Eastern Green Link 3 (EGL3) High Voltage Direct Current (HVDC) Cable Scheme

Consultation Booklet

June 2023

Scottish & Southern Electricity Networks

TRANSMISSION

Contents

Who we are

We are SSEN Transmission, the trading name for Scottish Hydro Electric Transmission. We are responsible for the electricity transmission network in the north of Scotland, maintaining and investing in the high voltage 132kV, 220kV, 275kV and 400kV electricity transmission network.

Our network consists of underground and subsea cables, overhead lines on wooden poles or steel towers, and electricity substations. It extends over a quarter of the UK's land mass, crossing some of its most challenging terrain.

Our first priority is to provide a safe and reliable supply of electricity to our communities. We do this by taking the electricity from generators and transporting it at high voltages over long distances through our transmission network for onwards distribution to homes and businesses in villages, towns and cities.

Our operating area is home to vast renewable energy resources and this is being harnessed by wind, hydro and marine generation. Working closely with National Grid, the GB transmission System Operator, we also enable these electricity generators to connect to the transmission system by providing their connections and allowing the electricity generated by them to be transported to areas of demand across the country.

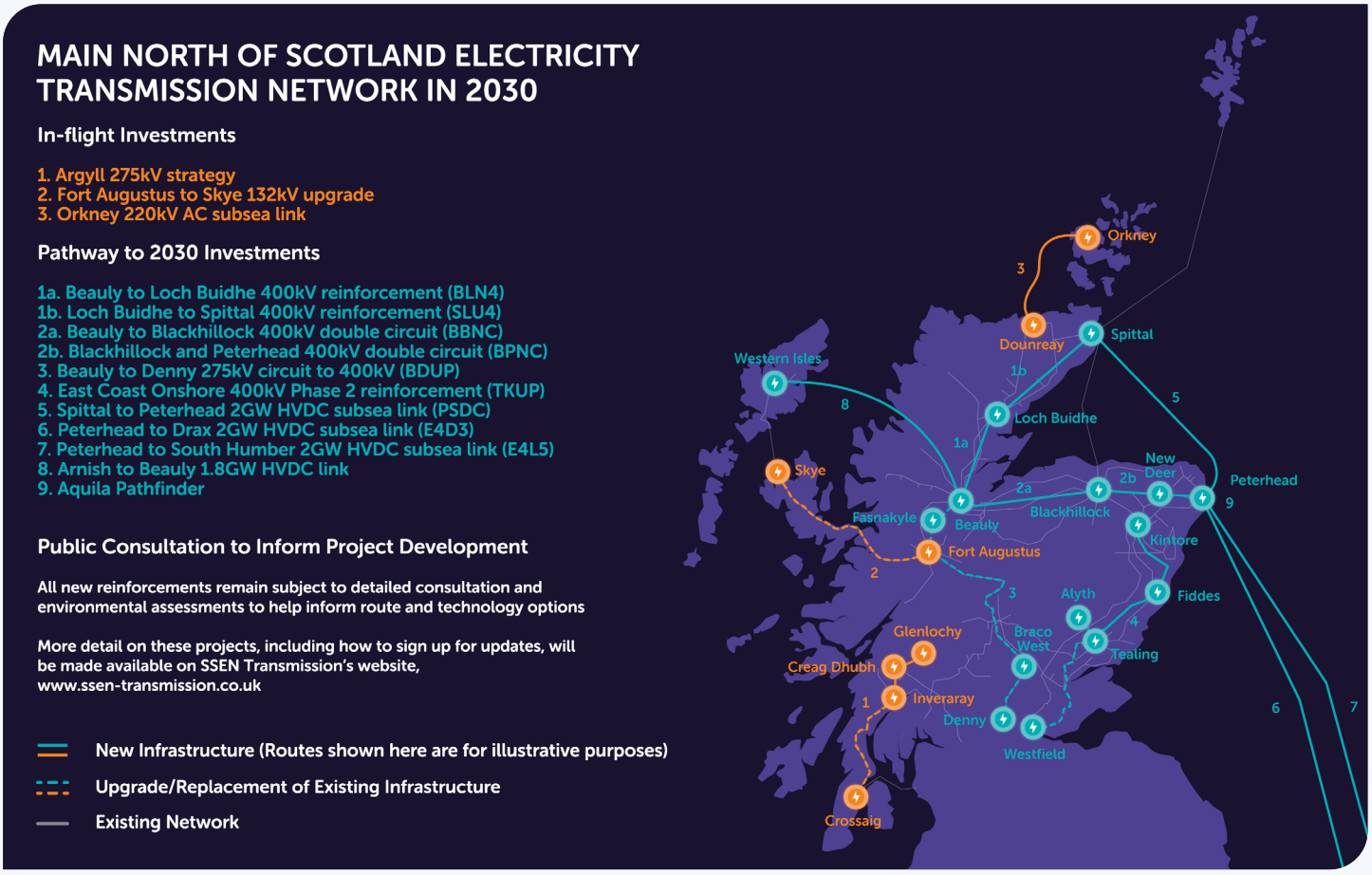
Scotland's transmission network has a strategic role to play in supporting delivery of the UK and Scotland's Net Zero targets. We're already a mass exporter of renewable energy, with around two thirds of power generated in our network area exported to demand centres further south. By 2050, the north of Scotland is expected to need 40GW of low carbon energy capacity to support net zero delivery. For context, we currently have around 8GW of renewable generation connected in the north of Scotland.

As a natural monopoly, we are closely regulated by the GB energy regulator, Ofgem, who determines how much revenue we are allowed to earn for constructing, maintaining and renovating our transmission network in the north of Scotland. These costs are shared between all those using the transmission system, including generation developers and electricity consumers. Following a minority stake sale which completed in November 2022, we are now owned 75% by SSE plc and 25% by Ontario Teachers' Pension Plan Board.

As a stakeholder-led business, SSEN Transmission is committed to inclusive stakeholder engagement, and we conduct this at an 'Advanced' level as assessed by AccountAbility, the international consulting and standards firm.

