

# Fanellan project overview

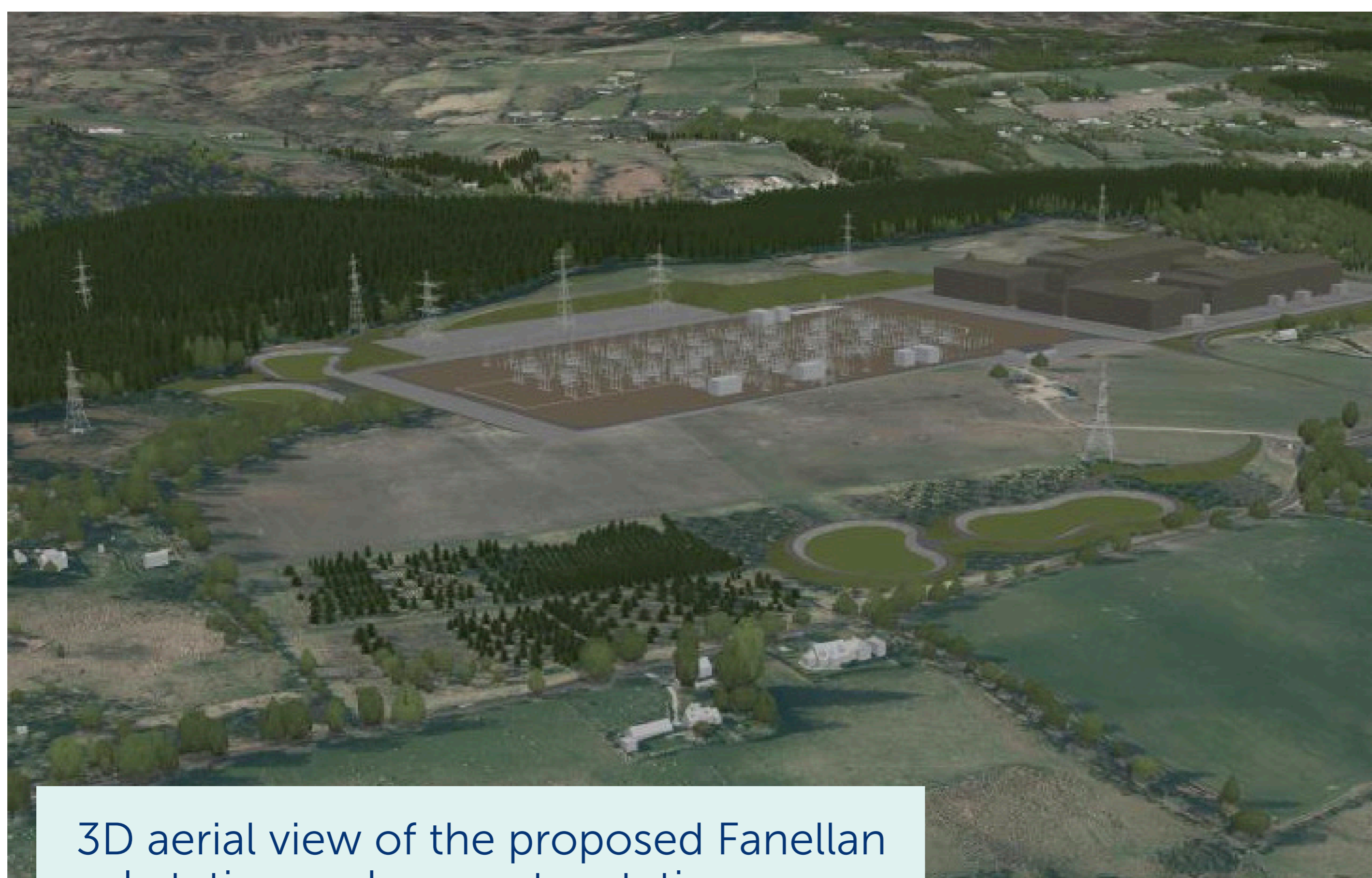
## Fanellan 400kV substation and converter station

The proposed new Fanellan substation and converter station is a strategic development which is required in the Beaully area.

It will provide connections for the Western Isles Connection project, the Beaully to Peterhead 400kV and the Spittal to Beaully 400kV overhead line projects. In addition, a section of the existing Beaully–Denny overhead line near Fanellan will initially be diverted around the new 400kV substation and converter station and will tie-in to the substation.

### It will provide connections for:

- New Spittal–Loch Buidhe –Beaully 400kV overhead line
- New Beaully–Blackhillock –New Deer–Peterhead 400kV project
- New Western Isles link connection into the HVDC converter station



3D aerial view of the proposed Fanellan substation and converter station

## A joint solution

Following extensive studies and assessments of alternative sites it was concluded that the optimum solution was to locate both new installations on a single larger site rather than two separate sites.

The advantages are the avoidance of lengthy AC (Alternating Current) connecting cables and reduced visual impact from co-locating this new infrastructure in one location.

## Project elements for the substation

### What is a substation?

An essential component in the energy network, substations connect sources of generation, such as wind farms and power stations. They connect overhead and underground circuits and can connect nearby utility systems. Substations manage electricity flows within the network, which can include connection and disconnection of circuits to direct the flow, transform voltages to higher or lower ratings (step-up or step-down—for example 275kV stepping-up to 400kV), manage the frequency of the electricity and increase efficiency and reliability of the power supply.

### Other key substation functions

Substations are critical in maintaining an efficient and healthy energy network, as they monitor and report back to operators on statistics and events to provide live information on our network. This allows for the following functions:

- Fault monitoring and identification which allows for isolation to protect the network and allow repairs.
- Allow for redirection and disconnection of energy to allow for demand/maintenance.
- Provide data such as voltage, current and power flow to allow for efficient running and future predictions.

### Substation project elements

Both the substation and converter station projects will share common access, security arrangements, site drainage and landscaping. A new access point from Fanellan Road, adjacent to the site, will be used to create the required compounds, laydown and storage areas in the initial stages. An additional access road is also being proposed further east of the site, at the main junction, which will eventually

be used as the main construction haul road and permanent access. This would then follow the route of the existing Beaully–Denny overhead line into the new Fanellan substation and converter station site to facilitate heavier construction traffic. This will reduce construction traffic on Fanellan Road. Perimeter access tracks are also required around the site.



