

The pathway to 2030

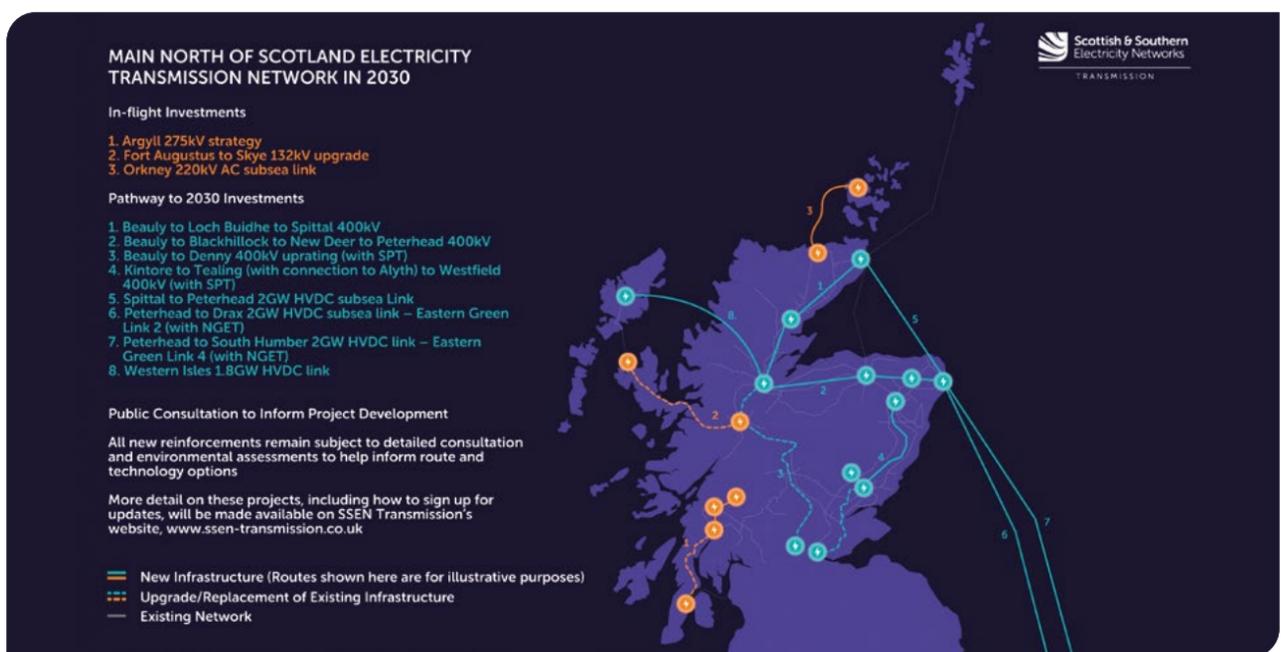
In July 2022, National Grid, the Energy System Operator (ESO) published their 'Pathway to 2030 Holistic Network Design' (1), setting out the blueprint for the electricity transmission network infrastructure required to enable the forecasted growth in renewable electricity across Great Britain, including the UK and Scottish Governments 2030 offshore wind targets of 50GW and 11GW.

For the north of Scotland, this confirms the need for over £7bn of investment on onshore electricity transmission infrastructure to deliver 2030 targets and a pathway to net zero, several of which will require accelerated delivery to meet 2030 connection dates. The need for these reinforcements has been further underlined with the recent British Energy Security Strategy (2). This sets out the government's plans to accelerate homegrown power for greater energy independence. The strategy aims to reduce the UK's dependence on and price exposure to global wholesale gas markets via the deployment of homegrown low carbon electricity generation supported by robust electricity network infrastructure.

These projects have been highlighted as critical to enable the delivery of the UK and Scottish Governments targets requiring accelerated delivery with in-service dates of 2030. These are in the very early stages of development, additional infrastructure will be required to facilitate the new overhead lines in the vicinity of our existing infrastructure.

We are currently assessing options, which include the extensions to existing substation sites as well as exploring new sites where appropriate.

The diagram below shows the planned north of Scotland Electricity Transmission Network in 2030.



Additional project information

Beaulieu to Loch Buidhe to Spittal 400kV
Initial consultation is planned for early 2023.

Beaulieu - Blackhillock - New Deer - Peterhead 400kV
Initial consultation began in September. Project information can be found on the project webpage; ssen-transmission.co.uk/projects/beaulieu-blackhillock-new-deer-peterhead-400kv/

Western Isles 1.8GW HVDC link
The HND also confirmed the requirements for new 1.8GW HVDC link from the Western Isles which will replace previous proposals for a 600MW HVDC link. Due to the Western Isles Link being increased to 1.8GW the final arrangements for the Western Isles Mainland HVDC Converter Station, land cables and connections to the Transmission Network are being re-evaluated. Once completed, the onshore infrastructure requirements for the new 1.8GW Western Isles link shall be shared with stakeholders and will be subject to extensive public consultation next year.
ssen-transmission.co.uk/projects/western-isles/

Other upcoming projects in the surrounding area:

Glen Strathfarrar VISTA (Visual impact of Scottish transmission assets)
Approximately 3.5km of overhead line (OHL) is planned to be removed and replaced with underground cable in Glen Strathfarrar. The aim of this project is to reduce the quantity of overhead line infrastructure, improving the visual impact in Glen Strathfarrar National Scenic Area.

Beaulieu to Deanie OHL reconductoring
Overhead line reconductoring is required along the existing line which has been identified as its beyond the designed lifespan. The works are planned to terminate at the starting point for Glen Strathfarrar VISTA project.

The neighbouring VISTA and OHL reconductoring projects will have separate consultation events.

(1) <https://www.nationalgrideso.com/future-energy/the-pathway-2030-holistic-network-design>
(2) <https://www.gov.uk/government/publications/british-energy-security-strategy>

Project need and overview

Project need

The required project need is being driven by operational requirements and asset condition assessments of the affected existing substations serving the power stations. Owing to geographical relationship and similar project programmes, the substations have been progressed in tandem, through the same site selection process. The proposed asset replacement project has been collectively termed **“West of Beaulay - Asset Replacement projects, formerly `The Beaulay Cluster.”**, which is the construction of separate but related off-line substations at Deanie, Culligran, Kilmorack and Aigas.

The project is required to upgrade the four existing substation assets from Deanie to Kilmorack Power Stations which converts the 11 kilovolt (kV) output to 132kV for export to the Transmission network. These assets are coming to the end of their operational life and need replacing.

The consequent deterioration in their condition poses a risk to failure, resulting in the affected power station unable to distribute renewable energy, risking reliability of supply to customers.

All four substations were built in the 1960's connecting hydroelectric generation to the transmission network.

The existing transformers were built when engineering design standards and requirements were very different. Modern transformers are quieter and more efficient but also require more space around them for cooling and safe access for maintenance.

This, together with a need to keep each of the generation assets connected to the network, means new substation sites need to be identified and located outwith existing substation compounds.