The Pathway to 2030 Holistic Network Design

In July 2022, National Grid, the Electricity System Operator (ESO) who are responsible for making sure that the electricity flows across the UK's system, balancing supply and demand at all times, set out how the transmission network needs to develop to accommodate the growth in renewable electricity across Great Britain. This also included the UK and Scottish Government's 2030 offshore wind targets of 50GW and 11GW. For the north of Scotland, this needs over £7 billion of investment in the transmission network to deliver the 2030 targets and help the country on its pathway to net zero and greater energy independence.



What does this mean for the North and North East of Scotland specifically?

Extensive studies informing the ESO's Pathway to 2030 Holistic Network Design confirmed the need for Eastern Green Link 3 to support continued growth in renewable generation both onshore and offshore in the North East of Scotland to feed demand centres in the South of England and will enable the connection of multiple ScotWind schemes considered in the HND.

Constructing a 525kV subsea cable connection between Peterhead and Lincolnshire provides the significant capacity required to take power generated from large scale renewable energy schemes in the North of Scotland to demand centres located in England and throughout the UK.

To enable this connection and also ensure sufficient generation capacity throughout the transmission system, new 400kV substations are required at key locations as shown on the map above. At Peterhead, high voltage Alternating Current/Direct Current (AC/DC) converter stations are also required to convert AC electricity to DC (and vice versa), from the EGL 3 offshore subsea connections from Peterhead south into England, and between Spittal and Peterhead. These 'hub' areas will also allow offshore and onshore renewable generation to connect to the reinforced electricity network. These projects are critical to enable the delivery of the UK and Scottish Governments 2030 net zero targets, and have a requirement for accelerated development and delivery.

EGL3 HVDC project need and overview

Project need

To meet the requirements of increasing renewable energy generation multiple projects are being developed by SSEN Transmission and others are being jointly developed between SSEN Transmission and National Grid. Extensive system studies have been completed to inform the ESO's 'Pathway to 2030 Holistic Network Design', confirming the requirement to develop new direct connections between the networks in Scotland and England.

To transfer the renewable power generated in the North of Scotland to demand centres in the South a 525kV HVDC link, via a subsea cable from Peterhead to the Lincolnshire area is required and will be known as Eastern Green Link 3. Additional transmission infrastructure is also being developed as part of other projects to support onward transfer of power, such projects include the Eastern Green Link 2.

Further information on the Eastern Green Link 2 project can be found on our website: **ssen-transmission.co.uk/projects/project-map/eastern-green-link-2**

Project overview

The Eastern Green Link 3 project will use the latest technology to provide a 2GW bi-pole, 525kV HVDC link between Peterhead in Aberdeenshire and the Lincolnshire area in England. This will enable the efficient transmission of high volumes of power which can then be further distributed to demand centres throughout the UK, as required.

At each end of the HVDC link, 400kV AC substations will supply power to (or receive power from) newly constructed high voltage AC/DC converter stations at Peterhead and Lincolnshire, depending on the directional flow of power. Consultations for the converter station sites have begun and future consultations will be held throughout 2023 and 2024.

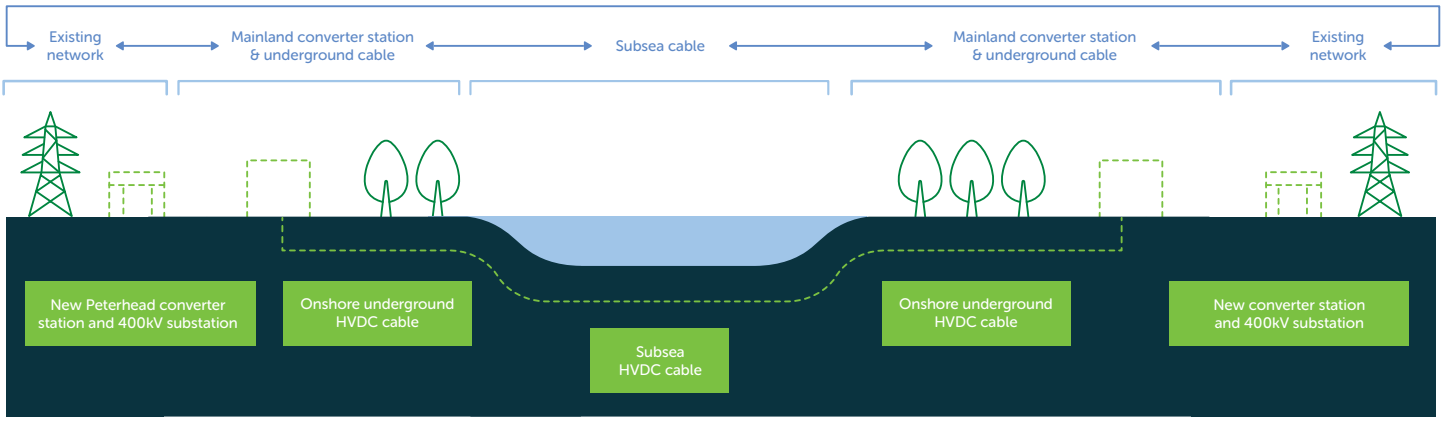
Peterhead Net Zero 2030 Developments

To achieve the planned Pathway to 2030 investments there is a requirement to develop a second 400kV substation, a second 132kV substation, and two HVDC link converter stations at Peterhead. All of these developments will occur at a single site to help to minimise impact on the local community. Further information about the Peterhead Net Zero:

ssen-transmission.co.uk/projects/project-map/peterhead-net-zero-2030-developments

Connections between these assets will be via HVDC cables buried either underground or below the seabed. In Peterhead, the land cable corridor could stretch up to 12km between the Peterhead Net Zero 2030 Development site and the associated landfall. The cables will also pass through a neighbouring HVDC switching station which will provide further resilience to the network. The subsea cable route is currently being developed, including making a final determination of preferred landfalls in Scotland and England however the subsea cable may cover up to 550km before making the transition back to land cable again. The length of the land cable corridor to grid connection in England will also depend on the final landfall location.