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## The proposed Fanellan 400kV substation shall comprise:

- The AC substation platform, indicatively 525m x 305m.
- AIS switchgear and busbar, to connect incoming circuits and to facilitate the cable connection from the HVDC converter station.
- Step-down transformers, to provide the site with Low Voltage Alternating Current (LVAC) supply.
- A control building, indicatively 45m x 25m, maximum height 8m.
- Existing access point from Fanellan Road to be used for construction access, subject to road upgrades.
- Construction of a haul road and longer term permanent access, for heavier load vehicles and to reduce extent of public road use.
- Sustainable Drainage Systems (SuDS) including access for maintenance.
- Temporary access tracks for OHL construction activities, temporary construction compounds and temporary storage compounds for topsoil and materials (size and location to be agreed).
- Land required on a temporary basis during construction for temporary construction laydown, equipment storage, site offices and welfare facilities.
- Site clearance activities, including some tree felling.

## Project elements for the converter station

### What is a converter station?

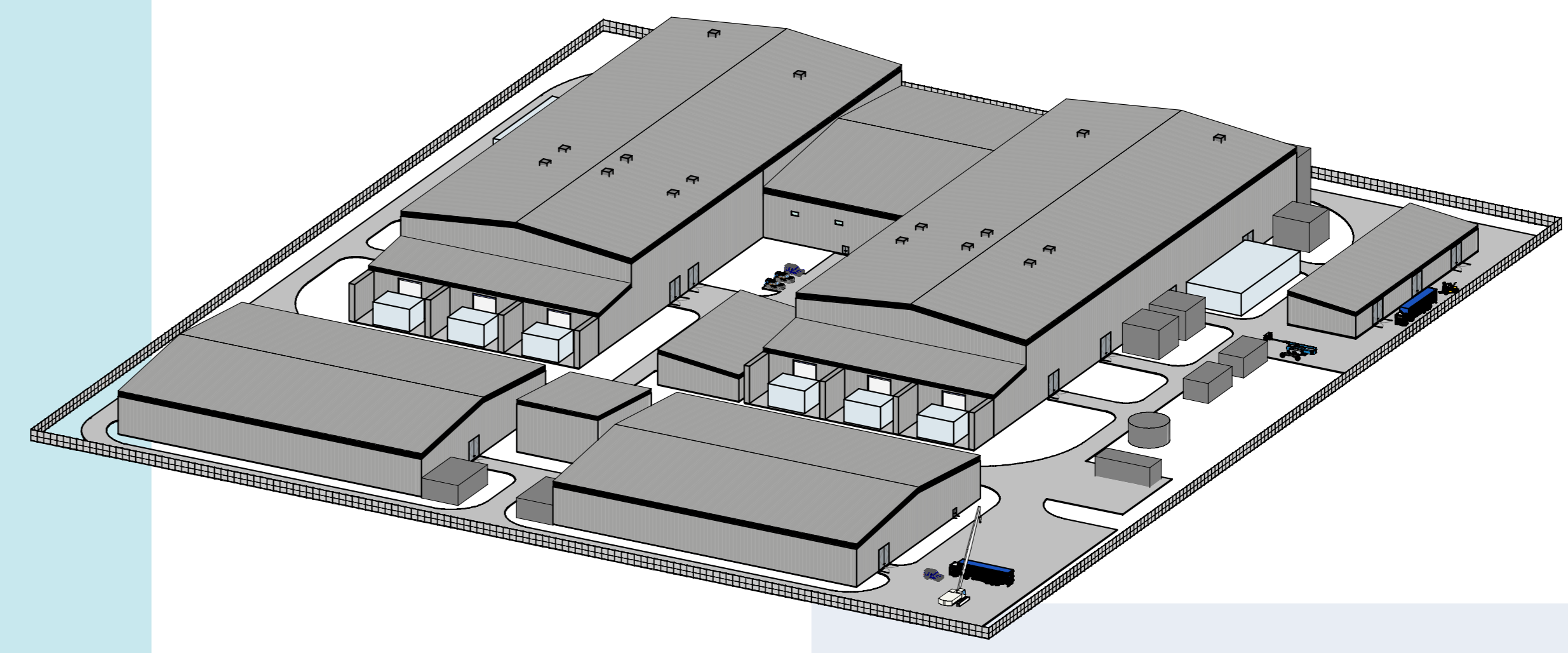
Converter stations change electricity from alternating current (AC) to direct current (DC), or vice versa. Alternating current is used in households whereas direct current is used to efficiently transport electricity over long distances, such as via subsea cables, with fewer electrical losses.

### HVDC project elements

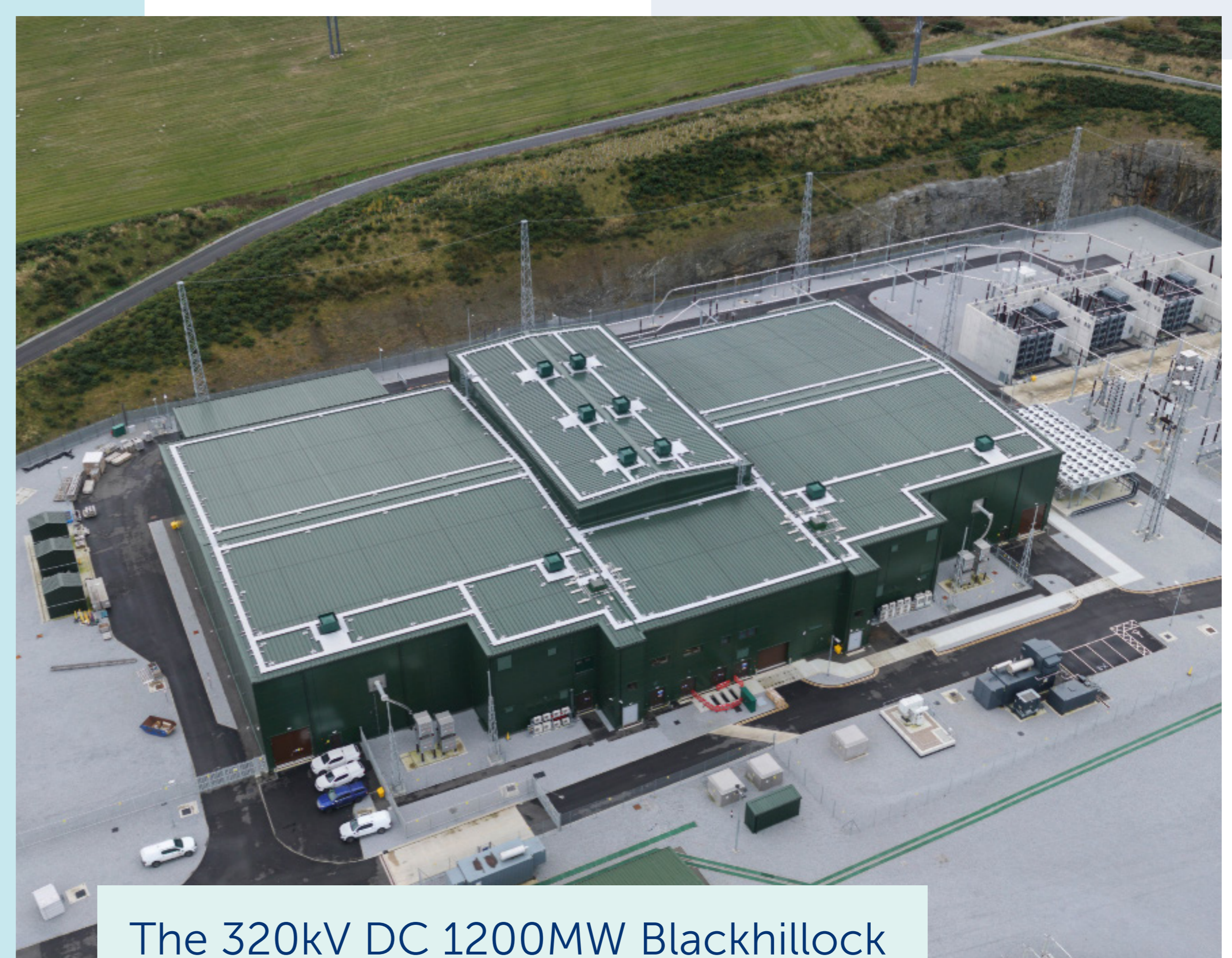
- A converter station platform, indicatively 290m x 350m, adjacent to the new substation.
- AC Filter Buildings (Approx 80m x 100m, 26m high).
- Smaller ancillary and support buildings adjacent to the main converter station building.
- Underground cable connection from Dundonnell to Fanellan site circa 80kms.

