Environmental Impact Assessment Report
Volume 1, Chapter 3: Site Selection and Consideration of Alternatives

MarramWind Offshore Wind Farm

December 2025

MarramWind

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3. Site Selection and Consideration of Alternatives

3.1 Introduction

3.1.1 Overview

3.1.1.1 This Chapter presents the design evolution process through the development of Scoping, Statutory Consultation, and the Environmental Impact Assessment (EIA) Report. It summarises the site selection process, describes the alternatives considered, and the reasons for choosing the selected option(s). It also explains the outcomes of the process that have led to the refinement of the MarramWind Offshore Wind Farm (hereafter, referred to as 'the Project'), and the environmental considerations and other factors that have been taken into account.

3.1.1.2 The site selection process for the Project has been framed between two locations: the Option Agreement Area (OAA) in the marine environment and the point of grid connection onshore. All site selection, routing, optioneering and consideration of alternatives have taken place between these two defined locations.

3.1.1.3 Consideration of alternatives have been considered in relation to the location of the following key elements of the Project:

- OAA;
- array infrastructure;
- offshore export cable;
- reactive compensation platform(s) (RCPs);
- landfall(s);
- onshore export cable corridor; and
- onshore substations.

3.1.1.4 The site selection and consideration of alternatives assessment have employed optioneering methodologies, detailed in **Section 3.4**. Optioneering entails evaluating multiple options against pre-defined criteria to identify the most suitable solution. These options may concern locations, routing, installation methodologies, or technological design. This process is fundamental to informed decision-making where several viable possibilities exist.

3.1.2 Project infrastructure overview

3.1.2.1 Key elements of the offshore and onshore Project infrastructure are listed below. Detailed descriptions are provided in **Chapter 4: Project Description**.

Offshore infrastructure

3.1.2.2 The Project's offshore infrastructure (**Volume 2, Figure 4.1: Offshore Red Line Boundary**), located seaward of Mean High Water Springs, includes:

- wind turbine generators (WTGs), including floating units (platforms and station keeping systems);
- array cables;
- subsea distribution centres (SDCs);
- subsea substations;
- offshore substations;
- RCPs (if required); and
- offshore export cables to connect the offshore infrastructure to the landfall(s).

3.1.2.3 The maximum extent of the North East 7 (NE7) OAA is predetermined by the Sectoral Marine Plan (SMP) for Offshore Wind Energy (Scottish Government, 2020). NE7 is also defined as the development area within the Option to Lease Agreement held between the Applicant and Crown Estate Scotland. As such, the location and boundary of the NE7 OAA is fixed.

3.1.2.4 The SMP development process and OAA site are described in **Section 3.4.2**.

3.1.2.5 The WTGs, array cables, subsea distribution centres, and offshore substations will fall within the extent of the OAA.

3.1.2.6 High voltage alternating current (HVAC) transmission may require up to two RCP's at a location along the offshore cable corridor route. This is dependent on the total length of transmission from the offshore substation to the Scottish and Southern Electricity Network (SSEN) Netherton hub substation, with the RCPs expected to be approximately midway along the transmission route.

Onshore infrastructure

3.1.2.7 The Project's onshore infrastructure (**Volume 2, Figure 4.2: Red Line Boundary and indicative onshore infrastructure layout**), located landward of Mean Low Water Springs (MLWS) includes:

- landfall(s) – the infrastructure associated with landfall located above MLWS;
- underground onshore export cables running from the landfall(s) to the onshore substations;
- onshore substations co-located on one site;
- underground grid connection cables connecting the onshore substations to the grid connection point at SSEN Netherton Hub; and
- tie-in to the grid connection point (SSEN Netherton Hub at the SSEN Netherton Hub, which is a separate project and does not form part of the consenting applications that this EIA Report relates to).

3.1.2.8 The grid connection point (SSEN Netherton Hub) is described in **Section 3.4.2**. The grid connection location has been predetermined for the Project by the Holistic Network Design (HND) process and by SSEN's site selection process, and therefore, like the OAA location,

it can be considered a fixed parameter that the Project infrastructure must be developed to accommodate.

3.1.3 Legislation and policy context

3.1.3.1 The EIA Regulations (outlined in Section 2.3 of **Chapter 2: Legislative and Policy Context**) require that the EIA Report should include: *"a description of the reasonable alternatives studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects*".

3.1.3.2 This EIA Report and the design process for the Project has taken full consideration of the EIA Regulations and other relevant policy and legislative requirements of the consenting regimes and jurisdictions relevant to the Project, as described in **Chapter 2: Legislative and Policy Context**.

3.1.4 Consultation and engagement

3.1.4.1 Section 5.5 in **Chapter 5: Approach to the EIA** sets out the Project's approach to consultation and engagement.

3.1.4.2 **Volume 3, Appendix 5.1: Stakeholder Issues Responses** sets out the comments raised by stakeholders from pre-engagement, Scoping workshops, Scoping Opinions and post-Scoping workshops relevant to the site selection and consideration of alternatives and how these have been addressed in this EIA Report.

3.1.5 Chapter structure

3.1.5.1 The remainder of this Chapter is structured as follows:

- **Section 3.2: Project design principles** describes the Project's design principles; design evolution process; mitigation hierarchy; and assurance of design decisions;
- **Section 3.3: Consideration of alternatives** introduces the consideration of alternatives and cross refers to later sections;
- **Section 3.4: Optioneering and site selection methodology** outlines the structured iterative process and methodology used to identify and refine suitable locations for the Project's infrastructure, based on a combination of external drivers and internal project milestones;
- **Section 3.5: Landfall selection** describes the site selection for the landfall;
- **Section 3.6: Site selection of NE7 for MarramWind** outlines how the NE7 site was selected for MarramWind and the evaluation process that led to its selection during the ScotWind leasing round;
- **Section 3.7: Site selection and consideration of alternative within the OAA** describes the technology alternatives within the OAA;
- **Section 3.8: Offshore export cable corridor** describes the site selection process for the offshore export cable corridor and subsequent refinements to the offshore export cable route;
- **Section 3.9: Reactive compensation platform site selection** describes the site selection process for the RCP and subsequent refinements to the RCP;

- **Section 3.10: Onshore substation site selection** describes the site selection process for the location of the onshore substation site and subsequent refinements;
- **Section 3.11: Onshore export cable corridor selection** describes the site selection process for the onshore export cable corridor and subsequent refinements to the onshore export cable route;
- **Section 3.12: Development design and technologies** describes other potential technologies and why those rejected have not been selected;
- **Section 3.13: Conclusion** summarises the site selection and consideration of alternatives process for the Project;
- **Section 3.14: References**; and
- **Section 3.15: Glossary of terms and abbreviations**.

