Bowdun Offshore Wind Farm, Onshore EIA Report

Volume 1, Chapter 5: Site Selection and Reasonable Alternatives Considered

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5.1 Introduction

5.1.1 This chapter of the Onshore Environmental Impact Assessment Report (EIA) Report provides a description of the site selection process undertaken and the alternatives considered during the design process to identify the siting of the onshore elements of the Project, landward of Mean Low Water Springs (MLWS) to the Grid Connection Point (GCP), are referred to as the 'Proposed Development'. The Onshore EIA Report accompanies the application to the Aberdeenshire Council for Planning Permission in Principle (PPP) for the Proposed Development.

5.1.2 This chapter describes the approach taken to site selection and consideration of alternatives undertaken for the Proposed Development. In particular this onshore EIA chapter:

- Summarises the legislative and policy context concerning site selection and consideration of reasonable alternatives;
- Summarises consultation and engagement relevant to site selection;
- outlines the approach taken to defining the spatial boundaries and constituent parts of the Proposed Development;
- Summarises the siting decisions taken to date by TWP and provides an indication of main reasons for the chosen option(s); and
- Summarises the reasonable alternatives considered for the Proposed Development, including location and infrastructure options.

5.1.3 The final design iteration and locations were determined through a combination of environmental assessments, surveys, engineering, and land inputs to progress the optimal design and locational parameters for the Proposed Development. The alternative site selections were considered for Landfall, the Onshore Export Cable Corridor and the Substation.

5.2 Legislative and Policy Context

5.2.1 The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (hereafter referred to as the 2017 EIA Regulations) sets out the provisions for EIA that are applicable to the Proposed Development. Schedule 4 (paragraph 2) of the 2017 EIA Regulations requires that the EIA Report include a description of the reasonable alternatives studied by the applicant, which are relevant to the Proposed Development and its characteristics, as well as an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.

National Planning Framework 4

5.2.2 National Planning Framework 4 (NPF4) was adopted and published in February 2023. NPF4 is the national spatial strategy for Scotland and sets out spatial principles, regional priorities, national developments and national planning

policies. NPF4 sits alongside the Aberdeenshire Local Development Plan to form the statutory development plan relevant for the Proposed Development.

5.2.3 Annex B of NPF4 outlines the 'National Developments Statements of Need', which provides detail on the significant developments that are important for achieving Scotland's spatial strategy and national outcomes. This includes strategic renewable electricity generation and transmission infrastructure. As such there is no further requirement for TWP to demonstrate the need for the Project in the Onshore EIA Report, given this is enshrined in NPF4.

Aberdeenshire Local Development Plan (2023)

5.2.4 The Aberdeenshire Local Development Plan (ALDP) directs decision making on all land-use issues and planning applications in Aberdeenshire. The ALDP balances economic growth with the urgent challenges of sustainable development and climate change.

5.2.5 Work has begun on the next ALDP which is expected to be published in early 2029 and cover the period between 2029 and 2039. The current ALDP remains the relevant LDP against which the application is to be considered.

5.3 Guidance on the Approach to Route and Site Selection

5.3.1 Published guidance on electrical infrastructure design and site/route selection has historically been focused on above-ground electrical transmission infrastructure with important landscape and visual impacts such as substations and overhead power lines. Whilst there is little established guidance applicable to the Proposed Development as a whole, there are recognised approaches for its component parts which, taken together, comprise a series of 'golden rules' that have been adopted in the design of the Proposed Development as follows.

Project Concept and Initiation

5.3.2 The National Infrastructure Commission (NIC) has published Design Principles for National Infrastructure (NIC, 2020) and guidance for national infrastructure (NIC, 2024). Whilst mainly aimed at Nationally Significant Infrastructure Projects in England and Wales, the guidance is applicable to Scottish Transmission Operators and these principles provide some important advice to project developers, particularly in relation to consultation in the early stages of assembling a project concept.

Substations

5.3.3 The relevance of planning and environmental considerations in the siting of onshore substations was set out by the Central Electricity Generating Board and more recently reviewed and adopted by National Grid Electricity Transmission (NGET) in the 'Horlock Rules'. The Horlock Rules are a set of guidelines produced by NGET to assist those responsible for siting and designing substations to mitigate the environmental effects of such developments (National Grid, 2003). They are still referred to and used by National Grid (and endorsed in ministerial decisions and at public inquiry) when undertaking planning studies for new infrastructure. Although they now have to be considered alongside the relevant policy set out in national planning policy, Development Plan documents, local planning policies and other sources.

5.3.4 The principles embedded in the Horlock Rules are relevant to the Proposed Development. In the Horlock Rules, NGET states that it will encourage generators to adopt the guidelines when working with NGET on proposals for substations, sealing end compounds or line entries. These guidelines also confirm that consideration must be given to environmental issues at the earliest stage in order to keep adverse effects to a reasonably practical minimum in the planning of new substations.

5.3.5 Table 5.1 summarises the Horlock Rules and how they have been considered in the design of the Proposed Development.

Table 5.1 Application of the Horlock Rules in the Design of the Proposed Development

Overall System Options and Site Selection	**How and Where Considered in the Onshore EIA Report**
Consideration must be given to environmental issues from the earliest stage to balance the technical benefits and capital cost requirements for new developments against the consequential environmental effects in order to keep adverse effects to a reasonably practicable minimum [Horlock Rules - Section III, paragraph 1]	Environmental issues have been considered since the commencement of the site selection process for the Proposed Development. This is detailed within Sections 5.7 and 5.8 of this chapter.
Amenity, Cultural or Scientific Value of Sites	
As far as reasonably practical seek to avoid altogether internationally and nationally designated areas of the highest amenity, cultural or scientific value by the overall planning of the system connections [Horlock Rules - Section III, paragraph 2].	The site selection and cable corridor refinement process has considered designated sites, including those designated for ecological, landscape and historic environment reasons. All internationally and nationally designated sites have been avoided as part of the selection of the Substation site and cable corridor. Further details are provided within Section 5.7 of this chapter.
Areas of local amenity value, important existing habitats and landscape features including ancient woodland, historic hedgerows, surface and groundwater sources and nature conservation areas should be protected as far as reasonably practicable [Horlock Rules - Section III, paragraph 3].	The site selection and design of the Substation has sought to protect areas of local amenity value, important existing habitats and landscape features as far as reasonably practicable. Where impacts cannot be avoided, appropriate mitigation has been developed to minimise such impacts. Mitigation measures are presented within Volume 2, Appendix 2.1: Schedule of Mitigation.
Local Context, Land Use and Site Planning	
Take advantage of the screening provided by landform and existing features and the potential use of site layout and levels to keep intrusion into surrounding areas to a reasonably practicable minimum [Horlock Rules - Section III, paragraph 4].	The evaluation of the Substation options for the Proposed Development considered opportunities to benefit from existing screening (i.e. vegetation, topography). Further details are provided within Section 5.7. Mitigation measures, including screening proposals for the Substation, are detailed within Volume 1, Chapter 8: Landscape and Visual Impact Assessment.
The proposals should keep the visual, noise and other environmental effects to a	Visual, noise and other environmental effects have been minimised as far as reasonably

Overall System Options and Site Selection	How and Where Considered in the Onshore EIA Report
reasonably practicable minimum [Horlock Rules - Section III, paragraph 5].	practicable through the selection of the Substation options. Mitigation for noise and vibration impacts is considered in Volume 1, Chapter 13: Noise and Vibration. Mitigation measures, including screening proposals for the Substation, are detailed within Volume 1, Chapter 8: Landscape and Visual Impact Assessment. Significant effects have largely been kept to a reasonable practicable minimum, where identified these have lead to the proposal of Additional Mitigation. Volume 1, Chapter 17: Summary of Significant Effects provides a list of the significant effects.
The land use effects of the proposal should be considered when planning the siting of substations or extensions [Horlock Rules - Section III, paragraph 6].	The existing land use has been considered within the site selection process. Further details on the consideration of land use are contained within Section 5.7.
Design	
Early consideration should be given to the options available for terminal towers, equipment, buildings and ancillary development appropriate to individual locations, seeking to keep effects to a reasonably practicable minimum [Horlock Rules - Section III, paragraph 7].	The effects associated with potential equipment within the Substation have been considered in the development of site proposals and through the assessment of environmental effects. Further details are also provided in Volume 1; Chapter 8: Landscape, and Visual Impact Assessment.
Space should be used effectively to limit the area required for development consistent with appropriate mitigation measures and to minimise the adverse effects on existing land use and rights of way, whilst also having regard to future extension of the substation [Horlock Rules - Section III, paragraph 8].	The initial footprint of the Substation has been determined based on a Maximum Design Scenario. The design of the Substation would be subject to further refinement during the detailed design stage, following the PPP Application. Note: the reference in the Horlock Rules to the 'future extension of the Substation' relates to the future extension of National Grid substations. This is not considered as it is not applicable for the Proposed Development.
The design of access roads, perimeter fencing, earth shaping, planting and ancillary development should form an integral part of the site layout and design to fit in with the surroundings [Horlock Rules - Section III, paragraph 9].	The requirement for access roads, fencing, site levelling, planting and other works (including the need for attenuation ponds) has been taken into account as a part of the Maximum Design Scenario approach as detailed in Volume 1, Chapter 2: The Proposed Development of this Onshore EIA Report.
Line Entry	
In open landscape especially, high voltage line entries should be kept, as far as possible, visually separate from low voltage lines and other overhead lines so as to avoid a confusing appearance [Horlock Rules - Section III, paragraph 10].	All onshore cables (including Onshore Export Cables and 400 kV Cables) will be buried underground.
The inter-relationship between towers and substation structures and background and	All onshore cables (including Onshore Export Cables and 400 kV Cables) would be buried

Overall System Options and Site Selection	How and Where Considered in the Onshore EIA Report
foreground features should be studied to reduce the prominence of structures from main viewpoints. Where practicable the exposure of terminal towers on prominent ridges should be minimised by siting towers against a background of trees rather than open skylines [Horlock Rules - Section III, paragraph 11].	underground. Therefore, the Proposed Development will not include overhead lines.

Onshore Cable Corridors (including Landfall)

5.3.6 There is no single recognised approach to the routing of buried high voltage cables. However, there are a number of widely used approaches to the routing of linear infrastructure which take their lead from the 'new approach to appraisal' originally devised for the appraisal of road projects under the framework of the Design Manual for Roads and Bridges; LA 104 Environmental Assessment and Monitoring, (Design Manual for Roads and Bridges, 2020).