We are currently reviewing the design with our equipment suppliers, and building designers, with a view to reducing the larger building dimensions as much as possible.

The overall platform size for the converter station and substation will be approx. 875x305m.



Indicative conceptual design for 2GW 525kV Bipole converter station



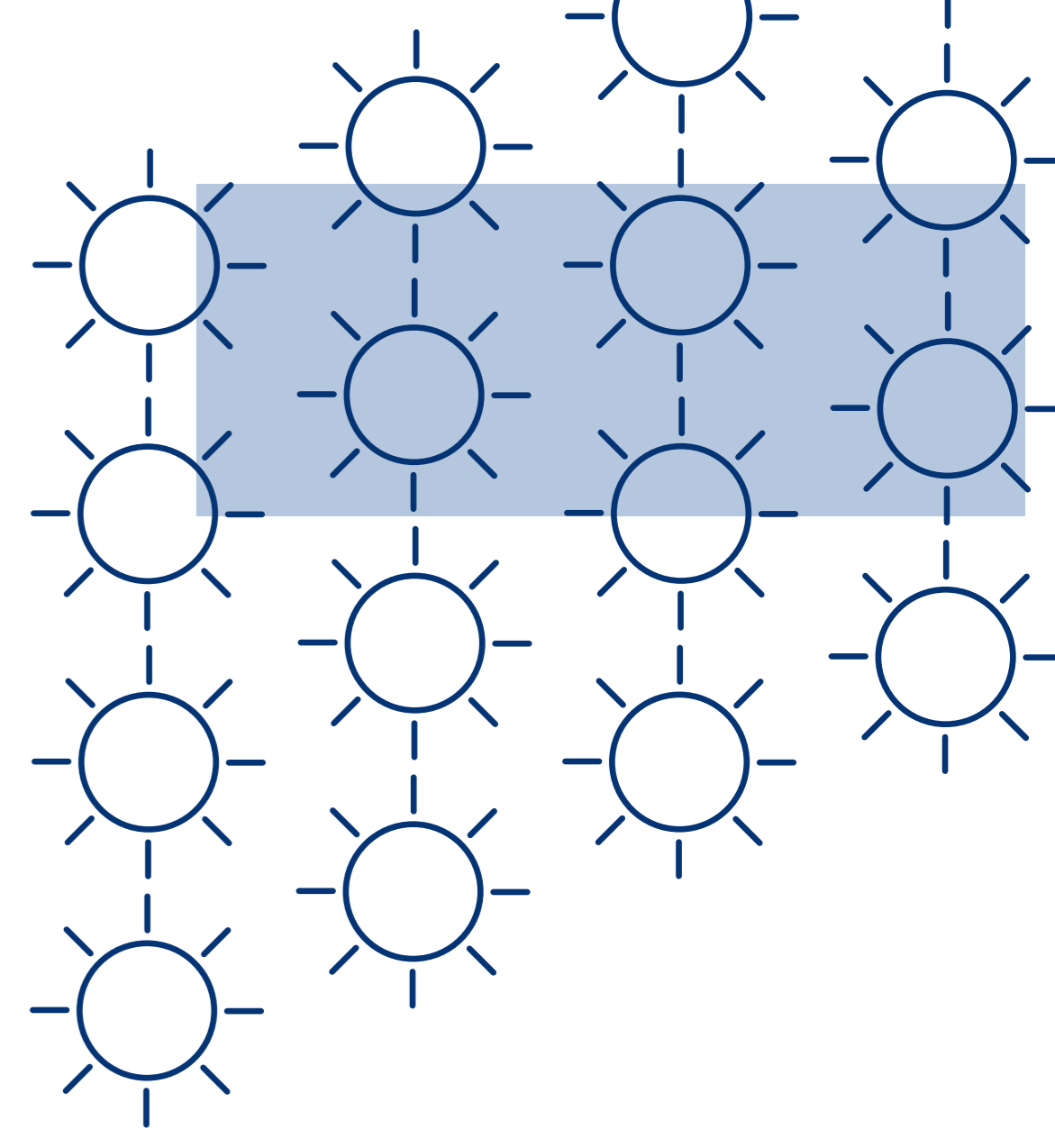
The 320kV DC 1200MW Blackhillock HVDC converter station

**The total platform size (base of the site) containing both installations will be approximately 875 x 305m, which includes a 4m high security fence. Landscape forms at the front and sides of the platform will help to screen the development. The sizes and locations are in refinement.**

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## Our consideration of Gas Insulated Switchgear (GIS) at 400kV

An Air Insulated Switchgear (AIS) substation is constructed with switchgear which relies on open air components. This means infrastructure must be positioned with sufficient clearance from other components in order to allow for safe operation and maintenance. This typically takes up a larger area of land than Gas Insulated Switchgear (GIS) which relies on housed components.