3.2 Project objectives and design principles

3.2.1 Project objectives

3.2.1.1 A series of Project-wide objectives have been developed to help ensure the development achieves specific goals. The Project objectives are:

- **Objective 1:** To export a significant volume of renewable electricity to the National Grid in support of United Kingdom (UK) and Scottish Government targets, ambitions and commitments for net zero emissions and offshore wind generation. This includes making an important contribution to the achievement of the Scottish Government's updated offshore wind ambition of 40 gigawatts (GW) of new deployment by 2035 to 2040.
- **Objective 2:** To increase security of supply for Scottish and UK consumers by being one of the largest floating offshore wind projects in Scottish waters.
- **Objective 3:** To support the realisation of Scotland's deep-water potential and maximise use of the available seabed in synergy with other users.
- **Objective 4:** To support and secure the development of the Scottish supply chain by being one of the largest floating offshore wind projects in Scottish waters, providing continuity and security for supply chain development.
- **Objective 5:** To drive technological innovation with the aim of lowering the costs to Scottish and UK consumers.
- **Objective 6:** To support socio-economic growth in Scotland and contribute to achieving a Just Transition.

3.2.1.2 Achieving these objectives is to be undertaken in an economic and efficient manner, compliant with relevant legislation, and with due regard for environmental impact and stakeholders interests. The project-wide objectives underpin the Project design principles, design decisions and the refinement of the design envelope through site selection and the consideration of alternatives.

3.2.1.3 Further detail on the benefits of the Project and the rationales that underpin the Project objectives is provided in the **Offshore Planning Statement** and the **Onshore Planning Statement**.

3.2.2 Project specific design principles

3.2.2.1 Based on these objectives, the site selection and consideration of alternatives process has been informed by the following key design principles:

- selection of the shortest feasible onshore export cable route to minimise environmental and amenity impacts and reduce transmission losses;
- avoidance of key sensitive features where possible and adherence to the mitigation hierarchy where avoidance is not feasible (see **Section 3.2.4**);
- avoidance or minimisation of interaction with features with associated construction risk or technical challenges;
- avoidance or minimisation of impact on populated areas and sensitive stakeholder locations such as schools and hospitals, in line with the mitigation hierarchy; and
- identification of site and corridor options of sufficient size to accommodate the required infrastructure.

3.2.3 Design evolution process

3.2.3.1 The design evolution process adopted for the Project is a fundamental element of the EIA. The Project's design evolution has aimed to be systematic, analytical, impartial, consultative and iterative allowing opportunities for environmental and planning policy constraints to be addressed, alongside the technical and economic considerations for the Project.

3.2.3.2 The process is iterative and has enabled the development of environmental measures that have been embedded directly into the design of the Project. These are referred to as 'embedded environmental measures' (discussed in further detail in **Chapter 5: Approach to the EIA**).

3.2.3.3 From the outset, environment considerations have been central to the Project's design. This is demonstrated through the development of the Commitments Register (**Volume 3, Appendix 5.2: Commitments Register**), which was initially presented in the Scoping Report (MarramWind Limited, 2023), updated following the Statutory Consultation, and has further refined at the EIA Report stage as the design evolved and more information became available.

3.2.3.4 The process has involved engagement and consultation, providing opportunities for stakeholders to provide feedback and to understand and influence the design as it progresses. **Section 3.1.4** describes where engagement has informed site selection, consideration of alternatives or a change to the design.

3.2.3.5 Engagement and consultation will continue to develop following the submission of the application, through the detailed design process.

3.2.3.6 At each stage in the evolution of the Project, the following activities, where appropriate were undertaken to consider alternatives and to refine the design. This included the following activities, where appropriate:

- updating of constraints mapping as new environmental information became available;
- analysis of information collection from EIA surveys;
- identification of technical construction challenges and engineering considerations;
- collaborative working with technical environmental specialists and engineers;
- detailed review of land ownership;

- engagement with stakeholders including other offshore wind developers and landowners; and
- considering feedback from Statutory Consultation.

3.2.3.7 With this approach to design, MarramWind Limited, (hereafter, referred to as 'the Applicant') is seeking to achieve a sustainable and environmentally appropriate design for the Project, one that will meet operational requirements at the same time as limiting and mitigating the environmental effects of the Project as far as practicable.

3.2.4 Mitigation hierarchy

3.2.4.1 The mitigation hierarchy (including identification of environmental mitigation measures) is a fundamental principle in design evolution that indicates the order in which the impacts of a development should be considered and addressed. The EIA Regulations define the mitigation hierarchy as follows:

- avoid;
- prevent;
- reduce; and
- offset.

3.2.4.2 The Institute of Environmental Management and Assessment (IEMA) Implementing the Mitigation Hierarchy from Concept to Construction (2024) states that the mitigation hierarchy is

> "*A systematic approach used to minimise adverse effects of a project or scheme on the environment and people. It is a series of steps or principles to guide decision-making and prioritise activity. The hierarchy comprises four stages, with the most desirable first: avoid, prevent, reduce and, finally, offset. The hierarchy indicates that avoidance is the priority and offsetting should only be relied on as a last resort*."

3.2.4.3 Robust application of the mitigation hierarchy has been followed throughout the site selection and design iteration process and also applied more widely on the Project.

3.2.4.4 The iterative design process has integrated the advice and expertise of environmental specialists who conducted the analyses informing this EIA Report, alongside regular collaboration with the Project's design teams. This has ensured that the design evolution reflects a comprehensive understanding of environmental sensitivities and that the mitigation hierarchy has been consistently applied.

3.2.5 Assurance of design decisions

3.2.5.1 Throughout the design evolution process, a number of design decisions have been made in response to the environmental constraints and technical challenges identified during the optioneering and EIA process and through stakeholder feedback. These have been progressed through discussion and interaction between the Applicant's development and engineering teams, as well as relevant environmental teams prior to the final design envelope being agreed for inclusion in the consent applications.

3.2.5.2 All design decisions have been made via a rigorous assurance process to agree and commit to the design decisions being made via a Technical Committee, Development Committee and a Board of Directors. Design decisions have been made from a well-informed position with a holistic consideration of all Project design principles, the mitigation hierarchy, and stakeholder views.

3.3 Consideration of alternatives

3.3.1 Scope

3.3.1.1 The EIA Regulations requires the Applicant to include in the EIA Report, a description of the reasonable alternatives, which are relevant to the Project and its specific characteristics, along with explanation of the main reasons for selecting the preferred option, taking into account the Project environment effects.

3.3.1.2 **Section 3.6** to **Section 3.11** describe the reasonable alternatives considered by the Applicant, including the rational for selecting the preferred option.

3.3.1.3 The scope of this assessment includes all infrastructure located between two fixed locations: the OAA and the grid connection point at the SSEN Netherton Hub. These fixed features and their geographical context are introduced below, along with the offshore and onshore infrastructure elements subject to optioneering.

Option Agreement Area

3.3.1.4 The OAA, shown in **Volume 2, Figure 3.1: MarramWind Option Agreement Area** is located approximately 75 kilometres (km) from the Aberdeenshire coast at its closest distance to shore, and covers a surface area of 684km^2. The water depth within the OAA ranges from 87.8 metres (m) to 133.7m.

3.3.1.5 There are numerous other wind farms under development in the wider area (as shown in **Volume 2, Figure 3.1**), both from the ScotWind leasing process and also from a separate leasing process, 'Innovation and Targeted Oil and Gas' (INTOG), which aims to provide development areas for demonstrator and decarbonisation projects.