Each substation is proposing an offline construction of a new 132/11 kilovolt (kV) single transformer substation, accommodating associated primary plant, control buildings and equipment (situated as near as possible to the existing substations) to connect the existing hydro power stations to the grid.

Following the construction of the new substations, existing substation structures and equipment shall be decommissioned and may be removed. The development will also include any upgrade of existing or new access tracks, temporary site compounds and construction laydown areas (where required). The substation designs are continuing to be developed and refined, guided by site circumstances, engineering specification requirements and project feedback (public, consultants, statutory consultees).

Project overview

- The following elements are anticipated requirements for each of the four new substations:
 - Design and construction of a new offline substation compound with 132/11kV transformer. These will be separate but linked substations, with indicative platform sizes of 50m x 95m.
 - A new 132kV circuit breaker and disconnecter.
 - Control building housing 11kV switch gear as well as communications and protection and control equipment.
 - Landscaping and biodiversity requirements.
 - Permanent access to the sites.
 - Upgrade of existing/new access tracks and temporary site compounds and construction laydown areas where required.
- In the interest of transparency, we are presenting this group of asset replacement projects as a whole to ensure that all local community members are aware of the full extent of the proposals and are invited to comment on the development of each separately.



Existing external transformer arrangement needing to be replaced (at Deanie & Culligran)



Existing internal transformers needing to be replaced (at Aigas & Kilmorack)

The consultation process

Engagement to date

Following the development of the initial site selection options for the four substations, consultations were held with statutory and non-statutory consultees and went out to public consultation in June 2022.

Following these, the project team have sought to ensure that comments or concerns raised, have helped to inform where possible the final substation locations and primary considerations for the designs as they have been progressed. This includes substation layouts (indoor or outdoor proposals) and design, landscaping enhancements and screening. Out with the formal consultation periods and events, we have continued to provide a dedicated web page for the projects and liaise with a wide range of stakeholders to help inform the project development and design.

What we're consulting on today

Following the first public consultation events held in June, these events (in two separate locations over two days) mark the first of two planned, sequential, public consultation events following the submission of the Proposal of Application Notices (PAN). The PAN submissions trigger the initial formal Town and Country Planning (major application), consultation process for these four sites - including the 12-week (minimum) pre application consultation period.

We are therefore holding this and other consultations to share information on where our site selections and design inputs are to date. This includes the identification of red line site boundaries which delineate the maximum extents of the proposed development across each of the sites.

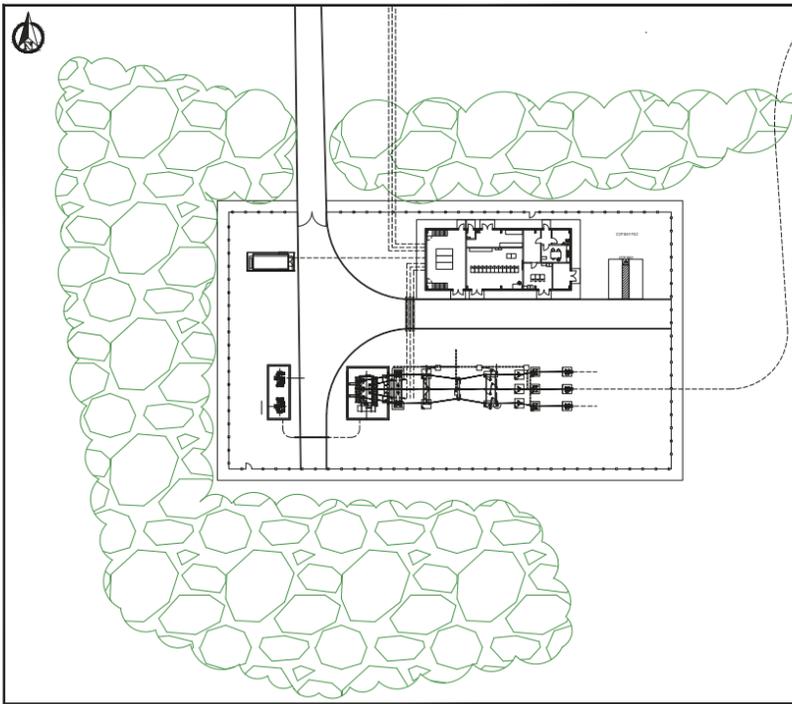
We are keen to hear feedback from the public and other interested parties.



Further public and stakeholder consultation is anticipated early next year, presenting our refined and preferred site options for feedback, prior to planning application submissions later in 2023. Where overhead line elements are required, (and not consulting permitted development) a similar application will be made to the Scottish Ministers, under Section 37 of the Electricity Act 1989. This will specifically cover the overhead line, not the main substation works.



Indicative substation layout and elevations

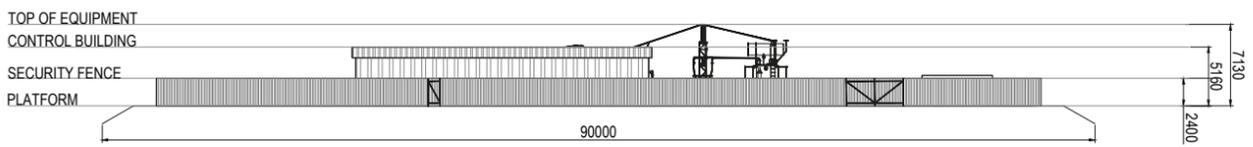


SITE LAYOUT
SCALE 1:500

The indicative substation layout view set out opposite provides an example of a current, typical single grid, transformer substation (outdoor arrangement - footprint circa 50m x 80m). At each of the four sites, similar arrangements will be designed in order to suit the site specific functional requirements and land restrictions.

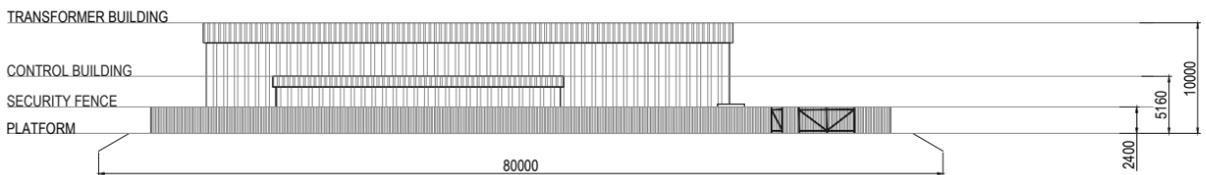
Associated equipment required for the substations' functionality are shown, including site access points with cognisance to both the construction and future site maintenance. Clearances and spatial requirements in line with current rules and regulations for safe working areas and access are also indicated.

The drawing below provides an indicative elevation view and notes estimated heights of key components for an outdoor arrangement.