5.3.7 All subsequent guidance has a similar approach which is a multi-criteria decision making framework. The key principles of a robust appraisal process for linear schemes are as follows:

- There must be a clear rationale for any proposal, based on a clear presentation of problems and challenges.
- There must be consideration of genuine, discrete options, not just an assessment of a previously selected option against clearly inferior alternatives.
- There should be an auditable and documented process which identifies the best performing options to be taken forward for further appraisal.

5.3.8 The selection of linear projects usually follows a sequential process as follows:

- Stage 1: Identify the advantages, disadvantages, and constraints of broadly defined corridor options, producing an environmental constraints map and identifying key issues.
- Stage 2: Assessment of identified range of options, suitable for public consultation, based on more information than at Stage 1, allowing comparison between.
- Stage 3: Refinement and further appraisal and/or consultation.
- Stage 4: Selection and validation of the preferred option.

5.3.9 TWP used a bespoke approach for site/corridor selection for the Proposed Development which considered other relevant guidance contained within the following reports and guidance documents:

- Holistic Network Design Methodology (National Grid ESO), 2022a);
- Pathway to 2030 Holistic Network Design (National Grid ESO, 2022b);
- Our approach to Options Appraisal (National Grid, 2012);
- Approach to Routing and Environmental Impact Assessment (SP Energy Networks, 2020); and

- The Holford Rules – guidelines for the routing of overhead lines (Central Electricity Generating Board (CEGB), 1959).

5.3.10 It is acknowledged that a number of these sources were published to inform developers of offshore wind or electricity infrastructure in England and/or Wales, as opposed to Scotland or are focused on overhead lines. Notwithstanding that, they have general relevance to good industry practice in the UK in this sector and informed the methods adopted by TWP during the site selection process.

5.4 Consultation and Engagement

5.4.1 Stakeholder engagement and public consultation is recognised as vitally important for shaping the approach to development. Engagement has been undertaken with a wide range of stakeholders to refine the siting and design of the Proposed Development. This has been done in parallel with the consideration of wider spatial constraints and environmental factors.

Scoping

5.4.2 Consultation on the proposed EIA methodology (including the Cumulative Effects Assessment methodology and approach to assessing transboundary and inter-related effects) was undertaken at the EIA scoping stage. The Bowdun Offshore Wind Farm Onshore Scoping Report (TWP, 2024), which contained details of the proposed approach to EIA for each topic was submitted to Aberdeenshire Council on 05 September 2024. TWP received the Scoping Opinion on 24 October 2024 from Aberdeenshire Council.

5.4.3 Following scoping, engagement has continued throughout the EIA process in order to facilitate proportionate EIA and the iterative design process.

Landowners

5.4.4 TWP has consulted landowners (and tenants/occupiers where known) throughout all stages of the development, with the aim of agreeing rights voluntarily for the potential cable routing within the PPP Application Boundary and Substation site. Surveys that informed the selection and refinement described in this Onshore EIA Report and planning application were undertaken with agreement of local landowners (and tenants/occupiers where relevant); this included preliminary ground investigations that informed the design process.

Community Consultation

5.4.5 Non-statutory and voluntary community engagement has been undertaken by TWP, this has included attendance at a range of public events to gather initial feedback and raise awareness of the Proposed Development.

5.4.6 Public events were held on 28 - 30 October 2024 in Drumlithie, Gourdon and Stonehaven respectively to introduce members of the public to the Project. At these events, information on the EIA process and scoping were shared. In addition, the principles that were influencing site selection and cable corridor decisions, including search areas and known environmental constraints within the scoping boundary, were presented. In addition, an online virtual

consultation room was provided for those who were unable to attend in-person events.

Pre-Application Consultation

5.4.7 As part of the Pre-Application Consultation (PAC), public events were held, PAC Events 1 (21 to 22 August 2025) and PAC Events 2 (02 to 3 October 2025). These events gave members of the community the opportunity to ask questions, raise concerns and provide feedback. Feedback provided from the community, statutory consultation bodies and other interested parties has helped refine the design of the Proposed Development and inform development of the Onshore EIA Report including mitigation commitments and design principles.

5.4.8 Further information on PAC is detailed within Pre-Application Consultation Report (TWP, 2025) supporting the PPP Application for the Proposed Development.

Summary of Consultation Responses Received

5.4.9 A summary of consultation in relation to site selection and cable corridor refinement is provided in Table 5.2, together with how these issues have been considered in the site selection process.

Table 5.2: Summary of Key Consultation Activities Undertaken for the Proposed Development Relevant to Site Selection

Date	Consultee	Discussion Topics and Consideration	How and where considered for site selection
24 October 2024	Aberdeenshire Council Scoping Opinion (Aberdeenshire Council, 2024)	The process by which the proposed onshore development's design has been, and will be, refined via the route planning and site selection and is clearly explained.	Volume 1, Chapter 2: The Proposed Development contains a description of the development's design and the design principles that will anchor further refinement during the MSC stage. This chapter explains the site selection process undertaken to date, building upon the process outlined in the Scoping Report. Section 5.7 and provides a summary of the consideration of different options and locations for all elements of the Proposed Development, including the criteria (environmental, economic, social and technical) considered in the selection process. Section 5.8 provides a summary of the alternatives considered.
	Aberdeenshire Council Natural Environment Team Scoping Response (Aberdeenshire Council, 2024)	Five Local Nature Conservation Sites (LNCs) are missing from the list of sites shown as being potentially impacted by the proposed works, which should be fully assessed within the EIA should they be included as part of the site boundary	The site selection process has looked to avoid designated sites and assets and included the LNCs identified by the Council. Further detail on potential impacts on LNCs is provided in Section 7.10 of Volume 1, Chapter 7: Biodiversity, Terrestrial Ecology and Ornithology.
	Historic Environment Scotland (HES) Scoping Response (Aberdeenshire Council, 2024)	HES strongly recommend that design of the proposals avoids any direct impacts on nationally important assets, in line with national policies, and that efforts are made to minimise any impacts on the setting of these assets. Note that any direct impacts on these assets are likely to require Scheduled Monument Consent (SMC) as administered by HES and that based on the current information HES would be unlikely to grant consent for works within the scheduled areas. Any direct impacts to these assets without SMC would be likely to trigger our compliance procedures.	The site selection process has looked to avoid Scheduled Monuments. In addition, setting impacts have been considered in the EIA Report. Reducing visibility from the proposed substation in the surrounding landscape and from receptors, including Seritage assets, has been a key consideration throughout design development. The restriction of the Substation buildings height is Embedded Mitigation that has resulted in avoidance of impacts. Further information is provided within Section 9.9 and Volume 1, Chapter 9: Cultural Heritage and Chapter 8: Landscape and Visual Impact Assessment.

Date	Consultee	Discussion Topics and Consideration	How and where considered for site selection
August-October 2025 (PAC Events)	Members of the Public	In general members of the public wanted to understand why the Proposed Development was located in Aberdeenshire and how the grid connection point, landfall and Red Line Boundary was determined. The materials and information shared explained the NESO allocated grid connection point at Hurlie Substation, which then influenced potential landfall, cable corridors and substation locations considered by the Project, along with desk-based constraints identification, consultation with landowners and emerging survey results.	The site selection process is explained in this Chapter and has been informed by information provided by members of the public, landowners and statutory consultees. The justification and need for the Proposed Development and alignment with Policy are summarised in Volume 1, Chapter 1: Introduction and descried in detail in the Planning Statement that supports the PPP application to Aberdeenshire Council for the Proposed Development (TWP, 2025).

5.5 Strategic Options

5.5.1 The design of the Proposed Development has been influenced by key criteria, including the following boundary conditions:

- National Energy Systems Operator's (NESO) site selection process for the Grid Connection Point (GCP).
- Siting of Landfall in an area to allow proven engineering techniques to be utilised within an acceptable construction and operational risk envelope (i.e. avoiding steep cliffs) while minimising impacts on local stakeholders.
- Sufficient available land to construct a Substation within an acceptable distance of the identified GCP.

Grid Connection Point

5.5.2 Renewable electricity generated by the Project must be connected to the national grid at a suitable GCP. In the north of Scotland, the electricity transmission network is owned by Scottish and Southern Electricity Networks Transmission plc (SSEN-T). The operation of the grid, and decisions as to where connections of this scale can be made, is the responsibility of NESO. This section describes options considered for the Project GCP at different project stages.

5.5.3 During the ScotWind leasing round, a GCP at Peterhead was assumed for the base case. This was derived from an initial grid capacity assessment and preliminary evaluations of potential onshore Substation locations, onshore cable routes, and Landfall sites, informed by desktop geotechnical studies, environmental constraints mapping, and optioneering exercises.

5.5.4 Post bid submission, the Applicant continued the Onshore Cable Corridor optioneering and refinements including more detailed feasibility studies to further identify possible suitable GCP options (RPS, 2023). The GCP options were selected in anticipation of the range of possible outcomes from the Holistic Network Design Follow Up Exercise (HNDFUE), undertaken by NESO (National Grid, 2023a). Initial screening identified six potential GCP locations: Peterhead, 'New Deer 2', 'New Deer-Hatton', Fetteresso, Fiddes, and Tealing. An offshore hub solution was also considered as a potential GCP. The GCP locations considered at that time are shown on Figure 5.1 (Annex – Figures).

5.5.5 As the HNDFUE process was progressed by NESO, the offshore hub solutions were removed as favourable options, with a radial connection being proposed as the transmission solution relevant to Scotwind E3 Planning Option Area (POA) which corresponds to the Bowdun Array Area. The offshore hub solutions were removed primarily due to technical and economic, constraints identified during the HNDFUE.

5.5.6 The HNDFUE was published in (March 2024), confirming a GCP for the Project at a new substation in the Fiddes area of Aberdeenshire in the Beyond 2030 report (NESO, 2024). This substation would be constructed by the Network Transmission Operator (NTO), SSEN-T. SSEN-T commenced public consultation on a new 400 kV OHL and substation site in May 2023 (SSEN-T, 2023). A preferred substation site was initially indicated at a location approximately

3.75 km south of the existing 132 kV Fiddes substation. Options also taken forwards by SSEN-T included a site at Banff Hill, near Arbuthnott, and an area north-east of the existing Fetteresso Substation within Fetteresso Forest.

5.5.7 Following consultation and site selection works undertaken by SSEN-T on potential substation options, the site within Fetteresso Forest was confirmed as the preferred option in Q3 2023 (SSEN-T, 2023b). An EIA Report was submitted to Aberdeenshire in December 2024 (Planning Reference APP/2024/1951) (SSEN-T, 2024).