EGL3 HVDC project need and overview



Project timeline

2023
- Consultations with stakeholders and statutory consultees.
- Onshore, offshore, and engineering surveys commence.

2024
- Marine Licence Pre-Application Consultation.
- Marine Environmental Assessment and Licence Application submission.
- Onshore Voluntary Environmental Assessment completion.

2025
- Project receives Marine Licence.
- Commencement of cable manufacture.

2026
- Commence onshore cable installation.
- Marine pre-installation activities.

2027 –2028
- Continue onshore cable installation.
- Marine cable installation.

2029 – 2030
- Marine cable installation completed.
- Onshore cable installation complete.
- Commissioning and energization.

Our consultation process

At SSEN Transmission, we are committed to delivering a robust and transparent consultation process underpinned by inclusion and accessibility. As a stakeholder led business, we understand the importance of involving communities and key stakeholders throughout each stage of our development process.

This period of engagement in the development phase is vital in shaping our proposals and to do this effectively, we need to capture feedback from stakeholders, harness local knowledge to identify key risks and explore potential community benefit opportunities. Today we are presenting our approach to developing this project, including environmental considerations, preliminary landfall selection, routing processes, and presenting maps which aim to give all stakeholders a better visual representation of the project to date.

This event is intended to provide a high-level overview of the project, and to specifically present information about the potential locations of landfall for the marine scheme elements and associated cables. If you require additional support to submit your views, please contact our Lead Community Liaison Manager Dav Lynch who will happily assist you.

What we're consulting on today

Desktop surveys and early analysis have enabled us to identify our preferred options for this project's marine cable landfall locations, onshore cable corridors and potential subsea cable corridors. Sharing our approach to developing this project and the rationale behind our early proposals, we are keen to hear stakeholder views around these proposals and if there are further considerations you believe need to be included during the next stage of the development process.

Who we're consulting with

We are interested in hearing feedback from a broad range of stakeholders including, but not limited to, local residents, landowners, businesses, non-statutory consultees and statutory consultees including local authorities, SEPA, Nature Scot, Historic Scotland, the Maritime and Coastguard Agency, Northern Lighthouse Board, and Marine Scotland.

Subsea cables and landfall

Why are subsea cables important?

Subsea electricity transmission cables are important critical infrastructure that carry power from areas where power is generated to areas of high demand where the power is consumed. Subsea cables provide an alternative to onshore power transmission and can help to increase redundancy and security of the energy system.

The proposed HVDC system will include approximately 550km of subsea cable linking landfall sites in Scotland and England. The subsea HVDC system is expected to consist of two conductor cables and one fibre optic communications cable these will be installed either bundled within a single trench, or separately in two separate trenches. These cables will be installed within one of the marine cable corridor options currently being considered. These identified corridor options are approximately 1km wide to allow for route refinement throughout the project development, which will be informed by detailed landfall assessment, marine surveys and engineering activities.

Wherever possible, the offshore cables will be buried in the seabed to protect them. Where burial is not possible, they will be protected using rock berms placed on top of the cables or an external cable protection system.

Cable landfall

Cable landfalls, or landing points, are the locations where our subsea cables come ashore.

Where possible, subsea cables are buried under the seabed to protect the cable from damage. When bringing the cable ashore, a section of the shoreline is excavated and ducts that will carry the cable from under the seabed onto land are installed. The cable is then pulled through the ducts, which are then buried and the shoreline is reinstated. This method is called 'open-cut trenching'.

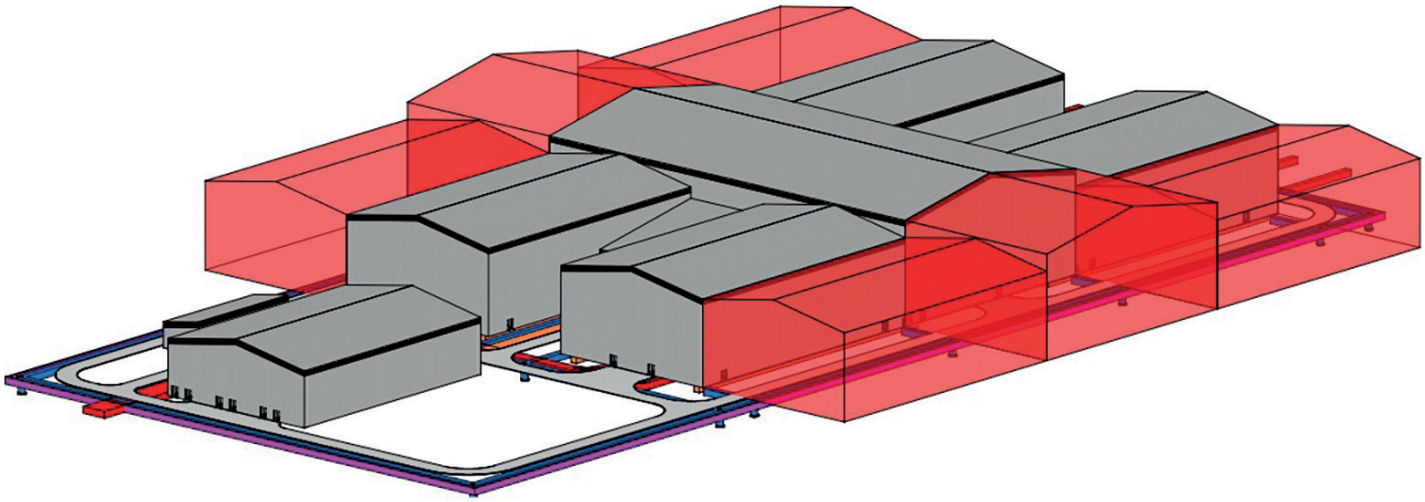
Where open-cut trenching is not possible, a horizontal directional drilling (HDD) approach can be used to drill and install ducts underground through the shoreline, providing an alternative method for cable landfall in areas of bedrock or challenging geology.

DC switching station

What is a DC switching station?

