Scottish & Southern Electricity Networks

TRANSMISSION

Consultation Document – Alignment Selection

Netherton Hub 400kV OHL Connection to New Deer and Peterhead: Rebuild

February 2025

Scottish & Southern Electricity Networks

TRANSMISSION

CONTENTS

GLOSSARY

Term	Definition
Above Ordnance Datum (AOD)	It is a vertical datum used by an Ordnance survey as the basis for deriving altitudes on maps.
AC	Alternating current.
Alignment	A centre line of an overhead line, along with location of key angle structures.
Amenity	The natural environment, cultural heritage, landscape and visual quality. Also includes the impact of SSEN Transmission's works on communities, such as the effects of noise and disturbance from construction activities.
Ancient Woodland	In Scotland, Ancient Woodland are areas of woodland that have existed since 1750 and are relatively undisturbed by human development. They are considered irreplaceable and have complex biodiversity that have accumulated over hundreds of years.
Ancient Woodland Inventory (AWI)	The Ancient Woodland Inventory (AWI) is a provisional guide to the location of Ancient Woodland and has three categories of woodland: i. Ancient Woodland (1a and R1) - Interpreted as semi-natural woodland from maps of 1750 (1a) or 1860 (R1) and continuously wooded to the present day. If planted with non-native species during the 20th century they are referred to as Plantations on Ancient Woodland Sites (PAWS). ii. Long-established woodlands of plantation origin (LEPO) (1b and R2) - Interpreted as plantation from maps of 1750 (1b) or 1860 (R2) and continuously wooded since. Many of these sites have developed semi-natural characteristics, especially the oldest ones, which may be as rich as Ancient Woodland. iii. Other woodlands on 'Roy' woodland sites (3) - Shown as unwooded on the 1st edition maps but as woodland on the Roy maps. Such sites have, at most, had only a short break in continuity of woodland cover and may still retain features of Ancient Woodland.
Beauly to Peterhead Connection (B2P)	A neighbouring overhead line development connecting the Beauly Substation to Peterhead via the New Deer development.
Biodiversity Net Gain (BNG)	It is an approach to development which makes sure that the natural environment is left in a measurably better state than they were before the development.
Biodiversity Units (BU)	Biodiversity units are the metric used to quantify the biodiversity gains and losses of a development.
Birds of Conservation Concern	Birds of Conservation Concern (BoCC) provides the status of all regularly occurring birds in the UK, Channel Islands and Isle of Man. The current version is BoCC 5. Birds of highest conservation concern will appear on the Red List.
Class 1 and Class 2 Peatland	Class 1 – Nationally important carbon-rich soils, deep peat and priority peatland habitat. Areas likely to be of high conservation value. Class 2 – Nationally important carbon-rich soils, deep peat and priority peatland habitat. Areas of potentially high conservation value and restoration potential.
Construction Environmental Management Plan (CEMP)	A site specific environmental management plan setting out the environmental management procedures, legislation and requirements for a particular project and site.
Consultation	The dynamic process of dialogue between individuals or groups, based on a genuine exchange of views and, normally, with the objective of influencing decisions, policies or programmes of action.
Corridor	A linear area which allows a continuous connection between the defined connection points. The corridor may vary in width along its length; in unconstrained areas it may be many kilometres wide.
DC	Direct current.
Distribution Network Operator (DNO)	The operator of the electric power distribution system which delivers electricity to most end users. SSEN is a DNO.

Term	Definition
Drinking Water Protected Areas (DWPA)	Bodies of surface water and groundwater identified in the Water Environment (Drinking Water Protected Areas) (Scotland) Order 2013 which are used for the abstraction of water intended for human consumption.
Effect	The direct or indirect physical consequence(s) of the proposed alignment option on receptors, under each of the various topic headings.
Electricity System Operator (ESO)	National Grid is the Electricity System Operator (ESO) for Great Britain. The ESO balances electricity supply and demand to ensure the electricity supply.
Environmental Impact Assessment (EIA)	Environmental Impact Assessment. A formal process codified by EU directive 2011/92/EU, and subsequently amended by Directive 2014/52/EU. The national regulations are set out in The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017. The EIA process is set out in Regulation 4(1) of the regulations and includes the preparation of an EIA Report by the developer to systematically identify, predict, assess and report on the likely significant environmental impacts of a proposed project or development.
Freshwater Pearl Mussel (FWPM)	It is an endangered species of mollusc, found in clean, nutrient poor low-calcium rivers.
Gardens and Designed Landscapes (GDLs)	The Inventory of Gardens and Designed Landscapes lists those gardens or designed landscapes which are considered by a panel of experts to be of national importance.
Geological Conservation Review (GCR)	The Geological Conservation Review (GCR) is a process to select areas of national and international importance for their geology and geomorphology within Great Britain.
Geology	The study of the rocks and similar substances that make up the earth's surface.
Gigawatt (GW)	One billion watts.
Ground Water Dependent Terrestrial Ecosystem (GWDTE)	Wetlands which critically depend on groundwater flows. They are safeguarded by the Water Framework Directive (WFD) and are sensitive to hydrological and ecological changes.
Habitat	Term most accurately meaning the place in which a species lives, but also used to describe plant communities or agglomerations of plant communities.
Habitat Map of Scotland (HABMOS)	It is the national repository for habitat and land use data. The map adopts internationally recognised data and habitat classification standards.
Historic Environment Scotland HES	Historic Environment Scotland is the lead public body established to investigate, care for and promote Scotland’s historic environment.
High Voltage Direct Current (HVDC)	A high voltage, direct current (HVDC) electric power transmission system uses direct current for electric power transmission, in contrast to the more common alternating current systems. Most HVDC links use voltages between 100 kV and 800 kV.
Holford Rules	Guidelines on overhead line routeing first formulated in 1959 by Sir William later Lord, Holford. The Holford Rules set out a hierarchical approach to routeing which advocates avoiding areas of high amenity value, minimises changes in direction, which takes advantage of topography and which minimises visual interactions with other transmission infrastructure.
Hydrogeology	A branch of geology concerned with the occurrence, use, and functions of surface water and groundwater.
Hydrology	The study of water on and beneath the earth’s surface, with regards to its occurrence, distribution, movement and properties as well as its relationship with the environment within each phase of the water cycle.
Irreplaceable Habitat	Irreplaceable habitats are habitats which are very difficult (or take a very significant time) to restore, recreate or replace once destroyed, due to their age, uniqueness, species diversity and rarity.
Kilovolt (kV)	One thousand volts.
Land Capability for Agriculture (LCA)	It is a land evaluation ranking that groups soils based on their potential for agricultural purpose.
Landscape Character Type (LCT)	A distinct, recognisable and consistent pattern of elements in a landscape that differentiate the area from another.

Term	Definition
Level of Impact	The outcome of a comparative appraisal of the combination of effects within a specific topic along a specific alignment option after a consideration of the potential for mitigation, using professional judgement based on experience.
Limit of Deviation (LOD)	The area either side of the proposed alignment within which micrositing of structures may take place in accordance with the conditions of the Section 37 consent.
Listed Building	Building included on the list of buildings of special architectural or historic interest and afforded statutory protection under the 'Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997' and other planning legislation. Classified categories A – C.
Local Nature Reserve	Areas of natural heritage that are locally important.
Long-Established woodlands of Plantation Origin (LEPO)	LEPO refers to the wooded areas that have a continuous history of being wooded since at least 1750.
Micrositing	The process of positioning individual structures to avoid localised environmental or technical constraints.
Mitigation	Term used to indicate avoidance, remediation or alleviation of adverse impacts.
National Cycle Network (NCN)	It offers a collection of signed walking and cycling paths connecting Scotland's cities, towns and countryside.
NCR	The National Cycle Routes are a UK-wide network of signed paths and routes for walking, wheeling, cycling and exploring the outdoors.
National Nature Reserve	Areas of natural heritage that are nationally important.
National Scenic Area (NSA)	A national level designation applied to those landscapes considered to be outstanding scenic value in a national context.
Native Woodland Survey of Scotland (NWSS)	The Native Woodland Survey of Scotland identified and mapped the location, extent, type and condition of all of Scotland's native woodlands.
NatureScot	NatureScot is the lead public body responsible for Scotland's natural environment.
Network Options Assessment (NOA)	The National Grid's Network Options Assessment (NOA) provides their recommendation for which network reinforcement Projects should receive investment, and when.
Ornithology	The study of birds, their behaviour, physiology and taxonomy.
Overhead line (OHL)	An electric line installed above ground, usually supported by lattice steel towers or poles.
Plantation Woodland	Woodland of any age that obviously originated from planting.
Potential Alignment	The Potential Alignment presents the outcome of our initial appraisal, before consultation, of environmental, technical, and cost constraints. It is the alignment we consider is the best balance of the constraints identified.
Private Water Supply (PWS)	A water supply that is not provided by Scottish Water.
Proposed Alignment	The Proposed Alignment presents the outcome following consultation and is taken forward to detailed design and section 37 consent application.
RAG Rating	A Red, Amber, Green rating provided to assess the potential impact of the proposed OHL.
Ramsar	A wetland site designated to be of international importance under the Ramsar Convention.
Route	A linear area of approximately 1 km width (although this may be narrower/wider in specific locations in response to identified pinch points / constraints), which provides a continuous connection between defined connection points.
Routeing	The work undertaken which leads to the selection of a Proposed Alignment, capable of being taken forward into the consenting process under Section 37 of the Electricity Act 1989.
Schedule 1 Species	Birds listed on the Schedule 1 of the Wildlife & Countryside Act 1981, of which it is an offence to intentionally or recklessly disturb at, on or near an 'active' nest.

Term	Definition
Scheduled Monument	A monument which has been scheduled by the Scottish Ministers as being of national importance under the 'Ancient Monuments and Archaeological Areas Act 1979'.
Scottish Environment Protection Agency (SEPA)	Scotland's principal environmental regulator, protecting and improving Scotland's environment.
Scottish Water (SW)	Scottish Water is a public company that provides public drinking water and sewerage services across Scotland. It is accountable to the public through the Scottish Government.
Semi-natural Woodland	Woodland that does not obviously originate from planting. The distribution of species will generally reflect the variations in the site and the soil. Planted trees must account for less than 30% of the canopy composition
Sites and Monument Record (SMR)	Sites and Monuments Record (SMR) holds documentary evidence and field inspections of all known archaeological sites and monuments.
Sites of Special Scientific Interest (SSSI)	Areas of national importance. The aim of the SSSI network is to maintain an adequate representation of all natural and semi-natural habitats and native species across Britain.
Span	The Section of overhead line between two structures.
Special Area of Conservation (SAC)	An area designated under the EC Habitats Directive to ensure that rare, endangered or vulnerable habitats or species of community interest are either maintained at or restored to a favourable conservation status.
Special Landscape Area (SLA)	Landscapes designated by councils, which are considered to be of regional/local importance for their scenic qualities.
Special Protection Area (SPA)	An area designated under the Wild Birds Directive (Directive74/409/EEC) to protect important bird habitats. Implemented under the Wildlife and Countryside Act 1981.
Scottish and Southern Electricity Networks Transmission (SSEN Transmission)	The owner, operator and developer of the high voltage electricity transmission system in the north of Scotland and remote islands.
Stakeholders	Organisations and individuals who can affect or are affected by SSEN Transmission works.
Study Area	The area within which the corridor, route and alignment study takes place.
Target Species	Legally protected and notable species of conservation concern.
The National Grid	The electricity transmission network in the Great Britain.
Vantage Point (VP)	A place, especially a high place, that provides a good, clear view of an area.
Volts	The international unit of electric potential and electromotive force.
Water Framework Directive (WFD)	European Community (EC)'s Water Framework Directive, sets out rules to halt deterioration in the status of water bodies and achieve good status for Europe's rivers, lakes and groundwater.
Wayleave	A voluntary agreement entered into between a landowner upon whose land an overhead line is to be constructed and Scottish Hydro Electric Transmission.
Wild Land Area (WLA)	Those areas comprising the greatest and most extensive areas of wild characteristics within Scotland.

1. INTRODUCTION

1.1 Purpose of the Document

This Consultation Document has been prepared by WSP UK Ltd ('WSP') on behalf of Scottish and Southern Electricity Networks Transmission (SSEN Transmission). SSEN Transmission, operating under licence held by Scottish Hydro Electric Transmission plc, owns, operates and develops the high voltage electricity transmission system in the north of Scotland and remote islands. This Consultation Document invites comments from all interested parties on the Potential Alignment identified for the Netherton Hub 400kV OHL Connection to New Deer and Peterhead: Rebuild (herein referred to as 'the Project'). The Project comprises the installation of a new 400 kV OHL connecting Netherton Hub to the Peterhead Substation.

This Consultation Document describes the alignment options appraisal undertaken, the alternatives considered during the selection of alignment options and the identification of the Potential Alignment. Comments are now sought from statutory authorities, key stakeholders, elected representatives and the public on the alignment selection process and the Potential Alignment identified.

All comments received will inform further consideration of the Potential Alignment.

The Consultation Document is available online at the Project website:

https://www.ssen-transmission.co.uk/netherton-400kV-OHL-rebuild

1.2 Document Structure

This report is comprised of the following Sections:

1. Introduction – setting out the purpose of the Consultation Document and document structure.
2. The Proposals – describes the need for and description of the proposals, and the typical construction methods.
3. Alignment Selection Process – sets out the alignment selection process and methodology that has been applied to date to derive a Potential Alignment.
4. Alignment Options - provides a description of the alignment options.
5. Comparative Analysis of Alignment Options – summarises the key considerations of each alignment option from an environmental, engineering and economic perspective, and provides a comparative appraisal of each alignment option in order to select a Potential Alignment.
6. Consultation on the Proposals – invites comments on the alignment assessment process and identification of the Potential Alignment.

1.3 Providing Feedback

As part of the consultation exercise, comments are sought from members of the public, statutory consultees and other key stakeholders on the Potential Alignment put forward in this Report.

When providing comments and feedback on this Consultation Document, SSEN Transmission would be grateful for your consideration of the questions below:

- Has the approach taken to select the Potential Alignment been clearly explained?
- Are there any factors, or environmental features, that you believe we may not have already considered during the Potential Alignment selection process?
- Do you have any specific concerns in relation to the Potential Alignment? If so, is there anything we could do to mitigate the impact of this?
- Do you feel, on balance, that the Potential Alignment selected is the most appropriate for further consideration at the Environmental Impact Assessment stage?
- SSEN Transmission's Community Benefit Fund will provide an opportunity for local groups and organisations to apply for community funding. Do you have any suggestions for local community benefits or local initiatives, such as volunteering, that we could support to leave a positive legacy in your area?

Comments on this Consultation Document should be sent to:

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Grampian House, 200 Dunkeld Road, Perth PH1 3GH

All comments are requested by Wednesday 16 April 2025.

1.4 Next Steps

Following conclusion of the consultation phase, a Report on Consultation will be produced which will document the consultations received, and the decisions made in light of these responses. The Proposed Alignment will then be confirmed which will be taken forward into the next stage of the environmental appraisal process.

Section 37 consent under the Electricity Act 1989 will be sought from the Energy Consents Unit of the Scottish Government for the proposed new OHL infrastructure.

2. THE PROPOSALS

2.1 The Need for the Project

Significant volumes of new renewable generation are expected to connect to the SSEN Transmission network, resulting in much greater bulk power transfer requirements on all major SSEN Transmission boundaries.

A strategic hub at Peterhead (herein referred to as 'Netherton Hub') is required for the purpose of establishing a common and coordinated approach to development for the future network reinforcements as identified in the Holistic Network Design (HND) to meet the UK's 2030 net zero targets. This holistic approach to project planning and development was considered necessary to maximise the potential efficiencies which comes from a single coordinated and collocated development site for both Alternating Current (AC) and Direct Current (DC) transmission infrastructure in the region. This collective development will substantially strengthen the local transmission network and support new onshore and offshore connections, such as those created through the Scotwind offshore lease rounds. Furthermore, it will help facilitate the export of future renewable generation from the North of Scotland to demand centres in throughout the UK.

The construction of a new OHL between a 400kV AC substation within Netherton Hub and Peterhead Substation is required to integrate the new substation site into the existing network and maximise the transfer capability between the new Hub substation and the wider transmission network to increase network security.

The line rating between the Hub and Peterhead Substation needs to be increased from 4000amps to 5000amps to facilitate network requirements, requiring use of heavier conductors compared with the New Deer – Netherton Hub OHL. This necessitates a full line rebuild and alignment options from Netherton Hub to Peterhead Substation in full.

Further information on SSEN Transmission Pathway to 2030 can be found at the following:
https://www.ssen-transmission.co.uk/projects/2030-projects/2030-need/

2.2 Project Overview

The Project entails the installation of a new 400 kV OHL connecting Netherton Hub to the Peterhead Substation.

The Project sits adjacent to a second connection considered in parallel to this one, comprising the permanent diversion of the existing OHL into a new 400 kV AC substation proposed as part of the Netherton Hub. The diversion is referred to as the Netherton Hub 400kV OHL Connection to New Deer and Peterhead: Tie-In (hereafter referred to as 'the Tie-In').

This Project is named as the Rebuild as the intention is to replace the existing New Deer – Peterhead OHL between Peterhead Substation and the stemming off point of the Tie-In connection from the existing OHL to Netherton Hub. In effect, this would be a further change to the existing OHL in addition to the Tie-In development. In the event that the Tie-In development does not proceed, the Rebuild may be redesigned to facilitate a direct connection between Netherton Hub and Peterhead Substation.

This Consultation Report details the Rebuild portion of the OHL and makes reference to the Tie-In where relevant. For details on the Tie-In portion of the OHL, please see the Tie-In Consultation Report (*Netherton Hub 400kV OHL Connection to New Deer and Peterhead: Rebuild*). An overview of the Project is shown on **Figure 1: Site Location**, and comprises the following elements:

- construction of a new 400 kV OHL, approximately 5.2 – 6.7 km in length, connecting the Netherton Hub to the Peterhead Substation;
- removal of approximately 6.3 – 8.9 km[1] of existing OHL between the Tie-In diversion point and the Peterhead Substation;
- installation of temporary OHL circuit to facilitate the transfer of the connection from the existing New Deer – Peterhead 400kV OHL to the diverted lines; and
- rationalisation and crossings of the existing transmission network.

[1] Note: this is the total length of removed OHL for both the Tie-In and Rebuild projects considered together. The Tie-In project would remove between 1.1 – 3.7 km of existing OHL, and the Rebuild would remove a further 5.2km.

Please note that **Figure 1** and subsequent figures display the potential Tie-In alignments off of which the Rebuild alignments would stem: T2A and T2B. For clarity, this Report assesses the Rebuild alignments only.

The Proposed Development would likely comprise steel lattice towers from the SSEN Transmission ASTI SSE400 tower suite. The typical height for the ASTI SSE400 tower suite is approximately 57 m, with a maximum standard height of up to 70 m.

The size of towers and span lengths is generally dependent on three main factors: altitude; weather; and the topography of the route. Towers are typically closer together at high altitudes to withstand the effects of greater exposure to high winds, ice and other weather events. Higher towers may be required in certain locations to maintain the required ground clearance heights, such as at road, river and rail crossings.

The proposed steel lattice towers would support six conductor bundles (2-3 wires per bundle) on six cross-arms (three on each side) and an earth wire between the peaks. Typical tower designs can be seen in **Plate 2.1**[2].

Plate 2.1 – Existing SSE400 steel lattice tower design

2.3 Construction Activities

The main construction elements associated with the Project are anticipated to include:

- establishment of temporary construction compound(s);
- establishment of permanent stoned access to areas identified as requiring operational access;
- establishment of temporary construction access to areas where permanent access is not operationally required;
- establishment of suitable laydown areas for materials and working areas for tower foundations and erection equipment;
- delivery of components and materials to site;
- undergrounding of distribution OHLs that cross or are in close proximity to the alignment;
- construction of approximately 5.2 – 6.7 km of new double circuit OHL;
- dismantling of approximately 6.3 – 8.9 km of redundant section of the existing New Deer to Peterhead double circuit OHL;

[2] The existing SSE400 tower suite design is currently being modified to provide stronger tower structures. The final tower design and appearance may differ slightly from the existing SSE 400 tower suite shown in Plate 2.1.

- remedial works would be carried out to reinstate the immediate vicinity, and any ground disturbed to pre-existing condition; and
- inspections and commissioning.

All construction activities will be undertaken in accordance with a Construction Environmental Management Plan (CEMP) which will define specific methods for environmental survey, monitoring and management throughout construction. A CEMP will be produced by the contractor and agreed with statutory stakeholders prior to the commencement of construction.

2.4 Programme

It is anticipated that construction of the proposed OHL would take place over a 24-month period, although detailed programming of works would be the responsibility of the Principal Contractor in agreement with SSEN Transmission. Subject to gaining the necessary consents, it is anticipated that construction would commence in 2027, with an estimated completion date in 2029.

3. ALIGNMENT SELECTION PROCESS

3.1 Introduction

The approach to alignment selection has been informed by SSEN Transmission's guidance 'Procedures for Routeing OHLs and Underground Cables of 132 kV and above'[3]. This guidance considers within it the Holford Rules[4], which sets out a hierarchical approach to routeing which advocates avoiding areas of high amenity value, minimises changes in direction, and takes advantage of topography to minimise visual interaction with other transmission infrastructure.

The guidance document sets out SSEN Transmission's approach to selecting a corridor, route or alignment for an OHL. This document helps SSEN Transmission to meet its obligations under Schedule 9 of the Electricity Act 1989, which requires transmission license holders:

- to have a regard to the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features of special interest and of protecting sites, buildings and objects of architectural, historic or archaeological interests; and
- to do what they reasonably can to mitigate any effect that the proposals would have on the natural beauty of the countryside or on any such flora, fauna, features, sites, buildings or objects.

The guidance develops a process which aims to balance these environmental considerations with technical and economic considerations throughout the Project.

The guidance splits a Project into the following key stages:

- Stage 0: Routeing Strategy Development;
- Stage 1: Corridor Selection;
- Stage 2: Route Selection;
- Stage 3: Alignment Selection; and
- Stage 4: Environmental Impact Assessment (EIA) and consenting.

The stages that are carried out can vary depending on the type, nature of and size of a Project and consultation is usually carried out at each applicable stage of the process.

