as if they were part of a formal planning application. A voluntary Environmental Appraisal will be submitted to the planning authority and statutory consultees, together with being published on our website.

The cable route, overhead lines and landfalls will be routed with the aim of avoiding direct impacts on any places of shelter for otters, and the construction works will be planned to avoid disturbance wherever possible.

The same approach will apply for the onshore element of the project (Orkney Infrastructure Project) to ensure we mitigate the impact of our activities on Orkney's terrestrial species.

c. What Archaeological studies have been carried out so far, and what measures will SSEN put in place to protect the Islands' archaeological heritage?

Given Orkney's vast, rich and highly significant archaeology we have carried out full baseline surveys of all our proposed routes and sites to identify any constraints. We have subsequently undertaken further targeted archaeology surveys and trial trenching in order to identify any unknown features. This has already been undertaken at the proposed Finstown substation site and along the main cable route.

The current work identified features and artefacts and excavation will be undertaken to understand the extent and significance of these. We will be looking to keep the public informed of any new finds through our Community Liaison Team.

As part of our Environmental Assessments we are also undertaking setting impact studies for scheduled monuments, listed properties/ structures and the World Heritage Site monuments to ensure we do not have an unacceptable level of impact on their value.

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