A modern component in the UK's energy network, switching stations facilitate the option to connect and disconnect DC transmission lines or other components such as generation to and from the system through a series of switches providing redundancy in the network. The switching station will provide redundancy in the network by allowing connections to the northern and southern elements of the UK network while providing uninterrupted connections for maintenance and similar works.

Conceptual drawing of a 4 bay DC switching station with provisional expansion



Switching station requirements

A switching station requires a large area of level ground similar to that required for a HVDC converter station.

All equipment would be contained within a large metal cladded, climate-controlled building, with other smaller auxiliary buildings adjacent.

The buildings would typically consist of suitably coloured steel cladding with a pitched roof.

All of the finished building designs are subject to approval with the local planning authority.

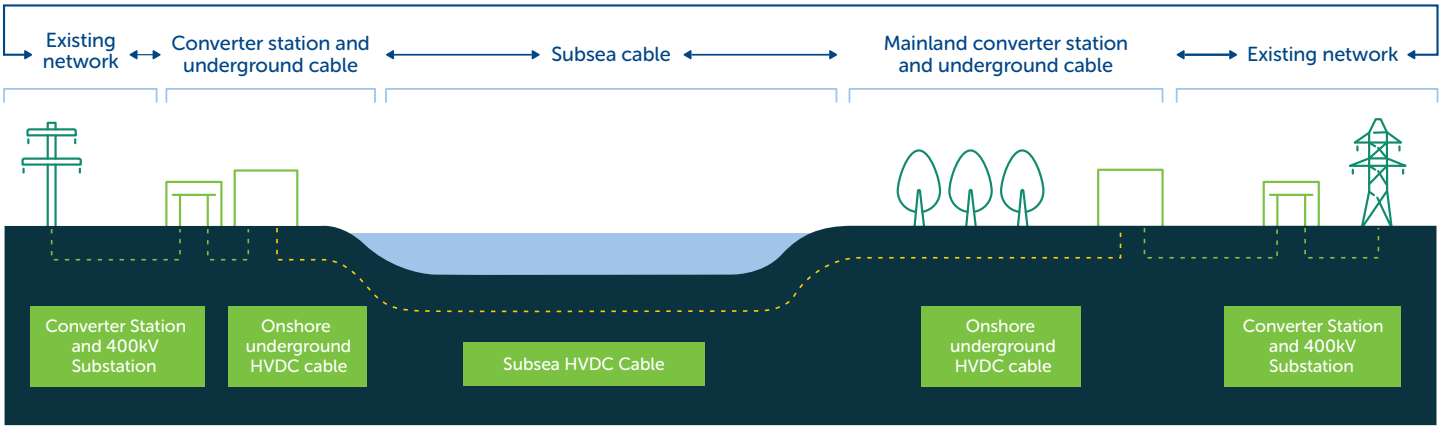
Switching stations are located along the DC transmission network between converters to provide the facilities described above.

This project will connect to a DC switching station at the Peterhead Net Zero 2030 Developments.

HVDC converter station

What is a converter station?

This is a site which converts Direct Current (DC) to Alternating Current (AC) or AC to DC. AC is how our houses and businesses use electricity from the grid. HVDC is a well-established technology that allows the efficient transmission of large quantities of electricity across long distances, with much reduced electrical losses compared with AC. It also introduces greater flexibility and resilience in the operation of the network and the management of variable outputs from renewable generation. A converter station needs to connect to a substation or switching station to access the AC network.



Converter station requirements

A Converter station requires a large area of generally level ground. Approximately 290m x 325m. Most of the equipment would be contained within a large metal cladded, climate controlled building, with other smaller auxiliary buildings adjacent.

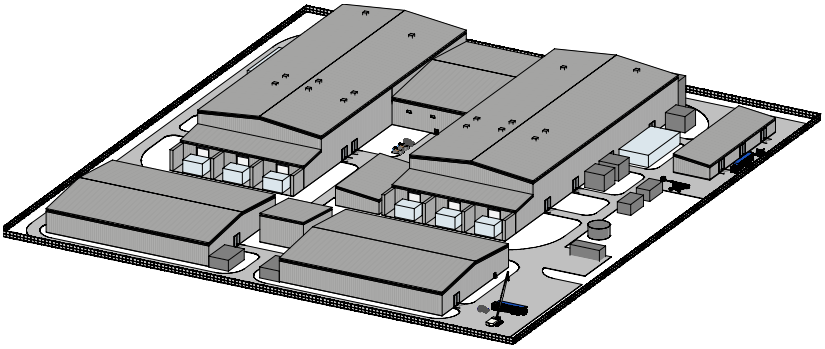
The buildings would typically consist of suitably coloured steel cladding with a pitched roof.

The proposed rating of the subsea links requires the main building to be taller than the other buildings being proposed.

This is due to the clearance distance required between the high voltage equipment and the buildings' structure.

All of the finished building designs are subject to approval with The Aberdeenshire Council.

Converter stations need to be located as close to the AC transmission network as is practicableto minimise additional infrastructure and improve network operation.



Indicative conceptual design for 2GW 525kV Bipole converter station

The 320kV DC 1200MW Blackhillock HVDC converter station

Our landfall selection and routing process

SSEN Transmission's approach to cable landfall selection and cable routing is underpinned by our statutory obligations and industry recommended practice.

As defined by our statutory obligations, SSEN Transmission aims to: 'Develop and maintain an efficient, coordinated and economical electricity transmission system in its licenced area' and in so doing, to 'have regard to the desirability of preserving the natural beauty, of conserving flora, fauna and geological and physiographical features of special interest and protecting sites, buildings and objects of architectural, historic or archaeological interest; and do what we 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'.