The Project has assessed from Stage 3: Alignment Selection due to the relatively short lengths of the diversions and number of nearby planned, approved and constructed OHLs, there would be little to no difference between route options, which are typically 1 km in width. Instead, the Project has taken a hybrid approach between the higher-level Red-Amber-Green constraints appraisal normally conducted for route options (see further details in **Section 3.2**) and a more detailed comparative alignment options appraisal, both of which are presented in the Appendices to this Report.

The project is effectively at Stage 3 Alignment Selection.

This study has involved the following four key tasks:

- identification of the baseline situation;
- identification of alternative alignment options;
- environmental analysis of alignment options; and
- identification of a Potential Alignment.

3.2 Methodology

3.2.1 Area of Search

The extent of the area of search, hereafter referred to as the study area, has been defined by the existing New Deer - Peterhead OHL, the Netherton Hub and the Peterhead Substation, with the aim of minimising the length of existing

[3] SSEN Transmission (September 2020). Procedures for Routeing Overhead Lines and Underground Cables of 132 kV and above. Revision 2.

[4] Holford Rules: Guidelines for the Routeing of New High Voltage Overhead Transmission Lines with NGC 1992 and SHETL 2003 Notes.

OHL to be replaced, on balance with other environmental and engineering factors. **Figure 1: Site Location** illustrates the locations of these elements, within the bounds of which alignment options were defined.

3.2.2 Baseline Conditions

A series of desk-based studies have been undertaken to identify a broad range of potential constraints and opportunities within the study area, which may be constraints to alignment options. This has involved the following activities:

- identification of environmental designated sites and other constraints, utilising GIS datasets available via NatureScot Site Link;
- identification of archaeological designations and other recorded sites, utilising GIS datasets available via Historic Environment Scotland Data Services and Local Historic Environment Teams;
- review of SEPA interactive Flood Risk Mapping;
- review of relevant Local Development Plans to identify further environmental constraints and opportunities, such as regional level designations or other locations important to the public;
- review of landscape character assessments of relevance to the study area;
- review of Ordnance Survey (OS) mapping (1:50,000 and 1:25,000 and online GIS data sources from OS OpenData) and aerial photography (where available) to identify other potential constraints such as settlement, properties, walking routes, cycling routes etc.;
- extrapolation of OS Vectormap GIS data to identify further environmental constraints including locations of watercourses and waterbodies, roads classifications and degree of slope;
- review of other local information through online and published media such as tourism sites and walking routes;
- identification of existing OHL transmission infrastructure, roads and railway lines within the study area;
- identification of existing and proposed windfarm developments and other third-party infrastructure within the study area;
- review of existing terrain, soil and ground conditions;
- landscape and ecology site visits and surveys;
- review of ecological data received from relevant bodies; and
- review of public and private water supply data from local authorities and Scottish Water.

3.2.3 Alignment Options Identification and Selection Methods

The following tasks have been undertaken in identifying and analysing Alignment Options:

- Desk-based review of initial alignment options presented by the engineering consultant. Comments and alternative alignment options were provided for discussion and further review.
- Site visits by the project landscape specialist, project ecology team, and SSEN Transmission to review the alignments on site and review environmental and technical considerations, particularly cumulative considerations.
- Ornithology surveys were undertaken to inform the alignment options and comprised Flight Activity Surveys (from one vantage point).
- Workshops held with SSEN Transmission and engineering consultants to review preliminary and final alignment options and suggested alternatives.
- Follow up workshops with SSEN Transmission, and the engineering, environmental and land consultants to further discuss alignment options and agree on a Potential Alignment.

Considerations for alignment options included a review of the steps outlined in the Holford Rules and SSEN Transmission's Routeing Guidance. In summary the following has been considered as far as is practicable at this Alignment Selection stage:

- Avoid if possible major areas of highest amenity value (including those covered by national and international designations and other sensitive landscapes) (Holford Rule 1).
- Other things being equal, try to avoid sharp changes of direction and reduce the number of larger angle towers required (Holford Rule 3).
- Avoid skylining the alignment in key views and where necessary, cross ridges obliquely where a dip in the ridge provides an opportunity (Holford Rule 4).
- Consider construction access and the availability of existing roads and tracks.
- Consider the appearance of other lines in the landscape to avoid a dominating or confusing wirescape effect.
- Consider technical issues related to crossing the existing OHL alignment, clearances, connectivity, outages, maintenance and faults.

Applying these principles, Alignment Options were identified for further assessment. The Alignment Options are shown on **Figure 1: Site Location** and described in **Section 4** of this Report.

3.2.4 Appraisal Method

At construction stage, to account for the likelihood of minor changes in the alignment following EIA and design stages, a buffer is included either side of the alignment, referred to as a Limit of Deviation (LOD). For this appraisal, where appropriate. A 100 m LOD has been assumed to account for features which have been identified in close proximity to the centreline of each option, such as consideration of Private Water Supplies (PWS).

Environmental Criteria

A series of appraisals were carried out by experienced professionally qualified individuals in the various specialist fields to enable an informed combined opinion on how the potential environmental effects identified during the baseline studies could influence the alignment options. Appraisal of alignment options has involved systematic consideration against the following environmental topic areas:

- Natural Heritage – designations, protected species, habitats, ornithology, hydrology, geology and hydrogeology;
- Cultural Heritage – Designations and Cultural Heritage Assets;
- Landscape and Visual – designations, landscape character and visual amenity;
- Land Use – agriculture, forestry and recreation; and
- Planning Proposals[5].

The following should be noted:

- The topic 'Proximity to Dwellings – residential properties and other sensitive receptors' is covered within the engineering criteria 'Proximity';
- 'Habitat' types have been defined in relevant UK Habitat Classification (UKHabprimary habitats[6]). For peatland, peatland classes as shown the Carbon and Peatland map (2016) are also referenced. For woodland, the categories assigned to areas noted on the Ancient Woodland Inventory (AWI) are also referenced, where relevant. Woodland definitions may therefore differ from those used within the 'Forestry' Section descriptions.
- For the Biodiversity Net Gain (BNG) assessment, in the absence of field data at this stage, condition was assumed to be moderate for all habitats. Blanket bog habitats were identified using the Peatland Classification of Scotland[7] and the HABMoS data[8]. Only peatland Class 1 and 2 were taken forward as blanket bog. Again, this habitat was assumed to be of 'Moderate' condition. Connectivity followed the simplified SSEN Transmission Guidance, where habitats of 'High' were assigned 'Medium' connectivity. Online available resources were used where possible to assign strategic significance, which relates the mention of the relevant habitats within the local plans. i.e. Local Biodiversity Action Plans (LBAPs). In the absence of an interactive map of the relevant local plans

[5] Planning proposal search was last carried out in September 2024

[6] UK Habitat Classifications. Available at: HM_Data Sheet_UKHab Classifications_A4 Landscape.pdf (habitat-matters.com)

[7] Peatland Classification of Scotland. Available at: https://map.environment.gov.scot/Soil_maps/?layer=10

[8] Habitat Map of Scotland. Available at: https://opendata.nature.scot/datasets/habitat-map-of-scotland/explore

allowing identification of sites of local conservation interest in the Aberdeenshire Council area, strategic significance was set at 'Moderate' to adopt a precautionary approach.

Engineering Criteria

Appraisal of alignment options has involved systematic consideration against the following engineering topic areas:

- Infrastructure crossings – major OHL crossings, road crossings, railways, rivers/lochs and navigable waterways.
- Environmental Design – elevation, atmospheric pollution, contaminated land and flooding.
- Ground Conditions – terrain.
- Construction/ Maintenance – access.
- Proximity – residential properties, windfarms, communication masts, urban environments and metallic pipelines.

Economic Criteria

Appraisal of alignment options has involved systematic consideration against the following economic topic areas:

- Capital Costs – construction, diversions, public road improvements, tree felling and land assembly; and
- Operational Costs – inspections and maintenance.

Comparative Appraisal

To identify the alignment which achieves the best balance between the technical, environmental and cost considerations, a series of multi-disciplinary workshops were held which focused on differences between the alignment options and ways of avoiding or minimising the interaction with a constraint.

This was aided by a by the use of a Red-Amber-Green (RAG) approach similar to that undertaken at the route selection stage. The rating is based on a four-point scale as follows:

Performance	Comparative Appraisal	
Most Potential  Least Potential	No Impact	Negligible, or no potential effects
	Lower Impact	Potentially minor effects, with little or no requirement for mitigation
	Moderate Impact	Potentially moderate effects subsequent to appropriate mitigation
	Higher Impact	Potentially major effects which may be difficult to mitigate

However, at the alignment stage the RAG ratings are often similar and differences not as apparent from using this tool. As such, a hybrid approach was used for assessment of the alignment options for the Project, using RAG ratings as the basis and then carrying out more detailed comparative appraisal, where relevant.

Using the terminology of SSEN Transmission's Routeing Guidance, the following definitions have been used:

Effect – the direct or indirect physical consequence(s) of the alignment option on receptors, under each of the various topic headings.

Level of Impact – the outcome of a comparative appraisal of the combination of effects within a specific topic along a specific route option after a consideration of the potential for mitigation, using professional judgement based on experience.

Cumulative Appraisal

In addition to the standard approach outlined above, the environmental appraisal for the Project included additional landscape cumulative considerations due to the varying possible combinations of connections into and out of the

Netherton Hub within an area containing several existing OHLs. Each landscape and visual appraisal considers the three Rebuild options in isolation and then cumulatively with the Potential Alignment of the Tie-In development (namely alignment options T1A and T2A).

3.2.5 Identification of a Potential Alignment

The overall objective throughout the appraisal of alignment options is to take full consideration of all environmental, engineering and cost factors to determine the most appropriate design to use for the development. Alignment options have been considered in combination to arrive at a Potential Alignment for the Project. The Potential Alignment presents the outcome of the initial appraisal, before consultation, of environmental, technical, and cost constraints. It is the alignment considered to be the best balance of the constraints identified.

3.2.6 Identification of a Proposed Alignment

Following the consultation period, the consultation feedback and SSEN Transmission responses to the feedback will be reported in a Report on Consultation document which will be made publicly available. Its purpose is to record the stakeholder feedback received during the consultation process; explain how SSEN Transmission has responded, and how it has informed the selection of the Proposed Alignment. If the consultation does not feed into the Project design this will also be incorporated into the Report on Consultation, with an explanation provided.

The Potential Alignment will be subject to further review after consultation to ensure feedback is considered fully before a Proposed Alignment is identified and taken forward to detailed design and section 37 consent application.

4. ALIGNMENT OPTIONS

The alignment options are shown on **Figure 1: Site Location**. All three alignments leave the Netherton Hub substation from the south side.

4.1.1 Alignment R1

Alignment R1 commences at a point on the existing OHL close to Tower 77. It follows a path generally east-south east for approximately 1.3 km, with one slight angle included near Tower 78, then takes a more south east heading for approximately 2.9 km. At a point roughly half a kilometre south of the Upperton Industrial Estate, it progresses east then north east until the connecting point with the Peterhead Substation, for a total alignment length of 5.2 km. It crosses the existing 275 kV Peterhead – Newmachar OHL at two points, and it is anticipated that this OHL would be re-routed south of Alignment R1, if this is progressed as the final option, rather than introducing a diamond crossing formation at each crossing point.

Due to the position of residential properties along this alignment, it is not possible to fully observe the preferred 170 m separation from all properties without taking a significant detour to the south. The alignment passes over generally rolling terrain with no obvious construction challenges, and space looks to be available at the angle towers for pulling positions.

4.1.2 Alignment R2

Alignment R2 follows the same path as Alignment R1 for much of its length. Approximately halfway along the full length of option R1, Alignment R2 deviates to a more east-north east heading for approximately 1.6 km, towards the Upperton Industrial Estate, until it once again meets the existing OHL. From here, it follows the same path as the existing New Deer – Peterhead OHL and would effectively be an in-situ replacement of the line up until the Peterhead Substation. The total length of Alignment R2 is approximately 5.2 km.

Due to the position of residential properties along this alignment, it is not possible to fully observe the preferred 170 m separation from all properties without taking a significant detour to the south. The alignment passes over generally rolling terrain with no obvious construction challenges, and space looks to be available at the angle towers for pulling positions.

4.1.3 Alignment R3

Alignment R3 is the most northern of the three Rebuild options, initially travelling south east for approximately 0.9 km from a point on the Tie-In Alignment T2A approximately 0.8 km from the substation. It then takes a generally eastward heading with angle towers in strategic locations to observe the potential separation from residential properties. This option crosses over a small patch of long-established woodland adjacent to the Burn of Faichfield and passes north of a similar-sized patch of plantation of ancient woodland origin (PAWS). Approximately 2.9 km along its length, measured from the starting point on Alignment T2A, it crosses the existing 132 kV Peterhead – St Fergus OHL, and undergrounding or other rationalisation would be required here. Continuing a further 0.9 km to the east, the option crosses another existing 132 kV OHL (Peterhead – Inverugie), before turning south east for a further 2.3 km. This stretch crosses through the Upperton Industrial Estate to the south of Peterhead, then turns south-south east for the last 0.6 km into Peterhead Substation. The total length of this option is approximately 6.7 km.

The ground is relatively level along this option, posing no obvious construction challenges with room at the angle tower locations for conductor pulling. This option is has the closest proximity to Peterhead.

5. COMPARATIVE ANALYSIS OF ALIGNMENT OPTIONS

5.1 Introduction

The following is a summary of the key considerations of each alignment option from environmental, engineering and economic perspectives, and provides a comparative appraisal of each of the options in order to select an overall Potential Alignment for each. The following figures accompany the text in this section and illustrate potential environmental baseline constraints identified under each topic.

- **Figure 2: Natural Heritage**
- **Figure 3: Cultural Heritage**
- **Figure 4: Landscape and Visual**
- **Figure 5: Land Use**

For cumulative context, **Figure 6: Cumulative Figure** displays other nearby developments associated with the Netherton Hub.

Appendices 1.1 – 1.3 provide more detail on individual alignment option considerations for each topic as listed in **Section 3**.

Where topics are not mentioned specifically within the text, there is no notable preference between the alignment options. This does not mean that there are no potential impacts relating to that topic, but that the topic does not differentiate between the options sufficiently to have a bearing on the alignment option choice.

5.1.1 Environment

There is little to differentiate the options on grounds of natural heritage designations, all are moderately constrained due to presence within foraging habitat suitable for species associated with the Loch of Strathbeg SPA and Ramsar around 12 km to the north. Given the presence of woodland listed on the Ancient Woodland Inventory (AWI) (see **Figure 5**), Alignment R3 would be least potential. Similarly, for protected species, Alignment R3 is least potential due to bisection of woodland at Dens that may support species such as bats and badgers; all options as otherwise again moderately constrained by protected species.

Habitats are broadly similar across all options, with no Annex 1 habitats likely to be present based on information available at this stage. When considering BNG, Alignment R2 has the lowest BU value and BU/ha, making it the potential option. Alignment R1 has a higher BU value, around 12% higher than Alignment R2, making it less potential and of Amber constraint under SSEN's Routeing Guidance. Alignment R3 is the least potential, with a BU value 62% higher than R2, and has thus been assigned a Red RAG rating.

In consideration of hydrology and hydrogeology, the three options are broadly comparable and moderately constrained by surface water or groundwater. No PWS have been identified within the LOD of any of the options.

For cultural heritage considerations, none of the options are considered to have potential for significant impacts on designated sites and have all been assigned a Green RAG rating. Alignment R3 is potential in this context as no SMR entries have been identified in the Inner Study Area, and has the least number of Scheduled Monuments in its associated Outer Study Area. For non-designated cultural heritage assets, R3 is again the preference; although it has the most listed buildings within its study areas, the effects are not likely to be significant, based on the appraisal undertaken, and has been assigned a Green RAG rating. Alignments R1 and R2 have Amber ratings as the Blackhill House Listed Building is located near to both alignments and has potential for greater effects to arise.

It is not considered likely that any of the rebuild options would compromise any of the key attributes or qualities of any landscape designation. All of the options end at the existing Peterhead Substation and therefore are the same distance from the nearest SLA, the North East Aberdeenshire Coast to the south of Peterhead, and would have the same level of potential effect, if any.

All rebuild options risk adversely affecting the local landscape character of the Landscape Character Type (LCT) 17 Coastal Agricultural Plain - Aberdeenshire at a local level in the vicinity of the Netherton Hub and are similarly constrained. In relation to the potential cumulative effects on the local landscape character, Alignments R1, R2 and

R3 are likely to have a similar degree of effect in this locality. In the vicinity of the Peterhead Substation, Alignment R1 has an advantage in that it has the opportunity to be aligned with a diversion of the existing Aberdeen – Peterhead 275kV OHL which would minimise effects on local landscape character in a location already cluttered with towers.

In consideration of visual amenity constraints, Alignments R1 and R2 are likely to have less of an effect on the local visual amenity than Alignment R3 due to their more linear alignments with fewer changes in direction and thus fewer angle towers. Alignment R1 crosses the existing 275kV Aberdeen – Peterhead OHL at two points southwest of the Peterhead Substation. If the solution at these points is to introduce diamond crossings or by undergrounding spans of the lines, the necessary terminal or sealing end towers would increase visual intrusion and cause visual effects at a local level, making this a less preferred option. The preferred alternative would be to reroute the existing 275kV OHL south of Alignment R1, avoiding crossings or undergrounding of connections and moving the existing 275kV OHL further from the cluster of properties south of Upperton Industrial Estate, making Alignment R1 the preference in visual terms. Alignment R2 has the advantage of being sited on the position of the existing New Deer Overhead line for the last 1.3 km (approximate) and would directly replace an existing OHL within the landscape. If rerouting the existing 275 kV OHL, the order of preference is R1, R2 then R3, as presented in **Appendix 1.1 Section 1.4**; if crossing the 275 kV OHL, then R2 is the preference, followed by R1 then R3.

All Alignments would have a cumulative effect with the existing New Deer OHL and the proposed B2P OHL, although this varies in extent for each. Each of the alignments has advantages and disadvantages in relation to visual amenity, however alignment option R1 or R2 combined with T1A and the B2P OHL is the preferred solution as there exists the opportunity to create two distinct infrastructure corridors entering Netherton Hub, reducing the potential for both options to be visible within views, and therefore reducing potential visual clutter. This solution also has the benefit of removal of the greatest number of towers of the existing New Deer OHL to the south, which are located on higher ground.

All alignment options pass through a mixture of LCA Class 3.1 and 3.2 agricultural land and are similarly constrained in this context. Alignment R1 has the most limited presence within Class 3.1 and is the marginal preference for agricultural considerations. No areas of commercial forestry have been identified within any of the alignment options, however it is noted that some tree removal would likely be required in places, including Ancient Woodland. All three options pass near to Core Paths as they approach the Peterhead Substation and may have an adverse effect on the recreational amenity of these paths for users. Alignment R3 is slightly more constrained as it is closer to Core Path 215.02, and thus marginally less potential in recreational terms.

All options broadly accord with national and local planning policies and are considered comparable with no obvious preference. Similarly, there is no obvious preference in consideration of third-party planning applications.

The environmental preference is again largely driven by landscape and visual amenity considerations. Alignments R1 and R2 are close in terms of preference, with the decision dependent on the solution for crossing the existing Peterhead – Newmachar 275 kV OHL southwest of Peterhead Substation. Should diamond crossings be required, R1 would be less potential than R2 due to increased visual amenity impacts locally. If the existing OHL is rerouted south of Alignment R1, then it becomes potential to R2 by rationalising the infrastructure corridor and moving the existing line away from the cluster of properties south of Upperton Industrial Estate. Alignment R3 is least potential when considering landscape and visual amenity, as well as for natural heritage considerations due to having the highest BU value and BU/ha.

5.1.2 Engineering

In relation to major crossings, all alignments have been designated as Red ratings due to a significant number of pipeline crossings. Alignment R1 is considered least potential within this category as it impacts upon seven pipelines and has nine other crossings. In addition to this, it is also likely to have the greatest impact on existing transmission infrastructure with multiple cable crossings; these are not overly significant but would also require two crossings of the existing 275kV OHL or require it to be realigned. This would be particularly challenging due to space constraints with the pipelines and nearby residential buildings.

Alignment R2 is considered the preference with respect to major crossings. It equally interacts with seven pipelines and also has an additional crossing when compared to Alignment R1; however, this alignment has reduced potential

impact to transmission infrastructure. This option crosses a 400kV OHL; however, this is the line that is to be replaced and is thus not considered to be a constraint in reality. Challenge is presented in relation to outage constraints on these circuits; due to how critical the circuits are, a double circuit outage is unlikely to be accepted so a temporary diversion would be required to allow for this to be constructable. In this area there is a high number of dispersed residential properties which may make routeing a temporary diversion particularly challenging.

Alignment R3 is similar to Alignment R2 with respect to preference for major crossings. This alignment interacts with the same seven pipelines but crosses them all at preferable angles and therefore limits the potential for interaction. The downside of this option relates to the crossing of two existing 132 kV OHLs. These crossings would require modification of the existing lines to create a diamond crossing arrangement or for them to be undergrounded. This is therefore not preferable as it introduces work on assets that otherwise could be left untouched.

When considering road crossings there is little to differentiate the alignments as all cross a similar number of roads. Due to the area being rural there are a large number of existing access / farm tracks but no A or B class roads. Scaffolding would likely be required or a stop-go system to facilitate the stringing activities over these crossings. The benefit to there being numerous access roads is that construction access can be carried out via many of these existing accesses, however upgrades may be required to be able to accommodate the plant required for the construction.

With respect to environmental design, the elevation observed across all the alignments is broadly similar within an overall minimum and maximum elevation of 33 m and 96 m, respectively. These elevations are well within the design capability of the structures and are therefore not an issue. All alignments have been designated Amber with respect to atmospheric pollution due to the proximity to the coast. Considering contaminated land, alignments R1 and R2 have no reportable hazards known along their paths and are therefore designated Green. Alignment R3 has an Amber rating as it passes in close proximity to five historic airfields and a known aircraft crash site. None of the alignments pass through any known landfill sites. SEPA's flood maps have been utilised to assess the proportion of each alignment exposed to flooding. Based on this it is evident that no alignments are considered a high risk from a flooding perspective and its likely towers can all be situated outwith flood zones.

The ground conditions across all three alignments are considered acceptable. The terrain observed is all mainly rolling hills with no particularly steep areas. Alignment R3 has the steepest slope at 19 degrees but this is across a short distance so could be spanned out. Similarly, all three alignments avoid any designated peatland so ground conditions are likely to be preferable across all options.