Feedback received for the substation was in favour of GIS technology and initially this was a consideration. Through project design and further study there is a fundamental difference in the GIS technology used at 132kV (such as that being built for the Beaulay 132kV project at Wester Balblair) and higher voltages, such as 400kV. It is more straightforward to connect high voltage

cables directly to 132kV GIS, this becomes more complex with 400kV GIS, which then necessitates the use of lengths of Gas Insulated Busbar (GIB). Therefore, increasing the size of the substation footprint.

Across Pathway to 2030 projects, GIS will only be progressed at sites where environmental requirements (such as coastal locations) dictate an indoor solution. In those cases, the downsides associated with a 400kV AIS substation indoors made GIS more favourable.

Our approach to AIS vs GIS across the whole Pathway to 2030 portfolio in general and at each site including Fanellan has been presented to Ofgem over recent months; Ofgem agreed with our approach.

## Beaulay–Denny 400kV overhead line diversion

The existing Beaulay–Denny 400kV overhead line crosses the proposed Fanellan 400kV substation and converter station site.

### This overhead line will therefore require a section of diversion to:

- Enable the Fanellan 400kV substation and converter station to be built
- Facilitate the connection of the Fanellan 400kV substation to the existing Beaulay–Denny overhead line which will enable the connection between the Fanellan substation and the existing Beaulay substation at Wester Balblair and the wider electricity network.

The permanent diversion will consist of six towers being installed to divert the existing overhead line around the proposed substation development on the northern side. In total the number of towers will change from 4 (existing overhead line) to 6 (newly diverted overhead line) in order to allow for redirecting the conductors and for the final tie-in to the new site. This results in approximately 1.7km of modified 400kV overhead line.

A temporary diversion will also be needed to allow for replacement of two existing towers. At this stage it is anticipated that the temporary diversion will be to the south of the existing Beaulay Denny overhead line between the new Fanellan substation and

converter station and Fanellan Road. There will also be a temporary diversion of the telecoms fibre. Access tracks, temporary compounds and laydown areas will be needed to facilitate construction of the overhead line and these may be shared with the proposed Fanellan substation and converter station to maximise efficiencies and minimise disturbance. The access tracks created will remain permanently for operational use. Drainage will also be shared with the substation and converter station site.

Some tree felling will be needed to accommodate safety clearances for the overhead line diversion. The overhead line diversion and temporary telecoms diversion will not form part of the formal planning application for the Fanellan substation and converter station and will be progressed under a separate consenting regime by the Energy Consents Unit of Scottish Government (telecoms fibre which may be covered by Permitted Development).

As all overhead lines of 132kV and above fall into the relevant regulations, an Environmental Impact Assessment (EIA) screening opinion will be sought from the Energy Consents Unit to confirm whether or not an EIA is required. If our project is deemed non-EIA (due to its scale or potential environmental impacts), a voluntary Environmental Appraisal (EA) may be produced by us to support the consent application.

This assessment would be made publicly available once submitted.

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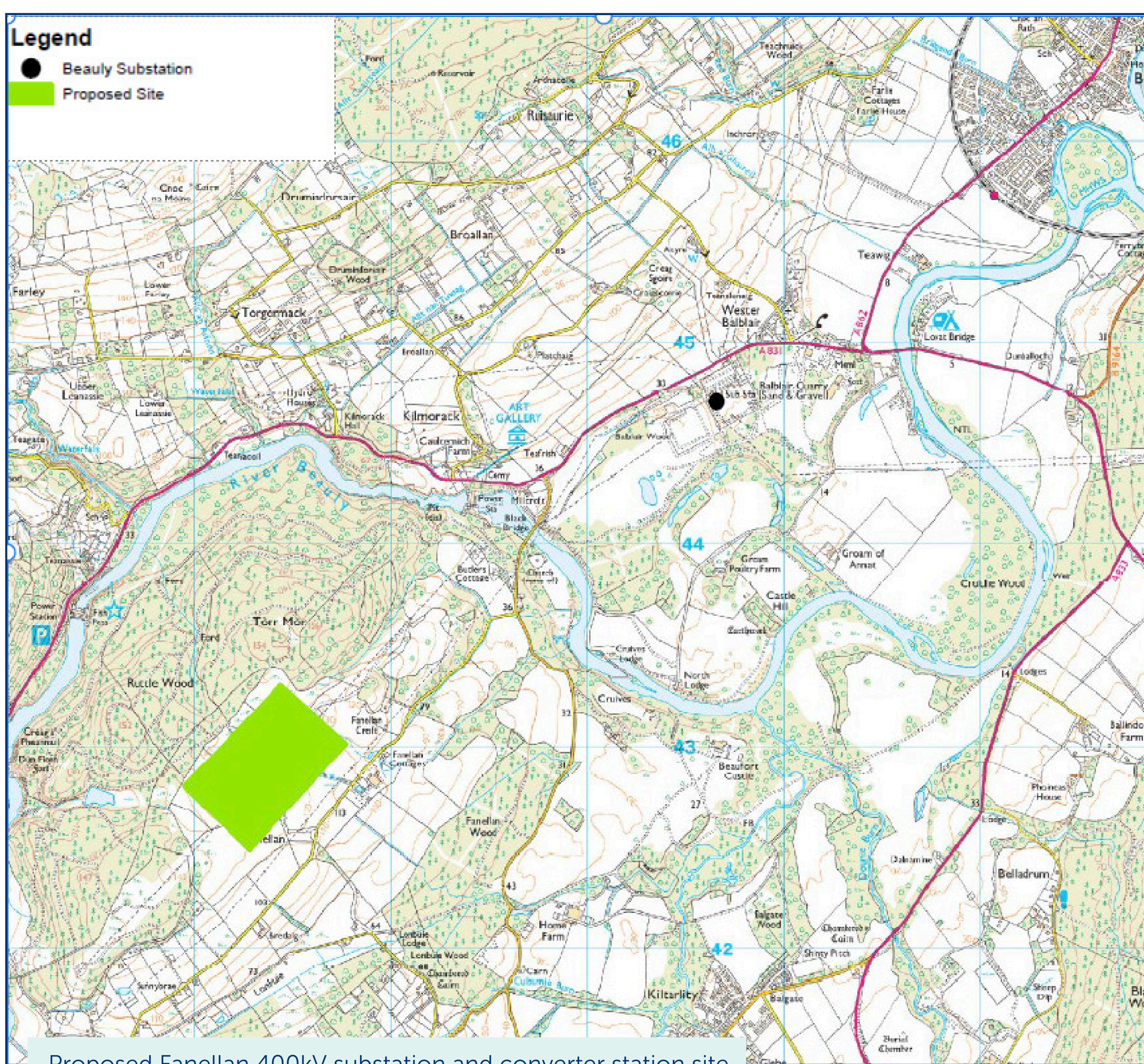
# How we've selected the substation and converter site

Our site selection process makes sure the design, consenting, construction and operation of our projects are undertaken in a manner, which on balance, causes the least disturbance to the local community and environment, while ensuring the solution taken forward is economically and technically practical.