5.5.8 Ultimately, NESO confirmed that the preferred GCP option would be a new substation, referred to as Hurlie, to be constructed by SSEN-T in Fetteresso Forest in Aberdeenshire. Therefore, this is the option TWP has taken forward in finalising the site selection process.

5.6 Site Selection Process Methodology

Overview

5.6.1 The site selection process had several overarching requirements:

- Identify Landfall locations which minimised impact on areas of environmental sensitivity, proximity to the offshore wind infrastructure and existing onshore grid infrastructure and be technical and geologically suitable.
- Identify suitable Substation sites which included being in proximity to the proposed GCP/existing transmission infrastructure, stable ground conditions, avoidance of flood risk areas and minimised impact to sensitive habitats.
- Identify Onshore Cable Route Corridors from Landfall to Substation sites considering environmental and technical constraints.
- Provide an initial assessment of onshore environmental cable routing from Landfall to the GCP.
- Undertake walkover surveys, identifying and documenting environmental constraints identified.
- Adhere to the established HND appraisal methodologies.

Consideration of Alternatives

5.6.2 This Onshore EIA Report chapter provides a description of the reasonable spatial and geographical alternatives that have been considered by TWP and presents a comparison of the environmental effects between different options. This consideration of alternatives is captured within Section 5.7 and 5.8.

5.6.3 Strategic-level project design alternatives were also considered as part of the site selection and design process. The strategic consideration of alternatives which fed directly into the site selection and design process are set out in Table 5.3.

Table 5.3: Strategic Alternatives Considered and Project Decisions

Alternatives Considered	Decision	Justification
Onshore Export Cables: buried cables; or overhead lines.	The Onshore Export Cables and 400 kV Cables would be completely buried underground for the entire length. No overhead lines would be installed as part of the Proposed Development.	TWP sought to minimise potential environmental impacts of the Proposed Development by avoiding the use of overhead lines, this was an early strategic decision taken by the project team.
Selection of Gas Insulated Switchgear (GIS) technology for the Substation; Or selection of Air Insulated Switchgear technology for the Substation.	Consideration of GIS or Hybrid Insultation Switchgear (HIS) technology for the Substation.	The environmental benefit of the GIS technology is that it allows for a lower building height within the Substation and reduces the footprint of the Substation, minimising the visual impacts and increasing distances from surrounding receptors. A reduced footprint also reduces the potential disturbance to other features (e.g. forestry). HIS technology has similar benefits although not as compact a footprint as GIS and is also being considered pending detailed design.
Major crossings: trenchless techniques; or open-cut trenching.	Trenchless techniques.	The Proposed Development includes trenchless techniques at major crossings (including sensitive watercourses, major road and rail crossings, utilities etc.) to minimise environmental impacts along the Onshore Export Cable Corridor and 400 kV Cable Corridor.

Site Selection Principles

5.6.4 Alongside published principles and guidance (see Section 5.2), the following site selection principles were developed and applied at the outset of the site selection and cable corridor refinement process for the Proposed Development.

- Shortest route to reduce potential environmental impacts by minimising the footprint of the cable corridors, as well as considering cost and minimising transmission losses.
- Avoidance of key sensitive features where possible. Where complete avoidance was not possible, successful mitigation would be required to minimise potential impacts.
- Minimise disruption to residential properties and villages.

5.6.5 Prior to starting each stage of the site selection process, a series of design principles and engineering assumptions were identified which governed the decisions made at each stage. These design principles and assumptions covered environmental, physical, technical, commercial and social considerations, as well as opportunities. Each step of the process involved

gathering data from a number of different sources to define and assess the options for each component of project infrastructure. Regular internal project workshops were held throughout the site selection process to collate and review the data gathered to date, and to reach cross-discipline decisions about refining the site selection options.

Site Selection Process Summary

5.6.6 As discussed in Paragraph 5.6.1, a staged site selection and design iteration process has been undertaken from inception to the point of submission of the Onshore EIA Report. The following key factors have driven the process:

- The HND Review, which eventually identified a new substation to be constructed in Fetteresso Forest as the GCP for the Project. This enabled the identification of onshore search areas and led to the identification of the Proposed Development's Landfall, onshore cable corridors and location of the Substation.
- Review of environmental, social and technical constraints and planning policy throughout the EIA process providing iterative feedback which led to site specific refinement of the Proposed Development.
- Consideration of other proposed developments in the area.
- Consultation with statutory and non-statutory consultees. As described within Section 5.4, TWP have undertaken pre-application engagement with stakeholders, communities and landowners in order to seek feedback to refine the site selection and project design.

5.6.7 The site selection and design refinement process followed an iterative approach to ensure the most appropriate and effective solution was identified with consideration of environmental, social and technical constraints. Following the identification of the GCP by NESO, the site selection has been progressed through four stages:

- Stage 1: Identification of the onshore search areas and defining of the Proposed Development scoping boundary.
- Stage 2: Identification of options, initial appraisal and undertaking site visits.
- Stage 3: Environmental appraisal, assessment and refinement of the siting and design of the Proposed Development.
- Stage 4: Identification of preferred options.

Site Visits

5.6.8 Site visits were carried out between 31 October and 02 November 2022. The site visits were a 'ground-truthing' of sites selected and appraised at a desk top level with particular focus on the candidate Landfall and Substation sites.

5.6.9 Additional visits have been undertaken throughout 2023, 2024 and into 2025 to review constraints within the initial Scoping Boundary allowing for refinement and arrival at the PPP Application Boundary.

Environmental Appraisal

5.6.10 The environmental appraisal (stage 3) was undertaken broadly in accordance with the methodology and criteria set out in NESO's HND (NESO, 2022).

5.6.11 The HND sets out a broad range of environmental, planning and land use constraints which have been considered when undertaking the environmental appraisal of Landfall, Substation and onshore cable corridor options identified during desk study and site visits.

5.6.12 The options for all components of the Proposed Development were considered against the appraisal Black/Red/Amber/Green (BRAG) criteria used in the HND. Each environmental, planning and/or land use constraint for which data was collected was given a BRAG score according to its relative importance, sensitivity or consenting risk associated with significant project impact or conflict if it cannot be avoided or mitigated. The overall BRAG score for an option or sub-option is determined by the highest scoring attribute for the option in question. The criteria are presented in Table 5.3.

Table 5.3: BRAG Appraisal Criteria

Category	Definition
Black	Features or designations which affect the likelihood of an option being achievable to such a degree that the option should not be considered.
Red	Features or designations that are so significant or pose such a high degree of risk to the design that they should be avoided, except in exceptional cases which include where potential mitigation (or compensation) is known; where the potential benefits to the design would clearly outweigh the potential harm and/or impacts; or where there are no alternatives.
Amber	The most protected features and/or areas that are likely to require detailed assessment and/or mitigation and should be avoided if possible.
Green	Features or designations to be considered in constraint assessment/study but which are likely to be capable of resolution.

5.7 Site Selection and Cable Corridor Refinement Process

Landfall

Stage 1 – Identification of Landfall Search Area

5.7.1 Broad search areas for the Landfall (St Fergus down to Carnoustie), the Onshore Routing and Offshore Routing were established to encompass the full extent of the onshore and offshore regions that could realistically be used to route the transmission export cables from the offshore lease area to the multiple potential onshore GCPs options (Peterhead, 'New Deer 2', 'New Deer-Hatton', Fetteresso, Fiddes, and Tealing) see Figure 5.1 (Annex – Figures).

Stage 2a – Identification of Landfall Zones

5.7.2 A preliminary desk study was carried out to identify potential Landfall zones, within the approximately 150km Landfall search area, capable of meeting the following technical criteria:

- Topography – A cliff shoreline of less than 15 m;

- Avoidance of any major and obvious engineering issues, such as a mountain, lake or other physical features (e.g. urban buildings, key utility infrastructure, etc); and,
- Minimum 300 m width of Landfall.

5.7.3 The initial desk study identified seven zones, see Figure 5.2 (Annex – Figures), in which the Landfall options could be situated i.e. that they could comply with the aforementioned criterion:

- East Haven;
- St Fergus;
- Craigewan Links;
- Sandford Bay;
- Cruden Bay;
- Newburgh; and
- Benholm.

Stage 2b - Appraisal of Landfall Zones

5.7.4 As the final GCP had not yet been determined multiple Landfall Zones were taken forward to identify potential candidate Landfall options, taking into account a number of environmental, social and technical considerations, including but not limited to:

- Topography (height difference) between the seabed and Landfall site including cliff heights;
- Land holding crossings;
- Shipping/anchoring and available depth for installation vessels;
- Key utility infrastructure e.g. pipelines, cables;
- Potential environmental constraints (e.g. designated sites, habitats, water Features, sea bed conditions, etc.)
- Potential access;
- Proximity to sensitive receptors; and
- Other developments.

5.7.5 Initial considerations within the above zones identified 19 potential Landfall options. Each location was assessed using a desk-based review of available environmental data.

5.7.6 Sandford Bay fell away as a zone as its availability was constrained due to the presence of other known projects in the vicinity. Based on these constraints, it was concluded that no further assessment work would be undertaken for this zone.

5.7.7 A key concern for all candidate Landfall options was the presence of sensitive environmental receptors, which did not fall under environmental designations, including habitats with features that could potentially classified as Annex I habitats, such as sand dunes. Sand dunes were identified at sites within St Fergus, Craigewan Links, Cruden Bay and Newburgh.

5.7.8 Following the desk study and initial appraisal, the candidate Landfall options were subject to site visits. These were used to verify the findings of the desk

study, highlight potential mitigation measures to be required, and identify further constraints or opportunities to be considered within the site selection process. An environmental and engineering appraisal was carried out across the candidate Landfall options based on the results from the desk based assessments and site visits.

Stage 3a – Shortlisting of Landfall Option

5.7.9 Following the consideration of the technical and environmental constraints options at East Haven, St Fergus, Craigewan Links, Cruden Bay and Newburgh were discounted due to conflicts with existing or planned land uses and the presences of environmental designations.

5.7.10 Most of the coastline was subject to significant environmental constraints, including designated SPAs at Cruden Bay, Newburgh, and East Haven, and the Marine Protection Area (MPA) off St Fergus and Craigewan Links. These often coincided with additional nearshore constraints such as Annex I reef habitats and existing physical infrastructure.

5.7.11 Further onshore challenges included extensive dune systems behind many of the beaches, land uses such as golf courses at Craigewan Links, Cruden Bay, and Newburgh, proposed developments near St Fergus, and other designated areas such as the Forvie National Nature Reserve at Newburgh. At East Haven, additional complexity arose from potential HDD requirements due to the proximity of the railway line running parallel to the coast.