ELEVATION A

In some cases, feedback has indicated preferences to situate the transformer equipment indoors. In this instance, a second building is constructed, specifically to house the electrical equipment. An indoor housed arrangement is shown on the elevation drawing example below. The transformer building itself requires to be larger than the control building (for safe height clearances). As part of our delivery, every effort is made to sensitively address the visual impact of each substation and its associated infrastructure. Substations can be screened by use of planting and/or where possible, by blending into existing backdrops within the landscape through careful site selection.



ELEVATION A



Substation site selection process

Overview of site selection process

SSEN Transmission has developed and implemented a formal process for the selection of sites for new substations of 132kV and above. The main aim of the process is to provide a consistent approach to the selection of new substation sites, underpinned by our statutory obligations 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' (Electricity Act 1989, Section 9 (2) a and b).

Our site selection process ensures the design, consenting, construction and operation of a substation is done in a manner that is technically feasible and financially viable whilst, on balance, creating the least disturbance during construction and operation to the environment and the people who live, work and use it for recreation.

The Beaulieu Cluster projects are currently at stage 2 - detailed site selection.

For most new substation projects following pre-site selection activities, the approach follows two principal stages, each iterative and increasing in detail and resolution, bringing cost, technical and environmental considerations together in a way which seeks the best balance at both stages. This staged process leads to the identification of a finalised proposed substation site, which will be taken forward for planning.

The key site selection stages are:

Pre-site selection activities

The starting point in all substation site selection projects is to establish the need for the project and to select the preferred engineering option to deliver it. This process will be triggered by the preparation of several internal assessments and documents.

Stage 1: initial site screening

This stage seeks to identify technically feasible, economically viable and environmentally acceptable site options within a defined area. The search area may vary depending on terrain, other infrastructure, designated areas and features and connection options or electrical loss tolerances. The aim is to identify several potential sites which can be initially assessed for suitability, with a preferred site identified.

Stage 2: detailed site selection

This current stage seeks to confirm and thereafter finalise and refine the preferred substation site options taken forward. This includes, seeking to avoid physical, environmental and amenity constraints where possible, whilst being acceptable to stakeholders, and remaining economically viable; all whilst taking into account engineering and connection requirements. The four sites will all be subject to EIA screening.

Following this current public and associated stakeholder consultation, the preferred site options being pursued will be updated to include any feedback and feasible modifications and refinements reflected in advance of taking forward to a planning application submission.

The planning application process

The outcome of each substation site selection process will culminate in seeking Consent under the Town and Country Planning (Scotland) Act. Each application will identify:

- The site boundary (the Planning Red Site Line Boundary) including any access route (up to the public road, including junction improvements).
- The proposed development in relation to the site boundary, with dimensions of all permanent structures, buildings, perimeter fencing, and any key drainage features (SuDS pond) and electrical features, such as transformers.
- Any required landscape planting proposals (both in situ and remote to the proposed site) will also be identified and detailed as part of each planning submission.

In some cases, the application will be subject to Environmental Impact Assessment (EIA) under the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017. This may result in further alterations to the proposed development to reflect outcomes of the EIA consultation process. Should the proposed development be deemed non-EIA (through development size/scale or number and significance of potential environmental effects), a voluntary Environmental Appraisal (EA) will still be carried out and submitted in support of the application.

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www.ssen-transmission.co.uk/projects/west-of-beaulieu-asset-replacement-projects/



Engineering and economic considerations

Our Transmission Operators licence requires us to provide best value for customers and GB consumers. As a natural monopoly, SSEN Transmission are closely regulated by the GB energy regulator Office of Gas and Electricity Markets (Ofgem), who determine how much revenue we are allowed to earn for constructing, maintaining and renovating our transmission network.

These costs are shared between all those using the transmission system, including generation developers and electricity consumers. We therefore work to strict price controls which means the following engineering and economic considerations form a key part of our site selection process:

Construction

The costs and practicalities associated with constructing new platforms can vary considerably with location, depending on ground conditions, topography and underlying geology.

This means considering access and delivery routes, space for laydown and construction compounds, alongside consideration of future use. The topography and underlying ground conditions dictate how much material must be removed and moved to create a level site with a suitable base. Importing and exporting large quantities of aggregates and spoil is expensive and is not environmentally desirable due to impacts associated with transport. We can also use topography to our advantage, utilising existing ridges, mounds and slopes to provide screening for the site. This can reduce the amount of additional hard and soft landscaping required.

Operations

Our sites will be operational for a long time and will require ongoing maintenance and repairs by our Operations Team.

They need to be able to access the site easily and safely in all weathers. More exposed sites will likely need more maintenance during their life. In addition, where we have created or enhanced local habitats, we take on the responsibility for long term maintenance of landscaping to ensure it is successful.

Any potential impacts to the operation of the existing network and security of supply for our customers (both demand and generation) must be carefully considered and minimised where possible.

Connections

Each new substation requires to be connected to both the affected existing power station and 132kV overhead lines, so proximity to both of these is desirable.

The further away from these points of connection the identified site is, the greater the engineering challenges and cost as more infrastructure is required to be installed. Underground cables, whilst less visually intrusive, are more expensive than equivalent overhead lines.

By minimising the 11kV cable route lengths, we are able to make more efficient use of the renewable energy that is generated at each Hydro Power Station.

Given the fixed location of the power stations, reducing any new overhead infrastructure is a key consideration.

Noise mitigation/technology

The plant and equipment used in the construction and connection of each substation will vary in cost.

Site location can drive the use of alternative technologies, driven by factors such as wind speed, altitude, proximity to coast etc.

The available footprint may also dictate the use of alternative technologies in order to fit the required plant and equipment, which can come at a price. Some plant and equipment may also require to be housed indoors at an additional cost. The choices between cable and overhead line in connecting the site with the wider network will also affect the cost of the project.

It is unlikely that any significant noise mitigation will be required across the four sites, due to the relatively small size of the transformers and surrounding background noise levels relative to sensitive noise receptors. However, should operational levels and background studies show a need, then mitigation would likely be in the form of enclosures or walls that are designed to absorb any noise above tolerable levels.

Forestry and biodiversity

The cost and environmental impacts of felling trees and any compensatory planting must be factored into the assessment.

SSEN Transmission are committed to a net loss of forestry and biodiversity on projects. Choosing a site with more tree felling or in more ecologically rich habitats will incur greater costs, both to remove the trees and then provide compensatory planting and habitat creation/enhancements.



Environmental considerations

Due to the location of the projects, there are a number of key environmental considerations. Deanie and Culligran are both located within or close to the Glen Strathfarrar National Scenic Area and Glen Affric to Strathconon Special Protection Area (SPA). They are also located close to the Central Highlands Wild Land Area and Glen Strathfarrar Site of Special Scientific Interest (SSSI).

Strathglass Special Area of Conservation (SAC) is located to the south of Deanie. Kilmorack is located in close proximity to four Category B listed Buildings and one Category C Listed Building. The main areas of assessment during site selection are outlined below. It should be noted that any potential impacts which concern the population have been considered under the umbrella of the "environmental considerations". These include potential impacts on visual amenity, noise, proximity to dwellings, recreational receptors and flood risk.