To do this we follow an internal process supported by third party environmental and technical experts. This has many key stages, each increasing in detail and definition and bringing technical, people, environmental and cost considerations together to find a balanced outcome.

## Our proposed site: Fanellan 400kV substation and converter station

Following our last consultation on the proposed Fanellan substation and converter station in February–April 2023, where we asked for your views regarding shortlisted sites, in December 2023 we confirmed that the site we were proposing to progress with was the combined substation and converter station site at Fanellan.



## Naming our site

Feedback from our consultation indicated that stakeholders felt the name of the substation should be more relevant to the area in which it is located. Now that a proposed site has been selected, we are changing the name of Beaully substation and converter station site to Fanellan 400kV substation and converter station.

Going forward, for the next consultation and submission of our planning application, the name will be formally changed to Fanellan substation and converter station.



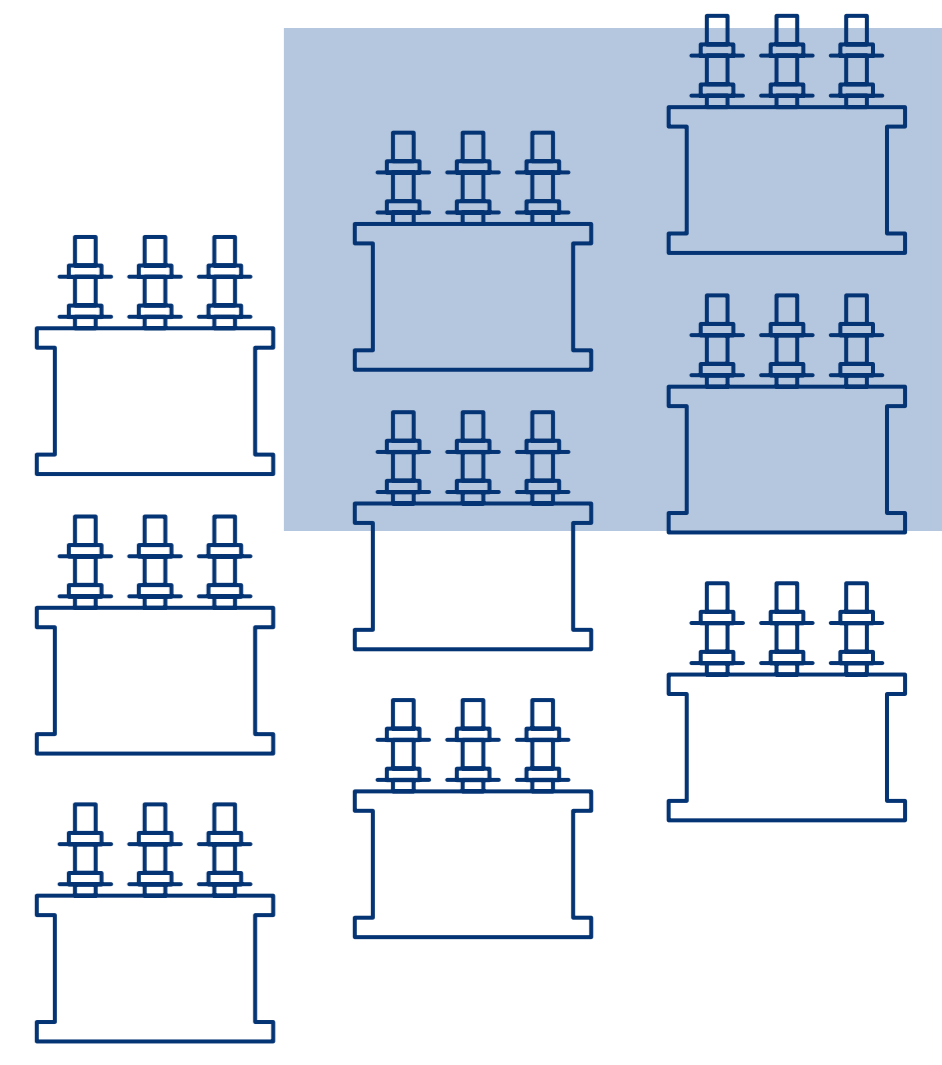
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# How we've selected the substation and converter site

## Why this site?

Following extensive surveys and assessments this combined site performed best on balance because it reduced the engineering complexities, whilst offering the best opportunity to limit overall environmental impacts on the wider area for the following reasons:

- From a connection and environmental impacts perspective it limits the work to the Beaulay–Denny OHL, the distance for the Spittal–Beaulay 400kV OHL connection and removes the requirement for a 400kV underground connection, out with the site boundary, to connect both the AC and HVDC sites.
- Although there will be some environmental impacts it does present substantial opportunity to mitigate visual impacts with landform and planting opportunities.
- It is also preferred from the perspective of environmental conditions (salt pollution, flooding, SF6, contaminated land and noise) as well as from a biodiversity, geology, hydrogeology and hydrology perspective.
- Engineering: The combined Fanellan site minimizes total collective adjacent land impact through sharing a platform, maximises the space available and is considered the most technical and cost-effective solution.

## What has changed since we last consulted?

Since the public consultation event in March 2023, the project team have completed the following:

- Site selection (including assessment of additional, alternative site options)
- Publication of 'Site selection consultation document: Beaulay Area 400kV substation and Western Isles HVDC converter station'
- Publication of the Report on Consultation (ROC) report in December 2023
- Ground investigations
- Environmental surveys (these are still ongoing)
- Background noise monitoring
- Appointment of contractor(s) to produce the design for the planning application
- Appointment of environmental consultant, including a Landscape Architect, to commence the Environmental Impact Assessment (EIA) and to design the landscape forms.
- Design development
- Black Bridge assessment
- Continued engagement with the local community through the Beaulay Community Liaison Group

The Fanellan site was the preferred site for consultation following an assessment of environmental, engineering and cost criteria. However, feedback from the consultation process recommended that we consider alternative sites in the site selection process, which included a site near West of Broallan and four sites in close proximity to the existing quarry at Balblair. This culminated in a review of potential options. These sites were assessed using the same site selection process used previously, however, it was found that none of these options performed better than the combined Fanellan site. The main challenges with each of these additional options resulted from engineering and constructability considerations, such as connection to the existing Beaulay–Denny 400kV OHL, limited space for ancillary works such as temporary compounds and landscaping, proximity to residential properties and thus noise, flood risk and proximity to cultural heritage.