5.7.12 The combination of these constraints led to very few Landfall opportunities that would be considered suitable. Benholm emerged as the least constrained and most technically feasible Landfall zone.

Stage 4 - Preferred Landfall Option

5.7.13 At this point in time (mid-2023) there was a strong indication from the HNDFUE process that the preferred GCP location was going to be Kincardineshire (this area incorporated the Fetteresso and Fiddes GCP options) and Benholm provided the most suitable Landfall zone for these GCP options. Other potential Landfall zones in South Aberdeenshire were assessed, including Stonehaven and Inverbervie, however they were found to be constrained due to continuous high cliffs and coastal settlements (see Figure 5.3 in Annex – Figures, which shows coastal characteristics and offshore bathymetry of this region).

5.7.14 The Benholm Landfall zone sits between the settlements of Gourdon and Johnshaven, it is characterised by an area of rocky raised beach where the cliff heights fall away, allowing a suitable location for construction of Transition Joint Bays (TJBs). The absence of high cliffs and sand dune systems meant this location was preferred from an engineering perspective. Although there are areas of Annex I reef in the nearshore this can be avoided by trenchless installation techniques. A potential wreck may be present in the nearshore, but this can be avoided by micro siting.

5.7.15 Four Landfall options were considered within the zone. All scored similarly on the environmental appraisal. Option E3.6(b) scored highest on the engineering appraisal. Figure 5.4 (Annex – Figures).

Onshore Substation

Stage 1 - Identification of Substation Search Area

5.7.16 The guiding principles for siting the onshore Substation for the Proposed Development aimed to achieve an economic and efficient connection, ideally as close as possible to the GCP, whilst also considering potential environmental constraints and adhering to the principles outlined in the Horlock Rules (see Table 5.1). This aligns with Section III, para. 1 of the Horlock Rules, which states the following in relation to the site selection of onshore substations:

'environmental issues from the earliest stage to balance the technical benefits and capital cost requirements for new developments against the consequential environmental effects in order to keep adverse effects to a reasonably practicable minimum...'

5.7.17 Prior to the confirmation of the location of the GCP through the HNDFUE process, GCP, search areas were initially set as a 2 km radius around the potential GCP locations of Peterhead, New Deer, Hatton, Fetteresso, Fiddes and Tealing.

5.7.18 The 2 km radius for the Substation Search Areas was determined by the desire to minimise transmission losses along the 400 kV Cable Corridor between the Substation and the GCP in the interests of efficiency, regulatory constraints and cost, because transmission losses increase with distance along the 400 kV Cable.

5.7.19 Following the publication of the HNDFUE, confirming a GCP would be developed by SSEN-T in the Fiddes area of Aberdeenshire, SSEN-T undertook consultation exercises in April 2023 (SSEN-T, 2023a) indicating a preferred substation site approximately 3.75 km south of the existing Fiddes substation. However, following responses to their consultation events and significant public interest, SSEN-T began considering a wider range of locations for the GCP (this included re-evaluation of options at Fetteresso and the introduction of Banff Hill, both options still within Kincardineshire). SSEN-T announced in Q4 2023 that the proposed Substation would be relocated to a location within a 5 km radius of the existing substation at Fetteresso. Consequently this chapter provides no further consideration of the substation locations near Fiddes or Banff Hill and focuses on the substation options considered for a GCP at Fetteresso.

Stage 2 - Identification of Options, Initial Appraisal and Undertaking Site Visits

5.7.20 Candidate substation sites were identified having regard to the following initial criteria:

- Existing physical constraints including settlement, developed areas, open water and existing infrastructure;
- Environmental, social and technical constraints;
- Separation from residential receptors (a 400 m buffer was applied where full enclosure could not be assumed);
- Planned development; and

- The minimum operational area required (initially assumed to be 200 m x 300 m).

5.7.21 Additional considerations applied relating to practical issues included:

- Topography of the land (i.e. to minimise cut and fill).
- Existing access to and from the site, including consideration of access for Abnormal Indivisible Loads.
- Exposure in the landscape and potential for effective screening.
- Opportunities for cable corridors into and out of the site.
- Proximity to the GCP.
- Proximity to overhead lines, pipeline infrastructure and avoidance of the need to cross other buried high voltage cables.
- Likely ground conditions, drainage and risk of flooding.

5.7.22 The initial desk-based appraisal identified seven candidate sites near Fetteresso using desk-based data sources, see Figure 5.5 (Annex – Figures).

5.7.23 Initial site visits conducted in Q4 2023 identified that potential substation sites outwith Fetteresso Forest were disadvantaged by landscape and topography constraints and were therefore considered unsuitable due to the likelihood of significant landscape and visual effects. Other key constraints considered were the locations of planned and existing infrastructure (e.g. OHL; pipelines) and forestry works as part of the Fetteresso Forestry Management Plan. This resulted in four candidate sites (F1-4) being taken forward for further consideration.

5.7.24 Following publication of the updated search area for Hurlie Substation in Fetteresso Forest a further three sites were identified (F5-7), with F7 being the only candidate site outwith the forest to provide a suitable comparison to those within.

5.7.25 Following confirmation from SSEN-T of the precise location for the Hurlie Substation site, a further five candidate sites were identified (F8-F12) as part of a desk-based exercise, which was subsequently followed up with a site visit.

Stage 3 - Environmental Appraisal, Assessment and Refinement

5.7.26 An environmental, social and technical appraisal was undertaken for each of the options identified. The key findings and reasons for discounting options are summarised as:

- F7 was not viable due to proximity to residential receptors and existing infrastructure, along with prominent location raising concerns that any development could not be effectively screened or otherwise integrated into the surrounding landscape.
- F1 and F4 were discounted due to the proximity of the existing OHL; existing Fetteresso Substation and also the proposed OHL. Similarly, F2 and F6 was discounted due proximity to the existing substation, they would also require two crossings of the Fetteresso 275 (400) kV OHL line and the resultant cable length became a barrier when compared with other options.

- F3 conflicted with proposed long term retention areas of the Forestry Management Plan and would lead to likely significant effects on landscape and visual receptors. In addition at that time there was uncertainty on the positioning of the proposed OHL and Hurlie Substation, and there were concerns on the tower positions and construction conflicting with this area.
- F5, F8, F9 and F11 were discounted as viable options due to significant technical constraints including topography, surface water and existing infrastructure - specifically the OHL for F5, F8 and F9 and the high pressure gas pipeline for F11. F11 would also have been very prominent visually due to its elevated location on Hill of Baulk.
- Site visits initially identified F10 as a viable option due to the terrain and proximity to suitable access routes, along with the location in a clear felled area. However, the site's feasibility was dependent on the final location and positioning of Hurlie Substation.
- F12 was regarded as having good existing screening and positioned in an area a suitable distance from existing and planned infrastructure. Whilst there would be conflicts with the FLS Land Management Plan i.e. the removal of woodland early, the coup where F12 was located had experienced significant windthrow on the southern half and was considered to have failed, meaning felling would be required regardless.

5.7.27 At this stage, access requirements could not be assessed beyond the existing Fetteresso Substation, as the routes that might be used or affected by construction and the emerging Hurlie Substation proposals were still unknown.

5.7.28 Due to constraints within Fetteresso Forest, i.e. existing and planned infrastructure (OHLs and existing Fetteresso substation) a location to the east or south-east of the indicative Hurlie substation location was considered to be most viable, this initial constraint was mapped and included in the Bowdun Onshore Scoping Report (TWP, 2024).

5.7.29 From the candidate substation locations F10 and F12 were identified as the most suitable options, with a preference for F10, due to its closer proximity to Hurlie and therefore shorter cable requirements provided it did not conflict with SSEN-T's emerging plans for Hurlie. Both options would require appropriate mitigation for forestry removal, protected species, noise, and potential visual and landscape impacts—issues common to all locations within Fetteresso Forest.

Stage 4 - Identification of Preferred Option

5.7.30 Following the appraisal and elimination of the other candidate Substation locations, F10 and F12, were discussed with SSEN-T and FLS. Due to F10 conflicting with SSEN-T's emerging proposals for Hurlie and an indication by SSEN-T that there would be insufficient space to co-locate the two substations, F12 was taken forward as the preferred Substation site for the Proposed Development and identified as such within the Bowdun Onshore Scoping Report (TWP, 2024).

Onshore Export Cable Corridor

Stage 1 - Identification of Onshore Export Cable Corridor Search Area

5.7.31 The search area for the Onshore Export Cable Corridor considers the area of land between the proposed Landfall and Substation sites. The Onshore Export Cable Corridor search area and constraints as presented at Scoping are shown on Figure 5.6 (Annex – Figures).

Stage 2 - Identification of Options, Initial Appraisal and Undertaking Site Visits

5.7.32 The identification and assessment of the Onshore Export Cable Corridor options included the assessment of the key environmental constraints that would provide obstacles and constraints between the point of Landfall at Benholm, the Substation site (Option F12) and finally the GCP at Hurlie Substation. A BRAG constraints analysis was undertaken to understand potential challenges for the routing from Landfall to GCP. This focused on the environmental, planning, engineering and cost constraints.

5.7.33 Environmental and planning features that were considered during the design of the Onshore Export Cable Corridor to reduce the associated impacts included the following:

- Locations of settlements, including residential dwellings and farms;
- Existing infrastructure, including roads, railway lines and pipelines;
- Statutory designated sites, such as SPAs, SACs, Ramsar and SSSIs;
- Historically designated sites, such as Scheduled Monuments and Listed Buildings;
- Rivers, open water (lochs/large ponds), bogs and other watercourses;
- high flood risk areas;
- Areas on the Ancient Woodland Inventory (AWI); and
- Areas of peat, particularly Classes 1 and 2 (nationally important) as defined by the Carbon and Peatland 2016 Map data published by NatureScot.

5.7.34 Engineering and cost considerations during the design of the cable corridor included the following:

- Major crossings, including major roads and watercourses;
- Accessibility from main roads for construction;
- Presence of utilities;
- Costs associated with length of cables required; and
- Suitability of topography or ground conditions for construction.

5.7.35 The land from Benholm towards Fetteresso Forest is characterised by rolling hills and occasional deeply incised valleys with steep topography. The elevation of the land rises steeply to the west of the A92. Several small settlements, including Arbuthnott and Drumlithie, are present. There is also the presence of existing third-party infrastructure including several high-pressure National Gas pipelines, the Forties Oil pipeline, the Shell NGL pipeline and the A90 and A92 roads and the main Dundee-Aberdeen railway line. There are also several electrical transmission lines, watercourses, including the Bervie water, and

blocks of ancient woodland. The area is also well known for a high level of designated and non-designated Cultural Heritage assets.