Grid connection

3.3.1.6 The connection point for the Project (full 3GW) is the SSEN Netherton Hub; a new facility currently under development by SSEN.

3.3.1.7 The SSEN Netherton Hub site is located approximately 6km to the west of Peterhead, close to Longside Airfield and the village of Longside. The A90 runs along its northern boundary. The planning application boundary for SSEN Netherton Hub covers approximately 230 hectares (ha).

3.3.1.8 SSEN Netherton Hub includes:

- a high voltage direct current (HVDC) switching station;
- two HVDC Converter Stations, one intended for the Spittal to Peterhead Interconnector and the other for Eastern Green Link 3 (EGL3);
- a 132 kilovolt (kV) substation; and
- a 400kV substation.

3.3.1.9 The Project will connect to the 400kV substation.

3.3.2 Site selection

3.3.2.1 The location of the OAA was agreed with Crown Estate Scotland (CES) prior to commencement of the EIA process (see **Section 3.4.2** for details). As such, the location of

the OAA is fixed for the purposes of site selection to inform EIA, and so alternative geographical locations for this endpoint were not considered.

3.3.2.2 The grid connection location at the SSEN Netherton Hub was proposed by the HND Report and sited by SSEN. This presented a direct radial connection for the Project which obviated the need for an approximately 30km onshore route to New Deer (as would have been required under the original connection agreement). The proposed connection point was therefore considered to provide a considerable reduction in potential impact to the onshore environment in particular, and acceptable to the Project in general.

3.3.2.3 However, the locations and corridors of all infrastructure between these fixed points, within the OAA and connecting to the SSEN Netherton Hub, are within the Applicant remit to optimise, propose and justify. A rigorous optioneering process has therefore been undertaken (see **Sections 3.5** to **3.11**) to identify all viable options for each infrastructure element and to compare and select those that will minimise environmental and community impacts.

3.3.2.4 The key infrastructure elements for which locations / corridors have been determined via an optioneering process, and the sections of this Chapter in which the outcomes of such processes are described, are summarised in **Table 3.1**.

Table 3.1 Summary of infrastructure subject to optioneering

Jurisdiction	Infrastructure	Section
Offshore / onshore	Landfall sites.	**3.5**
Offshore	OAA.	**3.6**
	Offshore export cable corridor.	**3.7**
	RCP sites.	**3.9**
Onshore	Onshore substation sites.	**3.10**
	Onshore export cable corridor (from landfall to the onshore substations and from onshore substations to SSEN Netherton Hub).	**3.11**

3.3.2.5 The exploration and comparison of geographical alternatives has been a major consideration in the development of the Project, as described in **Chapter 4: Project Description**, and the development of the associated Red Line Boundary.

3.3.2.6 **Section 3.12** sets out the reasonable alternatives that have been considered by the Applicant in relation to technology, including an explanation for selecting the chosen option.

3.4 Optioneering and site selection methodology

3.4.1 Overview

3.4.1.1 In order to understand the stages, that have been followed to optimise the locations of the infrastructure contained within the Red Line Boundary (as summarised in **Table 3.1**), it is important to acknowledge a number of external milestones that have informed the optioneering and site selection process.

3.4.1.2 In parallel, there have also been a series of development milestones that have shaped the optioneering and site selection process. At each milestone, the Project has become more precisely defined, and the area of interest has been progressively refined.

3.4.2 External milestones

ScotWind Leasing and OAA definition

3.4.2.1 In November 2017, CES revealed plans to initiate a leasing round for large-scale offshore wind energy projects within Scottish waters. The SMP for Offshore Wind Energy (Scottish Government, 2020) provided a spatial framework for the ScotWind leasing round by identifying areas of the seabed that could be made available for leasing by CES.

3.4.2.2 In April 2022, the Marine Directorate commenced an Iterative Plan Review of the SMP, followed by a Call for Evidence from ScotWind Developers in September 2022.

3.4.2.3 CES launched the first ScotWind Leasing Round in 2020, allowing developers to apply for the rights to construct offshore wind farms in specified lease areas, initially based on the Draft Plan Options outlined in the draft SMP in 2019.

3.4.2.4 These Draft Plan Options were subject to consultation and refinement by CES, with revised Plan Options made available for developers to consider.

3.4.2.5 By April 2022, 17 ScotWind projects had secured seabed Option Agreements. A further three projects were added through the ScotWind in August 2022, two of which later merged into a single project. In total, there are now 19 ScotWind projects with a total capacity of up to 32.3GW (Offshore Wind Scotland, 2025).

3.4.2.6 MarramWind is one of these successful projects, occupying the OAA identified under the SMP as ‘NE7’. The OAA is the area within which the turbine array and ancillary offshore infrastructure will be located.

3.4.2.7 The Marine Directorate is currently updated the SMP. It held a consultation on the Draft Updated SMP, which closed for responses on 22 August 2025. ScottishPower Renewables submitted a supportive consultation response on 20 August 2025.

Holistic Network Design

3.4.2.8 The HND report was published in July 2022 by the National Electricity System Operator (NESO) (NESO, 2022), with the aim of establishing a recommended offshore and onshore network design to accommodate an anticipated 50GW of future offshore wind capacity by 2030. The 2022 report, however, focuses on an initial combined 23GW of wind projects, including 11GW of projects successful in the ScotWind leasing round.

3.4.2.9 The Project is identified in the report as ‘SW_NE7’ (North Sea – North East Scotland), with a capacity of 1.5GW. The report acknowledges that this does not reflect the full 3GW capacity of the Project, noting:

> *"This generator has a connection contract for 3000 MW, currently divided into two stages (1000MW followed by 2000MW). The capacity of 1500MW reflects an alternative staging arrangement which takes account of the developer's intention to use HVDC technology. Only 1500 MW is included in this phase of the HND due to limitations on the total amount of ScotWind generation considered in this phase, but we expect to include its full capacity in the follow up exercise."* (NESO, 2022).

3.4.2.10 In March 2024, NESO published the Beyond 2030 report (NESO, 2024), which presented the ScotWind elements of the HND Follow Up Exercise (FUE). This report confirmed that the full 3GW connection for the Project will be at Peterhead (specifically 'Longside: Peterhead 2').

Grid connection siting

3.4.2.11 Further to the HND developments described above, discussion held between the Application and NESO confirmed that a new substation facility was to be built by SSEN in the Peterhead vicinity. A dialogue was subsequently established between the Applicant and SSEN in early 2023 to understand the state of progression of optioneering of this site and the timeline for its confirmation and subsequent delivery.

3.4.2.12 In January 2023, SSEN published a booklet in support of their public consultation process which reviewed 13 potential sites considered for the new substation site and identified four as preferred. Of these, three were grouped to the southwest of Peterhead, close to the A90, and one was 5km due west of Peterhead.

3.4.2.13 This was followed up in April 2023 by a second consultation booklet. This instalment provided justification for the final selection of the site 5km west of Peterhead (and exclusion of the other three), which was later given the name 'SSEN Netherton Hub'.

3.4.2.14 This provided certainty for the Project over the specific location of the allocated grid connection point (although at this time it was only the first 1.5GW which was assured; the second 1.5GW being confirmed later in the Beyond 2030 Report).