Clearance to buildings, windfarms, communication links, urban developments and pipelines have all been considered. The main consideration for clearance to buildings is residential properties, and the preferrable separation from properties is 100 m as a minimum, however a separation of 170m is potential. All alignments manage to maintain 100 m separation, however Alignment R1 has the highest number of properties between 100 – 170 m (six total) and Alignment R3 has the fewest at three. All alignments also have numerous commercial buildings within 100 m, however these relate to warehousing so as long as they are outwith the operational corridor this is not considered to be a significant issue. Alignment R3 is potential from a residential perspective as it impacts on the fewest properties, although it passes closer to Peterhead and in close proximity to the separately proposed HVDC convertor station. On balance, Alignment R2 is considered the potential option.

All alignments are ranked Green with respect to proximity to windfarms as all are further than three rotor diameters from nearby wind energy developments. In relation to communication masts, Alignment R1 is ranked Red due to running in parallel with a Northern Lighthouse Board link. Alignments R2 and R3 cross numerous links but it is assumed at this stage this can be mitigated by careful tower placement.

In relation to metallic pipelines, discussed above within the major infrastructure crossings considerations, there exists a preference for Alignment R3 if only considering the pipelines; however, when considering the other infrastructure crossings Alignment R2 is the preference.

The other considerations as part of the assessment are related to alignment length, DNO crossings and Electricity Safety Quality Continuity Regulations (ESQCR) assessment. The alignment lengths are all comparable with only a span length (approximately) to differentiate them, so this is not considered a material difference. All alignments have a similar number of DNO crossings of the 11 kV network with Alignment R2 having one fewer crossing. ESQCR considerations have been assessed based on the angle tower positions. The majority of the tower positions are

located within arable farmland so have a low-risk designation, however there are a couple of tower positions within Alignment R2 and Alignment R3 that are within an industrial area that would be designated a medium risk.

Overall, the potential alignment from an engineering perspective is Alignment R2. When considering the discussion above and the RAG ratings allocated throughout the assessment, Alignment R2 is least constrained, however it is recognised that all options have been assigned Red constraint in relation to major crossings, and that temporary diversions will be challenging for all options.

5.1.3 Economic

From a Capital cost perspective, all three alignments are suitable due to very similar line lengths.

The project requires engineering consultants to be onboarded to provide detailed engineering design. This will inform tower type and number, access road requirements, crossings protection (e.g. for crossing roads, rivers or railways), angle towers, diversion requirements, operational costs and tree felling requirements for each alignment. Once the detailed design is completed, a further capital cost assessment can be undertaken to confirm the Potential Alignment.

5.1.4 Multi-Disciplinary Appraisal

To summarise, the environmental appraisal identified Rebuild alignments R1 or R2 as the overall preference, with final choice depending on crossing types. The engineering appraisal identified Alignment R2 as the overall preference, and the economic appraisal did not identify a clear preference.

Unlike the Tie-In appraisal, the environmental and engineering considerations are given equivalent weight due to the number and degree of constraints identified for each. Landscape and visual considerations are most significant in environmental terms, while engineering appraisals identified several potential issues relating to major crossings, proximity to properties and installation of temporary transmission lines during construction.

On balance, Alignment R2 is considered to be the overall Potential Alignment for the Rebuild options on the basis of it being one of two environmental preferences and the notable engineering preference.

5.2 Potential Alignment

Following on from the comparative analysis carried out in Section 5, the Potential Alignment can be seen on **Figure 7: Potential Alignment** and comprises the following alignment options:

- Alignment R2

6. CONSULTATION ON THE PROPOSALS

SSEN Transmission places great importance on, and is committed to, consultation and engagement with all parties, or stakeholders, likely to have an interest in proposals for new projects such as this. Stakeholder consultation and engagement is an essential part of an effective development process.

6.1 Questions for Consideration by Consultees

When providing your comments and feedback, SSEN Transmission would be grateful for your consideration of the questions below:

- Has the approach taken to select the Potential Alignment been clearly explained?
- Are there any factors, or environmental features, that you believe we may not have already considered during the Potential Alignment selection process?
- Do you have any specific concerns in relation to the Potential Alignment? If so, is there anything we could do to mitigate the impact of this?
- Do you feel, on balance, that the Potential Alignment selected is the most appropriate for further consideration at the Environmental Impact Assessment stage?
- SSEN Transmission's Community Benefit Fund will provide an opportunity for local groups and organisations to apply for community funding. Do you have any suggestions for local community benefits or local initiatives, such as volunteering, that we could support to leave a positive legacy in your area?

6.2 Next Steps

The responses received from the consultation events, and those sought from statutory consultees and other key stakeholders, will inform further consideration of the alignments put forward, and the confirmation of the Proposed Alignment to take forward to EIA.

All comments are requested by **Wednesday 16 April 2025**. A Report on Consultation will be published after the consultation period has ended, which will document the consultation responses received, and the decisions made in light of these responses.

Submission of the Section 37 application is expected to take place in Q3 2025.

APPENDIX 1.1: REBUILD ALIGNMENT APPRAISAL DETAIL - ENVIRONMENTAL

1.1. Natural Heritage

1.1.1. *Designations*

Designated sites for Natural Heritage have been identified within the following study areas to account for potential connectivity between designated sites, their qualifying interests, and the alignment options.

- International or European designations e.g., Special areas of Conservation (SAC), Special Protection Areas (SPA), Wetlands of International Importance (Ramsar sites) – 10 km, extended to 20 km for SPA designated for greylag goose and pink-footed goose.
- National designations e.g., Sites of Special Scientific Interest (SSSI), National Parks, National Nature Reserves – 2 km.
- Regional designations e.g., Local Nature Reserves, Local Nature Conservation Sites, Wildlife Sites – 1 km.
- Ancient Woodland (identified from a review of the Ancient Woodland Inventory (AWI), Native Woodland Survey of Scotland (NWSS), 1st Edition maps, and any available site-specific field data) – within the option or appears connected via continuous canopy cover.

Alignment Option	RAG	Site Comparison Notes
Alignment R1	A	International or European designations: Buchan Ness to Collieston Coast SPA is located approximately 0.8 km east of the connection point for all alignment options and is designated for breeding fulmar, guillemot, herring gull, kittiwake, shag and seabird assemblage. These species are reliant upon the coastal habitat within and connected to the SPA, and the land associated with each Alignment (arable, inland) would unlikely represent supporting or functionally linked habitat. Similarly, Buchan Ness to Collieston SAC is located approximately 1.6 km from the alignment options and is designated for vegetated sea cliffs which are not connected / functionally linked to the habitat along the alignment options. Loch of Strathbeg SPA and Ramsar (approximately 12 km north of the alignment options), and Ythan Estuary, Sands of Forvie and Meikle Loch SPA and Ramsar (approximately 12.5 km south of the Alignments) qualifying interest include pink-footed goose. The arable farmland within and surrounding the footprint of the alignment options potentially provides suitable foraging habitat for pink-footed goose and is within the foraging range of qualifying populations from the two designated sites based on studies[9]. Therefore, there is potential for effects from the Project on qualifying populations of pink-footed geese through disturbance and displacement during construction and collision risk during operation. National designations: Bullers of Buchan Coast SSSI is approximately 1.6 km southeast of the connecting point at the east of all alignment options, designated for coastal habitats and sea birds and therefore unlikely to be affected by the Project[10].
Alignment R2	A	

[9] Mitchell, C. (2012). Mapping the distribution of feeding Pink-footed and Iceland Greylag Geese in Scotland. Wildfowl & Wetlands Trust / Scottish Natural Heritage Report, Slimbridge. 108pp.

[10] Hill of Longhaven SSSI is approx. 1 km south of Alignments R1 and R2 however it is designated for geological interests and not considered within the biodiversity section.

Alignment Option	RAG	Site Comparison Notes
		Regional designations: none[11]. Ancient Woodland: none.
Alignment R3	R	International or European designations: As above regards to Buchan Ness to Collieston Coast SPA, Buchan Ness to Collieston SAC, Loch of Strathbeg SPA and Ramsar, and Ythan Estuary, Sands of Forvie and Meikle Loch SPA and Ramsar. National designations: As above regards to Bullers of Buchan Coast SSSI. Regional designations: none. Ancient Woodland: Woodland at Dens which would be bisected by Alignment R3 has been listed as 2a Ancient Woodland (of semi-natural origin) on the AWI; however this area has also been recorded as a Plantation on Ancient Woodland Site by the NWSS. There is also an area listed as 2b Long-Established Woodland (of plantation origin) spanned by Alignment R3.

Further Assessment:

Based on the potential effects to qualifying populations of pink-footed geese highlighted above, all the alignment options are given an Amber rating. With regards to European protected areas, there is little to differentiate between them considering the extent of suitable foraging habitat for geese incorporating the alignment options and the wider area and considering the mobile nature of the species involved.

Flight activity surveys to the inform the Project and goose field use surveys for a related project, LT360 Aberdeenshire HVDC Connection S2P, will inform on goose activity in the Project's Zone of Influence. When a Potential Alignment is identified and further information on construction methods and programme are available, a Habitats Regulations Appraisal (HRA) Screening exercise will be undertaken to determine if the Project could result in Likely Significant Effects upon a European site, either alone or in combination with other plans or projects.

With reference to the presence of woodland listed on the AWI, Alignment R3 would be least preferred.

1.1.2. *Protected Species*

Data available from surveys for protected species for the Netherton Hub project and Eastern Green Link 3 (ELG3) project have been reviewed to inform this appraisal where the study areas overlap. This includes data for:

- Badgers – coverage available for parts of the alignment options because surveys have extended 1km beyond the Netherton Hub site and along the EGL3 site which is spatially similar to Alignment R3.
- Bats – coverage available for residential properties and trees in proximity to the alignment options, including Alignment R3.
- Otter and water vole – coverage available for watercourses within and up to 200 m beyond the Netherton Hub which partially overlaps with the connection of alignment options, and along watercourses crossed by Alignment R3.

For other species, a habitat suitability assessment has been undertaken from a review of habitat data, with reference to the known distribution of species from publicly available datasets (e.g., red squirrel[12,13], great crested newt

[11] Skelmuir Hill, Stirling Hill, Dudwick LNCS overlaps with Alignments R1 and R2 however it is designated for geological interests and not considered within the biodiversity section.
[12] Saving Scotland's Red Squirrels (online). Available at: https://scottishsquirrels.org.uk/squirrel-sightings/
[13] Scottish Forestry, Red Squirrel Stronghold Areas (online). Available: https://forestry.gov.scot/publications/21-map-of-red-squirrel-stronghold-areas

revised geographic zones[14], pine marten distribution map[15]), and professional experience of undertaking other ecological surveys in the same geographical region.

The following species have been considered for this exercise, with reference to their protection and conservation status e.g., European Protected Species (EPS) protected under the Conservation (Natural Habitats &c.) Regulations 1994 (as amended), species protected under national legislation such as the Wildlife and Countryside Act 1981 as amended (WCA), Protection of Badger Act 1992 (PBA), Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003 (SFFA), and priority species on the Scottish Biodiversity List (SBL).

- Bats (EPS, SBL);
- Otter (EPS, SBL);
- Wildcat (EPS, SBL);
- Great crested newt (EPS, SBL);
- Badger (PBA, SBL);
- Red squirrel (WCA, SBL);
- Pine marten (WCA, SBL);
- Water vole (WCA, SBL);
- Reptiles (WCA, SBL);
- Freshwater pearl mussel (WCA, SBL); and
- Migratory salmonids (SFFA, SBL).

Alignment Option	**RAG**	**Site Comparison Notes**
Alignment R1	A	European protected species: There are watercourses (some field drains) across all alignment options which could support otter. Spraints have been recorded from a watercourse crossed by Alignment R3 during EGL3 surveys. There are residential, farm and industrial buildings in proximity to all alignment options which may have suitability to support roosting bats; however, it is assumed that the OHL would be constructed with a standoff distance from buildings such that the risk of disturbance would be minimal. Alignment R3 extends through woodland at Dens which is likely to have potential roost features for bats; as well as riparian woodland along a burn in the east. There are also trees along the minor road at the connection to Netherton Hub site which were recorded to have potential roost features however no evidence of use has been recorded during EGL3 surveys. Negligible suitability for Scottish wildcat. There appear to be ponds within 250 m of Alignment R3; however these were assessed to offer 'poor' suitability for breeding great crested newt during EGL3 surveys. Great crested newts are unlikely to be present. Nationally protected species:
Alignment R2	A	
Alignment R3	A	

[14] O'Brien, D. Hall, J., Miró, A., & Wilkinson, J. (2017). Testing the validity of a commonly-used habitat suitability index at the edge of a species' range: great crested newt Triturus cristatus in Scotland. Amphibia-Reptilia 38: 265-273.

[15] Vincent Wildlife Trust, Pine Marten (online). Available: https://www.vwt.org.uk/species/pine-marten/

Alignment Option	RAG	Site Comparison Notes
		Badgers are active in the general area. Badger setts in current use and mammal burrows which showed no signs of current use by badgers have been identified in proximity to Alignment R3 (locations undisclosed due to sensitivity) and are likely to occur in proximity to Alignment R1 and R2 due to the prevailing habitat suitability. All alignment options are likely to extend through the territories of badger social groups but the Project is unlikely to compromise the conservation status of badgers based on their likely high density in the North East region. Further, the footprint of the Project will be minimal, and it should be feasible to microsite the tower locations away (minimum 30 m) from known badger setts and construction works should be localised to tower bases (i.e., not close off the full length of the OHL which would otherwise create a barrier to movement of mammals). Potential effects may be mitigated and are unlikely to be significant. Water voles may use the drainage ditches and tributary burns crossed the alignment options. The watercourses in the general area appeared relatively modified (drainage ditches) and are likely to have limited suitability for migratory salmonids – although migratory salmonids may be present in watercourses connected to the Ugie catchment including Burn of Faichfield which would be spanned by all alignment options (at different locations). The modified watercourses and drainage ditches are unlikely to support freshwater pearl mussels. In any case, it is likely that the infrastructure on the ground would be set back more than 10m from watercourses. Suitable resources for red squirrel and pine marten appear limited. No confirmed evidence of these species has been recorded during any surveys for the Netherton Hub and EGL3 projects – although opportunities for pine marten den sites and potential scat was recorded. As with badgers, it should be feasible to microsite the tower locations away from any confirmed features used by pine marten (if any) and the Project should not obstruct movement of terrestrial mammals. Generally, pine marten and red squirrel distributions appear to be more closely linked to more extensive areas of woodland and valleys in Aberdeenshire. Any potential effects may be mitigated and are unlikely to be significant. Suitable habitats for reptiles appear relatively limited in the modified landscape and this species is unlikely to be a material constraint because of the localised footprint of the towers. Overall, an Amber rating is applied to all Alignments as a precaution.

Further Assessment:

All alignment options have been assigned an Amber rating and further surveys will be required to further assess the potential impacts.

Alignment R3 would be least preferred because it would bisect woodland at Dens that may support protected species such as bats and badgers.

Field surveys for protected species will be undertaken for the Potential Alignment to inform assessment of how the Project may affect species which use the area for foraging, resting, commuting etc. The scope of protected species will be defined upon selection of a Potential Alignment, but is likely to include surveys for badgers, otters, water vole and bats.

1.1.3. *Habitats*

A field survey was undertaken of Alignment Option R1 and R2, where access allowed, to ground-truth the habitat mapping and collect site-specific data utilising UK Habitat Classification (UKHab) methodology. UKHab data from field surveys at EGL3 and Netherton Hub which overlaps with Alignment Option R3 and the northern sections of all alignment options respectively, have also been reviewed to inform this assessment. Where coverage was not possible during field surveys or prior ecology studies (Netherton Hub and EGL3), data were extrapolated using professional experience of the setting and land use across the rest of the alignment options as a desk-based exercise using the following information sources:

- Publicly available map resources and aerial photography;
- Carbon and Peatland 2016 Map[16] data to identify the presence of potentially irreplaceable peatland habitat (blanket bog/areas of deep peat). Class 1 and Class 2 peat are considered irreplaceable habitat; and
- Habitat Map of Scotland[17] (HABMoS) data to identify priority habitats including Annex I habitats (listed in the Habitats Directive).

A separate BNG assessment has been undertaken to calculate the baseline Biodiversity Units (BU) for each Alignment Option and identify areas of irreplaceable and high distinctiveness habitats. This does not include linear features.

The RAG rating for Habitats is separated out below into Annex I habitats and Biodiversity (units), following SSEN Transmission Guidance. The Biodiversity RAG table is presented separately, as this provides a comparison between the alignment options.

Groundwater Dependent Terrestrial Ecosystems (GWDTE) are covered under Hydrology / Geology further below.

Habitats 'RAG' rating:

Alignment Option	RAG	Site Comparison Notes
Alignment R1	G	Habitats are broadly similar across all alignment options and were found to comprise mainly modified grassland grazed by livestock and arable land including non-cereal crops and winter cereal stubble, with minor areas of developed land (e.g., residential / farm buildings and roads). Watercourses, predominantly field drains or modified watercourses and hedgerows bisect all alignment options. A small stand of coniferous woodland (plantation origin) was noted within the centre of Alignment Option R1. Areas of mixed scrub, along with gorse scrub were also present between areas of unmanaged land within agricultural areas. There are no areas of overlapping Class 1 or Class 2 peatland visible from the Carbon and Peatland 2016 Map. Based on desk based and field studies, there are unlikely to be any Annex I habitats within this Alignment Option.
Alignment R2	G	

[16] NatureScot (2016). Carbon and Peatland 2016 Map. Available: https://www.nature.scot/professional-advice/planning-and-development/planning-and-development-advice/soils/carbon-and-peatland-2016-map

[17] NatureScot (2015). Habitat Map of Scotland. Available: https://www.nature.scot/landscapes-and-habitats/habitat-map-scotland

Alignment Option	RAG	Site Comparison Notes
		According to SSEN Transmission Guidance, all alignment options are assigned a Green rating due to perceived lack of Annex I habitats.
Alignment R3	G	Habitats are broadly similar to Alignments R1 and R2, however there are also sections of mixed woodland at Dens which bisects Alignment R3. There is also a relatively larger extent of neutral grassland towards the eastern extent of Alignment R3; this was surveyed in the field and appeared to be in relatively species-poor and typical of an unmanaged grassland in the agricultural setting. There are no areas of overlapping Class 1 or Class 2 peatland visible from the Carbon and Peatland 2016 Map. There are unlikely to be any Annex I habitats within this Alignment Option. According to SSEN Transmission Guidance, all alignment options are assigned a Green rating due to perceived lack of Annex I habitats.

Biodiversity 'RAG' rating:

Alignment Option	RAG	Site Comparison Notes
Alignment R1	G	When compared with the alternative alignment options R2 and R3, this Alignment Option R1 has the lowest BU value at 259.63 BU. It has a relative BU value of 2.34 BU/ha, slightly higher than Alignment R2 (the lowest/least).
Alignment R2	G	When compared with the alternative alignment options R1 and R3, this Alignment Option R2 has the second lowest BU value at 262.78 BU. It has a relative BU value of 2.05 BU/ha.
Alignment R3	R	When compared with the alternative alignment options R1 and R2, this Alignment Option R3 has the highest BU value at 627.69 BU. It has a relative BU value of 3.25 BU/ha, higher than both alternative alignment options R1 and R2.

Further Assessment:

In terms of potential effects to habitats of elevated conservation importance, all alignment options have been assigned a Green rating due to perceived lack of Annex I habitat types.

For rebuild options, the BNG assessment identified Alignment Option R2 to have the second lowest BU value and lowest relative BU/ha, and is therefore the preferred option in BNG terms, being rated Green, although Option R2 is a viable alternative and also rated Green. Option R3 is the least preferred option, having the highest BU value compared to Option R1 and R2, and rated Red in line with SSEN's Routeing Guidance.

Upon selection of the Potential Alignment, areas not subject to initial field surveys will be ground-truthed at a future date to update UKHab classification and habitat condition assessment to support final BNG assessments of the Project. A full BNG assessment should be undertaken to provide compensation estimates for achieving a net gain in biodiversity for whichever Alignment Option is taken forward. This should use field-based evidence, be accurate to the footprint of the Project (i.e., tower bases and access routes), and also account for any linear habitat features for which impacts would be unavoidable.

1.1.4. *Ornithology*

A high-level habitat suitability assessment of the Project's broad corridor options for legally protected and notable species of conservation concern (referred to hereafter as 'Target Species') has been undertaken, informed by professional judgement and survey findings from a related Project with overlapping survey areas, Netherton Hub. Target Species are those which correspond to any of the following criteria, in accordance with the relevant NatureScot[18], [19] and Scottish Hydro Electric Transmission[20] guidance:

- Listed on Annex I of the EU Directive on the Conservation of Wild Birds 79/409/EEC (the 'Birds Directive') (Annex I);
- Listed on Schedule 1 (including Schedule 1A and/or A1) of the Wildlife and Countryside Act (1981) (Schedule 1);
- Listed as 'Red' Birds of Conservation Concern 2021 (BoCC5); and
- Listed on the Scottish Biodiversity List (SBL).

In addition, flight activity surveys have been undertaken across breeding and non-breeding seasons between 2023 – 2024.

All alignment options incorporate similar habitat mainly comprising agricultural land (grazing pasture and arable land). Bird surveys undertaken for a related project, Netherton Hub, indicate all alignment options are of low value for ornithological interests in the breeding season. Species recorded during May to July 2023 have included a range of typical farmland passerines (songbirds) in addition to grey partridge and oystercatcher. Grey partridge is a declining Red List species within Birds of Conservation Concern[21] (BoCC5) and listed within SBL. However, given the relatively localised nature of the alignment options and the extent of suitable habitat in the wider area, this species is unlikely to be significantly affected by the Project.

All alignment options occupy mainly agricultural habitat potentially used by foraging geese and swans. The same habitat could also support wintering populations of waders such as curlew and golden plover. Both species are listed within SBL, curlew is a Red List species within BoCC5, and golden plover is an Annex I species. These species will be recorded during ongoing flight activity surveys to inform the Alignment and Project and as incidental observations during field use surveys for the related project, LT360 Aberdeenshire HVDC Connection S2P.

There was an incidental record for barn owl during the ecology surveys for the related Netherton Hub project; the individual bird was disturbed from a roost site in a hedge. The roost site was not suitable for breeding, although buildings within the Netherton Hub site are potentially suitable for breeding barn owl. Potential barn owl pellets were also incidentally recorded during EGL3 surveys from a building in proximity to Alignment R3, at the eastern end. If barn owls are present, then they may forage within the area. The potential for collision risk is considered low given that barn owls typically forage close to ground level (typically 0-3m).