5.7.36 Whilst feasible route corridors were achievable, the complex topography and high level of environmental constraints meant that detailed route planning was required to optimise the buildability of the Proposed Development. Local landowner input was also identified as a key consideration to cable route identification.

5.7.37 The initial constrained areas identified were include in the Scoping Report, recognising that routing in these areas could lead to environmental impacts.

Stage 3 - Environmental, Engineering Assessments and Refinement

5.7.38 In 2024 A Preliminary Front-End Engineering Design (Pre-FEED) study was commissioned by TWP, as well as a ground investigations (GI), to support the identification of cable corridors, and refine the Landfall and substation designs at the locations identified in previous stages. In addition engagement with landowners that could be affected by emerging proposals commenced.

5.7.39 TWP has sought to enter into voluntary agreements with the landowners affected by the location and construction of the Proposed Development throughout the development of the Project. The views of landowners directly affected by the proposals have informed the Proposed Development design at certain locations, a typical example of this is siting cable routes along field boundaries where possible to minimise the disruption to the existing land uses. This informed potential cable routes and the development of the PPP Application Boundary.

5.7.40 Due to the presence of essential infrastructure with specific crossing requirements e.g. railway line; fuel and gas pipelines – along with other constraints, the cable corridor was largely shaped by the need to avoid environmental sensitivities, navigate suitable ground conditions and cross existing infrastructure appropriately, while also minimising overall land take. Design principles were developed (see Volume 1, Chapter 2: The Proposed Development) and exclusion areas identified. Consideration was also given on how to limit impacts on settlements and in particular navigate the cable route around Drumlithie and Arbuthnott. A buffer of a minimum of 50 m around neighbouring residential receptors was also incorporated into the development of the Application Boundary and consideration of access for construction and maximising the use of existing access tracks to limit land-take.

5.7.41 Figure 5.7 (Annex – Figures) shows the evolution of the PPP Application Boundary from the Scoping Boundary. The progression shows the establishment of a cable search area (black hatched area) and initial constraints mapping (orange hatch). The cable corridor was refined to a smaller corridor (green hatching) following preliminary environmental walkovers, ground investigations and discussions with stakeholders. This was developed into the PPP Application Boundary with the addition of anticipated accesses during construction and 50 m exclusions areas for neighbouring properties. The final frame shows the PPP Application Boundary, Substation search area and an indicative cable route

centreline. Further details on refinements for the cable routing are described in Section 5.8.

5.8 Alternative Design Development

Overview

5.8.1 Having selected the preferred Landfall, Onshore Export Cable Corridor and Substation locations, baseline field surveys and desk studies were used early in the EIA process to test their performance and find improvements. The following sections summarise the main design alternatives considered within the EIA process for each element of the Proposed Development to date and how they have been informed by consultation.

Approach

5.8.2 Alternatives considered in the EIA are described in the following section. They are the iterations of the environmental decision making process which has sought to improve the preferred options' environmental performance.

5.8.3 Alternatives have been considered for each element of the Proposed Development. This process has been informed by:

- Project requirements including commercial factors;
- Other engineering and technical criteria;
- Land use and land ownership constraints;
- Community consultation; and
- Ongoing environmental appraisal process.

5.8.4 TWP's overarching requirements for the Proposed Development and the Project Design Envelope has controlled the Maximum Design Scenario and need for a proportionate EIA. Taken together, these are the limits that have controlled the way within which alternatives have been considered. Certain elements of the Proposed Development were the subject of community consultation, and in some cases, local knowledge helped the design process, for example the crossing of the Bervie Water and the routing at the Landfall as described in more detail below. Consultation feedback has further informed the design of the development as proposed, for example commitment to cross major roads and paths via HDDs thereby avoiding closures and diversions.

5.8.5 The consideration of alternatives throughout the site selection and EIA process have been reported at the following milestones:

- Public information events during Scoping;
- Onshore EIA Scoping Report;
- Non-statutory events;
- Public engagement events in 2024 and 2025, attendance and presentations to Community Councils and meetings with representatives of Save Our Mearns; and
- PAC events in August and October 2025.

5.8.6 The environmental appraisal process has informed the optimisation of:

- the Landfall;

- the Substation;
- the Onshore Export Cable Corridor;
- the 400 kV Cable Corridor; and
- the construction methodologies and logistics for the Proposed Development.

5.8.7 As explained in 5.7.39 BOWFL has sought to enter into voluntary agreements with the landowners affected by the location and construction of the Proposed Development throughout the development of the Project and will continue to work with landowners effected for refinements taken forward at MSC.

Planning Permission in Principle Application Boundary

5.8.8 The Proposed Development is wholly contained in the final PPP Application Boundary to be submitted for approval by Aberdeenshire Council. The PPP Application Boundary includes the land required to construct the Proposed Development including means of access (both permanent and temporary), construction compounds and marshalling areas and land required for mitigation at the Substation site i.e. landscape and biodiversity planting and drainage.

5.8.9 However, the PPP Application Boundary is much larger than the land that will be occupied temporarily for construction and then permanently for operation. This is to allow further detailed design work to continue post submission. Compensatory planting will be prioritised within the PPP Application Boundary but will be subject to landowner agreement. Therefore, offsite compensatory planting if required would be detailed at the MSC stage.

5.8.10 The PAC Report (TWP, 2025) contains the full details of the feedback received throughout the evolution of the Proposed Development. Each topic chapter of the Onshore EIA Report contains a short summary table setting out how consultation relevant to that specialism was considered in the refinement of application design.

Landfall Design Refinement

5.8.11 The preferred Landfall zone was confirmed and maximum design scenarios developed following onshore, intertidal and near shore surveys, desk studies, landowner liaison and environmental/engineering appraisal as follows:

- Marine surveys undertaken along the Offshore Export Cable Corridor including:
  - Geophysical surveys;
  - Benthic subtidal surveys; and
  - Intertidal walkover surveys for benthic ecology and archaeology.
- Onshore surveys undertaken along the shoreline and within the landfall search areas including:
  - UK Habitat surveys;
  - Ornithology surveys;
  - Archaeology walkover surveys;

- Geotechnical surveys and testing of conglomerate material;
- Utilities research; and
- UXO Desk Based Assessment.

5.8.12 Following completion of intrusive GI at the preferred Landfall location, it was identified that underlying conglomerate material will present challenges to the proposed trenchless technique. Based on current findings, three trenchless installation options are under consideration: Horizontal Directional Drilling (HDD), Direct Pipe, and Micro Tunnel. Further design development will be progressed to evaluate these options in relation to electrical and geological parameters. Specialist input will be sought for each technique to inform the selection of the most appropriate solution for the final design.

Onshore Export Cable Corridor Selection

5.8.13 The Pre-FEED Onshore Export Cable Corridor was developed into the PPP Application Boundary through a process of design refinement through a variety of surveys, desk studies, consultation with the community and statutory consultees, landowner requirements and environmental/engineering appraisal as follows:

- Over-flown topographical survey;
- Landscape and viewpoint photography surveys;
- UK Habitat surveys, National Vegetation Classification and groundwater dependent terrestrial ecosystems (GWDTEs);
- UK protected species surveys;
- Feedback from Statutory Consultees (Aberdeenshire Council/SEPA/NatureScot/HES);
- Archaeology walkover surveys;
- Hydrological surveys;
- Baseline noise surveys;
- Traffic surveys; and
- Geotechnical surveys.

5.8.14 In addition to the above discussions with Network Rail, Shell, Ineos and National Gas, and Topographical Surveys influenced the designs and PPP application boundary.

5.8.15 Since the vast majority of environmental effects arising from a buried cable route occur during construction, design refinements have focused on the following key areas of mitigation:

- Use of trenchless crossings (e.g. Horizontal Directional Drilling, HDD) at key watercourses, the crossing of the railway line and major road crossings.
- Use of off-road haul roads to serve the cable construction sites removing the majority of construction traffic from narrow country lanes.
- Detailed consideration of access provision into and along the off-road haul roads prioritising access from major roads.
- Siting of strategic logistics compounds at either end of the cable route and half-way along it to minimise shuttling of construction materials.

- Use of locally quarried materials for construction and re-use of spoil generated by the works at the substation to achieve cut and fill balance.
- Protected species mitigation strategies to protect protected species and will include precautionary mitigation and good practice procedures. A Species Protection Plan will be developed at the MSC stage.

5.8.16 A full list of mitigation measures and environmental commitments is listed in Volume 2, Appendix 2.1: Schedule of Mitigation.

5.8.17 In general cable route corridor identification began with the approximate shortest distance in a straight line from the Landfall site to the Substation Search area.

5.8.18 The land from Benholm towards Fetteresso Forest is characterised by rolling hills and occasional deeply incised valleys with steep topography. The elevation of the land rises steeply to the west of the A92. Several small settlements, including Arbuthnott and Drumlithie, are present. There is also the presence of existing third-party infrastructure including several high pressure National Gas pipelines, the Forties Oil Pipeline, Shell N.G.L, the A90 and A92 roads and the main Dundee-Aberdeen railway line. There are also several watercourses, including the Bervie water, and blocks of ancient woodland. The area is also well known for a high level of designated and non-designated Cultural Heritage assets.

5.8.19 Whilst feasible route corridors were achievable, the complex topography and high level of environmental constraints meant that detailed route planning was required to optimise the buildability of the Proposed Development and avoid environmental impacts. Local landowner input also informed cable route identification. TWP has pursued a strategy of engagement with landowners and is using reasonable endeavours to acquire the necessary land and rights necessary by way of land option agreements through voluntary agreements. This includes the following:

- A land referencing exercise to identify landowners and other parties with an interest in the land.
- Engagement with landowners and/or their agents.
- Issuing of Heads of Terms in April 2025 with further engagement taking place with landowners and agents to seek to finalise commercial terms.

5.8.20 A routing exercise was carried using desk-based analysis of environmental data to map constraints and sensitive receptors such as environmental designations, existing infrastructure including major roads and rail lines and local topography. Potential onshore cable routes were identified based on a centreline with a 250 m buffer applied to either side to create an approximate 500 m wide corridor. Appraisals considered all constraints within this corridor.

5.8.21 Initial identification of potential cable corridors did not consider specific rural land uses expect for areas which would face significant disruption from cable construction including forestry, farm buildings or sheltered farming practices such as outbuildings. Potential routes were optimised for lower numbers of crossings and overall efficiency. The initial route corridor was designed to avoid shallow soils and slopes of >12°.