3.4.3 Project development milestones

3.4.3.1 The Project has undergone four key development milestones have shaped the design evolution process since the OAA was awarded in 2022. These are defined as:

- Scoping;
- Statutory Consultation round 1;
- Statutory Consultation round 2, and
- establishment of a Red Line Boundary for EIA.

3.4.3.2 A fifth development milestone occurred in Autumn 2025 with Statutory Consultation round 3 and 4 held in Aberdeenshire. These were held to inform stakeholders of the final design prior to consent submission rather than to inform design as per previous rounds of Statutory Consultation.

Scoping

3.4.3.3 The Scoping Report was developed in 2022 and submitted to Marine Directorate – Licensing Operations Team (MD-LOT) and Aberdeenshire Council in January 2023 (MarramWind Limited, 2023).

3.4.3.4 The Scoping Report aimed to provide stakeholders with information on the Project in order to:

- refine the scope of the assessment;
- focus on the key issues and engagement on the key topics to be addressed; and
- provide the baseline data sources and assessment methodologies to be used in the EIA Report.

3.4.3.5 The Scoping process establishes which aspects of the environment are likely to be significantly affected by the Project, which requires identification of:

- the people and environmental resources (collectively known as 'receptors' or ‘features’) that could be significantly affected by the Project; and
- the work required to take forward the assessment of these potentially significant effects.

3.4.3.6 Scoping occurs before a project is at an advanced or fixed stage of engineering design. This allows the stakeholder feedback obtained via the Scoping Opinion to be used to inform the ongoing design evolution of the Project. The resultant EIA Report will be based upon the Scoping Opinion this is received in response to the formal request for Scoping Opinion (supported by the Scoping Report).

3.4.3.7 A key element of the Scoping process is the selection of an appropriate Scoping Boundary. The Scoping Report (MarramWind Limited, 2023) is based on a Scoping Boundary. It is defined as the area within which the Project and associated infrastructure will be located, including the temporary and permanent construction and operational work areas. The Scoping boundary is presented in **Volume 2, Figure 3.2: Scoping Boundary**.

3.4.3.8 Further information on how the Scoping Boundary was established is presented in **Sections 3.5** to **3.11**.

Statutory Consultation rounds 1 and 2

3.4.3.9 Section 5.5 in **Chapter 5: Approach to the EIA** sets out the Project's approach to consultation and engagement.

3.4.3.10 In line with the legislation and pre-application consultation (PAC) requirements of the consenting regimes and jurisdictions relevant to the Project (see the **PAC Report** for detail), several rounds of Statutory Consultation have been undertaken.

3.4.3.11 The aims of the first two rounds of Statutory Consultation were to understand key local issues and gather views from the community, statutory consultees, the wider public and all interested in the Project to:

- seek the views and concerns of all interested parties so that these align with statutory requirements to ‘take account of views’ and give feedback on how views raised have been considered;
- provide all members of the communities local to the Project with access to the Applicant, to enable dialogue with interested stakeholders, and record their views on the Project;
- initiate relationships with community councils with a geographic interest in the Project;

- assist informing of the selection of the offshore and onshore export cable corridors within the export cable search areas, and the onshore substation site and location within the substation search area;
- provide an understanding of the relationship between the proposed onshore and offshore infrastructure;
- identify suitable mitigation measures; and
- comply with relevant regulations.

3.4.3.12 The first round of Statutory Consultation took place from 27 May to 1 July 2024. In person public drop-in sessions were held on 6 June and 7 June 2024. Online Q&A events were held on 30 May and 26 June 2024.

3.4.3.13 The second round of Statutory Consultation took place from 9 October to 19 November 2024. Public drop-in sessions were held on 29 and 30 October. Online Q&A events were held on 7 October and 7 November.

3.4.3.14 The aims of the third and fourth rounds of Statutory Consultation were to provide Project updates based on previous consultation and gather views from the community, statutory consultees, the wider public and all interested in the Project. These rounds of Statutory Consultation also presented the Red Line Boundary for EIA to stakeholders. Key focusses of Statutory Consultation 3 and 4 were to provide information on and gather feedback on proposed mitigation to minimise effects of the Project on people, communities and the environment.

3.4.3.15 The third round of Statutory Consultation took place from 18 August to 9 September 2025 with a public drop-in session on 27 August 2025.

3.4.3.16 The fourth round of Statutory Consultation took place from 30 October to 13 November 2025. A public drop-in session was held on 3 November 2025.

3.4.3.17 The **PAC Report** sets out the comments raised by stakeholders from Statutory Consultation.

3.4.4 Selection stages

3.4.4.1 The optioneering and site selection process has been conducted in a series of stages ('selection stages' 1 to 4), relating to the external and Project development milestones identified in **Section 3.4.2** and **Section 3.4.3**.

3.4.4.2 **Plate 3.1** shows the temporal spread of these selection stages in relation to the external and Project development milestones, and **Table 3.2**Table 3.2 provides a summary of the factors that have informed each stage of development.

3.4.4.3 The four selection stages provide a sequential breakdown of the progress of optioneering and site selection of the different infrastructure elements, as detailed in **Sections 3.5** to **Section 3.11**, allowing the state of development of each element to be considered in relation to the overall Project.