Alignment Option	**RAG**	**Site Comparison Notes**
Alignment R1	A	The arable farmland within and surrounding the alignment options potentially provides suitable foraging habitat for species potentially sensitive to disturbance and collision risk such as geese and waders during the non-breeding season. Therefore, there is potential for effects from the Project on these species. All alignment options have been given an Amber rating. There is little to differentiate between the alignment options considering the extent of suitable foraging habitat for these species incorporating
Alignment R2	A	
Alignment R3	A	

[18] SNH (2016). Assessment and mitigation of impacts of power lines and guyed meteorological masts on birds. Version 1, July 2016.

[19] SNH (2017). Recommended bird survey methods to inform impact assessment of onshore windfarms. Version 2, March 2017.

[20] Coleman, M., Fitchet, A., Seller, J., Williams, F. & Wright, P. (2016). SHE Transmission Ornithology Workshop – Ornithology Methods for Transmission Developments. SHE Transmission

[21] Stanbury, A., Eaton, M., Aebischer, N., Balmer, D., Brown, A., Douse, A., Lindley, P., McCulloch, N., Noble, D., and Win I. (2021). The status of our bird populations: the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain. British Birds 114: 723-747.

Alignment Option	RAG	Site Comparison Notes
		the alignments and the wider area and considering the mobile nature of the species involved.

Further Assessment:

All alignment options have been assigned an Amber rating and there is little to differentiate between the alignment options. Flight activity surveys to inform the Project and goose field use surveys for a related project, LT360 Aberdeenshire HVDC Connection S2P, have recorded very low activity from Target Species within the Project's Zone of Influence.

1.1.5. *Hydrology, Geology and Hydrogeology*

Hydrology, Geology and Hydrogeology receptors have been considered within a 1 km Study Area in relation to all alignment options.

Scottish Environment Protection Agency's (SEPA) guidance on assessing the impacts of developments on groundwater abstractions and Groundwater Dependent Terrestrial Ecosystems (GWDTE) (LUPS-GU31) requires assessment of groundwater abstractions and potential GWDTE located within 250 m of excavations greater than 1 m and within 100 m of excavations less than 1 m. Therefore, the 'GWDTE Study Area' includes the area within 250 m of the Site. Abstractions within 250 m of the Site have also been identified.

Consultation has been undertaken with Aberdeenshire Council in February 2024, in request for private water supply (PWS) information. Locations of PWS sources and infrastructure have not been yet verified. Further investigation through consultation and site survey, if required, may identify locations within the Alignment / LOD.

The Scottish Water asset database has been consulted in December 2024 for information relating to public water supplies.

In response to consultation for another SSEN project, Scottish Water (SW) provided Drinking Water Protected Areas (DWPA) data, which are considered as part of this appraisal.

Consultation has been undertaken with SEPA regarding licensed abstractions within all alignment options.

Habitat survey information was not available at the time of this appraisal in order to establish potential GWDTE. In the absence of this information, it has been assumed that GWDTE are present for the purpose of this appraisal.

A desk study and data search has been undertaken to identify the baseline environment, including information on solid and drift geology, surface water and groundwater, and designated sites. Available information has been used from the following sources:

- SEPA Water Classification Hub (River Basin Management Plan interactive web map)[22];
- Ordnance Survey (OS) 1:50,000 scale mapping;
- British Geological Survey (BGS) Geoindex Onshore Hydrogeological Map of Scotland 1:625,000 scale (interactive web map)[23];
- NatureScot SiteLink[24] (interactive web map); and
- SEPA DWPAs – Scotland River Basin District Maps (via The Scottish Government online) - Scotland river basin district maps [25].

[22] Water Classification Hub (interactive web map), SEPA. Available at: https://www.sepa.org.uk/data-visualisation/water-classification-hub/ [Accessed September 2024]
[23] The British Geological Survey – Hydrogeology. Available at: https://mapapps2.bgs.ac.uk/geoindex/home.html [Accessed September 2024]
[24] NatureScot Sitelink (interactive web map). Available at: Available at: https://sitelink.nature.scot/map. [Accessed September 2024]
[25] Scottish Government Drinking water protected areas - Scotland River basin district [online]. Available at: Scottish Government. Drinking water protected areas - Scotland river basin district [online]. Available at: https://www.gov.scot/publications/drinking-water-protected-areas-scotland-river-basin-district-maps/ [Accessed September 2024]

According to SEPA DWPAs, most of Scotland is located within a SEPA DWPA for groundwater, including the area in which the alignment options are located; however, each Alignment Option has been considered in relation to SEPA DWPA for surface waters.

As the Limit of Deviation (LOD) for each alignment is 100 m, all distances are measured from the LOD at the closest point for each alignment option.

Alignment Option	RAG	Site Comparison Notes
Alignment R1	A	NatureScot Sitelink indicates that Hill of Longhaven Quarry GCR/SSSI is located 850 m southwest of the Alignment R1. Alignment R1 crosses the Faichfield Burn (ID:23217). Alignment R1 is underlain by unnamed igneous intrusions (Late Silurian to Early Devonian) and Southern Highland Group, low productivity aquifers, where small amounts of groundwater may be present in the near surface weathered zone and in secondary fractures. Aberdeenshire Council data indicates that there are numerous PWS within 1 km of Alignment R1. None of which are indicated within the LOD; however, there are 13 PWS indicated within 250 m of LOD. SEPA data indicates that there are four authorised abstractions within 1 km of the LOD; one of which is indicated within 250m of the LOD. SW data indicates that there is one SW abstraction within 1 km of Alignment R1 which is not indicated within 250 m of the LOD. Alignment R1 is located 550 m south west of the catchment of River Ugie – 'North/South confluence to tidal limit', which is designated as a SEPA DWPA for surface water. The midwest part of Alignment R1 is located within SW DWPA of River Ugie which supplies Forehill Water Treatment Works (WTW). Based on the presence of watercourses, PWS, SEPA abstraction, SW abstraction, SW DWPA, and the likely presence of GWDTE within 1 km of Alignment R1, this option has been assigned an Amber rating.
Alignment R2	A	NatureScot Sitelink indicates that Hill of Longhaven Quarry GCR/SSSI is located 850 m southwest of the Alignment R2. Alignment R2 crosses the Faichfield Burn (ID:23217). Alignment R2 is underlain by unnamed igneous intrusions (Late Silurian to Early Devonian), and Southern Highland Group, low productivity aquifers, where small amounts of groundwater may be present in the near surface weathered zone and in secondary fractures. Aberdeenshire Council data indicates that there are numerous PWS within 1 km of Alignment R2. None of which are indicated within the LOD; however, there are 13 indicated PWS within 250 m of LOD.

Alignment Option	RAG	Site Comparison Notes
		SEPA data indicates that there are four authorised abstractions within 1 km of the LOD; One of which is indicated within 250 m of the LOD. SW data indicates that there is one SW abstraction within 1 km of Alignment R2 which is not indicated within 250 m of the LOD. Alignment R2 is located 550 m south west of the catchment of River Ugie – 'North/South confluence to tidal limit', which is designated as SEPA DWPA for surface water. The midwest part of Alignment R2 is located within SW DWPA of River Ugie which supplies Forehill WTW. Based on the presence of watercourses, PWS, SEPA abstraction, SW abstraction, SW DWPA, and the likely presence of GWDTE within 1 km of Alignment R1, this option has been assigned an Amber rating.
Alignment R3	A	NatureScot Sitelink indicates that there are no designated sites within 1 km of the Alignment R3 relevant to Hydrology, Geology and Hydrogeology. Alignment R3 crosses the Faichfield Burn (ID:23217). Alignment R3 is underlain by unnamed igneous intrusions (Ordovician to Silurian, Late Silurian to Early Devonian), and Southern Highland Group, low productivity aquifers, where small amounts of groundwater may be present in the near surface weathered zone and in secondary fractures. Aberdeenshire Council data indicates that there are numerous PWS within 1 km of Alignment R3. None of which are indicated within the LOD; however, there are two indicated within 250 m of LOD. SEPA data indicates that there are four authorised abstractions within 1 km of Alignment R3; one of which is located within 250 m of LOD. SW data indicates that there is one SW abstraction within 1 km of Alignment R3 which is not indicated within 250 m of the LOD. The middle part of Alignment R3 is located within the catchment of River Ugie – 'North/South confluence to tidal limit', which is designated as a SEPA DWPA for surface water. The midwest part of Alignment R3 is located within a SW DWPA of River Ugie which supplies Forehill WTW. Based on the presence of watercourses, PWS, SEPA abstraction, SW abstraction, SEPA DWPA, SW DWPA, and the likely presence of GWDTEs within 1 km of Alignment R3, this option has been assigned an Amber rating.

Further Assessment:

All of the alignment options of Section 1 have been assigned an Amber RAG rating, as each of the alignment options may compromise the quality and / or quantity of surface waters or groundwater. However, Alignment R3 is the most preferable as there are fewer PWS within 250 m of the LOD.

1.2. Cultural Heritage

Baseline information on known Designations and Cultural Heritage Assets was gathered for the following study areas:

- Inner Study Area: all recorded Designations and Cultural Heritage Assets held in the Scottish National Record of the Historic Environment Record (SNRHE) within each Alignment Option.
- Outer Study Area: Designations and Cultural Heritage assets (i.e. Scheduled Monuments, Listed Buildings, Conservation Areas, Inventory Gardens and Designed Landscapes and Inventory Historic Battlefields) within 2 km of each Alignment Option.

1.2.1. *Cultural Heritage Designations*

Alignment Option	RAG	Site Comparison Notes
Alignment R1	G	There are no World Heritage Sites, GDLs or Inventory Battlefields within the study areas. There are no scheduled monuments within Alignment R1. There are three scheduled monuments within the outer study area comprising Cairn Cotto Long Cairn (SM3276), Boddam Castle (SM3252) and Boddam Den, flint mining complex (SM6137). Cairn Catto Long Cairn (SM3276) is located approximately 1.5 km south of Alignment Option R1. There is potential for impacts through changes within the setting of the heritage asset, but these impacts are not likely to lead to significant effects due to the presence of the existing OHL adjacent to the monument and the existing OHL in the same direction, as well as intervening buildings and vegetation. Boddam Castle (SM3252) is located 1.9 km south east of Alignment R1. There is potential for impacts through changes within the setting of the heritage asset, but these impacts are not likely to lead to significant effects due to the proximity of Boddam Castle to the town of Boddam and the modern housing it is comprised of. Boddam Den, flint mining complex (SM6137) is located 900 m to the south east of Alignment R1. There is potential for impacts through changes within the setting of the heritage asset, however the importance of the asset is derived from it being a well-preserved prehistoric site, and its potential for increasing our knowledge on prehistoric mining. Therefore, impacts to the assets setting are not likely to lead to significant effects. There are three SMR entries within Alignment R1 related to post-medieval settlement and industrial activity, including a post-medieval farmstead, now destroyed, a former quarry, and an isolated pit that was excavated and no longer present. The footprints of the SMR entries would be easily avoidable through micro-siting of the alignment option. Based on the low potential for significant effects on Designations, the alignment option has been assigned a RAG rating of Green.
Alignment R2	G	There are no World Heritage Sites, GDLs or Inventory Battlefields within the study areas.

Alignment Option	RAG	Site Comparison Notes
		There are no scheduled monuments within Alignment R2. There are three scheduled monuments within the outer study area comprising Cairn Cotto Long Cairn (SM3276), Boddam Castle (SM3252) and Boddam Den, flint mining complex (SM6137). Cairn Catto Long Cairn (SM3276) is located approximately 1.5 km south of Alignment R2. There is potential for impacts through changes within the setting of the heritage asset, but these impacts are not likely to lead to significant effects due to the presence of the existing OHL adjacent to the monument and the existing OHL in the same direction, as well as intervening buildings and vegetation. Boddam Castle (SM3252) is located 1.9 km south east of Alignment R2. There is potential for impacts through changes within the setting of the heritage asset but these impacts are not likely to lead to significant effects due to the proximity of Boddam Castle to the town of Boddam and the modern housing it is comprised of. Boddam Den, flint mining complex (SM6137) is located 1.3 km to the south east of Alignment R2. There is potential for impacts through changes within the setting of the heritage asset, however the importance of the asset is derived from it being a well-preserved prehistoric site, and it's potential for increasing our knowledge on prehistoric mining. Therefore, impacts to the assets setting are not likely to lead to significant effects. There is one SMR entry within Alignment R2 related to post-medieval activity: an isolated pit that was excavated and no longer present. Based on the low potential for significant effects on Designations, the alignment option has been assigned a RAG rating of Green.
Alignment R3	G	There are no World Heritage Sites, GDLs or Inventory Battlefields within the study areas. There are no scheduled monuments within Alignment R3. There are two scheduled monuments within the outer study area comprising Boddam Castle (SM3252) and Boddam Den, flint mining complex (SM6137). Boddam Castle (SM3252) is located 1.9 km south east of Alignment R3. There is potential for impacts through changes within the setting of the heritage asset but these impacts are not likely to lead to significant effects due to the proximity of Boddam Castle to the town of Boddam and the modern housing it is comprised of. Boddam Den, flint mining complex (SM6137) is located 1.4 km to the south east of Alignment R3. There is potential for impacts through changes within the setting of the heritage asset, however the importance of the asset is derived from it being a well preserved prehistoric site, and it's potential for increasing our knowledge on prehistoric mining. Therefore, impacts to the assets setting are not likely to lead to significant effects.

Alignment Option	RAG	Site Comparison Notes
		There are no SMR entries within Alignment R3. Based on the low potential for significant effects on Designations, the alignment option has been assigned a RAG rating of Green.

Further Assessment:

None of the alignment options would have the potential to result in significant effects on Designations, so have all been assigned a Green RAG rating.

Alignment R3 is most preferred as it contains no SMR entries within the Inner Study Area and has the least number of Scheduled Monuments within the Outer Study Area.

There is the potential for unknown archaeological remains to exist within each Alignment option.

1.2.2. *Cultural Heritage Assets*

Alignment Option	RAG	Site Comparison Notes
Alignment R1	A	There are no Non-Inventory Gardens or Designed Landscapes within the study areas. There is one Conservation Area within the Outer Study Area, Boddam Conservation Area (CA428), located approximately 1.3km east of the Alignments. There are no Listed Buildings within the Inner Study area. There are 65 Listed Buildings within the Outer Study Area. The majority of Listed Buildings are within the village of Boddam Conservation Area. There is also a Category B Listed Building, Blackhill House located approximately 150 m south of Alignment R1. There is the potential for impacts through changes within the setting of Blackhill House (LB16395) due to it being located approximately 150 m south of Alignment R1. Due to the proximity of the asset to Alignment R1, these impacts have the potential to lead to significant effects. Based on the moderate potential for significant effects on Cultural Heritage Assets, the alignment option has been assigned a RAG rating of Amber.
Alignment R2	A	There are no Non-Inventory Gardens or Designed Landscapes within the study areas. There is one Conservation Area within the Outer Study Area, Boddam Conservation Area (CA428), located approximately 1.3km east of the Alignments. There are no Listed Buildings within the Inner Study area. There are 65 Listed Buildings within the Outer Study Area. The majority of Listed Buildings are within the village of Boddam Conservation Area. There is also a Category B Listed Building, Blackhill House located approximately 150 m south of Alignment R2. There is the potential for impacts through changes within the setting of Blackhill House (LB16395) due to it being located

Alignment Option	RAG	Site Comparison Notes
		approximately 150 m south of Alignment R2. Due to the proximity of the asset to Alignment R2, these impacts have the potential to lead to significant effects. Based on the moderate potential for significant effects on Cultural Heritage Assets, the alignment option has been assigned a RAG rating of Amber.
Alignment R3	G	There are no Non-Inventory Gardens or Designed Landscapes within the study areas. There is one Conservation Area within the Outer Study Area, Boddam Conservation Area (CA428), located approximately 1.3km east of the Alignments. There are no Listed Buildings within the Inner Study area. There are 71 Listed Buildings within the Outer Study Area. The majority of Listed Buildings are within the village of Boddam Conservation Area. There are no likely significant effects anticipated to the Listed Buildings due to distance from the Alignment R3. Vegetation, housing and OHL which comprise the landscape of the Listed Buildings contribute to significant effects to setting not being likely. Based on there being no likely significant effects on Cultural Heritage Assets, the alignment option has been assigned a RAG rating of Green.

Further Assessment:

The preferred Alignment Option in relation to Cultural Heritage Assets would be Alignment R3. Despite Alignment R3 having the most Listed Buildings within the Study Areas, the effects to Listed Buildings are not likely to be significant.

Alignments R1 and R2 would be least preferred as Blackhill House (LB16395) is located approximately 150m south of both alignments and therefore there is potential for significant effects to arise due to a change within its setting.

1.3. People

1.3.1. *Proximity to Dwellings*

See **Appendix 1.2 Section 1.5.1** within the Engineering Assessment.

1.4. Landscape and Visual

1.4.1. *Assumptions:*

- It is assumed that the existing towers and associated cables of the existing New Deer – Peterhead OHL would be removed between the stemming-off point of the Tie-In connection and Peterhead Substation.
- The angle towers required for changes in direction of the new alignment would have an increased bulk in comparison with the regular support towers.
- The Rebuild section towers would be SSEN 400 kV with triple conductors, approximately 57 m in height which would have a greater bulk than the tie-in section SSEN standard 275 kV towers, 45 m in height.
- Alignment Option R3 is assumed to stem off Tie-In Alignment T2A to complete the connection to Netherton Hub; in this instance, only the portion of T2A between Netherton Hub and R3 would be constructed. Alignment options R1 and R2 begin approximately at Tower 76 on the existing New Deer – Peterhead 400kV OHL.

- For the cumulative assessment, the preferred option for the Tie IN, T1A and for the Tie OUT, T2A are assumed for ease of reference. The tables in this section consider the following combined cumulative option: the Rebuild Options R1, R2 and R3 with the preferred options of Tie OUT 2A, + Tie IN 1A, with B2P (Beauly to Peterhead 400kV OHL), and with the aforementioned section of the existing New Deer – Peterhead 400kV removed.
- It is assumed in the event of Alignment R1 being the preferred choice, the segment of the existing 275 kV Aberdeen to Peterhead OHL crossing the option would be rerouted south of Alignment R1 to avoid the use of visually intrusive crossover arrangements.
- For Rebuild R2, near to Peterhead Substation, a temporary diversion of a small section of existing OHL would be required. Please refer to **Figure 4: Landscape and Visual**.

1.4.2. *Designations*

The potential for effects on national designations and on wild land areas is excluded as they lie beyond 10 km of the alignment options. The potential for effects on regional designations is noted when these lie within approximately 5 km of the alignment options. Gardens & Designed Landscapes are considered in **Appendix 1.1 Section 1.2 Cultural Heritage**.

Designations: Comparison of Alignment Options R1, R2 and R3

Alignment Option	RAG	Site Comparison Notes
Alignment R1	G	There are no National Parks or National Scenic Areas within 10 km of Alignment R1. The North East Aberdeenshire Coast Special Landscape Areas (SLA)[26] lies 4 – 5 km to the north and 1.5 km to the east of Alignment R1, at its closest point. The SLA to the north and east are unlikely to be affected.
Alignment R2	G	There are no National Parks or National Scenic Areas within 10 km of Alignment R2 The North East Aberdeenshire Coast Special Landscape Areas lies between 4 to 5km north and 1.5 km east of Alignment R2 and are unlikely to be affected.
Alignment R3	G	There are no National Parks or National Scenic Areas within 10 km of Alignment R3. The North East Aberdeenshire Coast Special Landscape Areas lies between 3 km north and 1.5 km east of Alignment R3 and are unlikely to be affected

Further Assessment:

All alignment options have been allocated a RAG Rating of Green as it is very unlikely for any of the alignment options to compromise any of the key attributes and qualities of any landscape designation. The effect on designations is not a decision-making factor.

Landscape Designations: Cumulative comparison of tie-in and rebuild alignment options.

Alignment Option	RAG	Site Comparison Notes
R1 + T1A + T2A + B2P	G	

[26] Aberdeenshire Council, Aberdeenshire Special Landscape Area, available at https://www.aberdeenshire.gov.uk/planning/plans-and-policies/archive-information/ldp-sg9-special-landscape-areas/

Alignment Option	RAG	Site Comparison Notes
R2 + T1A + T2A + B2P	G	There are no National Parks or National Scenic Areas within 10 km of any of the alignment options The North East Aberdeenshire Coast Special Landscape Areas lie between 3 – 5 km north and 1.5 km east of the rebuild alignments and are unlikely to be affected.
R3 + T1A + T2A + B2P	G	

Further Assessment:

All alignment options have been allocated a RAG Rating of Green as it is unlikely for any of the alignment options to compromise any of the key attributes and qualities of any landscape designation. All of the rebuild options end at the existing Peterhead Substation and therefore are the same distance from the nearest SLA to the south of Peterhead and would have the same level of constraint. Landscape designations are not considered to constrain the options considered.

1.4.3. *Landscape Character*

Effects on Landscape Character consider the potential for effects on nationally defined landscape character areas. Effects are noted when these character areas lie within or adjacent to the alignment options.

All alignment options lie within the Landscape Character Area (LCA): Nature Scot SNH National Landscape Character Assessment: Aberdeenshire 17 Coastal Agricultural Plain[27]

Key features of this LCA applicable to this Option Appraisal are:

- *low lying gently undulating landform;*
- *mixed farmland with occasional residential and farmsteads;*
- *occasional coniferous plantation often on elevated land;*
- *existing overhead lines, telecommunication towers. Peterhead Power station, windfarms and single wind turbines are features of the local landscape.*

Consideration is also given to potential effects on the local landscape character with an assumption of a potential area of effect of 5 km on either side of the OHL. All options lie within a predominantly rural landscape characterised by the features listed above and below:

- *small to medium sized fields with fences and hedgerows as field boundaries;*
- *woodland copse, tree belts and occasional conifer plantation;*
- *local windfarm on Gallows Hill with distant views of other wind development as single turbines or windfarm*
- *existing high and low level transmission lines within the locality;*
- *views of local disused airfield with various commercial uses, large industrial sheds and large agricultural storage sheds in farmsteads.*

As the alignment options approach Peterhead to the east, the local landscape character alters from rural to semi-urban with more visual detractors present, such as Peterhead Power Station, the busy A90, industrial large sheds and transmission lines entering the Peterhead Substation. Overhead lines are a feature of the local landscape, with a greater frequency closer to the Peterhead Substations.