Landscape and visual designations

The appearance of the substations within the landscape and how/where they will be seen is being carefully considered.

Site selection has also been guided by effects on nationally valued landscape, with particular consideration of:

- Deanie and Culligran projects in relation to the National Scenic Area and Wild Land Areas.
- The importance of Glen Strathfarrar Road Core Path, Public Rights of Way and other recreational access routes in the sensitive landscape.
- Landscape character, visual amenity and heritage assets (including several listed buildings).

Mitigation is anticipated to include using the existing landform features and the creation of sympathetic, hard and soft landscaping, with the natural landform offering opportunities for screening views of the proposed developments from key visual receptors.

Hydrology and geology

The following hydrological aspects are being considered as part of the site selection process for each of the substations:

- Private water supplies.
- Groundwater dependent terrestrial ecosystem (GWDTE's).
- Potential for flood risk (particularly at Aigas).
- If any designated sites are hydrologically linked to the site.

An appropriate site drainage plan for both the construction and operational phases will be developed to ensure no adverse impacts on the surrounding water environment.

Cultural heritage

The preferred site option at Kilmorack has the potential for setting impacts on listed buildings.

There is also the potential for impacts on known and unknown archaeological remains. Setting impacts will be considered as part of the design development. Mitigation measures may include screening for visual intrusion.

Land use, access and recreation

No long-distance routes are identified within the sites under consideration. Core paths and public rights of way are present within both the Deanie and Culligran site options.

Ecology and ornithology

Several ecology surveys and assessments have been carried out covering:

- Habitats, including biodiversity.
- Protected species, including suitability for badger, otter, bat, red squirrel and pine marten.
- Breeding bird surveys are in the process of being undertaken.

Tree felling will be required for the preferred site at Culligran, and possibly minor thinning at Aigas. All projects will seek to achieve no net loss of biodiversity which will be achieved through habitat improvement and additional planting at agreed locations.



Golden eagle



Red squirrel

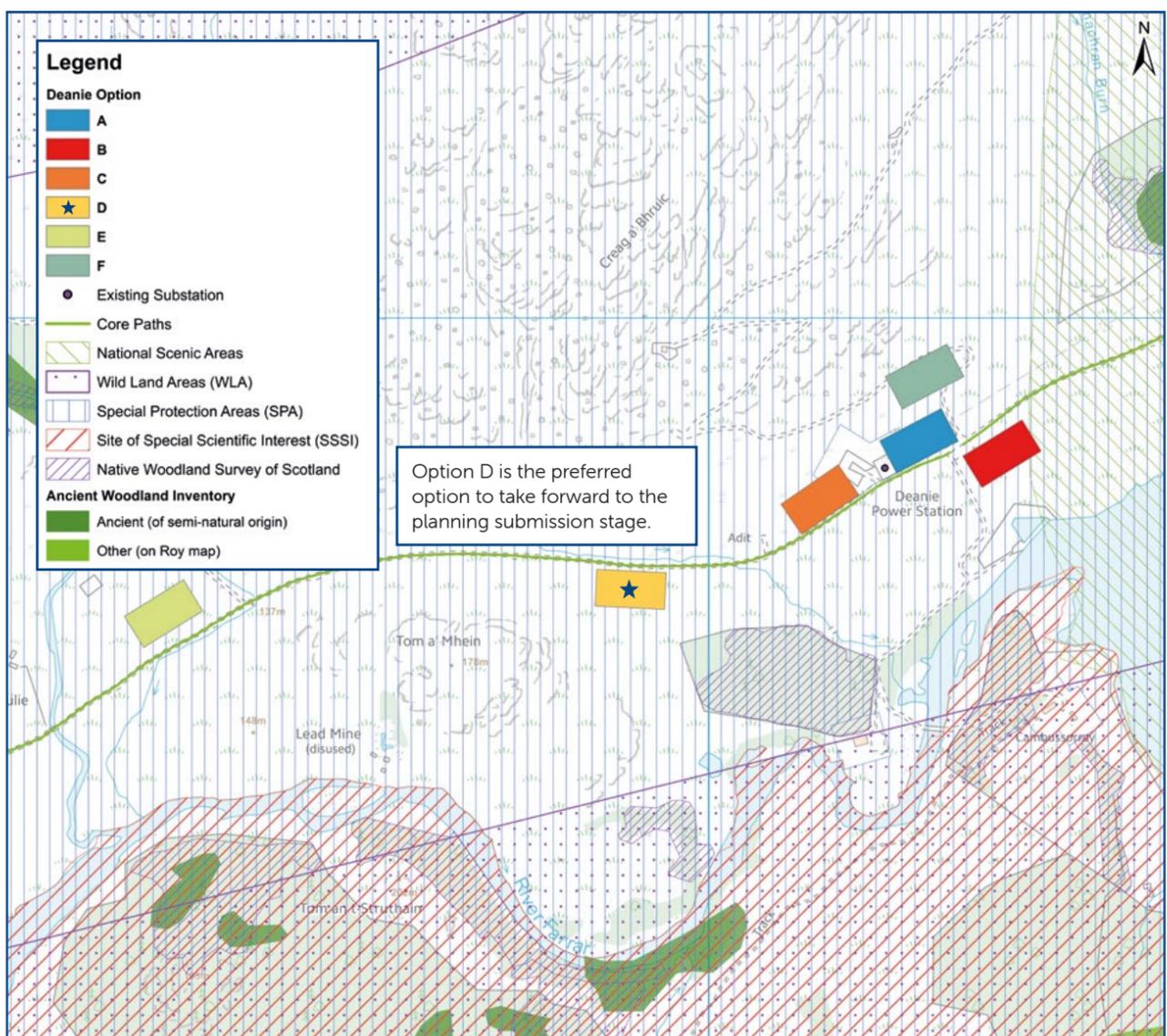
Deanie site selection search area, options and preferred site

Deanie Substation site options

The search area for Deanie is relatively small due to the requirement to be within 1km of the existing Deanie Hydro Electric Power Station. The area is defined by the following:

- Located north-west of Loch Beannacharan.
- Steep terrain profiles to the west and north of the existing Deanie Hydro Electric Power Station.
- There is an area of woodland to the south as well as the River Farrar (tributary of River Beauly), although the search area itself is not within any areas of woodland.
- Glen Strathfarrar Road is adjacent to all site locations.

Six options were originally considered at Deanie, (sites A to F) as part of the initial site selection (stage 1). Options A, B and D were then taken forward to the detailed site selection due to scoring better in terms of engineering and environmental constraints when compared to the other options.





Deanie site selection search area, options and preferred site

Aerial view of the proposed substation



Summary

On balance, when considering the engineering, environmental and cost criteria together, the preferred site to be taken forward to planning application submission is site option D.