Cable Routes at Landfall

5.8.22 At the Landfall a number of cable routes were considered as shown on Figure 5.8 (Annex – Figures). The initial desk based option identified during pre-FEED was to the east of Nerther Benholm Farm (green route); however, due to proximity to the Benholm SSSI, Local Nature Conservation Site (LNCS) and Ancient Woodland, additional options (purple and red routes) were considered. The elevation rises steeply from the coast as you progress north-west towards the grid connection point. To the north-east there are multiple neighbouring properties, as such initially options were confined to the west of Tillgygrain. However, at the request of the landowner an additional option (orange) further north-east that would run parallel to an existing road was considered. The topography and proximity to multiple neighbouring properties led to this option being ruled out. The preferred option here subject to detailed design is the purple route, as it maintains separation with the residential receptors and is feasible from an engineering perspective.

Bervie Water

5.8.23 The topographical challenges during a site visit to the Bervie Water area necessitated a reassessment of the initial alignment proposed. The steep terrain and surrounding constraints required a more detailed approach to route development, taking into account both environmental and historical land use.

5.8.24 The options considered and the preferred indicative alignment are shown on Figure 5.9 (Annex – Figures), as described in Volume 1, Chapter 2 The Proposed Development this crossing is proposed as a trenchless solution (HDD) and the extent of which would take into account the flood risk areas.

National Infrastructure

5.8.25 The presence of third-party national infrastructure within the area, including the assets owned by Network Rail, National Gas, INEOS, and Shell, introduces engineering constraints. The alignment at these locations are developed to facilitate crossings at perpendicular angles wherever practicable and are proposed as HDD crossings as indicated in Volume 1: Chapter 2: The Proposed Development.

Newmill Route Selection

5.8.26 The complexity of the constraints present within the Newmill area, north of Drumlithie warranted careful consideration to facilitate the identification of a viable route that limited environmental effects and navigated the technical challenges at this location. The key objective for the assessment was to prioritise the route option with the least environmental impact whilst meeting engineering requirements, particularly in relation to the crossing of the existing high-pressure gas main, proximity to the railway line near an area with a historical land slide and fatal accident and the proposed alignment of the Tealing to Kintore OHL.

5.8.27 A RAG Environmental Assessment was therefore completed to assess potential Onshore Export Cable Corridors options near Newmill 2 km to the north of Drumlithie.

5.8.28 Multiple route options and combinations were assessed against several environmental criteria including biodiversity, geology and soils, terrestrial water environment, air quality, cultural heritage, landscape and visual, noise and vibration, population and human health and land use.

5.8.29 The preferred route corridor in this area will be subject to further detailed design, but an indicative route has been assessed within this EIA to allow meaningful assessment and confirmation of embedded mitigation as detailed in the topic chapters.

5.8.30 The options considered and the preferred option are shown on Figure 5.10 (Annex – Figures), the preferred option will require the crossing of the national gas pipeline twice, however, limits effects on the properties in this area and avoids crossing the proposed SSEN-T OHL and maintains reasonable separation from these assets.

Onshore Substation Refinement

5.8.31 The surveys noted in preceding sections have also informed the refinement of the Substation site layout which was the subject of modelling and assessment as follows:

- three dimensional modelling of photomontages from key viewpoints informing the position of the substation switchyard to maintain separation from the closest receptors, a maximum 15m building height restriction together with the development of landscape mitigation proposals to retain existing screening provided by surrounding forestry;
- hydraulic modelling of the potential runoff from the Substation leading to the sizing of conceptual drainage attenuation measures; and
- three dimensional modelling of the Substation operational noise characteristics ensuring that noise limits set by Aberdeenshire Council are able to be met.

5.9 Summary and Next Steps

5.9.1 TWP has used a transparent and systematic process to select preferred options for the siting and design of onshore electrical infrastructure. Important decision making milestones have been the subject of community consultation.

5.9.2 The PPP Application Boundary provides sufficient land within which the final design will be developed. Following grant of the PPP Application, detailed design work will culminate in further submissions to Aberdeenshire Council for the approval of MSC. These detailed applications will seek approval of specific details related to the Proposed Development such as the:

- Final Substation layout and landscaping scheme;
- Final means of access, enclosure, drainage, lighting etc;
- Final details of how the construction and operation of the Proposed Development will be managed to protect the environment and the community. Such plans include:
- Construction Environmental Management Plan;
- Construction Traffic Management Plan;

- Substation Landscape Mitigation Plan; and
- Habitat Management Plan (including biodiversity enhancement measures).

5.9.3 The MSC process, as further influenced by the community and stakeholders, will ultimately provide a full suite of detail within the parameters as set out and approved through the PPP including precise details of exactly where the cable route will be located as well as specific design details for the Substation. These details will adhere to the agreed design principles and seek to deliver a design which incorporates all stated mitigation, as identified in this Onshore EIA Report. The continued design evolution through this MSC process, within the agreed parameters will allow the Proposed Development to be fully accommodated into the locality.

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Annex – Figures

N

New Deer 2

Peterhead

New Deer-Hatton

Aberdeen

Fetteresso

Fiddes

Tealing

Dundee

Perth

Dunfermline

Edinburgh

0 50 km

Legend

- Onshore GCP
- Offshore hubs
- Landfall Search Area
- Bowdun Array Area
- Offshore Wind Farms
- Onshore Routing Area
- Offshore Routing Area

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
02	NOV 25	FINAL	CS	AH	IP	GG
Scale @ A4		Scale: 1:800,000	DO NOT SCALE			
Jacobs No.		B2487500				

Jacobs

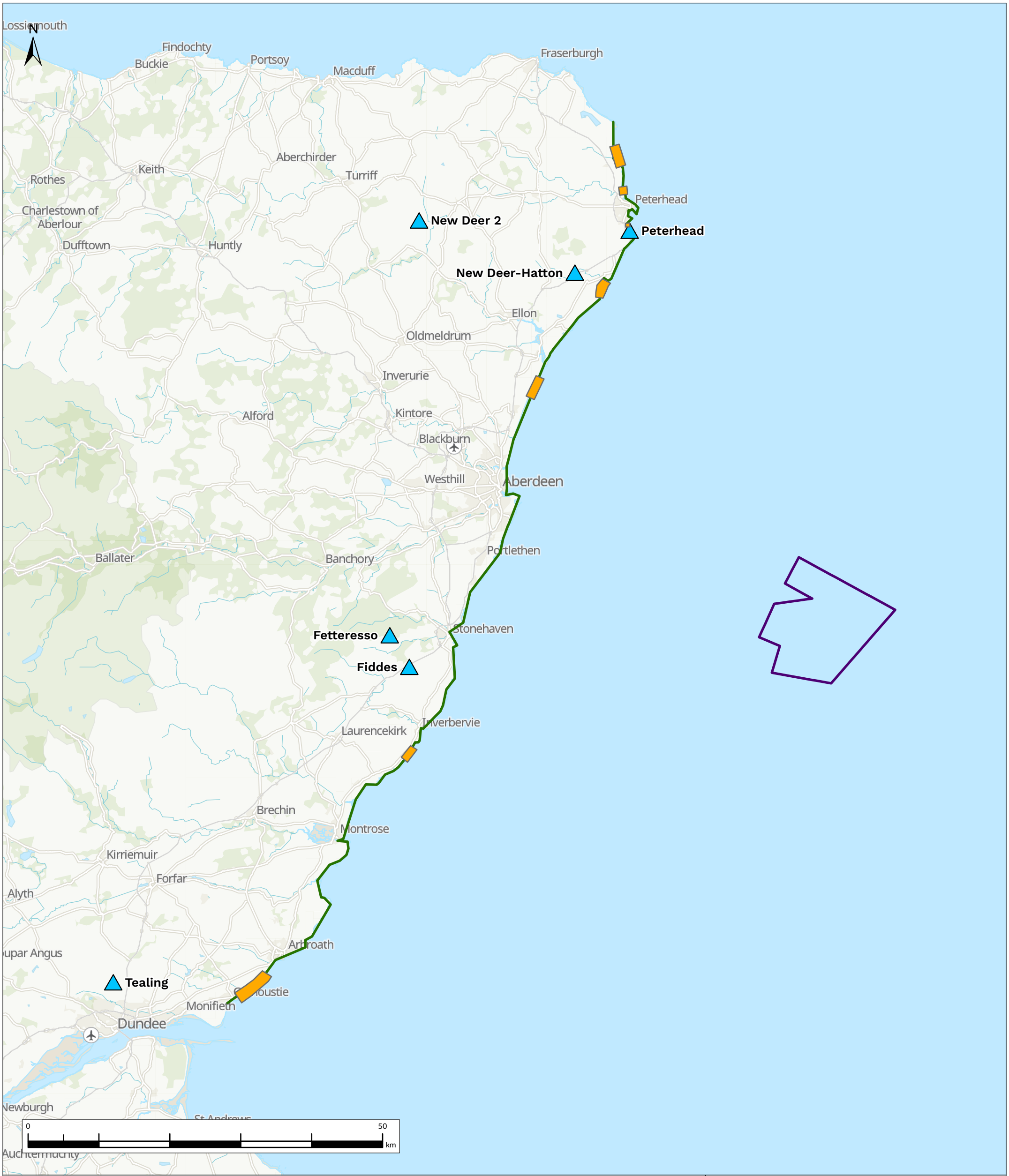
Client: THISTLE WIND PARTNERS

Project: Bowdun Offshore Wind Farm
Onshore EIA Report

Drawing Title: Early Grid Connection Options Considered for E3

Aconnex Number	Drawing Status
TWP-BOW-JCB-ENV-DWG-00015	FINAL

Figure 5.1



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Scale @ A4	Scale: 1:500,000	DO NOT SCALE				
Jacobs No.	B2487500					

Jacobs

Client: THISTLE WIND PARTNERS

Project: Bowdun Offshore Wind Farm
Onshore EIA Report

Drawing Title: Landfall Zones

Aconnex Number	Drawing Status
TWP-BOW-JCB-ENV-DWG-00016	FINAL

Figure 5.2

N

Portsoy
Macduff
Fraserburgh
Peterhead
Aberchirder
Turriff
Huntly
Ellon
Oldmeldrum
Inverurie
Alford
Kintore
Blackburn
Westhill
Aberdeen
Banchory
Portlethen
Stonehaven
Laurencekirk
Inverbervie
Brechin
Montrose
Arbroath
Carnoustie
Monifieth
St Andrews

0 25 km

Legend

- Bowdun Array Area

Coastal Character

- Beaches, Dunes and Links
- Cliffs and Rocky Coast
- Coastal Farmed Plain
- Raised Beach CoST