Landscape character: Comparison of Alignment Options R1, R2 and R3

[27] NatureScot Landscape Character Assessment, available at https://www.nature.scot/sites/default/files/LCA/LCT%20017%20-%20Coastal%20Agricultural%20Plain%20-%20Aberdeenshire%20-%20Final%20pdf.pdf

Alignment Option	RAG	Site Comparison Notes
Alignment R1	A	Alignment R1 starts at Tower 76 on the existing New Deer 400kV OHL to the south of the Hub at approximately +75 m AOD, crosses a stream valley to the east near Little Dens and then continues on high land to 100m AOD near Blackhillock. At Blackhillock the OHL passes down a steep scarp slope and then onto gradually sloping land towards the coast. This option crosses the existing 275 kV Peterhead to Aberdeen OHL near Greystone Farm and again crosses the same line near the existing Peterhead Substation. Option R1 approaches the Peterhead 2 Substation at approximately +30 m AOD. The landscape is gently undulating. The landscape is predominantly rural, mixed farmland of medium sized fields with trimmed hedgerows and fences as field boundaries. There is limited tree cover. Settlement consists of isolated farmsteads or individual residential properties and clusters of residential properties. At approximately 1.5 km from the Peterhead Substation, the local landscape character alters from rural to semi-rural and more urban in character. Alignment R1 enters an industrial area on the western edge of Peterhead. The existing 275 kV Peterhead to Aberdeen OHL is visible on the horizon to the south.
Alignment R2	A	Alignment R2 follows the same alignment as R1 until east of Blackhillock at the lower part of the slope, where it changes direction and passes eastwards across open farmland with limited settlement and then aligns parallel to the existing 132 kV OHL in the industrial area west of Peterhead and then connects into Peterhead Substation.
Alignment R3	A	Alignment R3 leaves the Tie-In T2A alignment at approximately 0.9 km south of the Netherton Hub. The Alignment then passes eastwards south of Toddlehills, crossing two stream valleys with ancient woodland and mixed farmland onto elevated land at approximately 70 m AOD. The alignment then changes direction and passes across open farmland. As the alignment approaches south west of Peterhead, it is aligned parallel with two existing overhead lines, a 132kV and the existing New Deer – Peterhead OHL through the industrial area. Alignment R3 crosses two existing 132 kV overhead lines before passing south east into the Peterhead Substation.

Further Assessment:

All three alignments lie on high ground and cross a similar landscape character, rural farmland to the west near the Netherton Hub which gradually becomes more semi-urban closer to Peterhead to the east with overhead lines becoming more prominent features in the locality. Alignment R3 lies closer to the residential area of Peterhead. All routes would compromise the local landscape character and are given an Amber rating.

Landscape Character: Cumulative comparison of tie-in, tie out and rebuild alignment options

Alignment Option	RAG	Site Comparison Notes
R1 + T1A + T2A + B2P	A	Alignment R1 passes through a rural area already compromised by overhead line development. There would be a cumulative effect on landscape character as Alignment R1 passes east towards Peterhead with the existing 275kV Aberdeen to Peterhead OHL. If this route is selected there is an opportunity to align this existing OHL to minimise crossings.
R2 + T1A + T2A + B2P	A	Alignment R2 passes through a rural area already compromised by overhead line development. There would be a cumulative effect on landscape character as Alignment R2 passes east towards Peterhead with the existing 275kV Aberdeen to Peterhead OHL.
R3 + T1A + T2A + B2P	A	Alignment R3 has several oblique angle changes in direction which would require bulky towers. The route passes within 300m of the edge of the settlement of Peterhead. There would be a cumulative effect on landscape character as Alignment R3 passes east towards Peterhead with the existing two overhead lines, 132kV present west of Peterhead, crossings would be required. Alignment R3 would be aligned in parallel with the existing OHL as it enters the Peterhead Substation.

Further Assessment:

All of the alignment options combined with Tie-in and Out alignments and the B2P OHL have the potential to compromise the landscape character of the LCA Aberdeenshire 17 Coastal Agricultural Plain at a local level in the vicinity of the Netherton Hub. The degree to which each of the options combined with the B2P OHL varies with benefits derived from removal of existing towers of the New Deer OHL which is sited on high ground in this location. The comparison emphasises the preference of tie-in Option T1A over T1B or T1C, as combination with T1A and the B2P OHL presents much less constraint.

In relation to the potential cumulative effects on the local landscape character, all three options R1, R2 and R3 are likely to have a similar effect as they pass through areas of similar landscape character, rural at the Hub and semi-urban at the east at Peterhead. Landscape character is not a deciding factor for the selection of a preferred rebuild alignment.

1.4.4. *Visual*

In this section the potential for effects on visual receptors (both individual and groups) are noted when the visual receptors have potentially clear visibility of the alignment option. It is assumed potential visual receptors would potentially have a significant effect within approximately 2 km of the alignment options, although this could extend further up to 3 km as all alignment options pass over elevated ground with open views particularly to the west north and east towards Peterhead. There are open long distance views in all directions as all rebuild options cross elevated land, consequently all would be visible at distance on the horizon from some locations within the surrounding area. There would likely be a cumulative visual effect with the B2P OHL entering the Netherton Hub from the west. The visual effects of the B2P OHL are less of a consideration as the line is viewed at a greater distance by the visual receptors in combination with the alignment options and consequently has less magnitude.

There would be localised views during the construction phase of contractors' compounds, earthworks and the installation of the towers, cables access tracks and entrances. These works would be temporary.

Visual receptors present in the locality include isolated farmsteads and individual residential properties, users of minor highways and recreational routes such as Core Paths, Cycle routes and public footpaths providing access to local schools. To the east lies the settlement of Peterhead with residential estates on the western perimeter adjacent to the A90 with long distance views to the west from elevated land.

There are visual detractors present such as occasional wind turbines, industrial sheds on the edge of Peterhead and at Longside Airfield, Gallows Hill Windfarm to the east, Peterhead Power Station. Several overhead transmission lines are present connecting into the Peterhead Substation. These are isolated features present in different compass directions and minimal in their visual impact with the local character to the west being predominantly rural, with open views of the surrounding farmland and forestry.

At this stage of the assessment, it is assumed that offsite planting of hedgerow trees, hedgerows and woodland plantations would not be possible. The assessment assumes the worst-case scenario with little planting present.

Visual: Comparison of Alignments R1, R2 and R3

Alignment Option	RAG	Site Comparison Notes
Alignment R1	A	Alignment R1 passes from Tower 76 to the south onto elevated land across open farmland to Blackhillock, a hamlet with scattered properties with a north south facing elevation. The alignment passes down a scarp slope and crosses open farmland until it reaches the industrial zone west of the A90 and passes down the current alignment of the existing New Deer OHL. There are limited residential properties with a close-up view. Residential properties at Toddlehill with a west facing aspect would have a view of Alignment R1 in the middle distance on the horizon. Properties at Blackhillock with a northern facing aspect would have a view of R1. These properties have a current view of the New Deer OHL however R1 is closer. The alignment is linear with minimal angle changes so less visually intrusive than Alignment R2 at this point. As Alignment R1 approaches Peterhead Substation, there would be a cumulative visual effect with the Aberdeen to Peterhead 275 kV from the south by nearby visual receptors. It is anticipated this 275kV OHL would be rerouted to be aligned in parallel to the south of R1. This method combined with the additional removal of the existing New Deer 400kV OHL ensures the visual effects to nearby residential properties are minimised. Two discrete infrastructure corridors into the Peterhead 2 Substation are created. However, if diamond crossing formations are used, rather than re-routeing, this would exacerbate visual impacts and create a more confusing wirescape.
Alignment R2	A	Alignment R2 replicates R1 above until it reaches north of Redleas Farm and then passes due east to the industrial zone west of Peterhead. There are changes in direction requiring bulky angle towers. Option R2 at the outskirts of Peterhead aligns parallel to the existing 132 kV OHL in the industrial area, using the existing route of the New Deer – Peterhead 400kV OHL and connects into Peterhead Substation, adjacent to the A90. There would likely be cumulative effects with the existing OHLs in this locality. This option produces three infrastructure corridors of OHL providing a more cluttered wirescape around Peterhead Substation.

Alignment Option	RAG	Site Comparison Notes
Alignment R3	R	This option may require felling or trimming of woodland within the two stream valleys, one of which is Ancient Woodland. Near to Netherton Hub, the residential properties at Toddlehills with an east / west facing aspect (potentially 11 properties) would have views at both front and rear elevations of Alignment R3. This view in the middle distinct at both elevations, would be cumulative with the retained towers of New Deer – Peterhead OHL on the horizon. This creates a cluttered wirescape which could be considered overbearing. Alignment R3 has several changes in direction which would increase the number of angle towers which have a greater visual impact than regular towers. The eastern end of the alignment passes in close proximity to the western perimeter of the settlement of Peterhead. The OHL would be visible in the middle distance from properties facing west, in combination with the existing, smaller scale 132 kV OHL adding further to views of transmission equipment. This may incur significant visual effects to residential properties within the settlement.

Further Assessment:

Alignments R1 and R2 are the preferred choice as they incur fewer visual effects to nearby residential properties in comparison to Alignment R3. Both alignments, R1 and R2 in comparison to R3 are likely to have less of an effect on the local visual amenity due to their linear alignment with less angled changes in direction. Alignment R1 with the rerouting of the existing Aberdeen to Peterhead 275kV OHL parallel to the south has the added advantage of creating two discrete infrastructure corridors into the Peterhead 2 Substation and is the slight preference but becomes less favourable than R2 if a diamond crossing is used rather than rerouting.

Visual: Cumulative comparison of tie-in and rebuild alignment options.

Alignment Option	RAG	Site Comparison Notes
R1 + T1A + T2A+ B2P	A	Two distinct infrastructure corridors into Netherton Hub with tower removal of the existing New Deer OHL. Two distinct route corridors with a more linear route into Peterhead 2 Substation, with minimal angle changes, thereby minimising visual effects.
R2 + T1A + T2A + B2P	R	Three distinct infrastructure corridors into Netherton Hub, increasing the wirescape.
R3 + T1A + T2A + B2P	R	Three distinctive infrastructure corridors into Netherton Hub, with the retained towers of the New Deer OHL increasing the wirescape. Larger angle towers for changes in direction.

Further Assessment:

All alignment options would have a cumulative effect with the existing New Deer OHL and the proposed B2P OHL, although this varies in extent for each. Each of the alignments has advantages and disadvantages in relation to visual amenity, however there is a preferred design solution as described below.

Alignment R1 is considered to be the preferred choice over R2 in relation to potential visual effects. With the removal of the existing New Deer 400kV OHL and rerouting of the Aberdeen to Peterhead 275kV OHL to the south aligned

parallel with R1 there is an opportunity to create two distinct infrastructure corridors into Peterhead Substation, thereby reducing visual effects to nearby residential properties in comparison with R2.

As noted at 1.4.1, above, this appraisal is based on the assumption that rebuild option R1 would entail the diversion of the existing 275 kV Aberdeen to Peterhead OHL to run close parallel with the diversion. However, if two diamond crossing formations are used rather than rerouting the existing OHL, R1 becomes less preferred than R2.

1.5. Land Use

Effects on agricultural land consider the potential for effects on land capability for agriculture. Effects are noted when land capable of producing an average to wide range of crops is located adjacent to or within the alignment options.

The wider area is characterised by largely ALC rating of 3.2 ("Land capable of average production though high yields of barley, oats and grass can be obtained"). Land capability for agriculture decreases further south of the Project (down to an ALC rating of 6.1).

1.5.1. *Agriculture*

Alignment Option	RAG	Site Comparison Notes
Alignment R1	A	Option R1 passes through Land Capability for Agriculture (LCA) of Class 3.1: land capable of producing consistently high yields of a narrow range of crops and / or moderate yields of a wider range; and 3.2: land capable of average production though high yields of barley, oats and grass. The alignment passes predominantly through areas of class 3.2, and it is not anticipated that it would compromise the functionality or viability of the land, given the relatively small footprint of each tower. This option is considered to have only limited constraint posed by agriculture; however, as it passes through Class 3.1 land, it has been allocated an Amber RAG Rating.
Alignment R2	A	As above, but with a slightly greater presence within Class 3.1 agricultural land due to the need for more angle towers in comparison with Option R1, which have larger foundation footprints.
Alignment R3	A	As per Option R1, but with greater presence overall in Class 3.1 land, and at two locations rather than only near Peterhead Substation.

Further Assessment:

All alignment options pass through a mixture of Class 3.1 and 3.2 agricultural land.

Option R1 has the most limited presence in Class 3.1 land, at approximately 470 m. Option R2 has greater presence, around 2.2 km, and Option R3 crosses Class 3.1 land in two locations; north east of Little Dens for approximately 700 m, and again closer to Peterhead Substation for approximately 1.5 km.

Option R1 is the overall preference in relation to agricultural constraints, however all three options are similar in posing little potential adverse effect on the functionality or viability of the land given the nature of the development and limited footprint required for each tower.

1.5.2. *Forestry*

Constraints in relation to forestry, per the SSEN Guidance Document, relate specifically to potential to compromise the commercial viability of forestry operations. Forestry constraints related to natural heritage are considered earlier in this Appendix.

Alignment Option	RAG	Alignment Comparison Notes
Alignment R1	G	Option R1 does not appear to pass through any notable areas of woodland. Some minor tree removal works may be required at points along the alignment to facilitate wayleaves, but it is not anticipated any areas of commercial woodland would be affected. As such, a Green RAG rating has been applied.
Alignment R2	G	As above.
Alignment R3	G	As above. It is noted that this alignment option passes through an patch of woodland listed as R1 Ancient Woodland (of semi-natural origin) and adjacent to a second area of R2 Long-Established Woodland, and the current centreline would likely require removal of trees at both of these locations.

Further Assessment:

There are no areas of commercial forestry identified along any of the alignment options. Some small patches of tree removal may be required in places, including Ancient Woodland; however, from a commercial forestry standpoint, none of the alignment options are considered to be constrained.

1.5.3. *Recreation*

Alignment Option	RAG	Alignment Comparison Notes
Alignment R1	A	These alignments are not located near any national cycle network routes. These alignments do not interact with any area known to be used for commercial sporting activities, including golf courses, country parks and shooting / stalking activities. Alignment R3 approaches near Core Path 215.02, and all three options are in close proximity to Core Path 215.04 as they connect into the Peterhead Substation. Given these proximities, the options may affect the recreational amenity of the paths. These alignments have therefore been allocated an Amber RAG Rating.
Alignment R2	A	
Alignment R3	A	

Further Assessment:

Generally, the three alignment options are not considered to be constrained by recreational land uses in the vicinity. Two Core Paths are in close proximity to the options, and the introduction of new, larger towers may affect the recreational amenity of these paths for users, and thus are constrained by them, with Option R3 most constrained and thus least preferred. It is recognised, however, that users of these paths already experience an industrialised landscape south of Peterhead, and this Project is effectively a replacement of an existing OHL, limiting potential adverse effects.

1.6. Planning

1.6.1. *Policy*

National Policy

National Planning Framework 4 (NPF4) was adopted by the Scottish Government in February 2023 and is a long-term plan looking to 2045 that guides spatial development, sets out national planning policies, designates national developments and highlights national and regional spatial priorities.

In contrast to previous National Planning Frameworks, NPF4 places national policy at the heart of planning decision making as it is part of the statutory Development Plan along with Local Development Plans. Upon the adoption of NPF4 in February 2023, NPF3, Scottish Planning Policy (SPP) and all Strategic Development Plans ceased to have any relevance to planning decision making in Scotland. NPF4 encapsulates the National Planning Framework, and National Planning Policy in the same document for the first time.

NPF4 identifies a number of National Developments which are significant developments of national importance that will help to deliver the spatial strategy. Statements of need are set out in NPF4 that describe the development to be considered as a national development for consent handling purposes. Amongst the national developments identified is National Development 3: Strategic Renewable Electricity Generation and Transmission Infrastructure which includes:

b) New and/or replacement upgraded on and offshore high voltage electricity transmission lines, cables and interconnectors of 132kv or more; and

c) New and/or upgraded Infrastructure directly supporting on and offshore high voltage electricity lines, cables and interconnectors including converter stations, switching stations and substations.

As stated above, NPF4 contains National Planning Policies, and these policy positions are to be taken into account in land use planning decision making. The NPF4 policies that are of the most relevance to the development are:

- Policy 1 – Tackling the Climate and Nature Crises. The intent is to encourage, promote and facilitate development that addresses the global climate emergency and nature crisis.
- Policy 2 – Climate Mitigation and Adaptation. Development proposals will be sited and designed to minimise lifecycle greenhouse gas emissions as far as possible and adapt to current and future risks from climate change.
- Policy 3 – Biodiversity. Development proposals need to contribute to the enhancement of biodiversity and integrate nature based solutions. Proposals requiring an EIA will only be supported where it can be demonstrated that the proposal will conserve, restore and enhance biodiversity.
- Policy 4 – Natural Places. Development proposals which by virtue of type, location or scale will have an unacceptable impact on the natural environment will not be supported. Development Proposals that are likely to have a significant effect on an existing or proposed European Site, and are not directly connected with or necessary to their conservation management, are required to be subject to an appropriate assessment of the implications to conservation objectives. Development proposals that will not compromise the designation status/overall integrity of a National Park, National Scenic Area, SSSI, Natural Nature Reserve, local conservation site, or local landscape area. Development proposals that are likely to have an adverse effect on species protected by legislation will only be supported where the proposal meets the relevant statutory tests. If there is reasonable evidence to suggest that a protected species is present on a site or may be affected by a proposed development, steps must be taken to establish its presence.
- Policy 5 – Soils. Development will only be supported if they are designed and constructed in accordance with mitigation hierarchy, and in a manner that protects soil from damage. Development proposals on prime agricultural land, or land of lesser quality that is culturally or locally important for primary use (as identified by the LDP), peatland, carbon-rich soils, and priority peatland habitat, will only be supported where it is for essential infrastructure and there is a specific locational need and no other suitable site. Where development on peatland, carbon-rich soils or priority peatland habitat is proposed, a detailed site specific assessment will be required.

- Policy 6 – Forestry, Woodland and Trees. Development proposals that enhance, expand and improve woodland and tree cover will be supported. Development proposals will not be supported where they will result in any loss of ancient woodlands, ancient and veteran trees, or adverse impact on their ecological condition, native woodlands, hedgerows, individual trees of high diversity value, or identified for protection. Fragmenting or severing woodland habitat without appropriate mitigation will also not be supported. Development proposals involving woodland removal will only be supported where they will achieve significant and clearly defined additional public benefits in accordance with relevant Scottish Government policy on woodland removal. Where woodland is removed, compensatory planting will most likely be expected to be delivered. Development proposals on sites which include an area of existing woodland or land identified in the Forestry and Woodland Strategy as being suitable for woodland creation will only be supported where the enhancement and improvement of woodlands and the planting of new trees on the site (in accordance with the Forestry and Woodland Strategy) are integrated into the design.
- Policy 7 – Historic Assets and Places. Development proposals with a potentially significant impact on historic assets or places will be accompanied by an assessment which is based on an understanding of the cultural significance of the historic asset and/or place. Development proposals in or affecting conservation areas will only be supported where the character and appearance of the conservation area and its setting is preserved or enhanced. Development affecting SM will only be supported where direct and significant adverse impacts on the integrity of the setting are avoided, or exceptional circumstances have been demonstrated to justify the impact. Development proposals affecting nationally important Gardens and Designed Landscapes will be supported where they protect, preserve or enhance their cultural significance, character and integrity and where proposals will not significantly impact on important views to, from and within the site, or its setting. Development proposals which sensitively repair, enhance and bring historic buildings, as identified as being at risk locally or on the national Buildings at Risk Register, back into beneficial use will be supported. Non-designated historic environment assets, places and their setting should be protected and preserved in situ wherever feasible. Where there is potential for non-designated buried archaeological remains to exist below a site, developers will provide an evaluation of the archaeological resource at an early stage so that planning authorities can assess impacts. Historic buildings may also have archaeological significance which is not understood and may require assessment.
- Policy 11 – Energy. To encourage, promote and facilitate all forms of renewable energy development onshore and offshore.
- Policy 12 – Zero Waste. Development proposals will seek to reduce, reuse, or recycle materials in line with the waste hierarchy.
- Policy 14- Design, quality and place - Development proposals will be designed to improve the quality of an area whether in urban or rural locations and regardless of scale. Development proposals will be supported where they are consistent with the six qualities of successful places and development proposals that are poorly designed, detrimental to the amenity of the surrounding area or inconsistent with the six qualities of successful places, will not be supported.
- Policy 18 – Infrastructure First. To encourage, promote and facilitate an infrastructure first approach to land use planning, which puts infrastructure considerations at the heart of placemaking.
- Policy 19 - Heating and Cooling - National and major developments that will generate waste or surplus heat and which are located in areas of heat demand, will be supported providing wider considerations, including residential amenity, are not adversely impacted. A Heat and Power Plan should demonstrate how energy recovered from the development will be used to produce electricity and heat.
- Policy 20 – Blue and green Infrastructure. Development proposals that result in fragmentation or net loss of existing blue and green infrastructure will only be supported where it can be demonstrated that the proposal would not result in or exacerbate a deficit in blue or green infrastructure provision, and the overall integrity of the network will be maintained. Development proposals for or incorporating new or enhanced blue and/or green infrastructure will be supported.
- Policy 22 – Flood Risk and Water Management. Development at risk of flooding or in a flood risk area will only be supported if they are for essential infrastructure. Developments will not increase the risk of surface

water flooding, manage rain and surface water through SUDS, and seek to minimise the area of impermeable surface. Development proposals will be supported if they can be connected to the public water mains. Development proposals which create, expand or enhance opportunities for natural flood risk management, including blue and green infrastructure, will be supported.

- Policy 23 - Health and Safety - Development proposals that will have positive effects on health will be supported whilst development proposals which are likely to have a significant adverse effect on health will not be supported. A Health Impact Assessment may be required. Development proposals that are likely to raise unacceptable noise issues will not be supported. A Noise Impact Assessment may be required where the nature of the proposal or its location suggests that significant effects are likely. Development proposals within the vicinity of a major accident hazard site or major accident hazard pipeline (because of the presence of toxic, highly reactive, explosive or inflammable substances) will consider the associated risks and potential impacts of the proposal and the major accident hazard site/pipeline of being located in proximity to one another.
- Policy 25 - Community Wealth Building - Development proposals which contribute to local or regional community wealth building strategies and are consistent with local economic priorities will be supported. This could include for example improving community resilience and reducing inequalities; increasing spending within communities; ensuring the use of local supply chains and services and local job creation amongst other things.
- Policy 29 – Rural Development. Development proposals in rural areas should be suitably scaled, sited and designed to be in keeping with the character of the area. They should also consider how the development will contribute towards local living and take into account the transport needs of the development as appropriate for the rural location. Development proposals in remote rural areas, where new development can often help to sustain fragile communities, will be supported where the proposal can lead to local employment, and is suitable in terms of location, access, siting, design and environmental impact.