Engineering summary

The initial technical assessment undertaken identified **options A and D** as the preferred locations to build the proposed new substation. Subsequent investigation into the feasibility of construction of the substation at **option A** immediately adjacent to the existing substation, found that it would be prohibitively challenging, if not impossible to build here without significant outages. This, in effect, would require the generating hydro power station to be disconnected from the grid for the duration of construction until the new substation was commissioned and ready for entry into service.

While **option D** presents its own challenges due to the distance from the power station, which increases the length of the 11kV cable route connecting the generated supply to the grid via the new substation. The costs associated with these losses over the design life of the substation and cabling is more commercially manageable than the revenue that would be lost by the customer, not to mention the reduced capacity of the grid to deliver power to end users, if we were to disconnect the power station for the duration of construction.

Site D also offers considerable extra space for a construction compound and permanent screening to be planted to help conceal the substation and reduce the overall visual and environmental impact.

Environmental summary

All site options have similar environmental constraints in terms of being located within the Glen Affric to Strathconon Special Protection Area (SPA), in close proximity (approximately 150m north) of the Glen Strathfarrar Site of Special Scientific Interest (SSSI) and Strathglass Special Area of Conservation (SAC). No site options are likely to result in significant woodland loss. None of the sites under consideration have any designated sites or known cultural heritage assets within 3km.

Glen Strathfarrar Road (Reference IN26.01) Core Path passes the majority of the site options, with none of the options likely to adversely impact the core path.

Site option A was considered to be the second preferred option to be investigated further at detailed design stage from an environmental perspective, as this option is situated directly next to the existing substation, thereby keeping the infrastructure in the same location.

Due to the sensitivities associated with the substation site options being located adjacent to Glen Strathfarrar National Scenic Area, **site option D** was considered be the preferred site when considering the landscape and visual sensitivities alongside scope for mitigation.

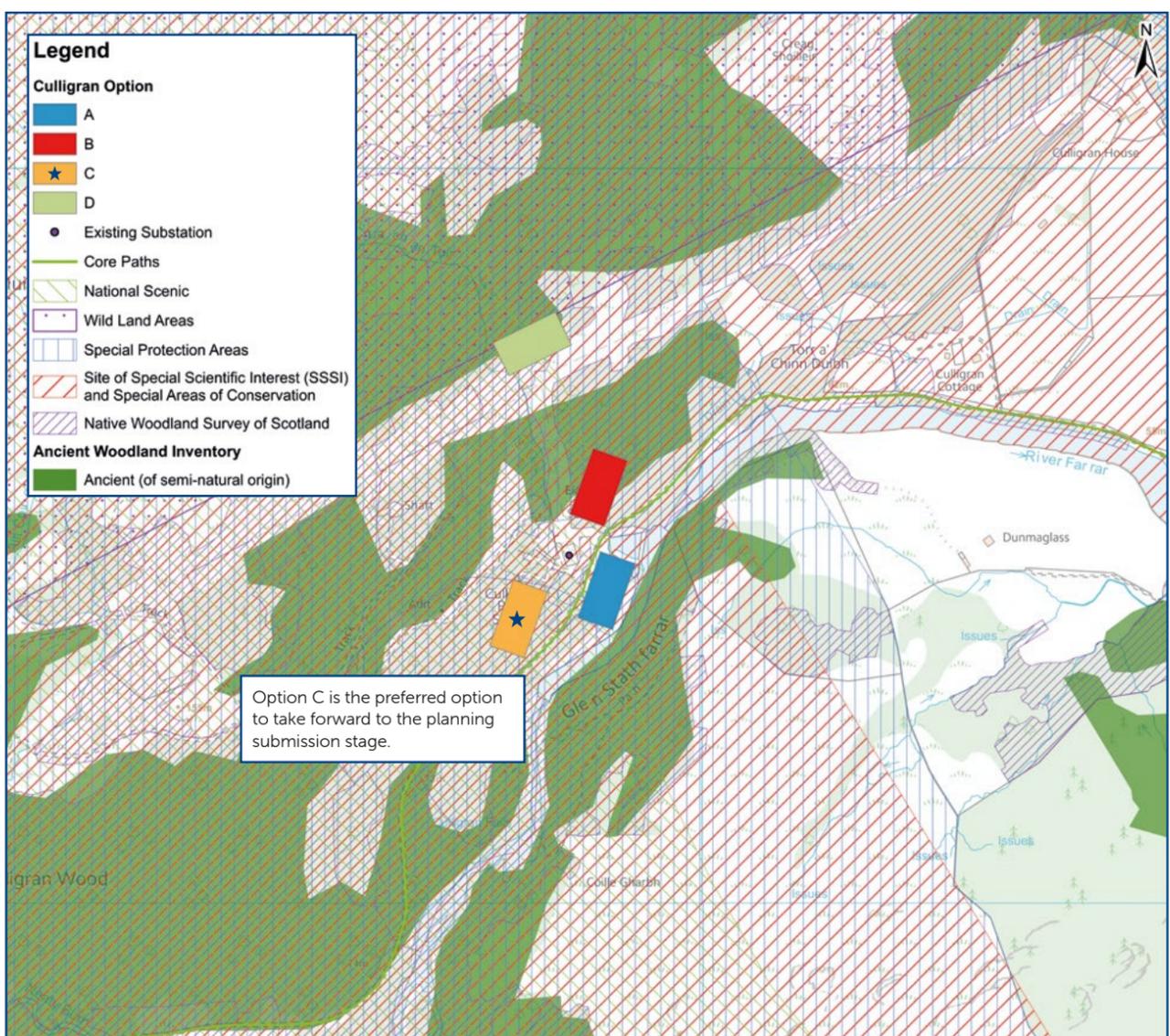
Culligran site selection search area, options and preferred site

Culligran Substation site options

The search area for Culligran is relatively small due to the requirement to be within 1km of the existing Culligran Power Station. The area is defined by the following:

- Search area is surrounded by areas of woodland.
- Steep terrain profiles to the north and west of the site options.
- North of the River Farrar (tributary of River Beaully).
- Glen Strathfarrar Road is adjacent to site search location.

For Culligran, four options were initially considered, (site options A to D), with options A, B and C further progressed to detailed site selection. Option D performed the worst in terms of environmental preferences and would be difficult to construct, with option C concluded as offering best scope overall.





Culligran site selection search area, options and preferred site

Aerial view of the proposed substation



Summary

On balance, when considering the engineering, environmental and cost criteria, the preferred site to be taken forward to planning application submission stage is **site option C**.

Engineering summary

Based on the initial technical assessment that was undertaken prior to the first consultation event, **site options B and C** were considered preferred options from an engineering perspective to take forward for more detailed investigation.

Both are located close to the existing substation and power station so are both advantageous with regards to the 11kV and 132kV connection points to the power station and grid. Both are likely to provide good suitability for earthworks. However, **option B** is located in close proximity to underground SSE generation assets.

