Shetland HVDC Link Project
Consultation, August 2016
Welcome to this public exhibition on Scottish Hydro Electric (SHE) Transmission’s proposed Shetland HVDC Link (the Project) between Shetland and mainland Scotland (Caithness).

The exhibition provides:
- An overview of the consenting process
- Information on who we are
- An overview of the project
- A summary of the development process
- Information on the route and on the routing considerations
- Information about the landfalls (the locations where the cable comes ashore)

The Consenting Process

SHE Transmission will require a Marine License from the Scottish Government as well as a Marine Works Licence from the Shetland Islands Council to construct and operate the Project. As part of the licence application procedure, SHE Transmission is preparing an Environmental Statement which will describe the characteristics of the project and provide information on the possible environmental effects of the connection and how they will be managed. The license procedures also require SHE Transmission to consult on its proposals. This exhibition forms part of the consultation process.

Both screening and scoping of the Project have been undertaken with Marine Scotland. This ensures that focussed and proportionate environmental information is produced to accompany the applications, which addresses the specific requirements and potential effects of the Project.

Following advice from Marine Scotland (and consultees), the potential effects of the installation and operation of the subsea cable will be considered along with the potential for cumulative effects where there is potential for effects to overlap with other marine and coastal developments.

The following topics will be covered as part of the Environmental Statement:
- Seabed and bedforms, including metocean conditions
- Water quality
- Designated sites
- Benthic ecology
- Marine mammals
- Fish and shellfish ecology
- Commercial fisheries and aquaculture
- Marine cultural heritage
- Shipping and navigation
- Socio-economics

Your Feedback

Your feedback on the Project is valuable and we would appreciate your input. As you examine this display, please consider the following questions:

1. Do you understand the need for the Shetland HVDC Link project?
2. Has the consultation information been clear and easy to understand?
3. Do you have any comment on how the subsea cable route and landfall locations have been selected?
4. Do you understand the consenting process that SHE Transmission will follow for the Shetland HVDC Link?
5. Do you have comments on the proposed scope of the Environmental Statement being prepared to accompany the marine consent applications?
6. Do you have any other comments that SHE Transmission should consider as it progresses the Shetland HVDC Link?

At the end of this exhibition, you will find a Comments Form and information on what happens next and how to have your say.
Scottish Hydro Electric Transmission Plc

Who we are

Scottish Hydro Electric Transmission (SHE Transmission) is part of the SSE group and owns and maintains the high voltage electricity network that serves the north of Scotland.

In total we maintain about 5,000km of overhead lines and underground cables – easily enough to stretch across the Atlantic from John O’Groats all the way to Boston in the USA.

Our network crosses some of the UK’s most challenging terrain – including circuits that are buried under the seabed, are located over 750m above sea level and up to 250km long.

The landscape and environment that contribute to the challenges we face also give the area a rich resource for renewable energy generation. There is a high demand to connect from new wind, hydro and marine generators which rely on SHE Transmission to provide a physical link between the new sources of power and electricity users. SHE Transmission is delivering a major programme of investment to ensure that the network is ready to meet the needs of our customers in the future.

Our responsibilities

As we are the only company that owns an electricity transmission network in the north of Scotland we are closely regulated by the energy regulator Ofgem. We are issued with a licence to operate and we must adhere to the terms of the licence. For this reason we operate on a very separate basis to other SSE businesses.

Our licence stipulates that we must develop and maintain an efficient, co-ordinated and economical system of electricity transmission.

What is the difference between Transmission and Distribution?

Electricity Transmission is the transportation of electricity from generating plants to where it is required at centres of demand.

The Electricity Transmission network, or grid, transports electricity at very high voltages through overhead wires, underground cables and subsea cables. The transmission network connects large scale generation, primarily renewables, to central and southern Scotland and the rest of Great Britain.

The Electricity Distribution network is connected into the Transmission network but the voltage is lowered by transformers at electricity substations, and the power is then distributed to homes and businesses through overhead lines or underground cables.

Overview of Transmission projects

| Existing infrastructure | Completed | Under construction | Potential development | Advanced planning |

Scottish Hydro Electric Transmission Plc
Scottish Hydro Electric Power Distribution Plc
Shetland HVDC Connection Project

SHE Transmission is required to develop proposals for a new electrical connection which would link Shetland to the Scottish mainland for the first time.

Viking Wind Farm, located on Shetland, has contracted with National Grid plc to connect to the UK transmission network by 2021. As Shetland is not currently connected to the National Grid, construction of a new subsea cable is required. SHE Transmission has proposed that a High Voltage Direct Current (HVDC) marine cable will run from Weisdale Voe in Shetland to Noss Head in Caithness.