These duties capture the principal objective of the landfall selection and routing process which is to:

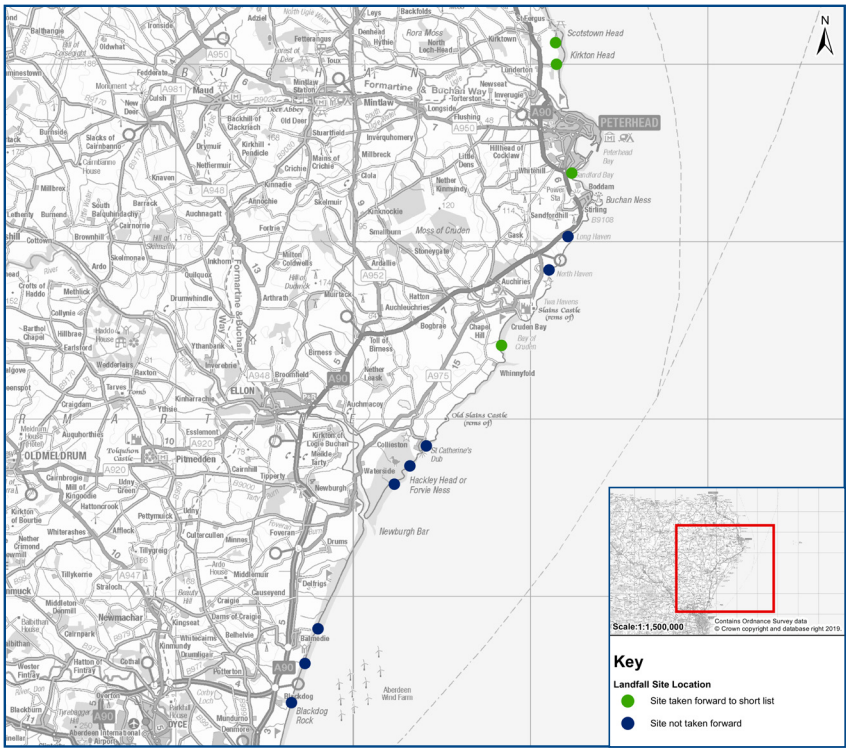
- Balance technical and cost considerations with environmental considerations;
- Select a proposed alignment which is economically viable and technically feasible;
- Minimise impacts on important resources or features of the environment to reduce disturbance to those living in it, working in it, visiting it or using it for recreational purposes.

The starting point for all marine cable projects is to establish the need for the project and to select the preferred strategic option to deliver it. This process is triggered by the preparation of several internal assessments and documents which identify the cable technology to be used and the point on the existing transmission network where a connection can be made. The Peterhead Net Zero 2030 Developments site has been identified as the key connection point in Scotland, for this project.

Once connection points have been identified, cable landfall selection and associated onshore and offshore routing follows a number of refinement stages to determine the most appropriate landfall locations. When selecting subsea cable routes and landfall locations, SSEN Transmission follows industry-wide guidance provided by regulatory bodies and standards organisations including DNV-GL, NatureScot, and SEPA.

Landfall selection: what we considered

Preliminary marine cable landfall search areas were identified along the Aberdeenshire coastlines to allow for a new connection at the Peterhead Net Zero 2030 Development. Within these search areas, potential landfalls characterised by soft sediment (sandy or gravelly) bays which could potentially accommodate either soft landings, or HDD were initial identified. As much of the Aberdeenshire coastline within the search area comprises cliffs, consideration was also given to cliff heights likely to be encountered, which were identified and assessed using a 'Red/Amber/Green (RAG) assessment approach considering high, medium and low impacts.



All potential landfalls identified for this project are illustrated in the map above. Blue dots represent landfalls that were not taken forward for detailed investigation. Green dots are potential landfall sites that have been taken forward for further investigation.

A RAG assessment is an evidence based, qualitative evaluation method based on a series of agreed criteria that allow for comparison and differentiation between options. Through this process, each potential landfall was assessed as red, amber or green based on the following criteria:

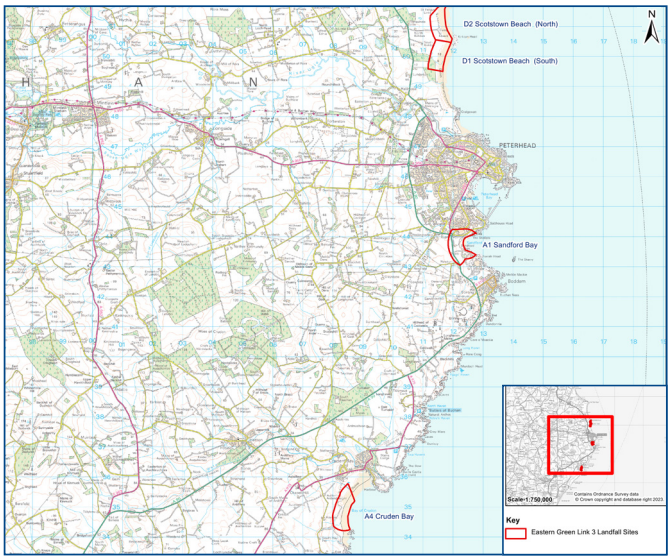
- Onshore environment: designated areas and features such as Special Site of Scientific Interest (SSSI), Special Protected Areas (SPA), Special Area of Conservation (SAC) and nature reserves, and features determined through landscape character assessments (LCAs), cultural heritage, water designations.
- Marine environment: seabed conditions and constructability, designated areas and features such as Marine Protected Areas (MPAs), interactions with other sea users (e.g. commercial fisheries, offshore wind farms, shipping/navigation), cultural heritage, and marine cable length.
- Geotechnical: both onshore and offshore considerations including sediment depth, presence of bedrock, glacial till, deposits, blown sand
- Landfall engineering: constructability, site access, cliff gradients, environmental effects on cable ratings

A summary of the outcomes of these preliminary RAG assessments can be found in the tables that follow.

Landfall site options

Following identification of suitable landfall zones, 12 potential landfall locations were taken forward for further investigation, of which 4 were subjected to a detailed RAG assessment:

- Cruden Bay is a long bay located south of Peterhead. It has an established dune system and has significant recreational use. Within the vicinity of the landfall area is a settlement and a golf course.
- Sandford Bay is located immediately south of Peterhead, set within a more industrial land use. The bay itself is soft sediment with rocky cliffs surrounding the site. There is some agricultural use near to the landfall area.
- Scotstown Beach (south) is located north of Peterhead and south of the gas terminal. It is a long beach with established dunes and recreational use.
- Scotstown Beach (north) is located north of Peterhead and south of the gas terminal (closer to the gas terminal than the south option). It is a long beach with established dunes and recreational use.