Site option B would also impact on an ancient woodland designated area and is located on steep topography which would be challenging for the construction of the substation. **Site option C** offers potential for site screening as a result of existing woodland. Both site options would have access challenges for the construction and substation operation.

During site construction activities, **site option C** could present some minor construction disruption to the existing power station, although this would be programmed to be coordinated with the customer.

On balance both options offer similar benefits in terms of connection to the existing power station and 132kV grid network, but because of the following **site option B** considerations:

- impacts on designated ancient woodland;
- existing underground infrastructure assets.

Alongside screening opportunities afforded from **option C**, **option C** has been identified as the preferred site to be taken through to planning and development.

Environmental summary

All site options have similar environmental constraints in terms of being located within the Glen Affric to Strathconon Special Protection Area (SPA), Glen Strathfarrar National Scenic Area (NSA) Glen Strathfarrar Site of Special Scientific Interest (SSSI) and Strathglass Special Area of Conservation (SAC).

Site option A is located adjacent to the River Farrar and therefore performs worst in terms of hydrology, whereas **site options B, C and D** are preferred in terms of hydrology due to their relative location further from the river.

Site option B is located within an area of Ancient Woodland Inventory and therefore performs worst in terms of Natural Heritage. **Site option D** is located in a woodland clearing and therefore performs best in terms of least woodland loss. However, this site option performs poorly in terms of landscape and visual impact.

Site option A and B perform similarly in terms of environmental preference for the second site option to be taken forward to detailed site selection.

Site option A would perform worst for hydrology due to the location adjacent to the river and **site option B** performs worst for natural heritage and woodland impacts due to this option being located within ancient woodland.

Site option C was defined to be the optimal site option for the environment on the basis that it is in lower quality woodland which also allows the site option opportunity for immediate screening; particularly as the wider area all sits within the Glen Strathfarrar National Scenic Area.

Aigas site selection search area, options and preferred site

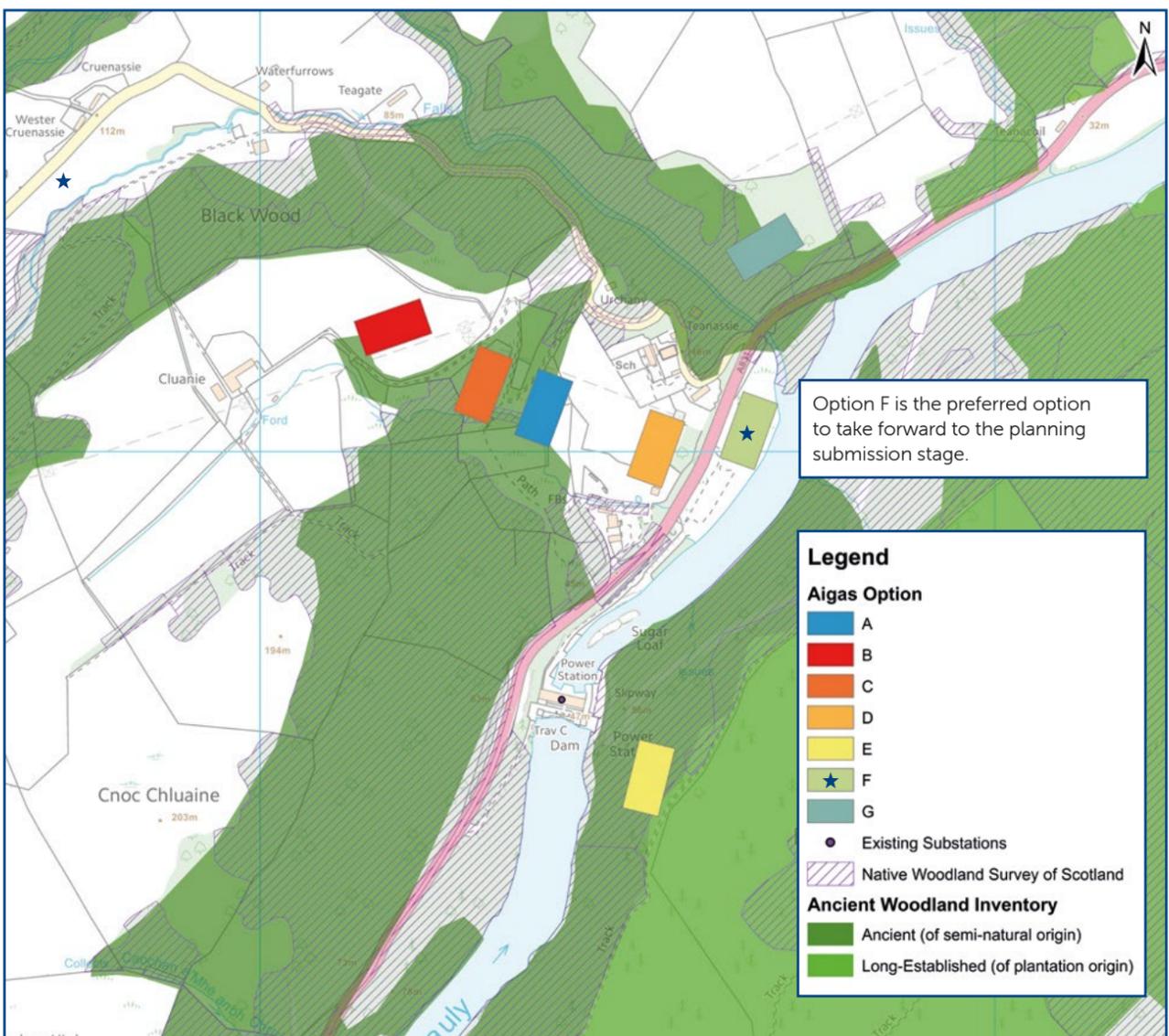
Aigas Substation site options

Following feedback from our previous consultation events, the project team are aware of concerns around noise of the proposed new substations' equipment. In the first instance, all of the proposed sites taken forward to the consenting stage will look to have a baseline noise position undertaken. There are a number of measures/technologies which will be considered and assessed on a case by case basis, depending on the proposed kit/technology for each site, the distance to audio receptors such as dwellings, wider site context and other environmental sensitivities with the aim of mitigating any adverse noise impact.

The search area for Aigas is relatively small due to the technical constraint requirements to be within 1km of the existing Aigas Dam. The area is defined by the following:

- Located adjacent to the River Beauly.
- Aigas Dam is located to the south.
- East of the search area is a large area of ancient woodland, west of the site is sparse woodland and agricultural land. Teanassie Primary School and residential properties sit immediately to the north.

For the preferred site location at Aigas, seven options were initially considered (sites A to G), with options F and G further progressed to detailed site selection. Site option F performed the best in terms of buildability, landscape and visual, natural heritage designations. This site is also however closest to the River Beauly, with initial concerns from SEPA on flooding potential. Site G is the second preferred option, requiring a longer cable connection which would lead to increased losses.