Local Policy

Local Development Plans (LDPs) cover all planning authority areas and provide detailed and site-specific planning policy for an area. The current development plan for the Aberdeenshire administrative area is the Aberdeenshire Local Development Plan, January 2023[28] (referred to as the LDP hereafter). The LDP lays out detailed policies which are used as a basis for determining planning applications on a local scale. As indicated above NPF4 now forms a part of the Development Plan and has replaced a number of predecessor planning policy documents at various levels. This includes Strategic Development Plans. Although a relatively recently adopted LDP, the Aberdeenshire LDP 2023 predates the adoption of NPF4 and has been formulated to interpret and implement the policy positions stated in the now superseded Aberdeen City and Shire Strategic Development Plan and as such some policy positions stated may be out of step with those contained in NPF4. The Town and Country Planning (Scotland) Act 1997 (as amended) makes it clear that where policy positions differ in this circumstance NPF4 policy positions will take priority. There are several policies that may be relevant in consideration of the Project. These include:

- R2 – Development Proposals Elsewhere in the Countryside- Permits development at appropriate locations in the countryside where there is a national requirement, and no suitable alternative site is available. Prefers brownfield redevelopment over greenfield development.
- P1 – Layout, Siting and Design- Major development (non-residential) may be required to participate in a design review process. Requires a masterplan that has been subject of public consultation to be prepared for employment sites >2ha. The Council will assess all development, whether on sites we have allocated or elsewhere, using a process that includes appropriate public consultation. Certain proposals for a national or major development should meet the prescribed criteria/level of public and stakeholder engagement, as outlined in Planning Advice- 1/2018, SP=EED® (Successful Planning = Effective Engagement and Delivery) – Planning Advice for development management and prospective applicants.

1.1 [28] https://www.aberdeenshire.gov.uk/planning/plans-and-policies/pldp-2020/

- Policy P2: Open Space and Access in New Development - All new developments must be accompanied by adequate public open space appropriate to the standards shown in the Aberdeenshire Parks and Open Spaces Strategy and should facilitate public access as appropriate.
- P4- Hazardous and Potentially Polluting Developments and Contaminated Land - In determining planning applications for development within the consultation zones for hazardous installations (including oil and gas pipelines), the council will consult with, and take full account of advice from the Health and Safety Executive (HSE), the Competent Authority (in the case of Control of Major Accident Hazardous sites) and the facility's owners and operators, and will seek to ensure that any risk to public safety is not increased.
- E1 – Natural Heritage - Generally protective towards sites designated for nature conservation interests at European, National, and local levels. Will not permit development where integrity of a protected site will be compromised.
- E2 – Landscape - states presumption against development that causes unacceptable effects through its scale, location or design on key characteristics, natural landscape elements, features or the composition or quality of the landscape character as defined in the Landscape Character Assessments produced by NatureScot whether impacts are alone or cumulatively with other recent developments.
- E3 – Forestry and Woodland - Generally protective towards woodland and the protection and enhancement of trees and woodlands in the planning and construction of built development.
- HE1 – Protected Listed Buildings, Scheduled Monuments and Archaeological Sites (including other historic buildings) - resistant to development that would have an adverse impact on the character, integrity or setting of listed buildings, or scheduled monuments, or other archaeological sites.
- PR1 – Protecting Important Resources - presumes against developments that have a negative effect on important environmental resources associated with air quality, the water environment, important mineral deposits, prime agricultural land, peat and other carbon rich soils, open space, and important trees and woodland.
- PR2 - Reserving and Protecting Important Development Sites - Safeguards land allocations from alternative development including sites to support the national developments identified in the National Planning Framework. Makes specific reference to High-voltage electricity transmission infrastructure, including cabling, substations, and converter stations and anticipates that they will be at a range of locations but are expected to include sites associated with the electricity substation south of Peterhead.
- C4 – Flooding - Requires FRAs to be undertaken in appropriate circumstances, requires climate change to be taken into account and presumes against development that increases flood risk vulnerability although does permit essential infrastructure in vulnerable locations if required to be located there for operational reasons where no alternatives are available.
- RD1 – Providing Suitable Services - Outlines developer responsibilities in relation to location and design of development that takes advantage of services that will support it. Covers transport, water/waste water management and supply etc.
- RD2 – Developer Obligations - Details that where, by itself or cumulatively, development would give rise to the need for new or improved infrastructure or services, and this is not to be directly provided as an integral part of the development, planning obligations or other appropriate means to secure such provision may need to be put in place. This could include contributions towards trunk road improvements.

Alignment Option	RAG	Alignment Comparison Notes
Alignment R1	G	From the perspective of national policy, all alignments comply broadly with national policy. The National Policy Framework (NPF4) details a plan for 'north-east revitalisation' with goals for both economic revitalisation and energy transition. In addition, the framework should support the development of domestic renewable energy. The Project would align with these objectives, helping to achieve energy transition away from fossil fuels, improving domestic energy supplies and specifically aligning with the actions to increase the provision and support of offshore renewable energy. The Project aligns with Policy 1 and 2 that tackles the climate and nature crisis with the intent to encourage and promote facilities that address the global energy crisis and minimise lifecycle greenhouse gases. None of the alignment options interact with any local policy allocations as part of the Aberdeenshire Local Development Plan and, in combination with evidence of compliance given above, has therefore been assigned a Green RAG rating.
Alignment R2	G	
Alignment R3	G	

Further Assessment:

All alignment options have been assigned a Green RAG rating and as such, there is no Potential Alignment in relation to policy.

1.6.2. *Proposals*

Proposals have been identified via searching the Aberdeenshire Council planning portal for developments of a sufficient size and nature that have been submitted within the last five years. Planning applications that have been refused are not included within this appraisal.

Alignment Option	RAG	Alignment Comparison Notes
Alignment R1	G	The SSEN project LT52 Eastern Green Link 3 HVDC UGC transects all of the alignment options. An OHL development is unlikely to be inconsistent with this UGC, subject to appropriate placement of towers. The alignment options are in close proximity / connect to the following SSEN projects: • LT52 Eastern Green Link 3 HVDC Converter Station • LT360: Spittal to Peterhead Link HVDC Converter Station • LT360: Spittal to Peterhead HVDC UGC • LT429: HVDC Switching Station • LT444: Netherton 400kV Substation • LT474: Netherton 132kV Substation As these are not 'third party' proposals, they are not considered constraints under SSEN's Routeing Guidance.
Alignment R2	G	
Alignment R3	G	

		Other infrastructure proposals within the vicinity of the alignment options include: • ENQ/2024/0106: Land at Netherton of Invereddie Longside Peterhead – National Development for Energy Hub • ENQ/2024/0486: Marram Wind Offshore Windfarm – Installation of Onshore Infrastructure • ENQ/2024/0953: Land North, North West and West of Peterhead – Onshore Transmission Infrastructure for Muir Mhòr Offshore Wind Farm • ENQ/2023/1286: Land North, North West And West Of Peterhead Aberdeenshire - Formation of Onshore Landfall Point, Laying of Underground Cable and Erection of Substation • ENQ/2022/1845: Substation Near New Deer Peterhead Aberdeenshire – Installation of Underground Cable • APP/2022/2161: Land North West of Four Winds Buckie Farm Boddam Aberdeenshire – Formation of a Cable Sealing End Tower Compound and Access (Approved) • APP/2023/1788: Land to the South West of Peterhead Grid Electricity Substation – National for Extension and Upgrade of Existing 275kV Electricity Substation (Approved) It is not currently anticipated that the alignment options would interact with any of these other proposals. Approved applications for dwellinghouses (Ref: APP/2023/0881; APP/2022/2512) are located in the vicinity of Option R1. Appropriate separation has been observed between these properties and Option R1 to avoid interaction. No other projects of a sufficient scale or nature likely to result in an adverse effect on receptors are located within or in close proximity to each Alignment. All alignment options have been allocated a **Green** RAG Rating.

Further Assessment:

All alignment options have been assigned a Green RAG rating and as such, there is no Potential Alignment in relation to proposals.

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APPENDIX 1.2: REBUILD ALIGNMENT APPRAISAL DETAIL - ENGINEERING

1.1. Infrastructure Crossings

Infrastructure creates a constraint on an overhead line often requiring additional clearance, enhanced reliability and protection provision to the infrastructure during construction and maintenance. Each crossing of infrastructure in an option thus has the potential to constrain the routeing.

1.1.1. *Major Crossings (132 kV, 275 kV, 400kV HVDC, Rail, bridges, rivers, canals, oil and gas pipelines or hydro pipelines)*

Major crossings include other OHLs of 132 kV and above, railways, rivers/lochs 200 m+ in width, navigable waterways, motorways and other major roads, major pipelines and other significant infrastructure. These crossings require specific overhead line (OHL) solutions and can greatly constrain a design.

The main challenge with crossing of pipelines is the potential of any AC interference between the metallic pipeline and the overhead line. Typically, where OHLs cross perpendicular to the pipeline the AC interference is negligible, however if this angle becomes more acute or there is some parallelism before and after the crossing this can result in interaction that needs to be studied to determine if any mitigations are required. There are significant challenges with applying mitigations too as often these pipelines cannot be shut off which means personnel would have to work on the live pipeline to install additional earthing which is not preferable.

In addition to this there is also the physical constraint from a tower positioning perspective whereby the pipelines will have a servitude associated with them ranging from 12m for the lower pressure SGN pipelines to 24.4m for the higher-pressure National Grid pipelines.

Alignment Option	RAG	Site Comparison Notes
Alignment R1	R	St. Fergus to Aberdeen National Gas Pipeline 6 Inch St. Fergus to Cruden Bay condensate pipeline (4bar) 20 Inch St. Fergus to Mossmorran condensate pipeline (50bar) Forties Pipeline System NGL St Fergus to Cruden Bay SSE Thermal Pipeline x1 BP Pipeline x2 St Fergus to Peterhead Shell pipeline x2 3x 132kV alternating current (AC) circuits underground cable (UGC) crossing 2x 275kV AC OHL crossing 1x EGL3 HVDC Crossing
Alignment R2	R	St. Fergus to Aberdeen National Gas Pipeline 6 Inch St. Fergus to Cruden Bay condensate pipeline (4bar) 20 Inch St. Fergus to Mossmorran condensate pipeline (50bar) Forties Pipeline System NGL St Fergus to Cruden Bay SSE Thermal Pipeline BP Pipeline x2 St Fergus to Peterhead Shell pipeline x3 3x 132kV AC circuits UGC crossing 1x 400kV AC OHL crossing*

Alignment Option	RAG	Site Comparison Notes
		1x EGL3 HVDC Crossing *Route takes alignment of existing 400kV AC OHL for approximately 1.5km on approach to Peterhead.
Alignment R3	R	St. Fergus to Aberdeen National Gas Pipeline 6 Inch St. Fergus to Cruden Bay condensate pipeline (4bar) 20 Inch St. Fergus to Mossmorran condensate pipeline (50bar) Forties Pipeline System NGL St Fergus to Cruden Bay SSE Thermal Pipeline BP Pipeline x2 St Fergus to Peterhead Shell pipeline x2 132kV AC OHL crossing (double circuit) 132 kV AC OHL crossing (single circuit) Three crossings and parallelism of EGL3 cable.

Further Assessment:

Each of the Alignments cross a number gas and condensate pipelines operating within the area due to the vast number of pipelines originating from St Fergus Gas Terminal. Alignment R1 and R3 both cross nine pipelines and Alignment R2 crosses 10.

In addition to the pipeline crossings all alignments have some interaction with the existing transmission network. Alignment R1 is least preferred from this perspective as it has two crossings of the existing 275kV OHL. This would either require a special crossing design or for the line to be moved or undergrounded.

Alignment R2 impacts upon the existing 400kV OHL that this alignment would be replacing, this means there would not be a permanent challenge with this, however there is the complication of how to build on top of the existing line whilst maintaining a reliable supply which would mean the requirement of a temporary diversion. This is considered acceptable however high-level feasibility studies have identified that the route for a temporary diversion would be heavily constrained with some nearby properties along with the existing line and would need some detailed design to confirm the feasibility.

Alignment R3 impacts upon two of the 132kV OHLs which, similarly to Alignment R1, would require crossing either through special OHL crossing designs or by dipping the circuits underground.

Overall, there is a slight preference for Alignment R2; this minimises the permanent impact to the existing transmission infrastructure and has only one additional pipeline crossing. Alignment R3 is preferrable from a pipeline perspective as minimises parallelism and crosses the assets closest to 90 degrees however impacts upon two 132kV OHLs having a greater impact to the transmission network.

1.1.2. *Road Crossings*

Road crossings include all other road crossings not considered under major crossings. Private tracks and driveways may also be included where the need for access to be maintained is present, or where relatively high traffic volumes are anticipated. Whilst the impact on OHL design is less for these crossings, measures are still required and collectively they can greatly constrain an alignment option.

All Alignments cross a similar number of roads with them mainly being minor unclassified roads. The restricted local access roads crossed by Alignment R2 and R1 could result in a restriction to the properties or businesses if no alternative access is available, however temporary scaffolding or protection would be installed anyway to minimise impacts.

Alignment Option	RAG	Site Comparison Notes
Alignment R1	G	10 minor road crossings. 1 local road crossing.
Alignment R2	G	9 minor road crossings. 2 restricted access local road crossings.
Alignment R3	G	8 minor road crossings. 4 restricted access local road crossings.

Further Assessment:

Alignment R1 and Alignment R2 both have 11 road crossings in total and Alignment R3 has 12. This additional crossing is not considered a significant factor and therefore all are designated green.

1.2. Environmental Design

The terrain, land features and atmosphere all have the potential to constrain the design of an OHL. In particular, the ease and safety of routeing, construction and maintenance can all be impacted. Furthermore, the environment can impose long term risk from pollution and flooding. Alignments with multiple or significant environmental features have a large risk of constraint in the routeing. Impacts on the environment from the OHL are considered outside this document and are not included in this section.

1.2.1. *Elevation*

High elevations increase wind and ice loading on the OHLs resulting in the need for shorter spans or stronger structures. This can constrain routeing options and increase cost. Additionally, access for construction and maintenance tends to be more difficult at altitude and the risk of severe weather is greater.

Due to the type of arable terrain these alignments cross, the elevations for all routes do not vary significantly and remain between 50m and 100m above ordnance datum (AOD) for all alignments. Elevation plots are included within **Appendix 1.2-B**.

Alignment Option	RAG	Site Comparison Notes
Alignment R1	G	Length Through 50.0m to 100.0m – 6,886m Max Elevation: 96m Min Elevation: 45m
Alignment R2	G	Length Through 50.0m to 100.0m – 6,802m Max Elevation: 96m Min Elevation: 45m
Alignment R3	G	Length Through 50.0m to 100.0m – 5,419m Max Elevation: 73m Min Elevation: 33m

Further Assessment:

Alignment R1 travels in the same direction as Alignment R2 initially, however continues in the general South-East direction for the majority of the route, turning north east for the last 1km. The elevation steadily increases for the first 2km before dropping into a natural valley in the landscape. It then climbs to the maximum elevation at approximately the midpoint of the route before dropping steadily until reaching the minimum elevation at the Netherton Hub substation.

Alignment R2 starts at an elevation of 55m and climbs as it initially travels south. It then turns east, where it drops into a natural valley in the landscape before climbing up to the maximum elevation at approximately the midpoint of the route. The elevation then drops as it continues travelling towards the east and the substation.

Alignment R3 travels south east initially with steady increase in elevation. Upon turning north east, there are two natural valleys in the landscape which are crossed, resulting in large changes in the elevation over short distances. As the route turns south east again, the elevation reduces until it reaches the minimum elevation of the alignment, before increasing again for the last 1km as it reaches the substation.

All alignments are rated Green as the elevations are well within the capability of the structure type so pose no real concerns.

1.2.2. *Atmospheric Pollution*

The atmospheric pollution has been checked based from the data gather from National Atmospheric Emission Inventory (NAEI: https://naei.beis.gov.uk/emissionsapp/). The NAEI provides information on the following pollutants that are deemed to affect the performance of OHLs.

- Carbon dioxide
- Nitrogen Dioxide
- Nitrogen Oxide
- Sulphur Dioxide
- Particulate matters (10um,2.5um, 1um & 0.1um)

Based on the pollution maps and due to the proximity to the coast, all alignments will require very heavy pollution insulators. This is due to the increased risk of flashover due to the build-up of pollutants on the insulator discs and very heavy insulators mitigate this risk by having an increased creepage distance. A map is shown in **Appendix 1.2-C** showing the region within 10km of the coastline.

Alignment Option	**RAG**	**Site Comparison Notes**
Alignment R1	A	All Alignments are within 10km of the coast so will require very heavy pollution insulators.
Alignment R2	A	All Alignments are within 10km of the coast so will require very heavy pollution insulators.
Alignment R3	A	All Alignments are within 10km of the coast so will require very heavy pollution insulators.

Further Assessment:

No further assessment required.

1.2.3. *Contaminated Land*

Contaminated land poses a significant health risk to construction and maintenance operatives, and is potentially expensive to mitigate, dispose of or remediate. As such, the presence of contaminated land in an alignment would be a significant constraint. For assessment purposes, the presence of unexploded ordnance (UXO), is also considered in this section as it has similar implications.

Alignment R1 is located approximately 1km from a quarry (Savoch Quarry) to the south of Little Dens and does not pass through any known contamination sites. All initial UXO hazard sources are located greater than 1km away hence the option has been allocated a Green rating.

Alignment R2 is located approximately 1km from a quarry (Savoch Quarry) to the South of Little Dens. There is no known contamination within the route hence the option has been designated a Green rating.

Alignment R3 passes within 1km of five historic airfields, transiting through the bottom left corner of one of the airfields. It also passes through a historic aircraft crash site hence the option is considered amber.

Alignment Option	RAG	Site Comparison Notes
Alignment R1	G	Initial UXO hazard sources greater than 1km away Savoch Quarry located approximately 1km away from route (South)
Alignment R2	G	Initial UXO hazard sources greater than 1km away Savoch Quarry located approximately 1km away from route (South)
Alignment R3	A	Within 1km of 5 historic airfields surrounding Longside Airfield Passes through aircraft crash site No reported landfill sites nearby.

Further Assessment:

Alignment R3 has a higher risk of encountering contaminated land due to the proximity to the historic airfields and known aircraft crash sites. It is likely these hazards could be navigated around, however Alignments R1 and R2 are preferable due to being further from these locations.

1.2.4. *Flooding*

Areas vulnerable to flooding pose a potential risk during construction, may prevent maintenance and can pose a physical risk to structures during flood events. As such, Alignments with large areas vulnerable to flooding would have a high risk of constraint.

The SEPA flood maps for surface water and river flooding have been used to carry out the assessment on the alignments. The surface flooding data uses the present-day low likelihood of flooding which equates to a 1 in 200-year return period. This data has also been adjusted to apply a 20% increase in rainfall intensity to capture the impacts of climate change for the 2080's in the absence of SEPA's full climate change data which is not available for this layer. Further detail on this can be seen within the SEPA guidance[29].

The river flooding data has a climate change layer available that covers the impacts on flooding for the 2080's. The likelihood of flooding for this data set is classified as medium but this still equated to 1 in 200-year return period. Similarly additional explanation of this data set is available within the SEPA guidance[30].

An overlay of the two datasets above have been included within **Appendix 1.2-E**.

Alignment Option	RAG	Site Comparison Notes
Alignment R1	G	Small river flood risk approx. 90m in length. Small surface water flood risk approx. 120m in length. Crosses 2 SEPA Riparian Corridors
Alignment R2	G	Small river flood risk approx. 90m in length. Small surface water flood risk approx. 118m in length. Crosses 3 SEPA Riparian Corridors
Alignment R3	G	Small river flood risk approx. 120m in length. Small surface water flood risk approx. 270m in length. Crosses 3 SEPA Riparian Corridors

Further Assessment:

Alignment R1 crosses two small unnamed rivers/streams along the route.

[29] https://www.sepa.org.uk/media/594528/surface_water_summary_v3.pdf
[30] https://www.sepa.org.uk/media/594527/river_summary_v3.pdf

Alignment R2 crosses three small unnamed rivers/streams along the route.

Alignment R3 crosses Burn of Faichfield and two small unnamed rivers/streams along the route.

All the watercourse crossings along the alignments are not considered significant and pose little risk with respect to flooding and are therefore all designated as Green.

1.3. Ground Conditions

Ground topography and condition can directly impact the ease of routing, access, construction and maintenance. Alignments with large areas of difficult ground conditions are more likely to be significantly constrained.

1.3.1. *Terrain*

Steep or mountainous slopes present a significant difficulty for routeing, access, construction and maintenance. Alignments with a large proportion of steep or mountainous slopes are more likely to be constrained and thus more difficult and costly to build and maintain.

The terrain has been assessed by reviewing the average gradient and maximum gradients of the terrain along the Alignments using ordnance survey (OS) digital terrain model (DTM) 50 data, see **Appendix 1.2-F**.

All Alignments pass through arable farmland with very gradual rolling terrain, none of the slopes observed in these alignments pose any significant concern from a construction and maintenance perspective.

Alignment Option	RAG	Site Comparison Notes
Alignment R1	G	Length through 0° to 5° slope – 6,404m Length through 5° to 10° slope - 783m Max slope: 8°
Alignment R2	G	Length through 0° to 5° slope – 6,228m Length through 5° to 10° slope - 904m Max slope: 8°
Alignment R3	G	Length through 0° to 5° slope – 6,705m Length through 5° to 10° slope - 543m Length through 10° to 20° slope - 270m Max slope: 19°

Further Assessment:

No further assessment required.

1.3.2. *Peatland*

Peat, particularly deep peat, represents a significant difficulty for access, construction and maintenance. Alignments with a large proportion peatland are more likely to be constrained and thus more difficult and costly to build and maintain. Peatland is also an important habitat and construction of new OHLs can cause lasting damage.