Bathymetry

High

Low

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
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Jacobs No.		B2487500				

Jacobs

Client: THISTLE WIND PARTNERS

Project: Bowdun Offshore Wind Farm
Onshore EIA Report

Drawing Title: Offshore Bathymetry and Coastal Characteristics

Aconnex Number	Drawing Status
TWP-BOW-JCB-ENV-DWG-00017	FINAL

Figure 5.3

N

Shakil Hill

A92

Brae Rd

Gourdon

Gourdon Hill or Bikhame Hill

The Coach House

Knoxhill House

Nether Benholm Cottages

Nether Knox Steading

E3.6(a)

Cotter House

E3.6(b)

Benholm

A92

E3.6(c)

Beeches Brae

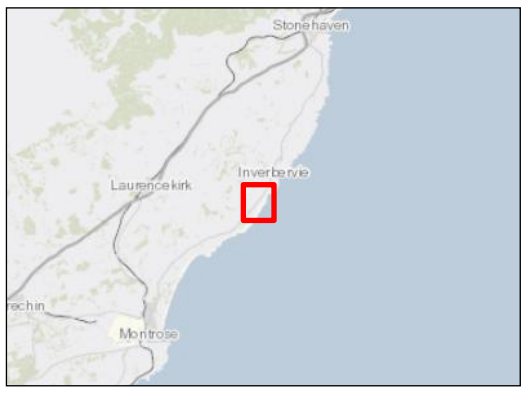
E3.6(d)

East Walk Plantation

0 0.5 km

Legend

- PPP Application Boundary
- Candidate Landfalls
- Category A Listed Building
- Category B Listed Building
- Possible Wreck
- Scheduled Monuments
- Local Nature Conservation Site
- Ancient Woodland
- Annex I Reef
- Benholm Landfall Zone



Jacobs

Client: THISTLE WIND PARTNERS

Project: Bowdun Offshore Wind Farm
Onshore EIA Report

Drawing Title: Candidate Landfall Sites Considered

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Jacobs No.		B2487500				

Aconnex Number: TWP-BOW-JCB-ENV-DWG-00018

Drawing Status: FINAL

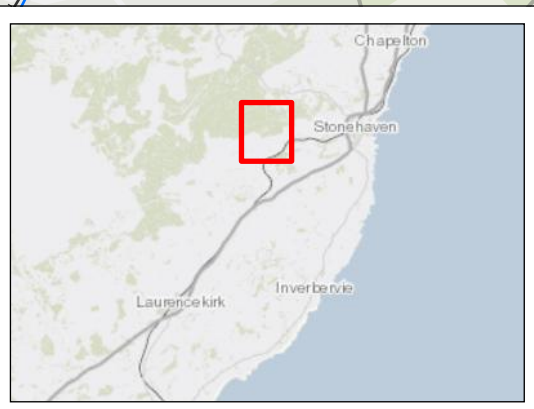
Figure 5.4

N

Stonehouse
West Kaim Hillock
Burn of Anaholans
Water Hill
Moss of Anaholans
Hill of Trusta
Whitehill
Smiddy Cottage
Hare Bog
Burn of Day
F12
F6
F5
F8
F10
F11
F1
F9
F4
F3
F7
F2
Foggy Moss
Whiting Burn
Elf Hill
The Steading
Upper Wyndin
Wester Wyndings
Hill of Quithel
Elfstone
Springwood
Burn of Annamuick
Upper Quithel
East Town Cottages
Annamuick Cottages
Nether Quithel Cottage
Quithel Cottage
Hillview Cottages
Tannachie Croft
Hill of Tannachie
Gowans
The Old Barn
Carmont Wood
Waters Farm
Seafield House
Carmont Hill
Mill of Newmill Cottage
Stony Hill
0
1
km

Legend

- PPP Application Boundary
- Scoping Cable Corridor
- 2km buffer from GCP
- Candidate Substation Sites
- Fetterresso substation
- Hurlie Indicative Substation Location
- Ancient Woodland
- Scheduled Monuments
- National Gas Pipeline
- 400m from Residential Properties
- Proposed SSEN-T TKUP OHL
- Existing SSEN HV OHL
- Railway Line



Jacobs

Client: THISTLE WIND PARTNERS

Project: Bowdun Offshore Wind Farm
Onshore EIA Report

Drawing Title: Substation Candidate Locations Considered

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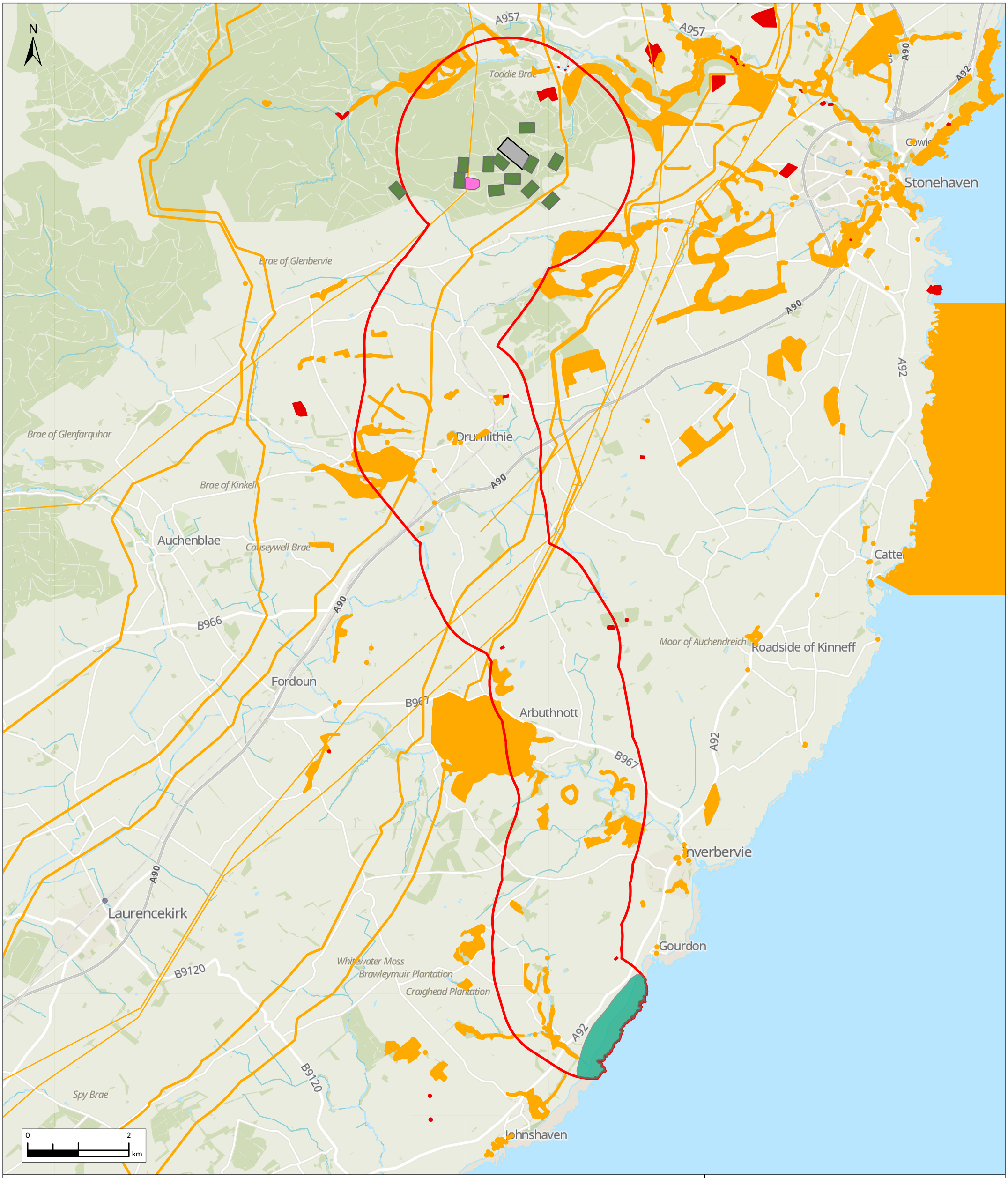
Jacobs No.		B2487500				

Aconnex Number: TWP-BOW-JCB-ENV-DWG-00019

Drawing Status: FINAL

Figure 5.5



Legend

- Onshore Export Cable Corridor Search Area
- Benholm Landfall Zone
- Candidate Substation Sites
- Fetterresso substation
- Hurlie Indicative Substation Location