Aigas site selection search area, options and preferred site

Aerial view of the proposed substation



Summary

On balance, when considering the engineering, environmental and cost criteria, the preferred site to be taken forward to the planning application submission stage is **site option F**. (subject to Flood Risk Assessment outcomes).

Engineering summary

All site options except **site option F** have space available for laydown and construction areas.

Site options D, E and F are located in close proximity to 11kV and 132kV connection points which allows the best use of existing infrastructure.

Site options A, B, C and G would require an increased length of 11kV cable which would result in more energy losses for the customer.

Major road improvements would be required to access **site options A, B, C, E and F**. Steep ground conditions are present at **site options A, C, E and G** which would cause challenges during the construction of the substation platforms.

Site option D is located closest to residential dwellings and Teanassie Primary School.

Site option E would require tree clearance and a connection to the south of the River Beaully which would be technically complex and potentially unfeasible. **Site option F** is closest to the River Beaully and therefore could have flood risk implications as well as there being insufficient space for a standard substation site layout.

A replacement overhead line 'Tee' connection would likely be required to facilitate a new substation location at **site option G** which would require additional works and increase the overall construction footprint of this site. Based on the initial technical assessment, **site option F** and **option G** were identified to take forward for more detailed development.

Following more detailed engineering development, the decision has been made to progress with **site option F**. The challenges of **F** (narrow site and potential flood risk) were deemed to be less of a shortcoming than those of **G** which is a steeply sloping site that would require a long complex cable route and significant changes to the overhead line. The major benefit of **site option F** is its proximity to the existing power station, reducing cable losses, meaning higher efficiencies and more renewable energy reaching consumers.

Environmental summary

Site options A, B, C, E and G are located either wholly or partially within areas of ancient woodland and therefore perform worst in terms of Natural Heritage.

Site options D and F are preferred in terms of Natural Heritage.

Site option F is located adjacent to the River Beaully and therefore performs worst in terms of hydrology.

However, this site option performs best in terms of landscape and visual as the site has the potential to be screened. **Site option D** is located closest to the primary school.

On balance, **site option F** is the optimal site for the Environment. The second preferred site option would be **site option G**, even though this site is located on ancient woodland designation. The woodland has been cleared and is therefore characterised as an agricultural field.

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Kilmorack site selection search area, options and preferred site

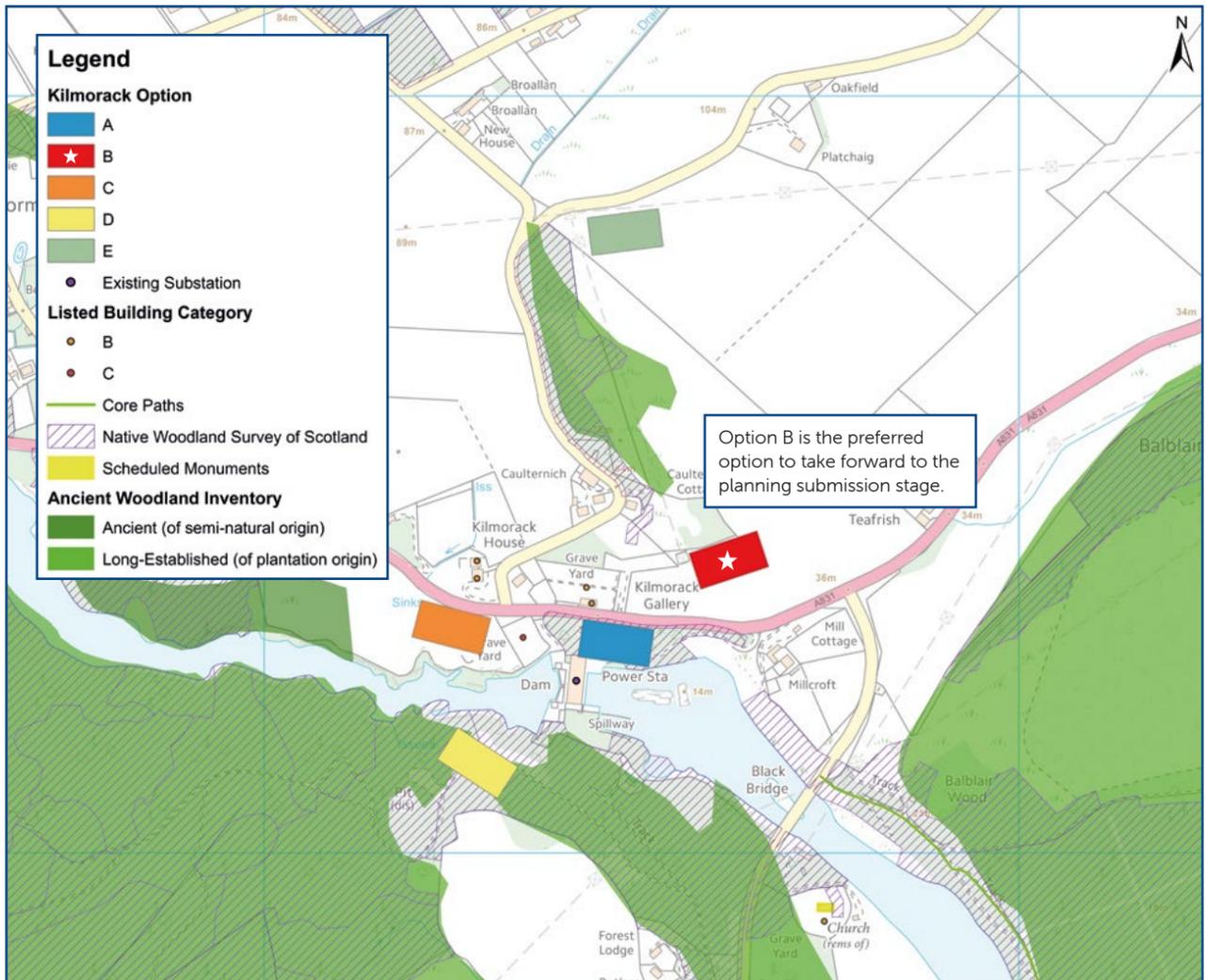
Kilmorack Substation site options

The search area for Kilmorack is relatively small due to the requirement to be within 1km of the existing Kilmorack Power Station. The area is defined by the following:

- Kilmorack Gallery and several residential properties are in close proximity, located north of the existing Kilmorack substation in a primarily flat area.
- A831 road runs adjacent to the existing Kilmorack substation.
- Surrounding area consists of agricultural land and small areas of woodland to the north and large woodland area to the south.
- River Beauly is in close proximity.

For the site location at Kilmorack, five options were initially considered, (sites A to E), with options B and C progressed to detailed site selection. These options have limited impact to natural heritage, cultural heritage and woodland loss and also perform best in terms of engineering.

There were two combined site options for Kilmorack and Aigas considered but both options required extensive woodland loss, a crossing of the River Beauly and would lead to extensive energy losses due to the length of the required cable. As a result, neither option was taken beyond the initial site selection.