The Shetland HVDC Link would be used primarily to transport large volumes of energy to Caithness and onwards to the Blackhillock Substation in Moray. It could also be used to provide electricity for Shetland.

Project description

SHE Transmission is proposing to construct and commission a subsea HVDC circuit which will be approximately 257km in length and capable of carrying 600MW. The cables will be bundled together and will include a fibre optic cable which will be used to control and monitor electrical equipment.

As the HVDC cable leaves land and enters the sea, it will either be routed via ducts that are created using a Horizontal Directional Drill or through a traditionally excavated trench. Once offshore the HVDC cable will be buried under soft sediment to a target depth of 1.8m, wherever possible. If the cable cannot be buried it will be protected by alternative methods, for example High Density Polyethylene (HDPE) duct or rock placement.

In addition to the subsea HVDC cables, the other key elements of the Shetland HVDC Link include:

- Construction of an HVDC Converter Station at Upper Kergord, Shetland
- Construction of an 8km underground HVDC cable between the HVDC Converter Station at Upper Kergord and the landfall location at Weisdale Voe
- Construction of an underground HVDC cable between Noss Head and a new Caithness HVDC Switching Station located to the north of Wick

Proposed marine works

The subsea cable installation comprises:

- Pre lay survey
- Boulder clearance
- Cable trench ploughing
- Cable laying
- Cable burial
- Rock placement (where required)
- Post installation survey
### The development process

The chart below shows the main stages of the development process and the opportunities there will be for local people and others to give feedback as cable route design and environmental assessment works progress. All dates are indicative at this stage.

<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006/2007</td>
<td>Search to identify potential landfall locations, potential subsea cable route options and carry out preliminary environmental assessments for cable route from Shetland to Moray.</td>
</tr>
<tr>
<td>Sept to Nov 2007</td>
<td>Preliminary consultation undertaken to inform the derivation of the cable route from Shetland to Moray.</td>
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<tr>
<td>2007/2008</td>
<td>Consider the feedback from consultation and clarify the preferred routes for the cable route from Shetland to Moray.</td>
</tr>
<tr>
<td>2008</td>
<td><strong>April to May:</strong> Public consultation exercise on potential routes for the cable route from Shetland to Moray. <strong>Sept:</strong> Meetings held with statutory authorities and key stakeholders on informal Scoping Report for Shetland to Moray cable route.</td>
</tr>
<tr>
<td>2008/2009</td>
<td>Carry out detailed environmental surveys and assessments to inform the marine consent application for the cable route from Shetland to Moray.</td>
</tr>
<tr>
<td>2010</td>
<td>Decision made that original Shetland to Moray cable route was not viable, and alternative routeing between Shetland and Caithness was proposed. Carry out detailed environmental surveys along the Shetland to Caithness cable route, during which the mussel bed was discovered (later designated by Scottish Natural Heritage as the Noss Head MPA).</td>
</tr>
<tr>
<td>2013</td>
<td>Carry out detailed environmental surveys on the preferred cable route from Shetland to Caithness and determination of preferred landfall on the Caithness coastline.</td>
</tr>
<tr>
<td>2015</td>
<td>Screening opinion requested from Marine Scotland. We agreed with Marine Scotland that a report collating environmental information would be provided to support the application packages.</td>
</tr>
<tr>
<td>2016</td>
<td><strong>March:</strong> Submission of scoping report to Marine Scotland to ensure agreement of topics to be included in supporting environmental information. Statutory consultation undertaken by Marine Scotland as part of this process. <strong>April:</strong> Carry out environmental surveys of the Noss Head MPA and surrounding area to determine extent of the mussel bed. <strong>April to Oct:</strong> Preparation of Environmental Statement to accompany the Marine Licence and Marine Works applications. <strong>Aug:</strong> Receipt of Scoping Opinion from Marine Scotland to confirm the requirements for the Environmental Statement. <strong>Aug:</strong> Pre-application consultation with the public on the preferred cable route and scope of the Environmental Statement. <strong>Aug to Sept:</strong> Consider and reflect on feedback from consultation on the scope of the Environmental Statement. <strong>Nov:</strong> Submission of Marine Licence application to Marine Scotland and Marine Works application to Shetland Islands Council.</td>
</tr>
<tr>
<td>2017</td>
<td>Statutory Consultation – Marine Scotland and Shetland Islands Council will both undertake statutory consultation following submission during which representations can be made directly to the relevant authority. Determination of Marine Licence and Marine Works applications.</td>
</tr>
<tr>
<td>2019</td>
<td>Subject to consent, commencement of construction works.</td>
</tr>
<tr>
<td>2021</td>
<td>Subject to consent, completion of construction works.</td>
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Subsea Cable Route

Subsea Route Selection
The project development team have developed the subsea cable route in a manner which balances technical, economic and environmental considerations to select a route which is economically viable, technically feasible and capable of being granted consent.