A range of sources including British Geological Survey (BGS) and NatureScot has been utilised to determine the potential areas of peatland along the alignment.

Alignment Option	RAG	Site Comparison Notes
Alignment R1	G	No areas of peatland
Alignment R2	G	No areas of peatland

Alignment Option	RAG	Site Comparison Notes
Alignment R3	G	No areas of Peatland

Further Assessment:

The alignments do not pass through any designated areas of peatland and the BGS soil data for the area also confirms this.

1.4. Construction / Maintenance

Overhead lines should be routed considering the needs of construction and maintenance as the choice of alignment can have a significant impact on the safety and cost of the project throughout its lifetime.

1.4.1. *Access*

Construction of temporary access for construction are a significant project cost and an Alignment that is remote from existing tracks and the public road network has the potential to incur large access costs. Furthermore, access for inspection and maintenance is necessary throughout the life of the asset. An alignment remote from existing access routes represents a significant risk and has a high potential to be constrained.

All the alignments under consideration have a good network of access tracks within the surrounding area. No portion of the alignments is greater than 1km from an existing access with the majority being situated between 100m and 300m from an existing form of access.

Alignment Option	RAG	Site Comparison Notes
Alignment R1	G	Length through 50m to 100m from access roads – 1,125m Length through 100m to 300m from access roads – 4,116m Length through 300m to 1000m from access roads – 258m
Alignment R2	G	Length through 50m to 100m from access roads – 1,355m Length through 100m to 300m from access roads – 3,136m Length through 300m to 1000m from access roads – 1,020m
Alignment R3	G	Length through 50m to 100m from access roads – 1,004m Length through 100m to 300m from access roads – 3,385m Length through 300m to 1000m from access roads – 1,561m

Further Assessment:

All routes pass through arable farmland where future operational access can likely be obtained by 4x4 and construction can be undertaken via temporary stone tracks and trackway matting. The area between Longside and Peterhead has a high number of local access roads which provides benefit from a construction perspective, however there may need to be some public road improvements to be able to accommodate the size of plant used for the construction.

1.4.2. *Angle Supports*

OHLs with a high number of angle supports tend to be more difficult to construct, due to the number of angle pull throughs, and often require more extensive access. As such, an alignment with a large number of angle supports is at a greater risk of being constrained.

The approximate number of angle towers has been assessed for each alignment, with Alignment R3 having the fewest at five and Alignment R2 having most at seven.

Alignment Option	RAG	Site Comparison Notes
Alignment R1	G	6 angle towers
Alignment R2	G	7 angle towers
Alignment R3	G	5 angle towers

Further Assessment:

The PR-NET-ENV-501 guidelines suggests that any option that exceeds the option with the least number of towers by under 10% be rated Amber and then anything greater than 10% red. However, the variation between the alignments is only two towers which is not considered to be significant. Alignment R2 has the highest number of angle towers at seven so will likely have an increased cost compared to Alignment R3 and R1 but again this cost will unlikely be the deciding factor.

1.5. Proximity

Existing features can constrain an Alignment often requiring the features to be avoided to reduce or avoid impact. These include properties, windfarms, telecommunications masts, urban area and metallic pipes.

1.5.1. *Clearance*

Dispersed buildings and properties are a common feature of the Scottish landscape. Placing OHLs in close proximity to these features is rarely well received and best avoided. Alignments with numerous areas in close proximity to buildings and properties have significant risk of constraining routeing.

In addition to constraining the route, a suitable distance must be kept from residential properties from an audible noise perspective. When overhead lines are energised, a phenomenon called corona discharge can occur which is when the air surrounding the overhead line conductor becomes ionised. Conductors are designed to minimise this corona discharge however it can be impacted by other factors such as surface irregularities on the conductor or raindrops sitting on the conductor. This corona discharge can result in an audible crackling sound or a low frequency hum.

A preferred separation of 170m has been used for the assessment as a suitable offset to remain from residential properties.

The Ordnance Survey Address Base Premium data set has been used to identify the location of a residential and commercial building in the area surrounding the alignments. In addition to this local planning applications have also been reviewed to identify any possible future developments in close proximity to the line.

Alignment Option	RAG	Site Comparison Notes
Alignment R1	A	Residential Buildings within 100m – 0 Residential Buildings within 170m – 6 Minimum distance to Residential Buildings – 116m Commercial Buildings within 100m – 1 Commercial Buildings within 170m – 1 Minimum distance to Commercial Buildings – 100m Other within 100m – 0 Other within 170m – 1 Minimum distance to Other Buildings – 124m 1 of the properties relates to a planning application APP/2022/2512
Alignment R2	A	Residential Buildings within 100m – 0 Residential Buildings within 170m – 5 Minimum distance to Residential Buildings – 116m Commercial Buildings within 100m – 4

Alignment Option	RAG	Site Comparison Notes
		Commercial Buildings within 170m – 1 Minimum distance to Commercial Buildings – 70m Other within 100m – 1 Other within 170m – 3 Minimum distance to Other Buildings – 76m 3 of the commercial (engineering) buildings within 100m (2 of these buildings are within approximately 40m from the edge to the proposed route)
Alignment R3	A	Residential Buildings within 100m – 0 Residential Buildings within 170m – 3 Minimum distance to Residential Buildings – 133m Commercial Buildings within 100m – 4 Commercial Buildings within 170m – 2 Minimum distance to Commercial Buildings – 67m Other within 100m – 2 Other within 170m – 1 Minimum distance to Other Buildings – 90m New HVDC convertor station being constructed approximately 50m from the route

Further Assessment:

All alignments have been designated as Amber due to having numerous residential properties within 170m. All alignments do however maintain a minimum separation of 100m.

Alignment R1 has six residential buildings within 170m with the closest being approximately 116m away. This occurs at a pinch point where the alignment passes between a group of properties and also crosses a number of gas pipelines which restricts the options to navigate through the area. Alignment R1 also has one commercial building at 100m from the alignment which is associated with some farm sheds, and this is not considered to be a significant issue.

Alignment R2 has five residential buildings within 170m with the closest being approximately 116m away. This occurs at the same pinch point as Alignment R1. Alignment R2 has four commercial properties within 100m, the first is the same agricultural sheds as Alignment R1, the other three are associated with Score group (an engineering firm) and appear to be storage warehouses so again are not considered to be of major concern.

Alignment R3 has three residential properties within 170m; the fewest of all options. However, it does pass closer to the larger settlement of Peterhead. The closest property is approximately 133m away at the closest point and this is where the alignment passes through Toddlehills: a row of properties along the road edge. Alignment R3 also has four commercial buildings within 100m, however only one of them appears to be associated with a building the remainder all appear to be storage areas. In addition, this alignment passes close to the proposed HVDC convertor station EGL2 which is not preferable as could constrain operations in the area.

1.5.2. *Windfarms*

Windfarms pose a risk to OHLs due to disruption of airflows.

When turbines are placed in close proximity to an OHL it impacts upon the airflow around the conductors and fittings potentially causing aeolian vibration or turbulent buffeting. This in turn can impact the conductor's lifespan due to accelerated fatigue of the components. Current industry guidance states that where a turbine is situated greater than three rotor diameters from an OHL, the airflow has returned to normal, and the impact becomes negligible.

The planning applications in this area have been reviewed to confirm possible turbine locations. No turbines have been identified within three rotor diameters and therefore all alignments are classified as green.

Alignment Option	RAG	Site Comparison Notes
Alignment R1	G	No known turbines within close proximity
Alignment R2	G	Crosses 300m buffer
Alignment R3	G	No known turbines within close proximity

Further Assessment:

No further assessment required.

1.5.3. *Communication Masts*

OHLs can block existing line of sights for telecommunication masts and thus the line of sights from mast can constrain structure locations.

The OS map and cell mapper website (https://www.cellmapper.net/) have been assessed to check if any communication masts are present near the Alignments.

Using data from OFCOM's Spectrum Information System, the location of transmitting and receiving devices that are registered with a licence can be identified. The locations of these transmitters, receivers and associated fixed links have been assessed to determine if any are in close proximity or cross the alignments.

Alignment Option	RAG	Site Comparison Notes
Alignment R1	R	Joint Radio Company Limited fixed link crossed (mast located approximately 400m from Peterhead substation) 2x BT fixed links crossed Scot Tel Limited fixed link crossed 3x Northern Lighthouse Board "other" links crossed – these run in close parallel to a section of the alignment.
Alignment R2	A	Joint Radio Company Limited fixed link crossed (mast located approximately 400m from Peterhead substation) 2x BT fixed links crossed Scot Tel Limited fixed link crossed Northern Lighthouse Board "other" link crossed
Alignment R3	A	Joint Radio Company Limited fixed link crossed (mast located approximately 400m from Peterhead substation) – this runs in close parallel to alignment for a section of the alignment. 2x BT fixed links crossed Scot Tel Limited fixed link crossed Northern Lighthouse Board "other" link crossed

Further Assessment:

Alignments R1, R2, and R3 all cross the same fixed links from Joint Radio Company, BT and Scot Tel Limited and are located within 400m of the Joint Radio Company mast at Peterhead substation. Alignment R1 also crosses an additional Northern Lighthouse Board link and runs in parallel which is not preferable.

Alignment R2 is considered to have the least impact from a communication mast perspective.

1.5.4. *Urban Developments*

As with dispersed buildings and properties, urban areas represent a significant constraint that will often need to be routed around.

The location of alignments R1 and R2 are not close to any major urban developments and are more located within a rural area with some small clusters of properties and farms nearby that can be seen on the OS maps. Alignment R3 does pass in closer proximity to the outskirts of Peterhead which is not preferable.

Alignment Option	RAG	Site Comparison Notes
Alignment R1	G	No significant developments.
Alignment R2	G	No significant developments.
Alignment R3	A	Comes within closer proximity to the outskirts of Peterhead.

Further Assessment:

As mentioned above, the alignments are not located in close proximity to any major urban developments, with rural properties located sporadically along the routes. Alignment R3 has been ranked Amber to take note of its close proximity to the outskirts of Peterhead where there are larger housing developments.

1.5.5. *Metallic Pipes*

Metallic pipes have to be both avoided by individual supports, as they are often expensive to reroute, and, ideally, the final alignment should avoid running parallel, to avoid electrical impacts on the pipelines. As such it represents a constraint on Alignments.

The metallic pipelines in proximity to the alignments have already been considered under the major crossing sections, however due to the significant interaction between the pipelines and OHL alignments they have been included here too.

Alignment Option	RAG	Site Comparison Notes
Alignment R1	R	St. Fergus to Aberdeen National Gas Pipeline 6 Inch St. Fergus to Cruden Bay condensate pipeline (4bar) 20 Inch St. Fergus to Mossmorran condensate pipeline (50bar) Forties Pipeline System NGL St Fergus to Cruden Bay SSE Thermal Pipeline BP Pipeline x2 St Fergus to Peterhead Shell pipeline x2 SGN Intermediate Pressure Pipeline
Alignment R2	R	St. Fergus to Aberdeen National Gas Pipeline 6 Inch St. Fergus to Cruden Bay condensate pipeline (4bar) 20 Inch St. Fergus to Mossmorran condensate pipeline (50bar) Forties Pipeline System NGL St Fergus to Cruden Bay SSE Thermal Pipeline BP Pipeline x2 St Fergus to Peterhead Shell pipeline x3 SGN Intermediate Pressure Pipeline
Alignment R3	R	St. Fergus to Aberdeen National Gas Pipeline 6 Inch St. Fergus to Cruden Bay condensate pipeline (4bar) 20 Inch St. Fergus to Mossmorran condensate pipeline (50bar) Forties Pipeline System NGL St Fergus to Cruden Bay SSE Thermal Pipeline BP Pipeline x2 St Fergus to Peterhead Shell pipeline x2 SGN Intermediate Pressure Pipeline

Further Assessment:

All alignments cross a number of pipelines. Alignment R3 is preferable from an AC interference perspective as it minimises interaction and crosses closest to 90 degrees. Alignments R1 and R2 both parallel and cross with the pipelines at a shallower angle and are therefore not preferred.

AC interference studies would be required to confirm any potential mitigation requirements and agreements would be required with the operators.

1.6. Other Considerations

The considerations listed in this section are not engineering considerations in PR-NET-ENV-501 however, they are deemed to be significant enough that they require consideration in the alignment selection process.

1.6.1. *Route Lengths*

The length of the OHLs affects the numbers of structures/accesses required, the extent of visual impact from the OHL and project cost.

The three alignments are seen to be very similar in length (<5% difference between minimum and maximum lengths) hence all alignments have been designated a green ranking. Alignment R3 is approximately 5% longer than the shortest (R2) but this only equates to approximately one additional span so is not considered a significant factor.

Alignment Option	**RAG**	**Site Comparison Notes**
Alignment R1	G	7,187m
Alignment R2	G	7,137m
Alignment R3	G	7,527m

Further Assessment:

No further assessment is required.

1.6.2. *DNO Crossings*

Existing Distribution Network Operator (DNO) crossings are generally undergrounded or diverted to avoid creating a construction and maintenance hazard. There is a cost and programme requirement associated with this activity and alignments with a large number of DNO crossings could find minimising such crossing a significant routeing constraint.

Each of the alignments under review has been overlayed with the distribution network to determine the required crossings/undergrounding of each option. The alignments have been assessed based on the number and voltage of the crossings.

Alignment Option	**RAG**	**Site Comparison Notes**
Alignment R1	G	Six 11kV crossings
Alignment R2	G	Five 11kV crossings
Alignment R3	G	Six 11kV crossings

Further Assessment:

All Alignments have been designated Green with respect to DNO, with a difference of one fewer crossing for Alignment R2. These crossings will come with additional cost and potential constraint relating to outage availability, these are not avoidable by the alignment options and therefore are comparable.

1.6.3. *ESQCR Assessment*

The Electricity Safety Quality Continuity Regulations (ESQCR) assessment is not considered in PR-NET-ENV-501, however in this document a high level ESQCR assessment has been carried out for each option as per the SSEN ESQCR guidance: PR-PS-311.

At this stage, tower positions are not known as no alignment has been selected as the preferred. For the purpose of this assessment, the angle tower locations have been considered and ESQC classification has been applied.

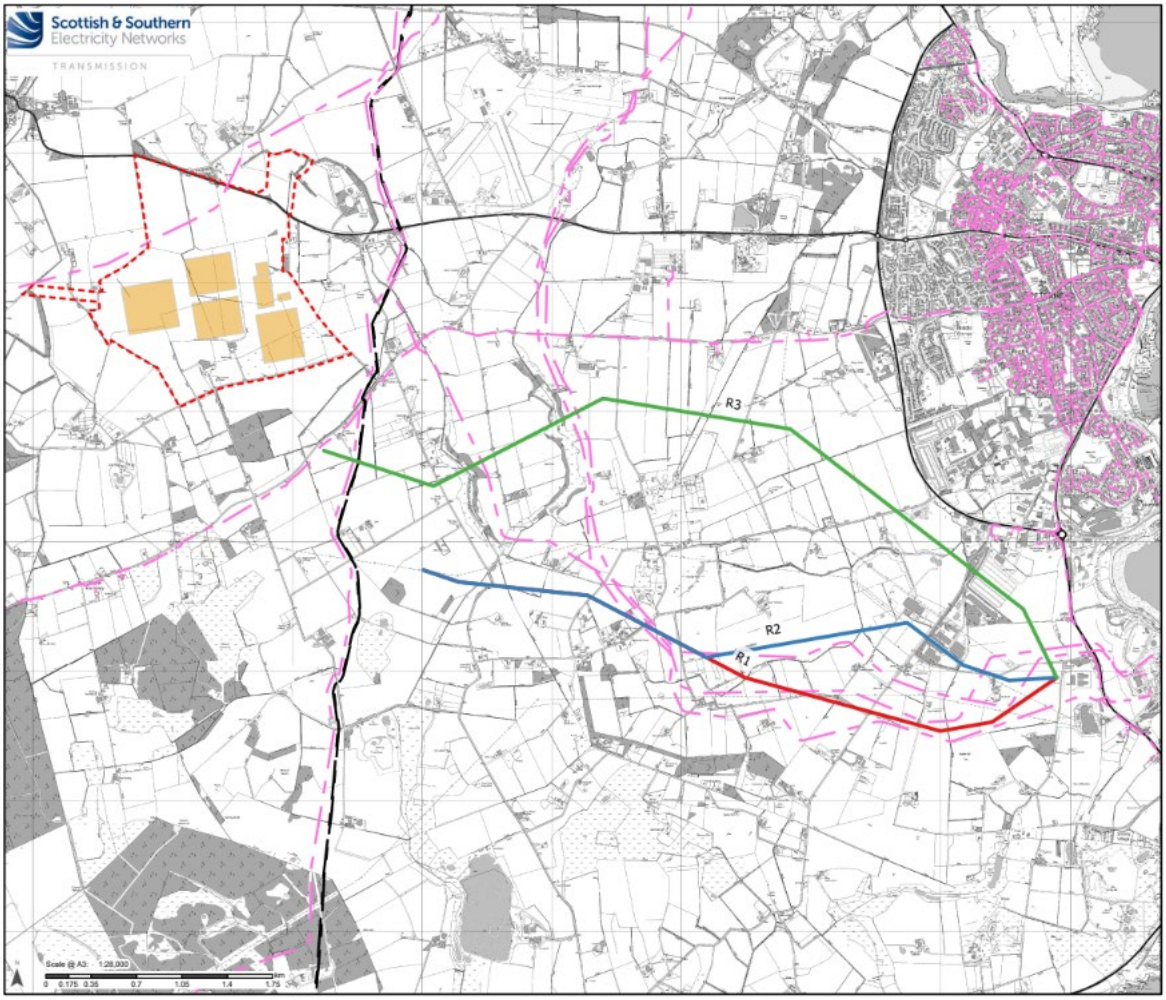
The conductors on transmission lines are not covered and there is no historic information relating to vandalism therefore the ESQC rating is only high if the surrounding land classification code is between A-H. Figure 1 uses satellite imagery overlayed with the indicative angle tower positions to determine the land classification.

Figure 1 – ESQCR indicative tower placement

	Alignment R1 Land Classification	Alignment R2 Land Classification	Alignment R3 Land Classification
Structure 1	Arable Crops - N	Arable Crops - N	Arable Crops - N
Structure 2	Arable Crops - N	Arable Crops - N	Arable Crops - N
Structure 3	Arable Crops - N	Arable Crops - N	Arable Crops - N
Structure 4	Arable Crops - N	Arable Crops - N	Arable Crops - N
Structure 5	Arable Crops - N	Arable Crops - N	Industrial Area - J
Structure 6	Arable Crops - N	Arable Crops - N	Arable Crops - N
Structure 7	Arable Crops - N	Industrial Area - J	Arable Crops - N
Structure 8	Arable Crops - N	Arable Crops - N	-
Structure 9	-	Arable Crops - N	-

All alignments have been classified as low risk from an ESQC perspective due to being situated mainly in arable crops. Alignments R2 and R3 have two towers in close proximity to an industrial/commercial area and are therefore classified medium risk in these locations; however, it is only for one span so is considered acceptable and an OHL already exists in the location for Alignment R2 which this would be replacing.

Appendix 1.1-A Pipeline Crossings



Legend

Name

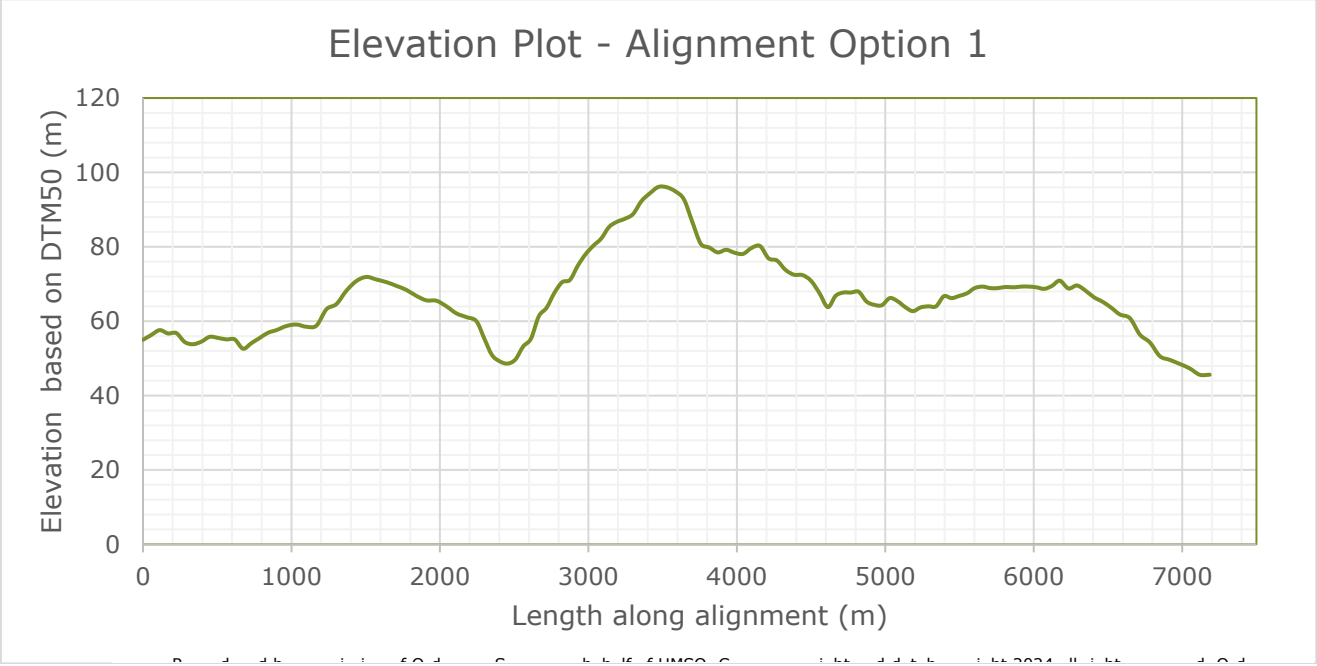
- R1
- R2
- R3
- Red Line Boundary
- Site Layout