Kilmorack site selection search area, options and preferred site

Aerial view of proposed Kilmorack substation indicative site area



Summary

On balance, when considering the engineering, environmental and cost criteria, the preferred site to be taken forward to the planning application submission stage is **site option B**.

Engineering summary

Site options A and B are located in close proximity to existing 11kV and 132kV connection points as well as offering potential screening opportunities. **Site options B, C, D and E** have space available for laydown and construction areas. **Site options C and E** are also suitable for earthworks.

Site option A has insufficient space for a standard site compound and laydown area and may not be technically feasible. This site option would also require significant outage requirements due to the interface with the existing 132kV underground cable.

Site options A, B, C and D would require road improvements to facilitate improved construction access for substation platform works and transformer delivery.

Site option B is located in close proximity to existing SSE generation assets. **Site option C** lies adjacent to a cemetery which presents a significant technical constraint that is likely to limit feasible 11kV connection routes.

Further to this, **site option C and E** would require additional work to facilitate a new OHL arrangement. **Site option D** is located to the south of the River Beauly, in an area of steep topography and would require significant woodland clearance. Based on the initial technical assessment, **site option B** and **option C** were identified to take forward for more detailed development.

Following more detailed engineering development the decision has been made to progress with **site option B**. The reason for this is that **option B** presents the least restricted site that has the clearest connection to the overhead line and power station.

Environmental summary

Site option D performs worst in terms of Natural Heritage Designations, hydrology and geology, recreation and woodland and forestry, due to being located within the woodland area to the south of the River Beauly.

Site option A performs worst in terms of visual impact due to the visual intrusion to the graveyard. **Site option D and B** perform best in terms of landscape and visual. **Site option E** conflicts with an existing planning application and would therefore not be considered to be an appropriate site option to take forward.

Site option B is the preferred site option in terms of environmental topics as this is located within an agricultural field, thereby having limited impacts to Natural Heritage, Cultural Heritage and woodland loss. The existing woodland has the potential to screen the substation from the properties at Caulternich.

On balance, the preferred environment site option to be progressed to Detailed Site Selection stage would be **site option B**.

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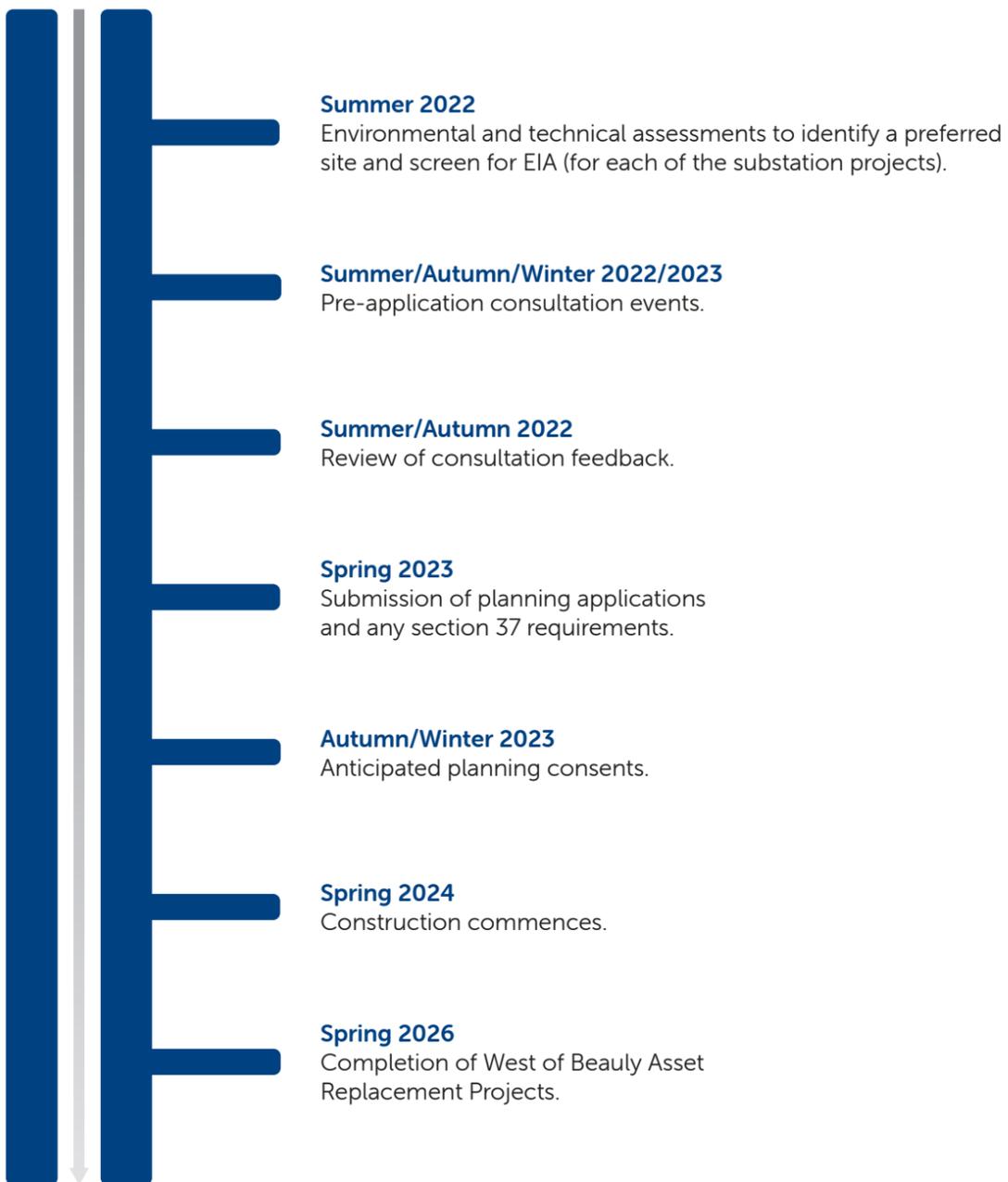
What happens now

In the interest of transparency, we have presented these four proposed asset replacement projects as a whole, to seek to ensure all stakeholders are aware of the full extent of the proposals and are invited to comment on each of the proposed developments separately.

All feedback and comments following these consultation events will be reviewed by the project team and where possible will inform further design refinement of the substations and sites. This feedback period is open until 5pm, Tuesday 29th November. A final consultation is anticipated early next year, presenting our proposed sites, updating on feedback received and associated final design's (including refinements) prior to planning application submissions.

Where overhead line elements are required, a similar application may require to be made to the Scottish Ministers, (under Section 37 of the Electricity Act 1989). This will specifically cover the overhead line, not the main substation works.

Project timeline



Electrical losses maps

The following maps show the constrained search areas for the 4 proposed substations. The coloured circles represent the electrical losses experienced and associated viability through the required 11kV cable connection to any new substation. Electrical losses are too great and therefore unviable of a distance at or beyond 1km of the existing substations.