Plate 3.1 Key milestones / stages in optioneering and site selection process

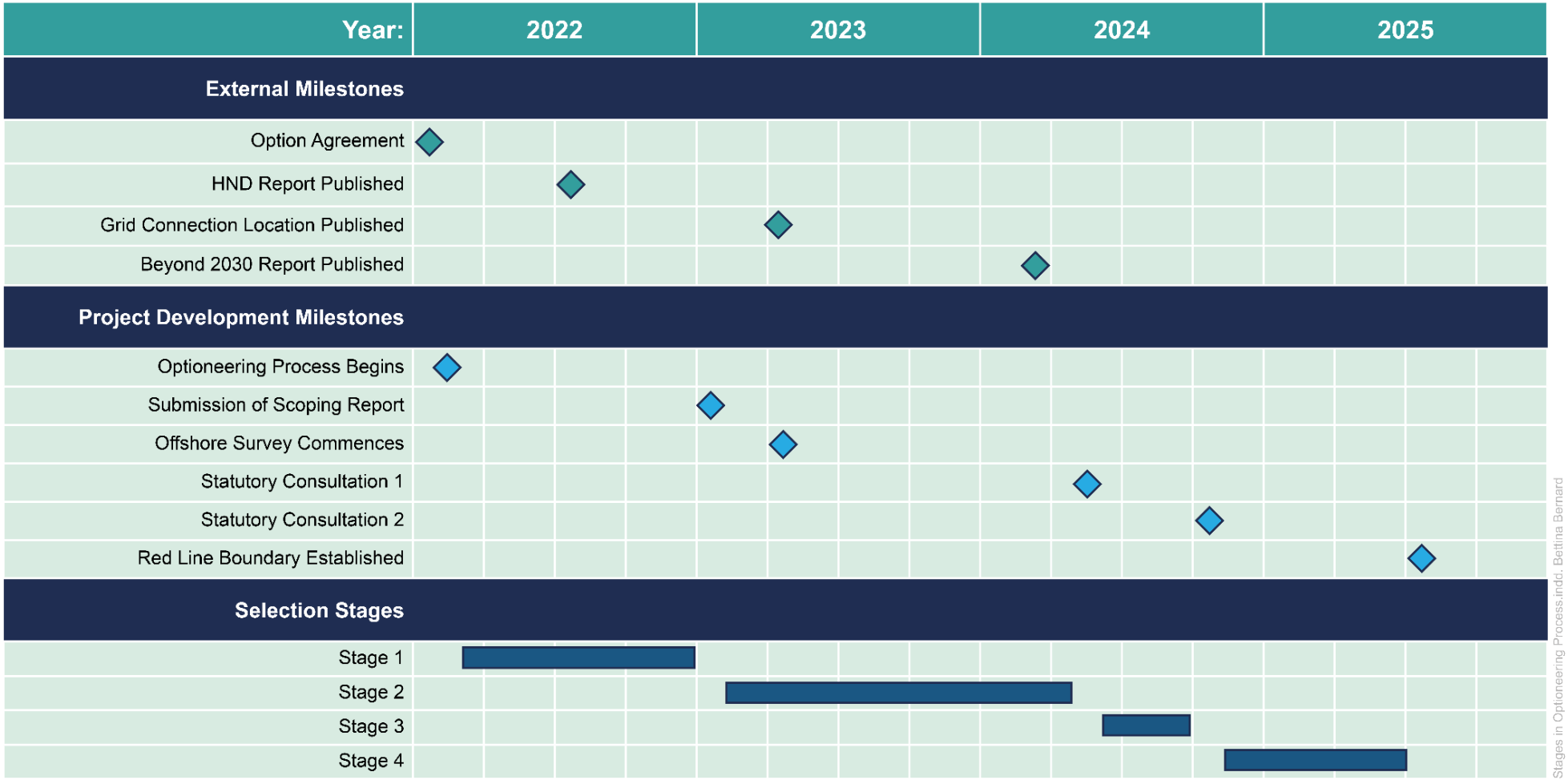


Table 3.2 Summary of the selection stages

Selection stage	Starting point	Finishing point	Commentary
1	**Commencement of optioneering process** • NE7 secured as the OAA for the 3GW Project. • Prior to publication of HND Report. • Project held grid connection agreement at New Deer. • It was understood that this was likely to be replaced by a grid connection agreement at Peterhead, depending on outcome of HND.	**Submission of Scoping Report based on Scoping Boundary** • The HND Report was published within this period; advising a first 1.5GW connection to Peterhead. • Landfall search area identified to serve both potential connection points (New Deer and Peterhead). • Speculative work undertaken to identify and compare export cable routes and site options onshore and offshore.	• At this stage, the first 1.5GW connection was known to be in the vicinity of Peterhead, but the site location was not known (new substation was to be built). • The HND report did not identify the specific location of the second 1.5GW connection. • Scoping was therefore conducted on the basis of a Scoping Boundary that could accommodate connections to New Deer and Peterhead.
2	**Scoping Report submitted** • Identification of the Peterhead grid connection point location was anticipated. • The scope and extent of the marine survey was pending and required a defined corridor.	**Statutory Consultation 1** • Landfall zones compared and shortlisted to support a connection at SSEN Netherton Hub (full 3GW). • Export cable corridor route and site options investigated onshore and offshore to support known connection point.	• Peterhead grid connection point location was known (SSEN Netherton Hub). • HND FUE Report confirmed second 1.5GW connection to Peterhead.

Selection stage	Starting point	Finishing point	Commentary
3	**End of Statutory Consultation 1 (feedback received).**	**Statutory Consultation 2** • Preferred export cable corridor route and site options identified.	• Statutory Consultation 1 feedback informed optioneering process and focussing in on preferred options. • Development of plans for neighbouring projects was also a key consideration.
4	**End of Statutory Consultation 2 (feedback received).**	**Establishment of the Red Line Boundary for EIA.**	• Statutory Consultation 2 feedback informed optioneering process and zeroing in on preferred options. Red Line Boundary established for EIA.