The following table summarises the outcomes of the RAG assessment for the potential four landfall locations:

Category	Cruden Bay	Sandford Bay	Scotstown Beach (south)	Scotstown Beach (north)
Marine environment landfall and offshore cable	M	M	M	M
Environment and consent landfall	M	M	M	M
Geotechnical engineering	L	M	L	L
Engineering landfall	M	L	M	M

Cruden Bay

There are potential marine consenting constraints due to congestion with other marine space users including oil pipeline and telecoms cabling already using bay as landfall. The geotechnical assessment showed this location to have potentially deep soft sediments. Buchan Ness to Collieston Coast SPA extends into low water, but does not cover the beach itself. The Buchan Ness to Collieston SAC and Bullers of Buchan Coast SSSI designations extends to protect the cliffs either side of the bay. Any impacts to these features will need to be considered.

Sandford Bay

Is a wide soft sediment bay. There could be marine consenting challenges due to potential for congestion of other infrastructure, existing and planned, coming into the bay. There are known bedrock geology challenges (the weathered and fractured granite) with a fragment rocky coast.

Scotstown Beach (south)

There are marine routing challenges due to the Southern Trench MPA and potential interaction with the designated features of this site. There are established dune systems and in places pockets of designated ancient woodland. There are soft sediments but further investigation would be required to increase confidence that there is not hard sediment.

Scotstown Beach (north)

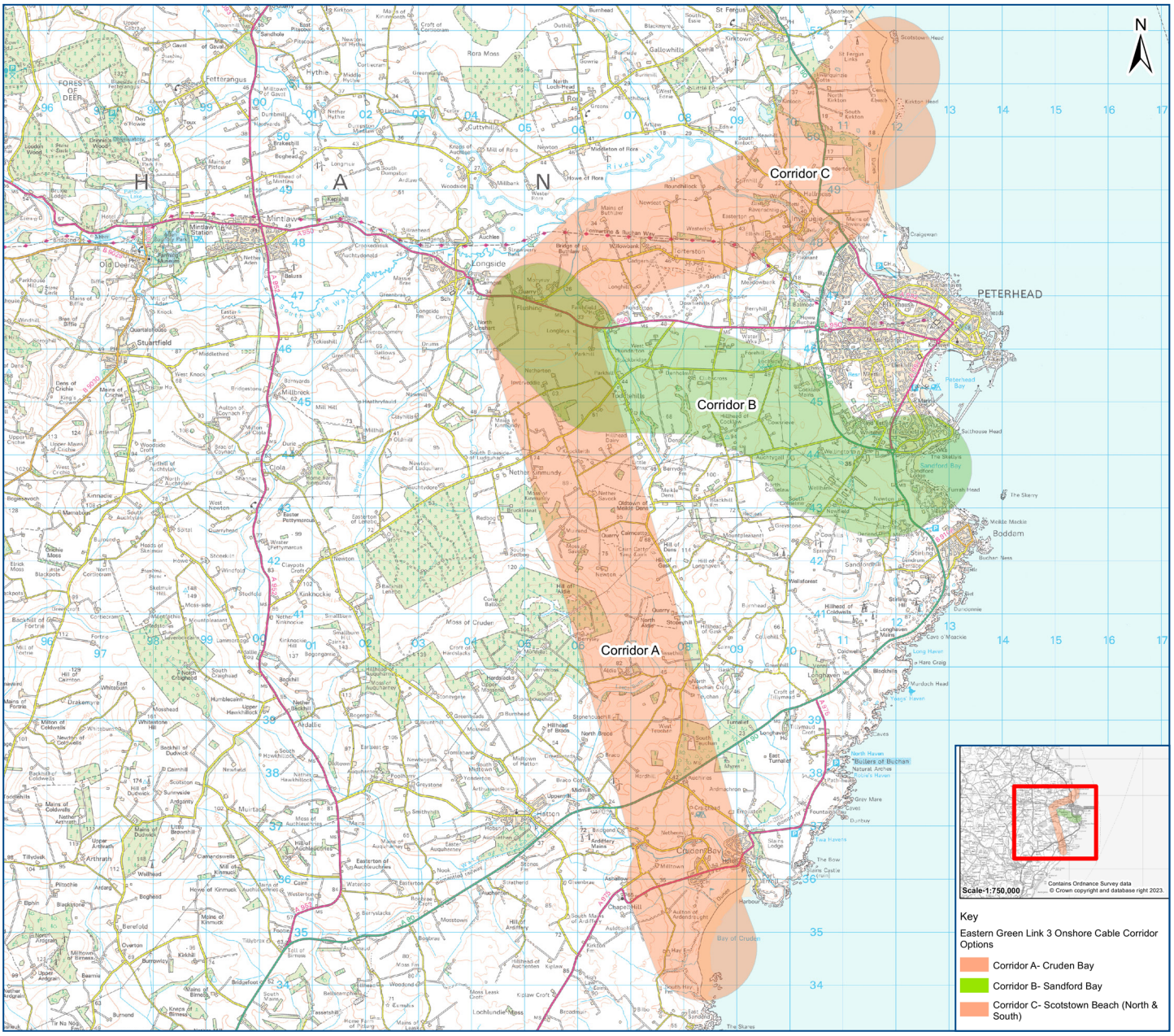
At this stage of the landfall selection process there is little to separate Scotstown Beach south and north options, as such the findings are the same. There are marine routing challenges due to the Southern Trench MPA and potential interaction with the designated features of this site. There are established dune systems and in places pockets of designated ancient woodland. There is soft sediments but further investigation would be to be confident there is not hard sediment.

Overall Findings: The options were considered fairly similar but on balance Sandford Bay is considered to be the option with the least constraints across engineering, environmental onshore and offshore constraints. Further investigations will be undertaken to choose a preferred location and site for the landfall. This process will be informed by stakeholder feedback and further technical analysis.