The Highland Council has specifically requested for us to consider the option, whereby the HVDC converter station is located at the Wester Balblair Quarry and the substation sited at Fanellan.

A full assessment of this option was completed, however there are clear technical and environmental justifications for why this option is not suitable. All additional site options scored less favourably than Fanellan. The Highland Council has recommended for reducing land take, to try to reduce the proposed platform level, to consider the use of GIS and involve landscape architects to ensure that the design integrates with the existing landform at Fanellan.

## What's next?

Further design development of the combined Fanellan site has been taking place and we will continue to listen to feedback and comments and implement them where feasible. We are now at the pre-application stage of our site selection process and following this consultation. We will be engaging again in June when we will share feedback from this consultation and any subsequent changes to design prior to submitting a planning application to The Highland Council later this year.



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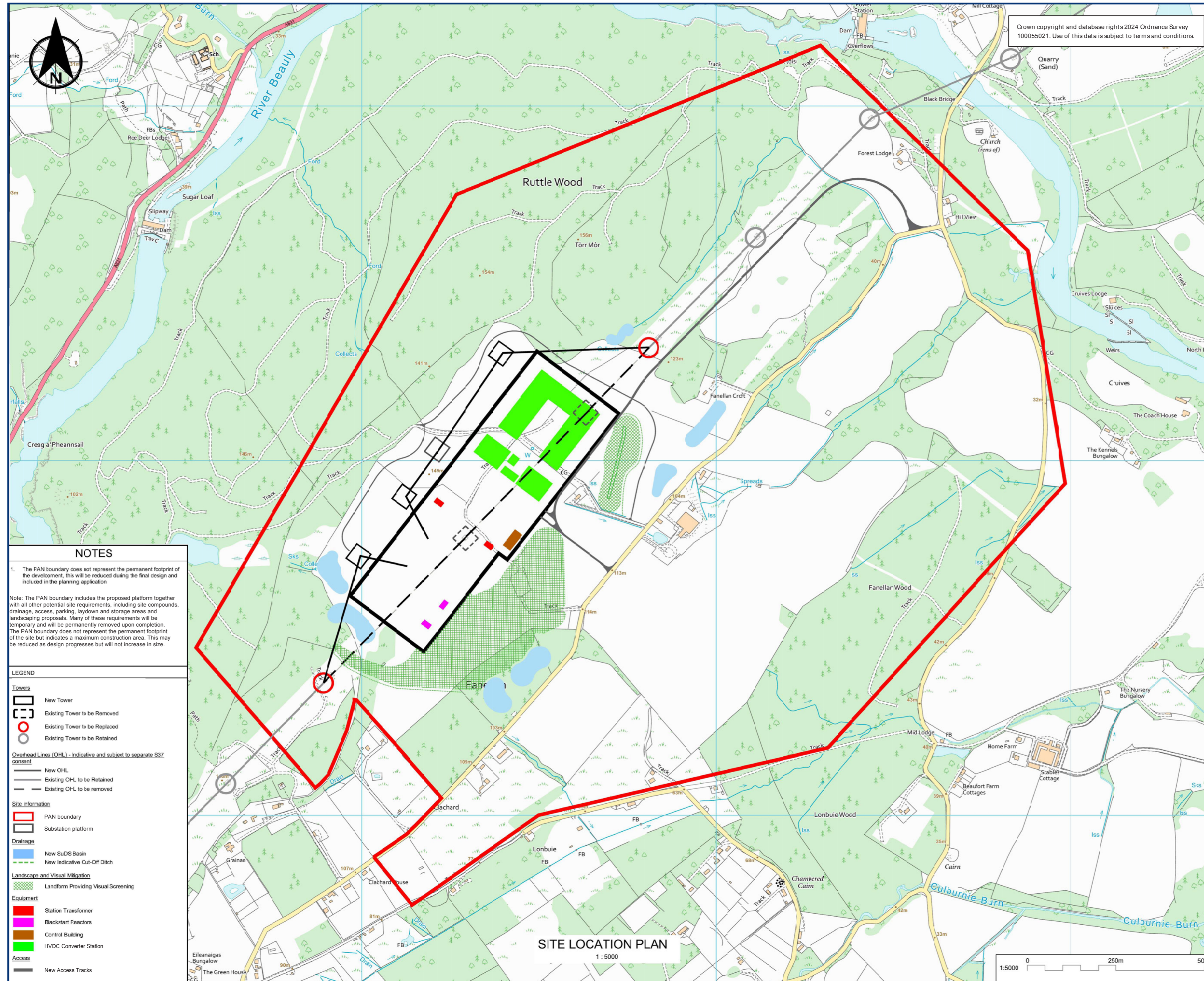


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# PAN boundary



Download a copy of the map by scanning the QR code or by visiting the following URL: [bit.ly/3T0wL0z](https://bit.ly/3T0wL0z)

**Please note:** As well as the substation site footprint, the PAN (Proposal of Application Notice) boundary has to include all other site requirements, including any temporary site compounds, temporary and permanent drainage, site access and on-site parking, laydown and storage areas for materials and excavated soils, as well as hard and soft landscaping proposals.

Many of these requirements will be temporary, during the construction phase, and will be permanently removed upon completion of the project. The PAN boundary, therefore, does not represent the permanent footprint of the substation itself but indicates the full development area.

## PAN boundary map clarity and assurances

We are aware of the concerns that have arisen following the recent submission of our Proposal of Application Notice (PAN) and would like to provide some clarity on the process and reassure local residents that our designs and requirements for each site have not significantly changed from what has been shown to date.

for materials and excavated soils, as well as hard and soft landscaping proposals. Many of these requirements will be temporary, during the construction phase, and will be permanently removed upon completion of the project. The PAN boundary, therefore, does not represent the permanent footprint of the substation itself but indicates the full development area.

We, like other developers, are required to submit a Proposal of Application Notice to the appropriate planning authority for large infrastructure projects, such as our substation projects, where they are classed as "Major" or National Developments under the Town and Country Planning regime. The PAN must be issued a minimum of 12 weeks prior to a planning application being submitted and must provide a location plan, including a general development area (PAN boundary), together with confirmation of the details of two rounds of public consultation events.