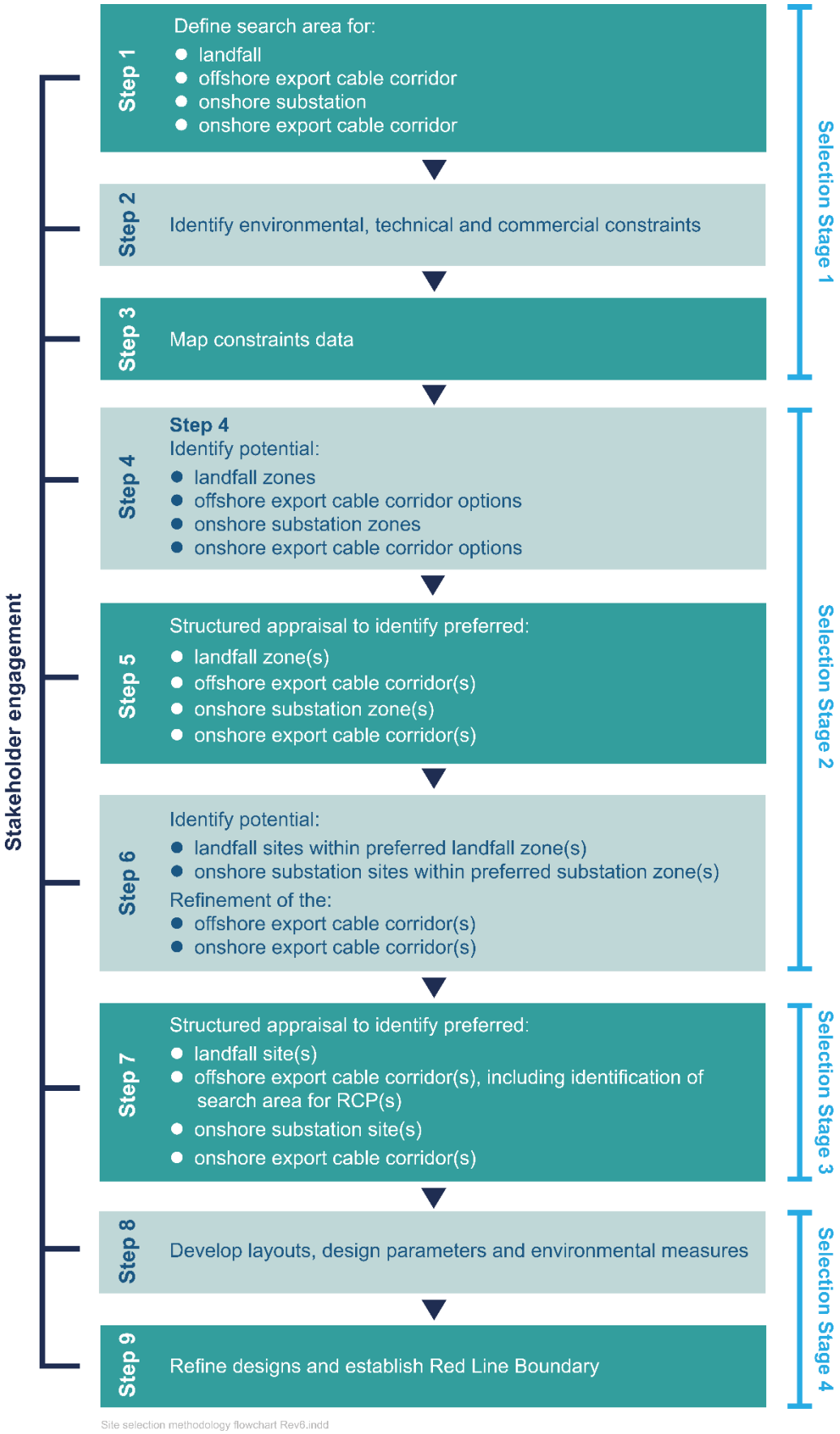
3.4.5 Methodology

3.4.5.1 The Section outlines the general methodology applied to the optioneering and site selection process, including:

- the sequence used to narrow down preferred sites and corridors;
- the assessment criteria applied;
- the iterative nature of the process; and
- the interdependencies between infrastructure elements.

3.4.5.2 Selection, assessment and shortlisting of infrastructure elements that are subject to optioneering (as identified in **Table 3.1**) has been conducted based on the sequence shown in **Plate 3.2**.

Plate 3.2 Optioneering and site selection sequence



3.4.5.3 The first step was to define assessment criteria for each infrastructure element. These varied by element but were aligned with the principles set out in **Section 3.4**.

3.4.5.4 A broad search area was then identified to encompass all reasonable route options between the OAA and the grid connection point. In some cases options were limited by spatial constraints (for instance, proximity to grid),

3.4.5.5 To focus efforts in the onshore environment, the search area was divided into 'zones' based on shared characteristics and the avoidance of 'hard' constraints (for examples major obstacles to development). This enabled broad screening and prioritisation of suitable areas.

3.4.5.6 Within each zone distinct site or corridor options were identified based on natural or built boundaries (for example, rivers, roads, tree lines).

3.4.5.7 In the offshore environment, zoning was not required due to the broader and more dispersed nature of constraints.

3.4.5.8 Identified options were then appraised against the assessment criteria to determine their technical, environmental and economic viability. This process was iterative and refined as more information became available.

3.4.5.9 Iterations occurred at each selection stage (see **Section 3.4.4**) and as new data emerged, including:

- completion of detailed assessments (for example. site access);
- desk studies (for example utilities, historic environment and contamination);
- site visits;
- ecology survey results;
- updates from external stakeholders (for example SSEN); and
- stakeholder feedback.

3.4.5.10 Infrastructure elements were not assessed in isolation. Where one element (for example landfall) clearly outperformed others, it influenced the selection of related elements (for example cable routes). Trade-offs were considered to identify the least impactful overall combination.

3.4.5.11 The overall aim was to select a landfall, onshore export cable corridor, onshore substation site and offshore export cable corridor that together formed the most balanced and environmentally appropriate solution.

3.5 Landfall selection

3.5.1 Selection stage 1: Scoping Boundary

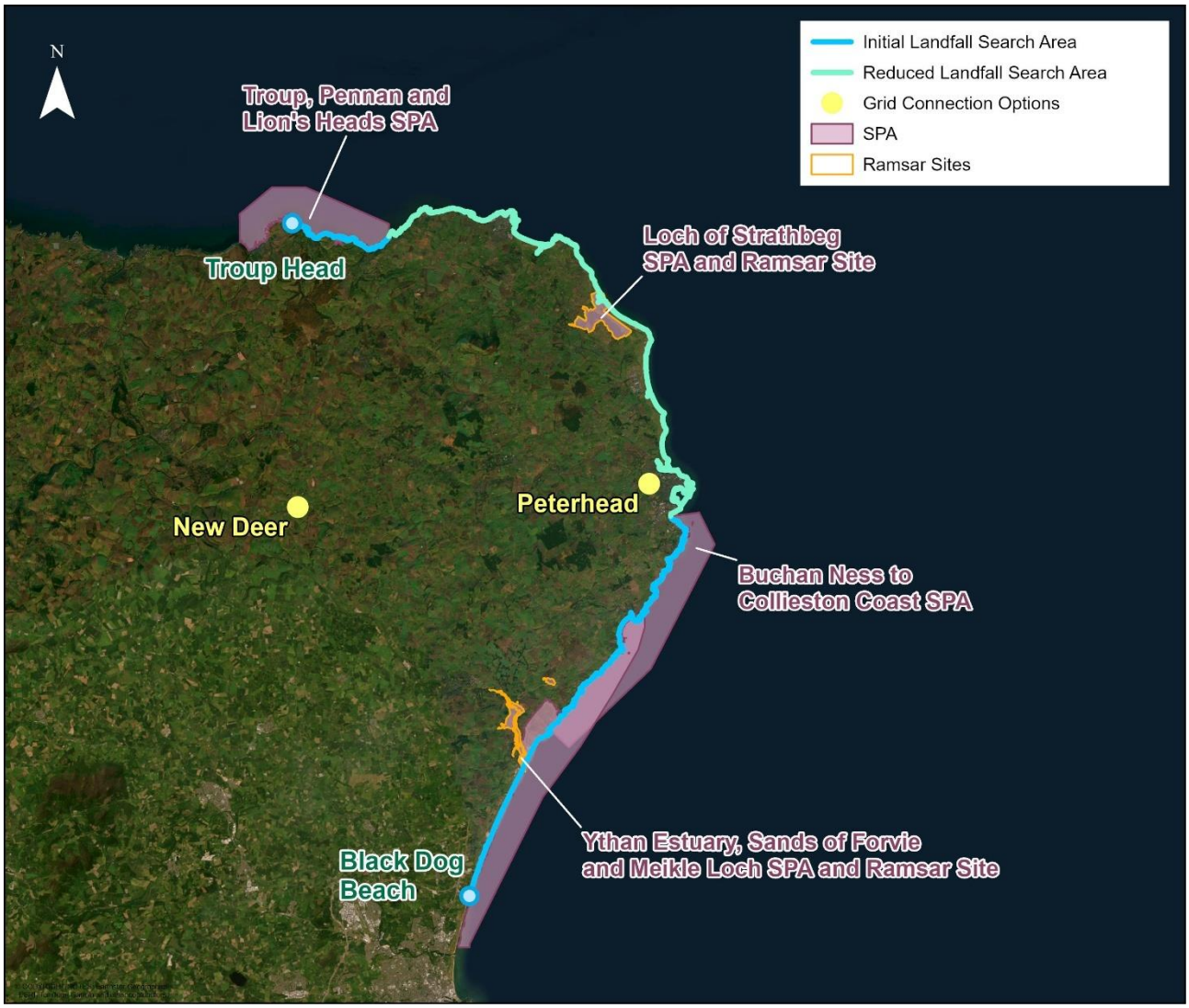
3.5.1.1 Landfall optioneering commenced prior to the results of the NESO HND in July 2022, at a time when the Project held a grid connection agreement for a 3GW grid connection at New Deer, which was expected to be superseded on confirmation of the expected grid connection at Peterhead (see **Section 3.4.2**).