Economic Considerations
The means by which the HVDC cable is constructed and the route it takes are key factors informing the cost of the Shetland HVDC Link. A straight line route theoretically presents the cheapest option, however, in reality the technical challenges and costs of transitioning the cable across multiple seabed and land features would mean that this is not a viable solution.

SHE Transmission’s preferred installation method for HVDC subsea cables is to bury them on the seabed. This method is the most common installation technique and is a proven method for protecting cables. In areas with thin sediment cover, or additional seabed constraint, alternative means of protecting the cable on the seabed will be necessary. Covering cables with concrete mattressing is possible however due to the precise design requirements it is deemed to be relatively expensive, unsuitable for extensive lengths and subsequent maintenance of the cable can be complex.

SHE Transmission is also considering placement of rocks to cover the cable. The placement is more economically efficient than installation of concrete mattresses and provides a high degree of protection. The final technique being considered, especially in sensitive marine habitats, is cable armouring where both cables will be encased in a polymer casing and laid on the seabed. This option is costly however it reduces the requirement for burying, rock placement or laying of concrete mattresses.

SHE Transmission is looking at all options of cable protection along different sections of the cable route. Final decisions will be taken once detailed engineering design studies have been completed.

Technical Considerations
There is a wide range of technical considerations; from cable size and capacity; connection to existing transmission infrastructure; to the method of installation which inform the routeing process, with associated economic and environmental implications.

Technical considerations include cable installation and protection methods, which are more achievable in softer sediment. Avoidance of undulating seabed topography is preferred to minimise the possibility of free spans, where the cable is suspended above the seabed, which can lead to seabed scouring. It is also necessary to take account the access to existing infrastructure at either end of the cable route. Noss Head was selected as a landfall as it is close to the existing HVDC network connecting Caithness and Moray. Weisdale Voe on Shetland was selected as part of the permitted development works associated with the Kergord Converter Station.

Environmental Considerations
SHE Transmission recognise that a major infrastructure project like the Shetland HVDC Link can have the potential to impact on the environment, therefore careful design and planning is required at every stage. Through careful planning and evaluation SHE Transmission will be able to develop effective protection measures within sensitive areas during both installation and operation of the cable.

A key example includes how the Noss Head Marine Protected Area (MPA) will be protected. SHE Transmission has considered the physical disturbance to the designated habitats within the MPA, changes in temperature in the immediate vicinity of the cable and effects of smothering on benthic communities on the seabed. Given the available information, SHE Transmission intends using cable armouring in this area to minimise the impact on this sensitive marine environment.

It is recognised that the sea area through which the proposed cable route passes is considered important for a variety of commercial fisheries activities, including whitefish, shellfish and aquaculture. SHE Transmission is working with the relevant fishing organisations to ensure that possible disruption to fishermen operating in these areas is limited as far as practical.
Routing Considerations

Route options
Determining the most appropriate route for the HVDC cable has required the consideration of several route options. The area of investigation is between Weisdale Voe, Shetland and a landfall location at Noss Head Caithness, mainland Scotland. Three routes between these points have been considered during the development process:
1. A straight line between preferred landfalls including four land transitions
2. An entirely subsea route avoiding islands and major seabed features
3. An adapted version of option 2, which also avoids aquaculture and fishing areas, chartered anchorage areas, documented wreck sites and areas of elevated currents and significant sedimentary bedforms

Determining Suitability
Defining the most economic, environmentally sensitive and technically achievable route has been done by considering the requirements of each constraint.

To understand these constraints, marine surveys have been undertaken to map the seafloor to provide a detailed understanding of the geology, seabed sediments and the flora and fauna it supports. This information has been combined with data on other marine factors including fishing, shipping and the suitability of the seabed sediments for cable burial. The combination of this information enables the development of the preferred subsea cable route.

Sensitivity of receptors
Receptors could be considered as any aspect of the environment, both human and non-human which may be impacted upon (positively or negatively) during both construction and operation of the cable. Completion of a range of technical studies help us to establish what the most sensitive receptors are within the area, the likely impacts they may experience during the installation and operation phases of the project and the magnitude of these impacts.

Examples of the likely receptors which could be impacted upon include, but are not limited to:
- Seabed habitats and associated organisms
- Water quality
- Marine mammals
- Commercial fisheries and aquaculture
- Marine cultural heritage
- Shipping and navigation

Impacts on receptors and the most effective means of mitigation have been taken into consideration when selecting the most appropriate route for the subsea cable.
Noss Head Cable Landfall

Key considerations and challenges.