Onshore cable corridor options

Onshore cable corridors were developed connecting the four landfall options to the Peterhead Net Zero 2030 Development:

- Corridor A: From Cruden Bay this corridor, which is the longest option, would cross the A975 and the A90 and head north towards the Peterhead Net Zero 2030 development.
- Corridor B: From Sandford Bay, located immediately south of Peterhead, the corridor would move north west towards the Peterhead Net Zero 2030 development.
- Corridor C: Serving the two landfall options at Scotstown Beach (south and north), this corridor would move west crossing the A90 and then south towards Longside into the Peterhead Net Zero 2030 development.



The following table summarises the outcomes of the RAG assessment for the three corridors:

Category	Cruden Bay Corridor A	Sandford Bay Corridor B	Scotstown Beach Corridor C
Natural Heritage Designations	H	H	H
Cultural Heritage Designations	H	M	M
Landscape Designations	M	L	M
Agriculture	M	M	M
Forestry	L	L	L
Infrastructure Crossings	H	H	H
Environmental Design	L	L	L
Ground Conditions	H	M	M
Construction/Maintenance	L	L	L
Proximity to other infrastructure	M	M	M
Design	L	L	L

Corridor A is longer than Corridors B and C and is therefore more likely to contain a greater number of environmental features. There are more natural heritage and cultural designations along Corridor A.

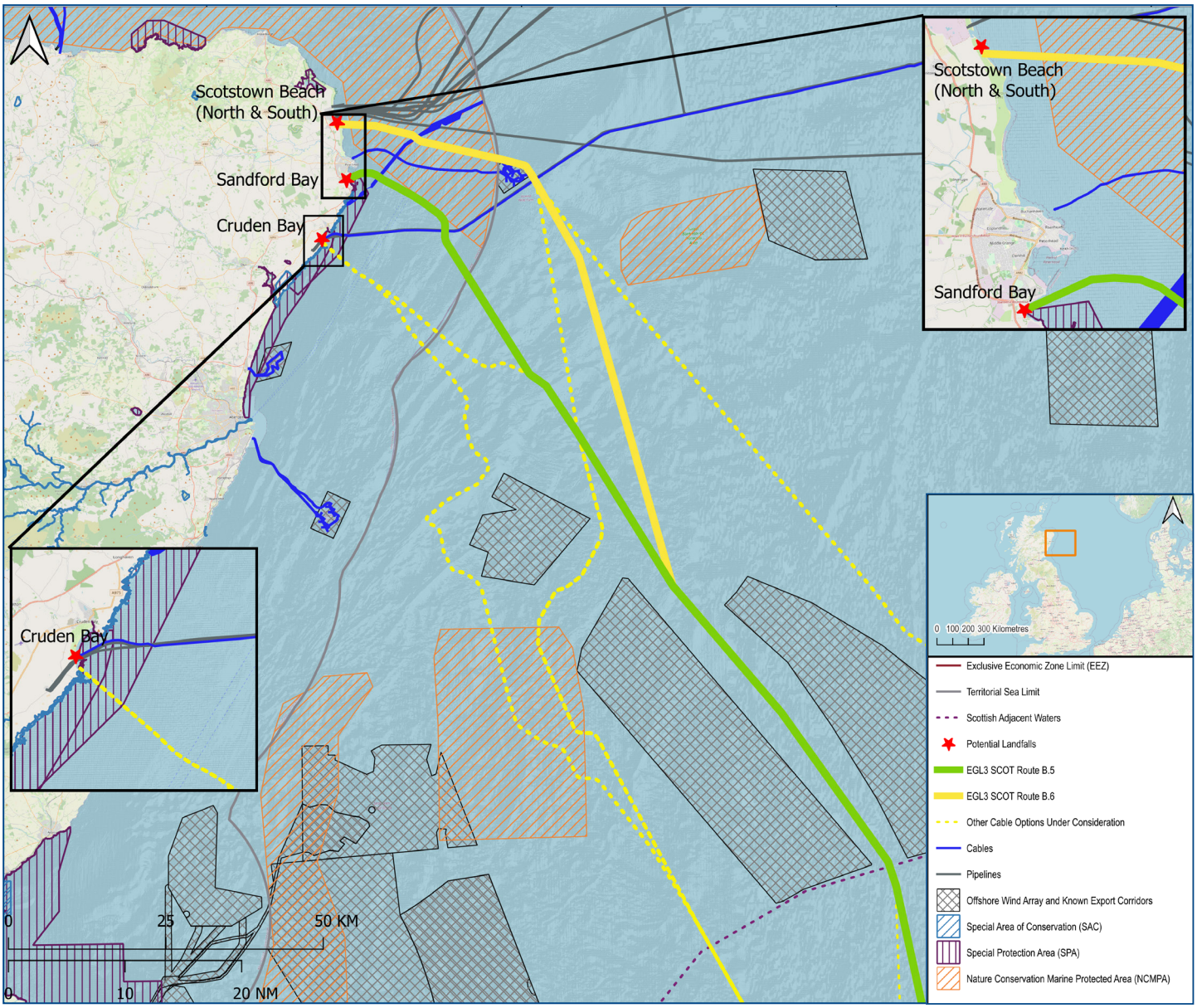
All corridors lie in close proximity to designated sites (international, national and local) and all corridors contain habitat suitable to support protected species and features and birds. It is expected that through further detailed routing it will be possible to minimise or avoid impacts to these habitats and features.

Corridor B does not fall within any designated landscape areas, heritage landscape assets or ancient woodland. Whereas Corridors A and C both fall within designated areas.

From an engineering perspective, the crossing of other infrastructure being the largest challenge across all corridor options. All routes would require multiple infrastructure crossings, including gas pipelines, overhead lines, rivers, and roads. There is a greater potential for peat along Corridor A, but with routing impacts may reduce the impact.

Overall Corridor B is considered to present the fewest engineering and environmental constraints. Further investigations will be undertaken to choose a preferred corridor and this process will be informed by stakeholder feedback, further technical analysis and the location of the preferred landfall.