3.5.1.2 The landfall site identification process was therefore initially undertaken on the basis that solutions would need to be appropriate for a grid connection point at New Deer or a connection in the vicinity of Peterhead (or both). A landfall search area was developed accordingly.

3.5.1.3 The search area for the landfall extended from Troup Head in the north to Black Dog Beach, north of Aberdeen, in the south. This search area encompassed a total of 70km of coastline centred around a grid connection point in the vicinity of Peterhead.

3.5.1.4 These spatial extents (shown in **Plate 3.3**) were chosen to provide a range of options for locating a suitable landfall, whilst minimising the distance of both an offshore and onshore export cable corridor between the OAA and both potential grid connection points to reduce potential environmental impacts and technical constraints.

Plate 3.3 Landfall search area



3.5.1.5 The extents of the search area were then refined to avoid the Troup, Pennan and Lion's Head Special Protected Area (SPA), which covers 16km of coastline around Troup Head, and the combined extent of the Buchan Ness to Collieston Coast SPA and the Ythan Estuary, Sands of Forvie and Meikle Loch SPA / Ramsar, which stretches 44km along the east-facing coast to the north of Black Dog Beach.

3.5.1.6 This effectively narrowed the search area down to the 'Reduced Landfall Search Area' shown in **Plate 3.3**, which equates to the stretch of coast between Rosehearty on the north coast (west of Fraserburgh) to Sandford Bay (south of Peterhead), thereby establishing the coastal extents of the Scoping Boundary.

3.5.1.7 Environmental, commercial and technical constraints were also identified and mapped at this stage, in order to provide a framework for assessment and selection going forward. These are summarised in **Table 3.3**.

Table 3.3 Constraints considered for landfall selection

Constraint category	Constraint
Bathymetry and morphology	• distance to 10m water depth contour; • seabed mobility; • coastal erosion; • coastal management; and • metocean.
Geology and geotechnics	Nearshore burial characteristics.
Seabed obstructions	• oil and gas infrastructure; • chartered wrecks and obstructions; • cables; • disposal sites; and • anchorages.
Unexploded ordnance (UXO)	Risk of UXO.
Commercial	• inshore fishing activity; • static fishing activity; • commercial fisheries activity; • shipping interests; • aquaculture sites; • shellfish protected areas; • harbour limits; and • land ownership.
Residential and community	• residential properties; • community facilities; • planning policy and applications; • public access; and • amenity and recreation.
Nature Conservation	• designated sites and important habitats and species; • seal haul-out sites; and • fish nursery and spawning grounds.
Ground conditions	• landfills; • contaminated land; • agricultural land; • geodiversity; • soil and peat; and • minerals.
Water environment	• Water Framework Directive (WFD) surface water bodies; • potable use; and • flood risk.
Landscape and visual	• landscape designations; and

Constraint category	Constraint
	• proximity to properties, transport, recreational routes and tourist destinations.
Historic environment	• listed buildings; • scheduled monuments; • inventory battlefields; • inventory gardens; • properties in care of Scottish Ministers; • World Heritage Sites; • areas of archaeological potential; • designated wrecks; • protected military remains; and • important palaeo-landscapes.
Construction	• space for construction compound and landfall installation; • change in elevation; • geohazards; • access; and • utilities.

3.5.2 Selection stage 2: Statutory Consultation 1 boundary

3.5.2.1 During selection stage 2, two important external developments took place. Firstly, SSEN published the intended location of their new substation site (into which the Project is to connect) at SSEN Netherton Hub, Longside, near Peterhead, and secondly, in March 2024, NESO published the Beyond 2030 Report, which confirmed the full 3GW connection for the Project will connect into the SSEN Netherton Hub.

3.5.2.2 As a consequence, the requirement to maintain landfall options to facilitate a connection to New Deer was no longer applicable. Landfall site selection therefore focused on options that were preferable for connections to Peterhead, and more specifically, SSEN Netherton Hub.

3.5.2.3 Consideration of key constraints within the landfall search area was undertaken to allow the coastline to be divided into zones coded LF1 to LF4, as follows:

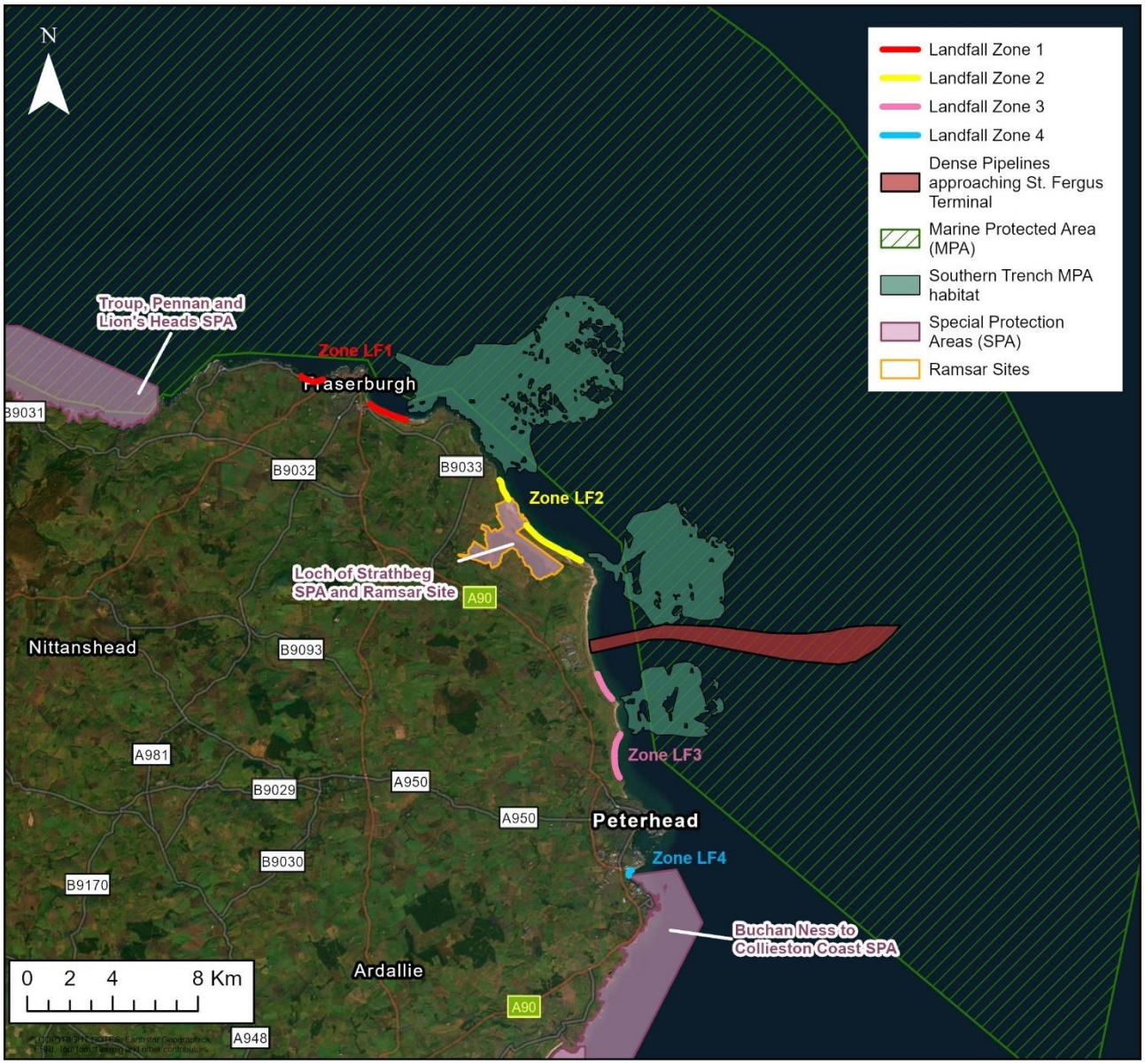
- **Zone LF1: Fraserburgh Vicinity**
  - Zone LF1 covers the area between the eastern extent of the Troup, Pennan and Lion's Head SPA and the sensitive habitats within the Southern Trench Marine Protection Area (MPA) (which covers the wider nearshore area around Aberdeenshire down to Peterhead town), avoiding Fraserburgh.
- **Zone LF2: St. Combs to Rattray Head Zone**
  - Zone LF2 covers the area between the Southern Trench MPA to the south east of Fraserburgh and an area of sensitive habitats within the Southern Trench MPA at Rattray Head (which reaches south to meet the series of pipelines coming ashore at St. Fergus Gas Terminal, effectively cutting off a section of beach between the two as inaccessible). Landfall Zone LF2 avoids the Loch of Strathbeg Ramsar and SPA.
- **Zone LF3: North of Peterhead**