At our initial site selection consultations in 2023 we provided an illustration of what each proposed substation may look like once completed and their respective locations, but these did not detail the temporary construction requirements, nor any permanent landscaping, drainage or accesses. At that time these elements had not yet been designed and therefore the full extent of construction works, which would be used to inform a planning application red line boundary, could not be shown.

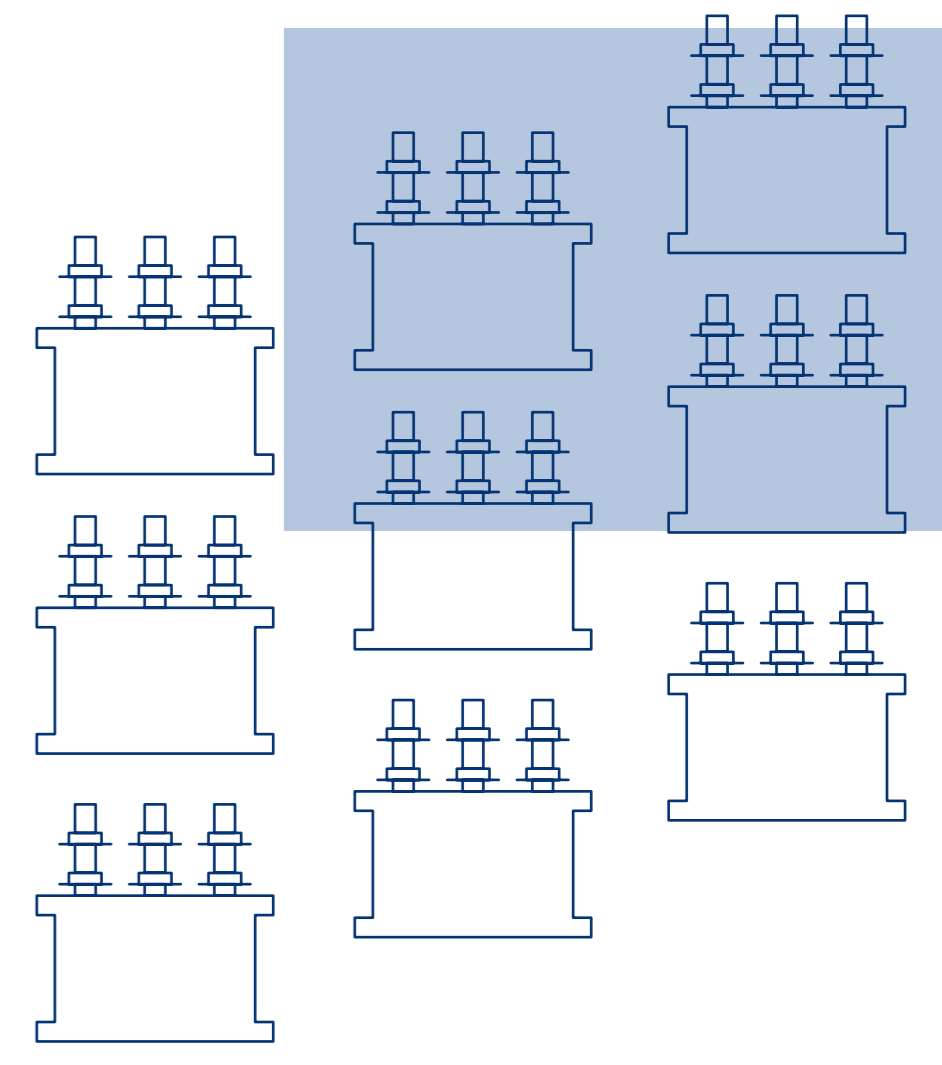
As well as the actual substation site footprint, the PAN boundary has to include all other site requirements, including any temporary site compounds, temporary and permanent drainage, site access and on-site parking, laydown and storage areas

The substation footprint at this time is unlikely to differ significantly from those initial illustrations. The full layout of the proposed development will be presented at the upcoming public consultation and will be online for viewing.

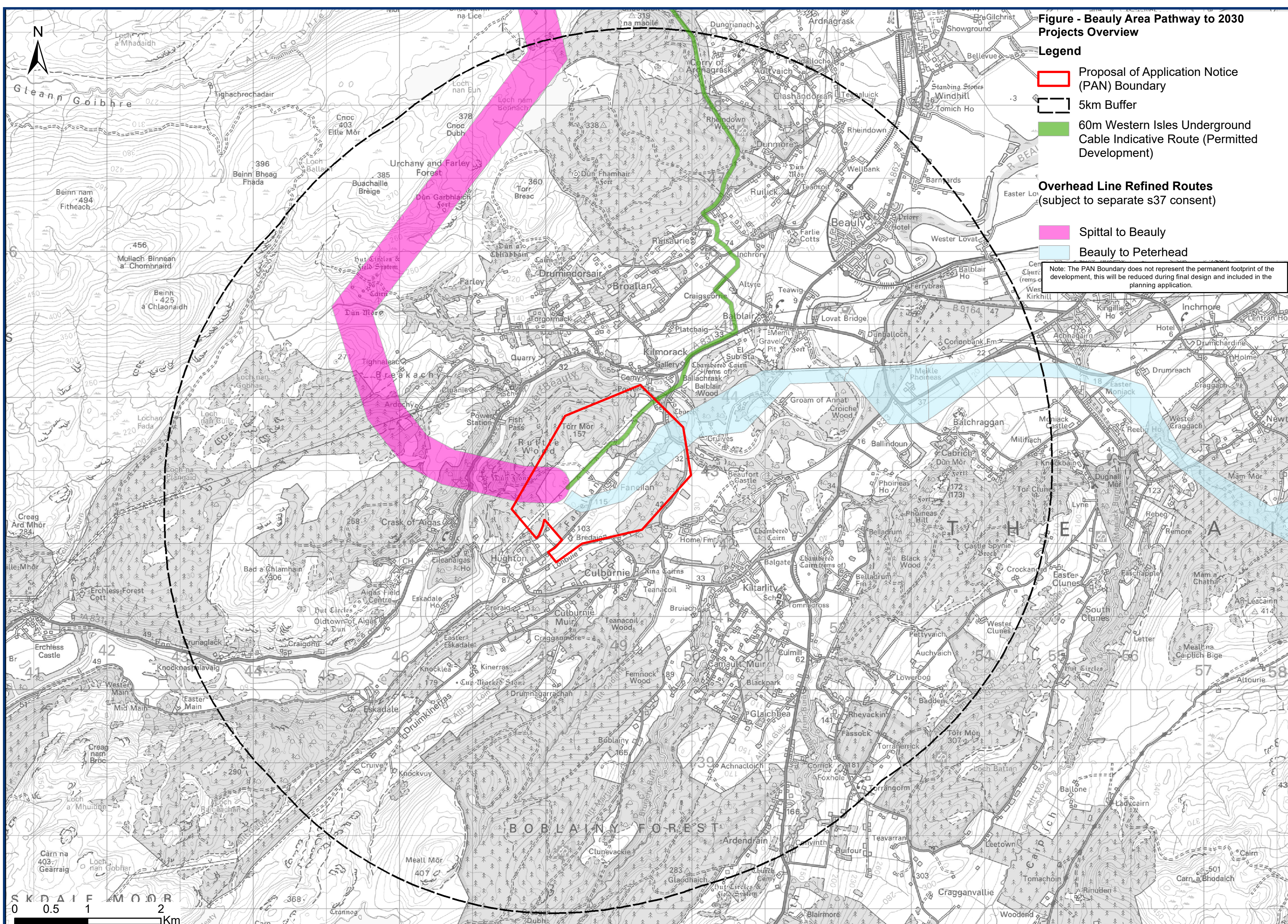
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# Connections into the Fanellan site