Subsea cable route options - overview



Subsea cable corridors giving access to each of the shortlisted possible landfall areas are currently under investigation. Each potential corridor has been identified according to key technical, environmental, economic, and permitting criteria. A preferred route corridor will be further refined over the coming months, informed by technical and stakeholder feedback received including from this community consultation, and by additional information gathered during marine survey.

Criteria for subsea cable corridors

Technical criteria

The subsea cable corridors have been selected to avoid:

- Known seabed hazards and obstructions such as wrecks and dumping grounds;
- Areas where installation would be difficult or hazardous, such as steep slopes or irregular rocks;
- Areas of marine activity such as shipping lanes, anchorages and fishing grounds;
- Areas of geological instability such as earthquake zones and landslips; and,
- Areas where recovery of the cable for maintenance would be difficult.

Permitting criteria

The subsea cable corridor must be acceptable to:

- The owners of the offshore seabed;
- The owners of the foreshore; and,
- Military authorities.

Environmental criteria

The subsea cable corridors have been selected to avoid:

- Known areas of environmental concern, such as designated areas (MPAs, SACs, SPA), marine conservation areas, and fishing grounds; and
- Areas where prevailing climatic or sea conditions would make installation and maintenance activities difficult or hazardous.

Economic criteria

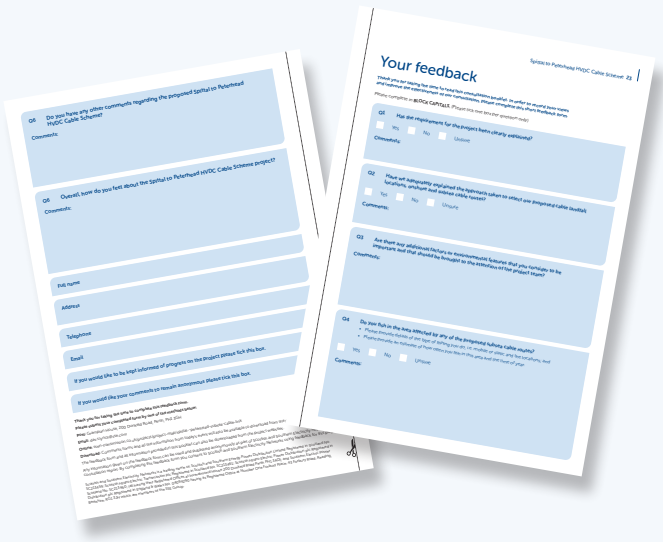
The corridors also make careful consideration of the number and type of potential crossings of other infrastructure and make appropriate consideration of proximity to other infrastructure. They will also be reviewed for UXO (Unexploded Ordnance) and other potentially dangerous areas.

What happens now and how do I have my say?

We understand and recognise the value of the feedback provided by members of the public during all engagements and consultations. Without this valuable feedback, the project development team would be unable to progress projects and reach a balanced proposal.

We are keen to receive your views and comments in regards to the following questions:

- Has the requirement for the project been clearly explained?
- Have we adequately explained the approach taken to select our proposed cable landfall locations, onshore and subsea cable routes?
- Are there any additional factors or environmental features that you consider to be important and that should be brought to the attention of the project team?
- Do you fish in the area affected by any of the proposed subsea cable routes?
  - Please provide details of the type of fishing you do, i.e. mobile or static and the locations; and
  - Please provide an estimate of how often you fish in this area and the time of year.
- Do you have any other comments regarding the proposed EGL3 HVDC Cable Scheme?
- Overall, how do you feel about the EGL3 HVDC Cable Scheme project?



Comments

Your views and comments can be provided to the project team by completing the feedback form or by writing to our Community Liaison Manager. All feedback received will be assessed and the proposed options adapted where necessary.

Dav Lynch

Lead Community Liaison Manager

dav.s.lynch@sse.com

+44 (0) 7918 404 443

Grampian House
200 Dunkeld Road
Perth, PH1 3GH

Additional information

Information will also be made available via the project webpage and social media channels:

Project website:
www.ssen-transmission.co.uk/projects/project-map/eastern-green-link-3

Follow us on Facebook:
@ssencommunity

Follow us on Twitter:
@ssetransmission

Your feedback

Thank you for taking the time to read this consultation booklet. In order to record your views and improve the effectiveness of our consultation, please complete this short feedback form.

Please complete in **BLOCK CAPITALS.** (Please tick one box per question only)

Q1 Has the requirement for the project been clearly explained?

☐ Yes ☐ No ☐ Unsure

Comments:

Q2 Have we adequately explained the approach taken to select our proposed cable landfall locations, onshore and subsea cable routes?

☐ Yes ☐ No ☐ Unsure

Comments:

Q3 Are there any additional factors or environmental features that you consider to be important and that should be brought to the attention of the project team?

Comments:

Q4 Do you fish in the area affected by any of the proposed subsea cable routes?

- Please provide details of the type of fishing you do, i.e. mobile or static and the locations; and
- Please provide an estimate of how often you fish in this area and the time of year.

☐ Yes ☐ No ☐ Unsure

Comments:

Q5 Do you have any other comments regarding the proposed EGL3 HVDC Cable Scheme project?

Comments:

Q6 Overall, how do you feel about the EGL3 HVDC Cable Scheme project?

Comments:

Full name

Address

Telephone

Email

If you would like to be kept informed of progress on the project please tick this box. ☐

If you would like your comments to remain anonymous please tick this box. ☐

Thank you for taking the time to complete this feedback form.

Please submit your completed form by one of the methods below:

Post: Grampian House, 200 Dunkeld Road, Perth, PH1 3GH

Email: dav.s.lynch@sse.com

Online: www.ssen-transmission.co.uk/projects/project-map/eastern-green-link-3

Download: Comments forms and all the information from today's event will also be available to download from the project website.

The feedback form and all information provided in this booklet can also be downloaded from the project websites.

Any information given on the feedback form can be used and published anonymously as part of Scottish and Southern Electricity Networks consultation report. By completing this feedback form you consent to Scottish and Southern Electricity Networks using feedback for this purpose.