Pipelines

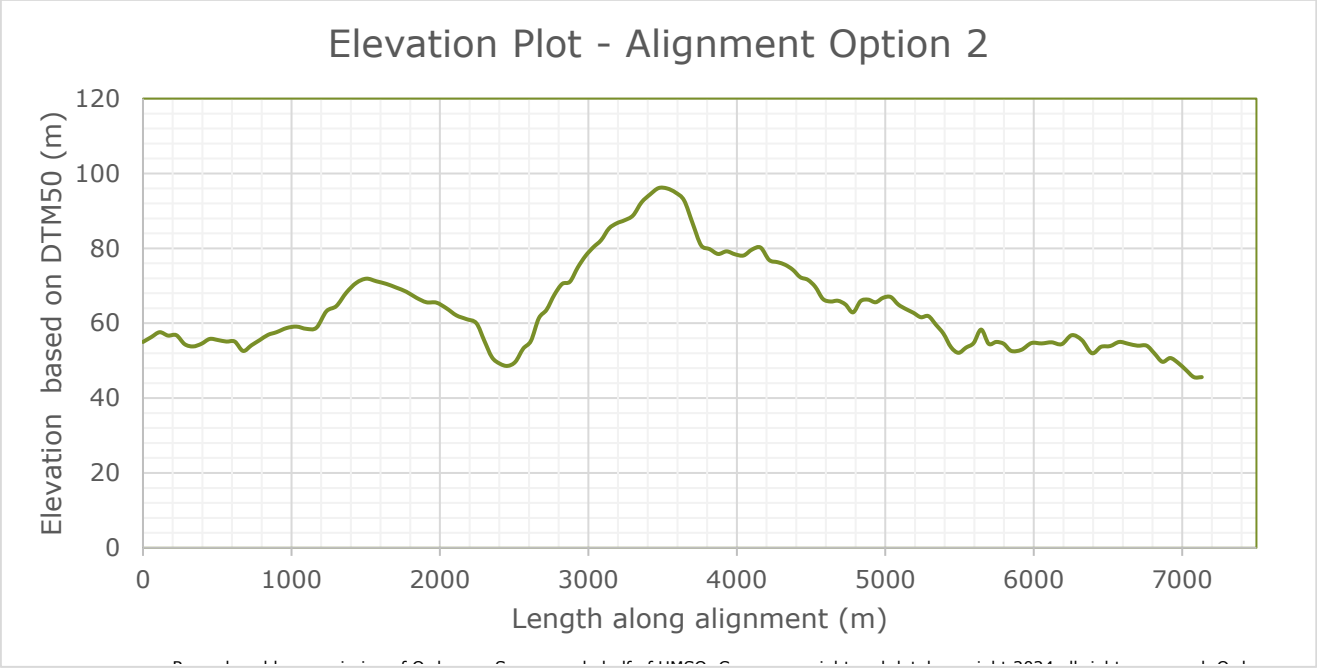
- Gas Pipe
- Other Pipe

Appendix 1.1-B Elevation Plots

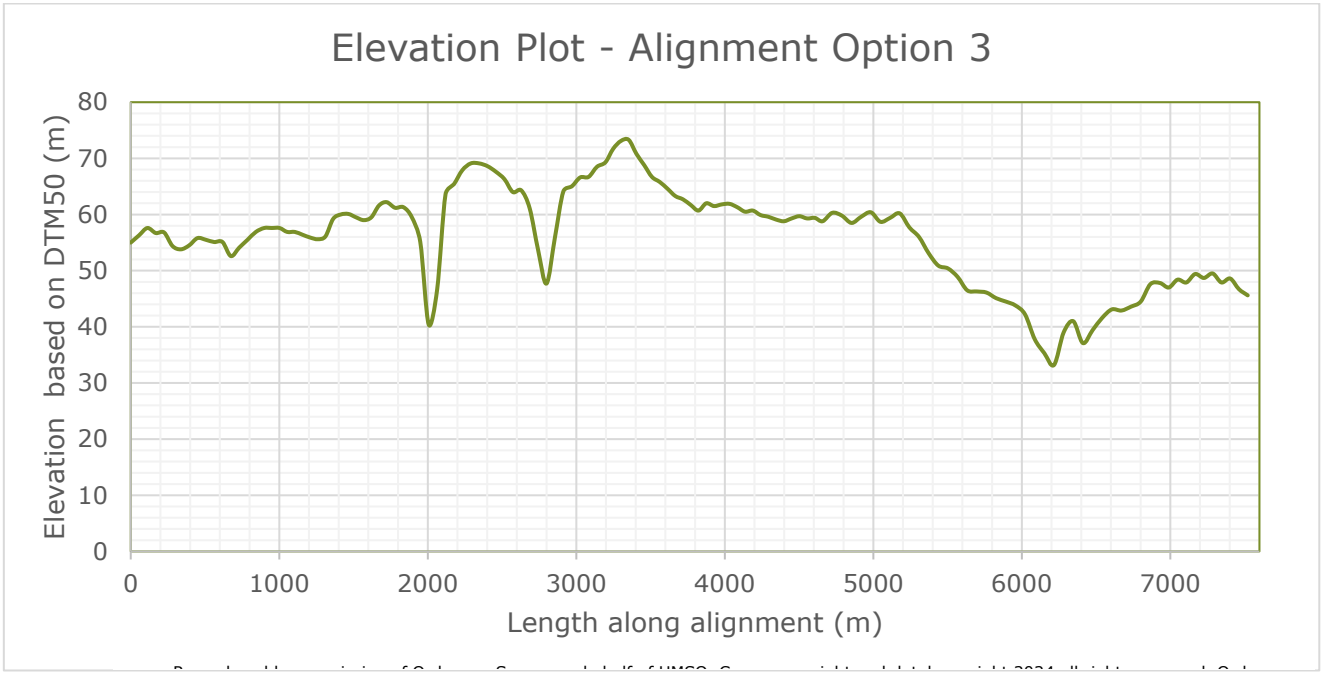
Alignment R1



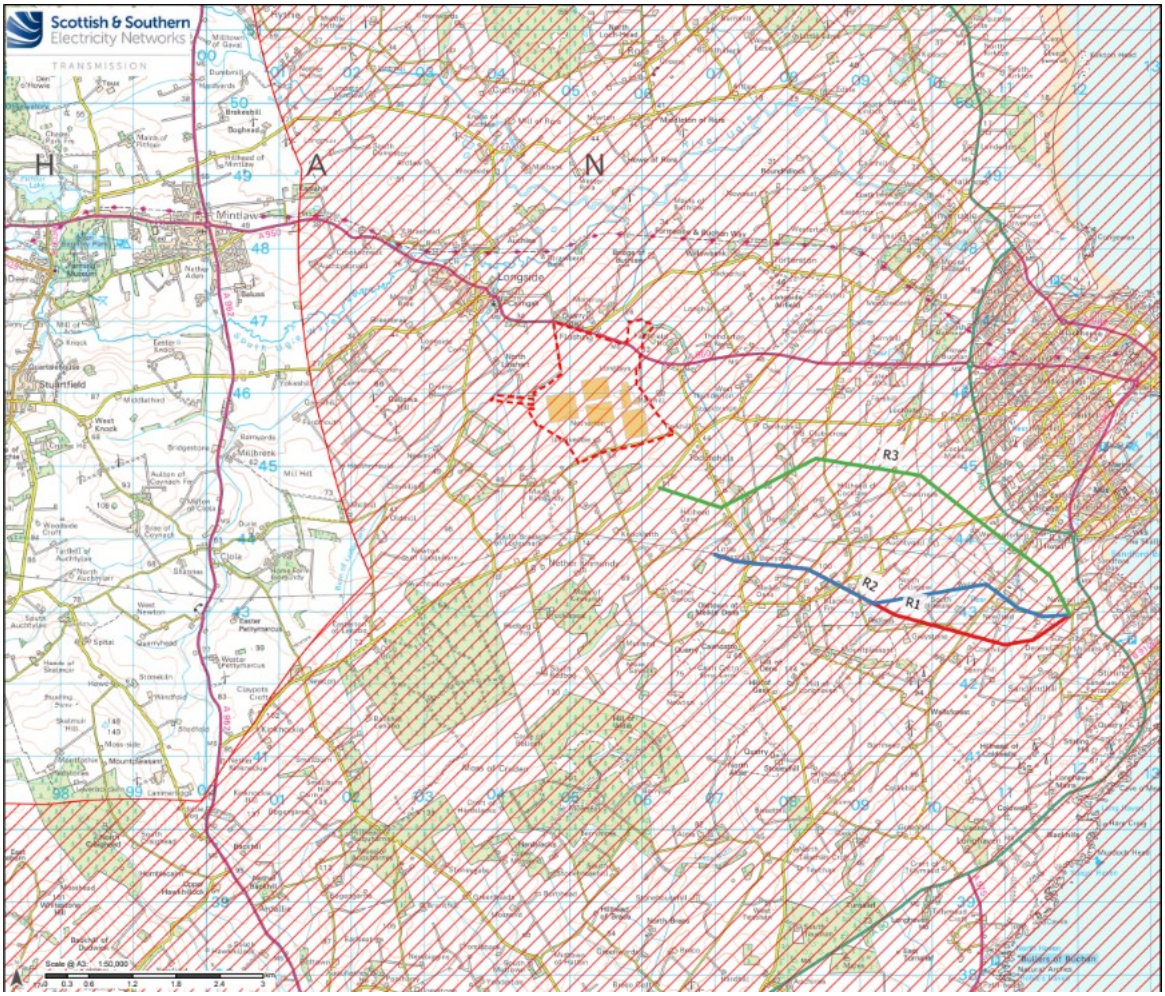
Alignment R2



Alignment R3



Appendix 1.1-C Coastal region – Very Heavy Pollution

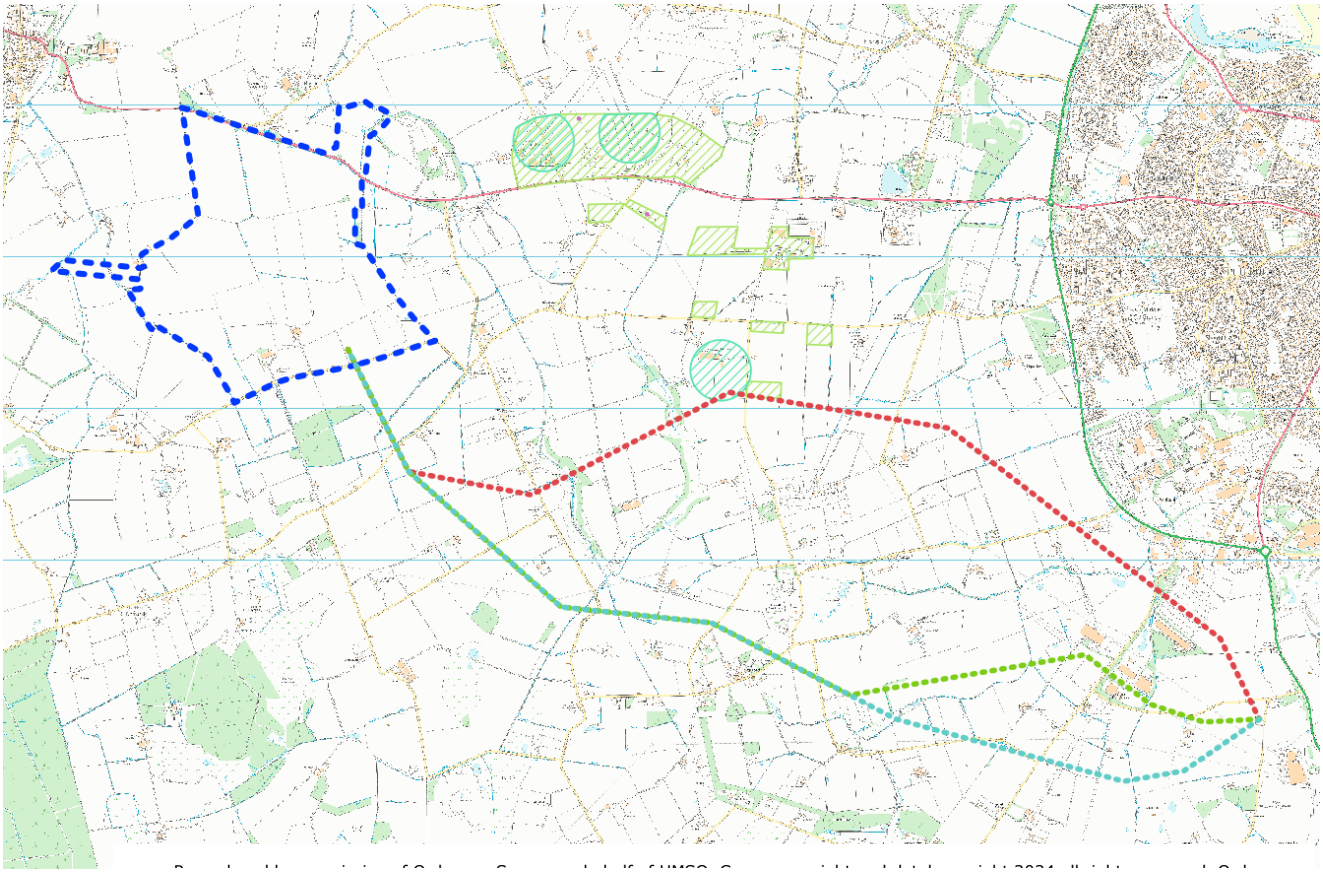


Legend

Name

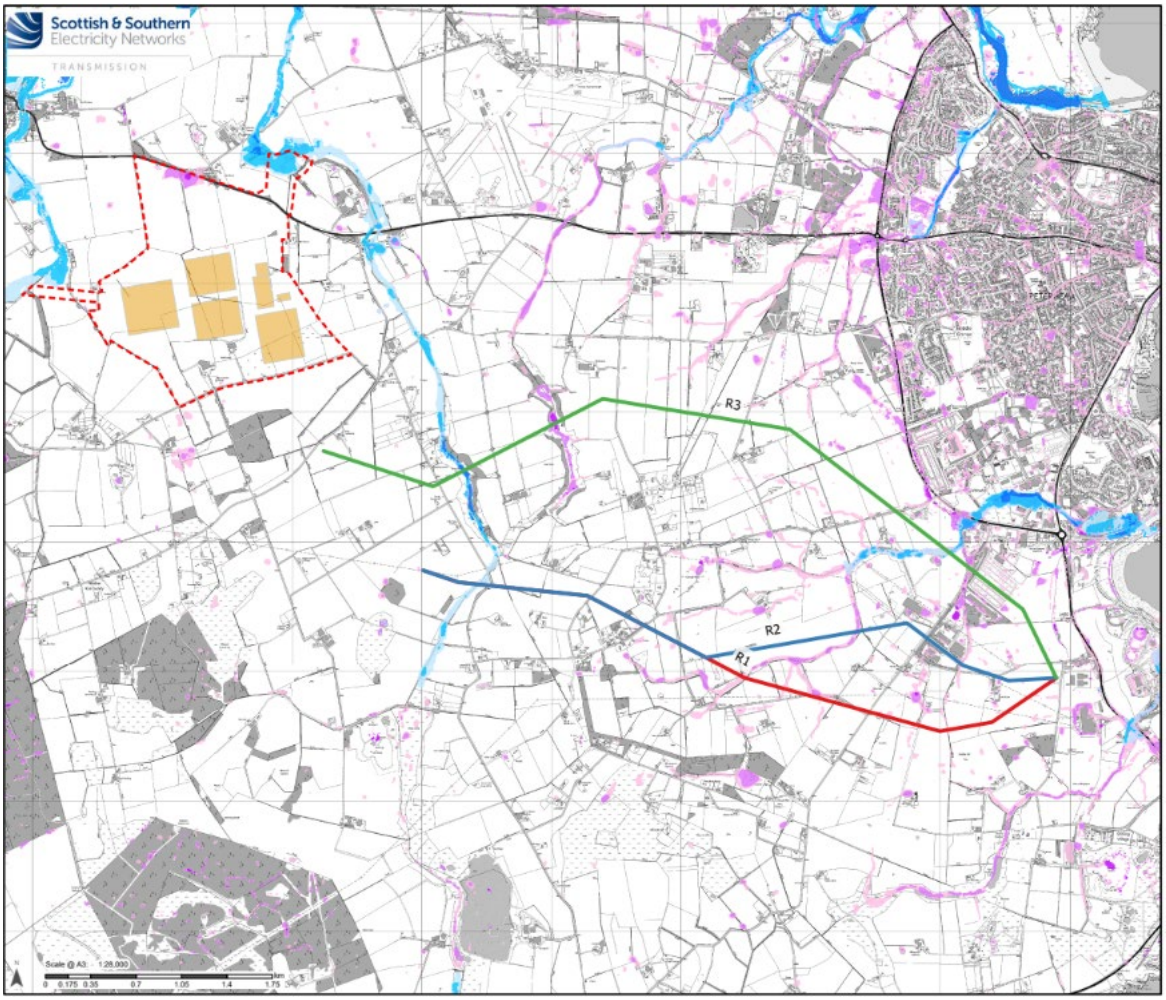
- R1
- R2
- R3
- Site Layout
- Red Line Boundary
- Coastal Region (within 10km)

Appendix 1.1-D UXO Survey



- Aircraft Crash
- Airfield
- Anti-Invasion Feature
- Military Training

Appendix 1.1-E Flood Risk



Legend

Name

- R1
- R2
- R3
- Site Layout
- Red Line Boundary

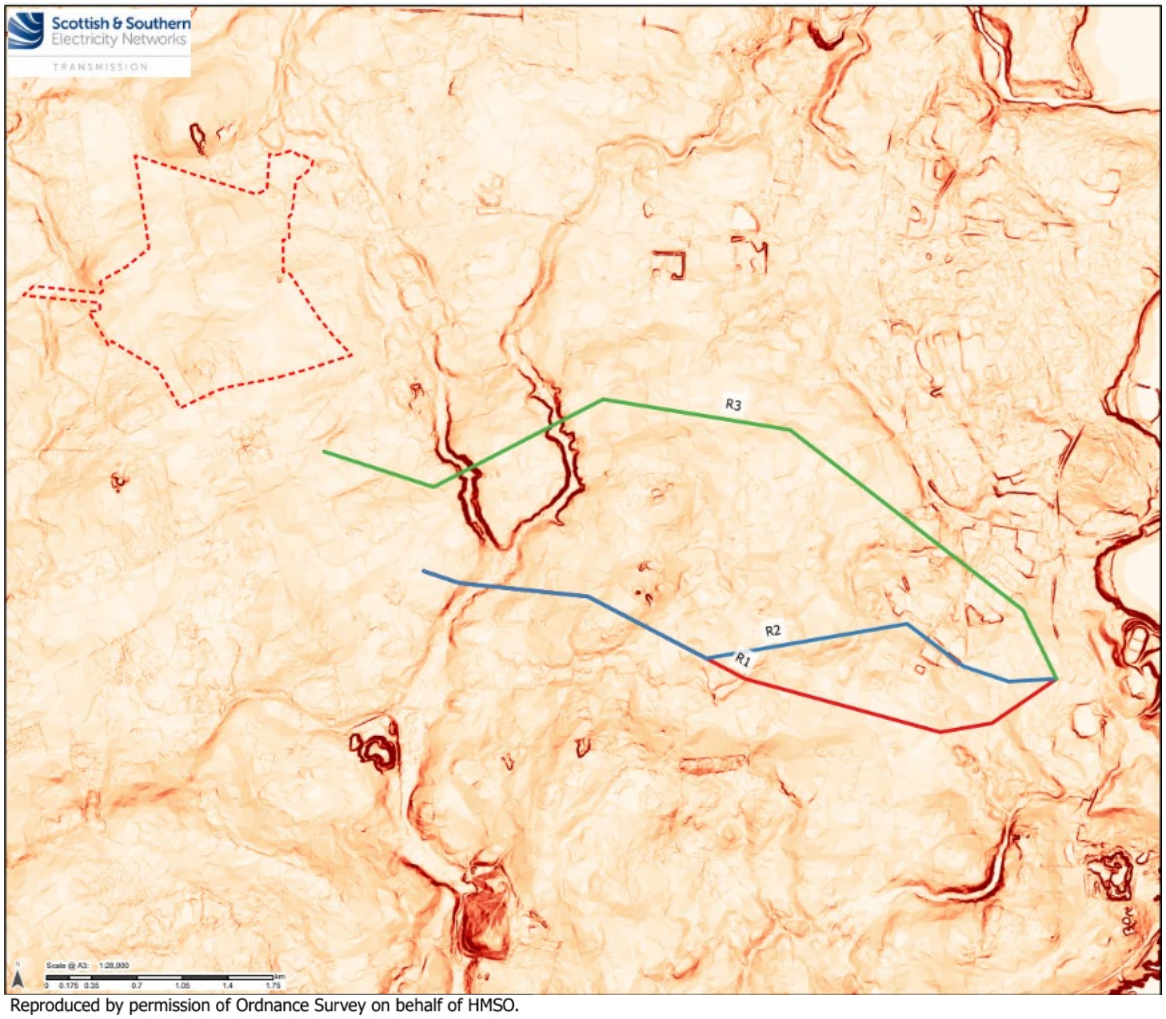
SEPA - River Flood Risk

- River Flood Extent - High Likleyhood - Depth: Greater than 1m
- River Flood Extent - Medium Likelyhood - Depth: 0.3m -1m
- River Flood Extent - Low Likleyhood - Depth: Less than 0.3m

SEPA - Surface Water Flood Risk

- Surface Water Extent - High Likleyhood - Depth: Greater than 1m
- Surface Water Extent - Medium Liklelyhood - Depth: 0.3m -1m
- Surface Water Extent - Low Likleyhood - Depth: Less than 0.3m

Appendix 1.1-F Slope



Legend

Name

- R1
- R2
- R3
- Red Line Boundary

Slope Angle

20

0

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APPENDIX 1.3: REBUILD ALIGNMENT APPRAISAL DETAIL - ECONOMIC

1.1 Capital

The estimate capital cost is primarily based on length of OHL. Key findings are summarised as below.

Alignment Option	RAG	Site Comparison Notes
Alignment R1	G	Alignment R1 is the longest option and therefore the most expensive. However, costs are less than 120% of the lowest cost option meaning alignment is Green rated.
Alignment R2	G	Lowest cost option.
Alignment R3	G	Alignment R3 is the second longest alignment, although costs are still less than 120% of the lowest cost option.

Further Assessment:

From a Capital cost perspective, all three alignments are suitable due to very similar line lengths.

The project requires engineering consultants to be onboarded to provide detailed engineering design. This will inform tower type and number, access road requirements, crossings protection (e.g. for crossing roads, rivers or railways), angle towers, diversion requirements, operational costs and tree felling requirements for each alignment. Once the detailed design is completed, a further capital cost assessment can be undertaken to confirm the Potential Alignment.