Constraints

Status

- Amber
- Red

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Jacobs No.		B2487500				

Jacobs

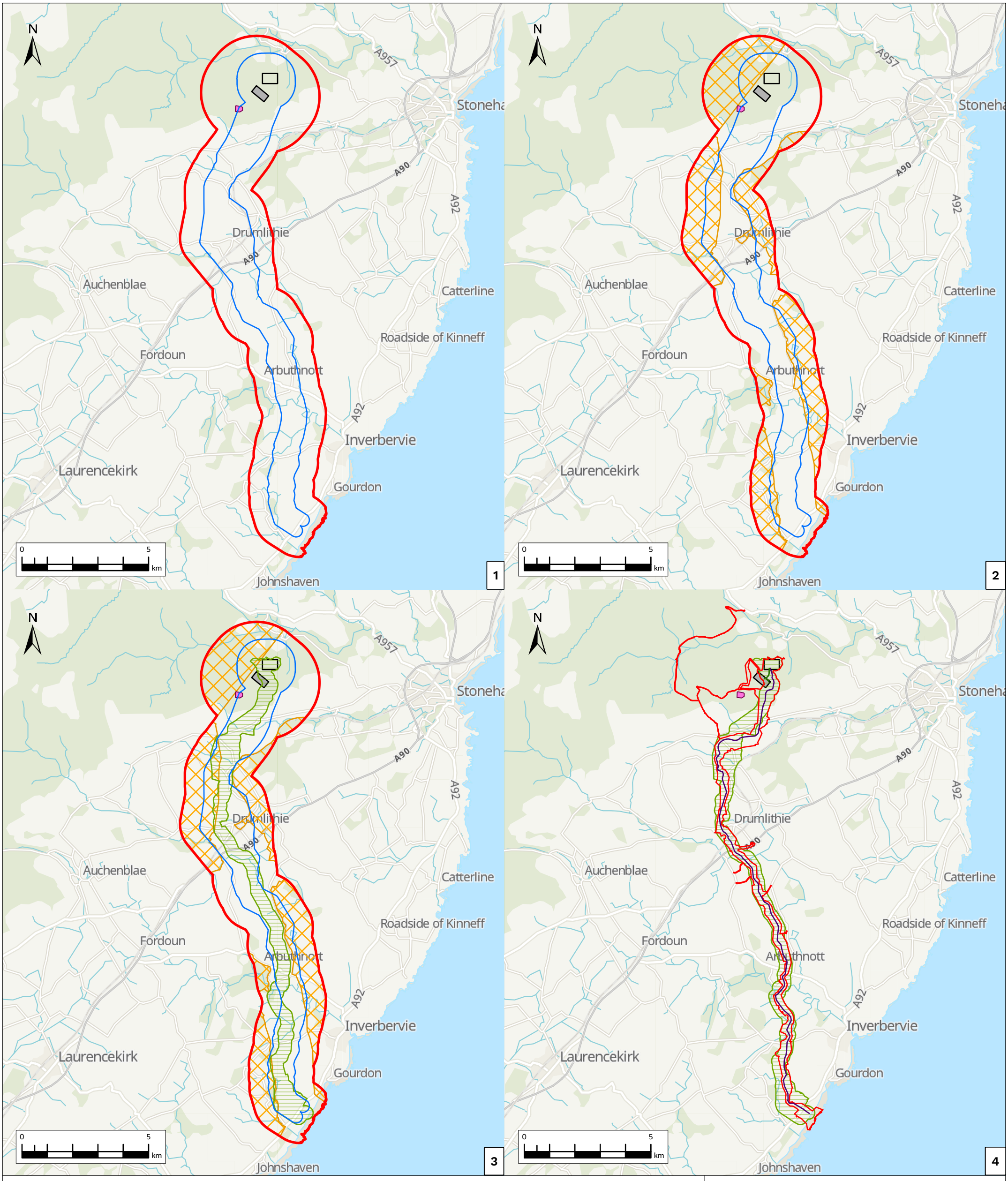
Client: THISTLE WIND PARTNERS

Project: Bowdun Offshore Wind Farm
Onshore EIA Report

Drawing Title: Onshore Export Cable Corridor Search Area

Aconnex Number	Drawing Status
TWP-BOW-JCB-ENV-DWG-00023	FINAL

Figure 5.6



Legend

- PPP Application Boundary
- Scoping Boundary
- Preferred Bowdun Onshore Substation Location
- Indicative 220/275 kV Cable Centreline
- Indicative 400 kV Cable Centreline
- Cable Search Area
- Refined Cable Search Area
- Fetteresso Substation
- Initial Constraints Mapping
- Hurlie Indicative Substation Location

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Jacobs

Client: THISTLE WIND PARTNERS

Project: Bowdun Offshore Wind Farm Onshore EIA Report

Drawing Title: Evolution of PPP Application Boundary from Scoping Boundary

Aconnex Number	Drawing Status
TWP-BOW-JCB-ENV-DWG-00024	FINAL

Figure 5.7

N

Burn of Benholm (SSSI)

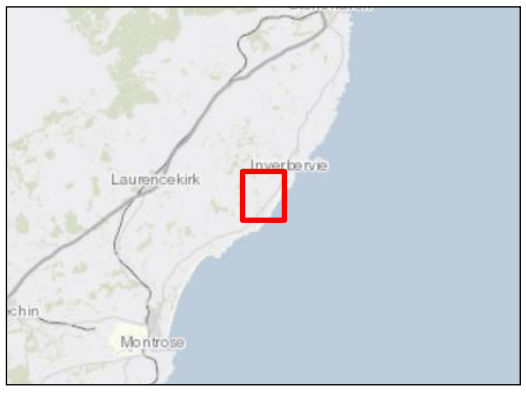
0 1 km

Legend

- Scoping Boundary

Landfall Cable Route Options

- Option 1 - COWI
- Option 2 - Alternative
- Option 3 - Preferred
- Option 4 - Alternative Land Owner Request
- Category A Listed Building
- Category B Listed Building
- Conservation Area
- Scheduled Monuments
- Ancient Woodland
- Local Nature Conservation Site
- Site of Special Scientific Interest (SSSI)
- Flood Zones



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Jacobs No.		B2487500				

Jacobs

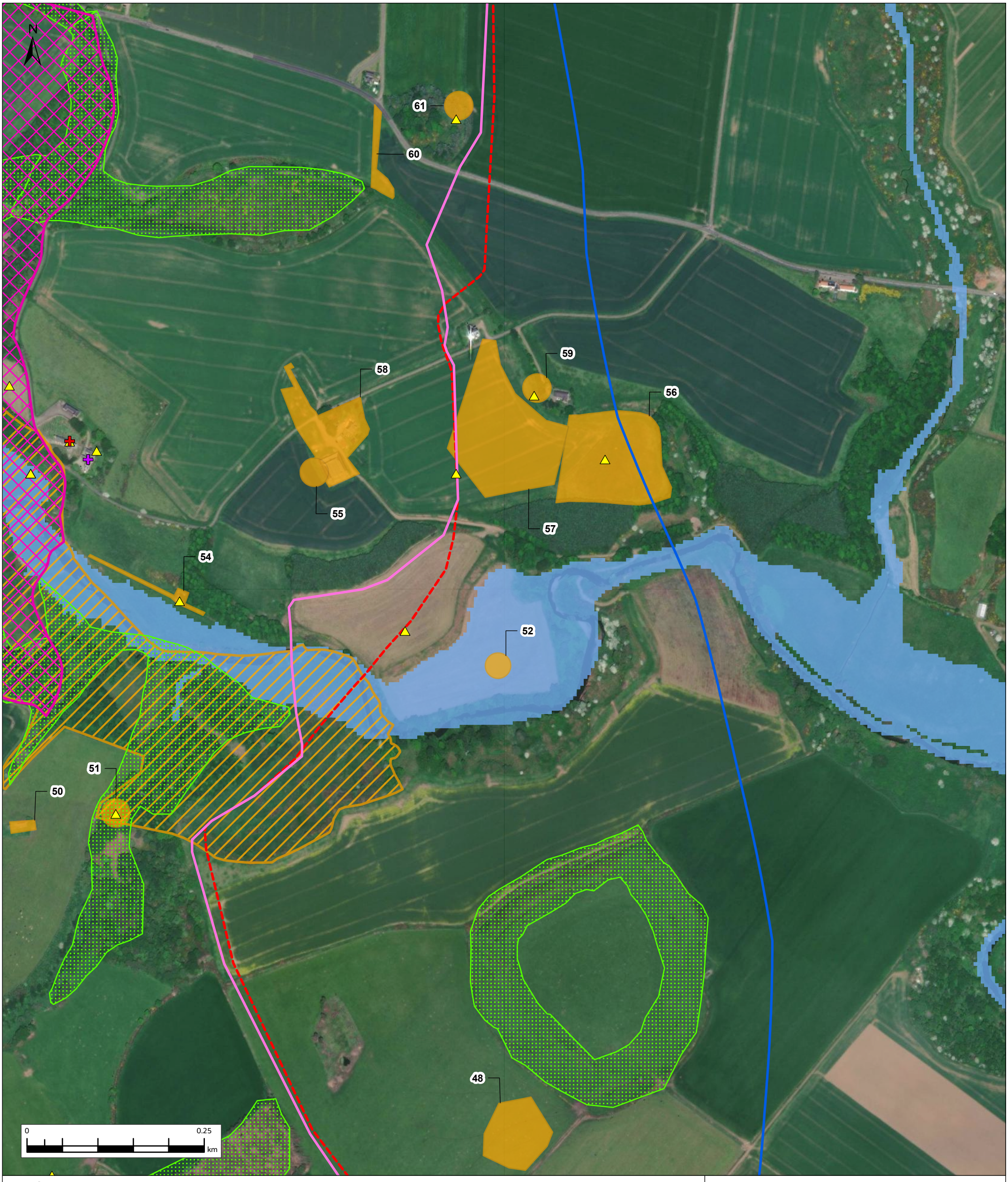
Client: THISTLE WIND PARTNERS

Project: Bowdun Offshore Wind Farm Onshore EIA Report

Drawing Title: Landfall Cable Route Options

Aconnex Number	Drawing Status
TWP-BOW-JCB-ENV-DWG-00025	FINAL

Figure 5.8



Legend

- Bervie Water Crossing Original route
- Cable Route Bervie Water Crossing Option 1
- Cable Route Bervie Water Crossing Option 2
- Category A Listed Building
- Category C Listed Building
- Canmore Sites
- Non-designated archaeological remains and historic buildings
- Local Nature Conservation Site
- Ancient Woodland
- Gardens and Designed Landscapes
- Flood Zones

Jacobs

Client: THISTLE WIND PARTNERS

Project: Bowdun Offshore Wind Farm
Onshore EIA Report

Drawing Title: Bervie Water Cable Route Options

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Jacobs No.		B2487500				

Aconnex Number: TWP-BOW-JCB-ENV-DWG-00026

Drawing Status: FINAL

Figure 5.9

N

Hill of Quithel
Upper Quithel
st Town Cottages
Hillview Cottages
Quithel Cottage
Nether Quithel Cottage
Tannachie Croft
Hill of Tannachie
Burn of Annamuick
Annamuick Cottages
Springwood
Elfstone
Elf Hillock
Wester Wyndi
Upper V
The Old Barn
Gowans
Cormond Wood
Carmont Hill
Waters Farm
Seafield House
Mill of Newmill Cottage
Blererno
Stony Hill
Carmont Cottages
Springing Greens
Keabog Farm Cottage
Jacksbank Wood
Pitdrichie Cottages
Long Den
Little Bogburn
Upper Kinmouth
Lower Foord
Whitehill Wood
Highland
Blackhill Wood
Forest Avenue
Quarrygate
East Kinmouth
Mid Kinmouth
West Kinmouth
Clearymuir Farmhouse
Hillrise
Clearymuir

0 500 m

Legend

- Bowdun Indicative Preferred Cable Route Centreline

Newmill Alternatives

- Option 1
- Option 2
- Option 3
- Option 4
- Option 5
- Scheduled Monuments
- Ancient Woodland
- Local Nature Conservation Site
- Flood Zones
- National Gas Pipeline
- Proposed SSEN-T TKUP OHL
- Existing SSEN HV OHL

Jacobs

Client: THISTLE WIND PARTNERS

Project: Bowdun Offshore Wind Farm Onshore EIA Report

Drawing Title: Newmill Cable Route Options

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Jacobs No.		B2487500				

Aconnex Number: TWP-BOW-JCB-ENV-DWG-00027

Drawing Status: FINAL

Figure 5.10