Map showing indicative routes for the Spittal-Beaulieu and Beaulieu-Peterhead 400kV overhead lines and Western Isles cable connecting in to the Fanellan site.

## Spittal-Loch Buidhe-Beaulieu 400kV overhead line

A new 400kV overhead line, approximately 170km in length connecting Spittal to Beaulieu via Loch Buidhe. This new overhead line will connect into the Fanellan 400kV substation.

This overhead line will not form part of the formal planning application for the Fanellan converter station and will be progressed under a Section 37 Electricity Act consent to be determined by the Scottish Government.

## Beaulieu-Blackhillock-New Deer -Peterhead 400kV overhead line

A new 400kV overhead line, approximately 180km in length connecting Beaulieu to Peterhead, via New Deer and Blackhillock. This new overhead line will connect into the Fanellan 400kV substation.

This overhead line will not form part of the formal planning application for the Fanellan converter station and will be progressed under a Section 37 Electricity Act consent to be determined by the Scottish Government.

## Western Isles HVDC underground cabling

Circa 80km of onshore underground cables to provide a link between the Western Isles and the Beaulieu area. This will consist of High Voltage Direct Current (HVDC) underground cables from a landfall at Dundonnell to the Fanellan converter station. The cable needs to be undergrounded as it is a HVDC connection.

The current proposed route for this can be seen on the image below. This underground cabling will not form part of the formal planning application for the Fanellan 400kV substation and converter station and will be progressed under Permitted Development.



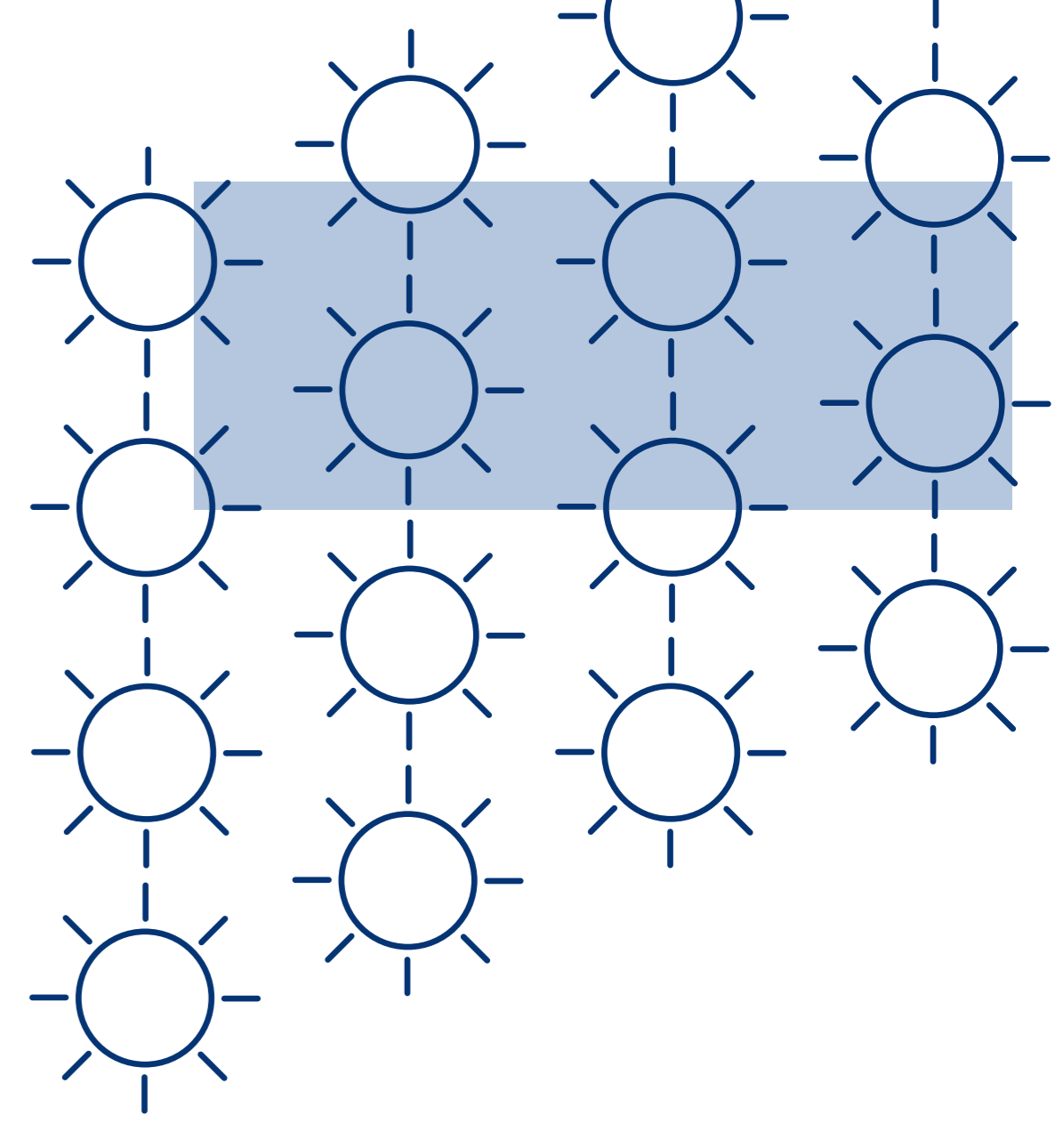
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# Building colours