The criteria used to judge a possible landfall location were:
- Geology of seabed and coastline
- Proximity to existing electrical infrastructure
- Suitability of near shore sea conditions
- Level of any commercial fisheries effort
- Presence of areas of cultural heritage
- Presence of ecological features
- Current use of the landfall location and surrounding areas
- Ease of construction and operation
- Any anticipated licensing obstacles

Four landfall locations were originally considered on the Caithness coastline:

1. Freswick’s Bay
2. Sinclair’s Bay (north)
3. Sinclair’s Bay (south)
4. The rocky headland south of Noss Head

The proposed landfall location at Noss Head has been selected, balancing a range of cost, technical and environmental factors. A key factor in determining this landfall was the immediate availability to connect to the HVDC network, the surrounding land uses and the absence of obvious archaeological interests. The presence of the Noss Head Marine Protected Area offshore and the ways to mitigate any potential impacts on this feature have been carefully considered in the decision making process and through consultation with Scottish Natural Heritage.
Shetland Cable Landfall

Key considerations and challenges.

The criteria used to judge a possible landfall location included:
- Geology of seabed and coastline
- Level of any commercial fisheries effort
- Presence of ecological features and designated sites
- Distance from ferry terminals
- Distance to converter station at Upper Kergord
- Ease of construction and operation
- Any anticipated licensing obstacles

Six landfall locations were originally considered on the Shetland coastline:
1. Laxo Voe
2. Laxo Ferry Terminal
3. Ayre of Atler
4. West Voe of Skellister
5. Weisdale Voe
6. Gonirth

The proposed landfall location at Weisdale Voe has been selected, balancing a range of cost, technical and environmental factors. Alternative landfall locations were discounted because of their closer proximity to the ferry terminal and anchorages, presence of wrecks and other archaeological features, proximity to more densely populated areas and a rockier seabed, which would require rock placement as a cable protection method, leaving a risk to commercial fishing activity.
What happens next and how do I have my say?

We appreciate all feedback and thank you for taking the time to provide your comments. You can complete a feedback form today, or you can post it back to us at the address provided. Information can also be provided by our Community Liaison Manager upon request. Feedback submitted to SHE Transmission as part of the pre-application consultation process and will be used to inform our submission to Marine Scotland as the relevant Planning Authority. Any feedback received at this stage will be presented in a Consultation Report submitted with our planning application. You will also have the opportunity to make formal representation to our planning application once it is submitted. This consultation will be carried out by Marine Scotland and Shetland Islands Council.

Comments can be submitted as follows:

At the exhibition today
Complete a Comment Form and give it to a member of the team.

By post
Complete a Comments Form and post it to our Community Liaison Manager (details opposite).

By email
Complete a Comments Form and email it to our Community Liaison Manager (details opposite).

Information can also be posted out to you by our Community Liaison Manager upon request.

Please provide any comments to us by 9 September 2016

Get in touch with our Community Liaison Manager:

Neil Anderson

Email: neil.anderson@sse.com
Phone: 07500 912 506
Write: Neil Anderson, SHE Transmission Inveralmond House, 200 Dunkeld Road, Perth, PH1 3AQ

We are very keen to ensure that members of the community understand the Project as it will progress to application for a Marine Licence and Marine Works Licence from Marine Scotland and Shetland Islands Council in late 2016.

Although the Project is now in an advanced development stage, we are still openly welcoming comments and feedback to help us refine the scope of the Environmental Statement.
Your comments

Thank you for taking the time to attend this information event. In order to record your views and improve the effectiveness of our consultation, please complete this short feedback form. Please complete in BLOCK CAPITALS.

Name

Address

Telephone

Email

Do you understand the need for the Shetland HVDC Link project?

☐ Yes ☐ No

Comments

Has the consultation information been clear and easy to understand?

☐ Yes ☐ No

Comments

Do you have any comment on how the subsea cable route and landfall locations have been selected?

Comments
Do you understand the consenting process that SHE Transmission will follow for the Shetland HVDC Link?

Comments

Do you have comments on the proposed scope of the Environmental Statement being prepared to accompany the marine consent applications?

Comments

Do you have any other comments that SHE Transmission should consider as it progresses the Shetland HVDC Link?

Comments

Do you have any other feedback for the project team?

Comments

Thank you for taking the time to complete this form.
If you would like your comments to remain anonymous, please tick this box. □

Any information given on this comments form may be used and published as part of SHE Transmission’s consultation report. By completing this comments form you consent to SHE Transmission using this information for these purposes. By providing contact details you consent to SHE Transmission contacting you in relation to this proposal. Your details will not be used for any other purpose. If you wish your comments to remain anonymous, please tick the box at the end of this form. Please note that comments made to SHE Transmission are not representations to the Marine Scotland and Shetland Islands Council as planning authority at this stage. The opportunity for lodging representations will be when the application is formally submitted to the Marine Scotland and Shetland Islands Council for formal consideration.