- Zone LF3 covers the area between the offshore pipelines connecting at St. Fergus Gas Terminal and Peterhead town, to the south of another area of sensitive habitats within the Southern Trench MPA.

- **Zone LF4: South of Peterhead**
  - Zone LF4 covers the area between Peterhead town and the northern extent of the Buchan Ness to Collieston Coast SPA.

3.5.2.4 The four landfall zones are shown in **Plate 3.4**.

Plate 3.4 Landfall zones



3.5.2.5 An appraisal of the relative favourability of the Zones was conducted, with key observations as summarised below:

3.5.2.6 Zone LF1 was considered highly challenging due to its location and the range of constraints present. It lies more than 20km from the known connection point at Peterhead (although approximately equidistant from New Deer). Key challenges include:

- Proximity to sensitive environmental features including:
  - Rosehearty to Fraserburgh Coast Site of Special Scientific Interest (SSSI);
  - Northeast Aberdeenshire Coast Special Landscape Area (SLA); and
  - North Aberdeenshire Coast SLA.
- Proximity to community and amenity features, such as:
  - beach award areas at Fraserburgh and Waters of Philorth;
  - the Great Trail and harbour breakwater.
- Technical constraints including:
  - areas of high risk of UXO;
  - limited space for landfall due to high density of water abstractions to the west of Fraserburgh and existing amenities in Fraserburgh Bay.

3.5.2.7 Zone LF2 was considered more favourable than LF1, and the potential route to Peterhead would be shorter (>15km). A major impediment in this area is the presence of and proximity to the Loch of Strathbeg, which holds multiple overlapping designations (Ramsar site, SPA, SSSI). It is within the Northeast Aberdeenshire Coast SLA and there are multiple areas of medium / high coastal flood risk, as well as areas at risk of coastal erosion. Available space is restricted because of the need for both landfall construction areas and onward inland cable routes to avoid the Loch of Strathberg designated areas.

3.5.2.8 Zone LF3 is much closer to Peterhead, and there are fewer environmental constraints. Although the area is also within the Northeast Aberdeenshire Coast SLA, there are no environmental designations in the immediate area and residential and community receptors are relatively few. Access to the coastline may be difficult to achieve in some areas due to the coastal dune system and some (non-protected) areas of woodland.

3.5.2.9 Zone LF4 covers only a small section of coastline in the form of Sandford Bay. Part of the Bay falls within the Buchan Ness to Collieston SPA. There are existing subsea cables and pipelines already in the nearshore area, and further cable installations planned (including the Eastern Green Link (EGL) 2 and EGL3 interconnector cable projects). The strengths of this zone included its proximity to Peterhead and the industrial character of the area, but inshore space for construction and cable routing is already limited.

3.5.2.10 Zone LF3 was considered the most promising for landfall siting to serve a SSEN Netherton Hub connection, and Zone LF4 had a number of potential advantages to this same end, dependent on investigation of the amount of space available for the landfall infrastructure and associated export cables in both in the nearshore area and onshore. Zones LF1 and LF2 were discounted from further consideration, in favour of Zones LF3 and LF4.

3.5.2.11 The next step taken was to identify and compare potential landfall site options within the two zones retained for consideration.

3.5.2.12 Landfall Zone LF3 comprises 6.7km of coastline, extending from the southern extent of the St. Fergus Gas Terminal in the north to the mouth of the River Ugie at Peterhead in the south. Within this zone, two distinct areas were identified as potential landfall locations.

3.5.2.13 The first area is Scotstown Beach, covering the stretch of coastline between St. Fergus Gas Terminal site to the north and a rocky outcrop at the southern extent of the beach. There is a dune system of varying width running along the shore, and a path providing access in the approximate center of the zone.

3.5.2.14 The second is at Lunderton, where a (different) rock outcrop marks the northern end of the beach and the extent of the potential landfall area, and Craigewan Links Golf Course located at the southern end. There are dunes running along this stretch of coastline, including an area at the southern end which is part of the golf course.

3.5.2.15 Landfall Zone LF4 comprises 0.4km of coastline from Peterhead town in the north to the northern extent of the Buchan Ness to Collieston Coast SPA in the south. Due to the fact that the Zone itself is very small, there is only one site option within the Zone for the potential construction of the landfall.

3.5.2.16 The three landfall site options, two in LF3 and one in LF4, are shown in **Plate 3.5**.

Plate 3.5 LF3 and LF4 landfall site options

3.5.2.17 It was decided that all three options would be retained for Statutory Consultation 1. Other offshore wind farm developers were looking to locate landfalls along the same stretch of coastline, and it was necessary to maintain flexibility to work with and around neighbouring proposed projects.

3.5.3 Selection stage 3: Statutory Consultation 2 boundary

3.5.3.1 A comparative assessment of the three landfall site options was carried out during selection stage 3, with the conclusion that the northernmost sites (Scotstown and Lunderton) offered the greatest advantages. The assessment of the relative favourability of the sites is summarised in **Table 3.4**.

Table 3.4 Summary of Selection Stage 3 landfall option assessment

Site Option	Assessment	Conclusion
Scotstown	• Presence of overwintering pink-footed geese (amongst other bird interest), utilising fields within and around site during Winter months. • Potential disturbance to sensitive sand dune communities and direct loss of habitats listed on Annex 1 of the Habitats Directive. • Site intercepts several WFD water body tributaries to the Annachie Burn and the Black Water WFD water body and floodplain of the Annachie Burn headwaters (medium to high flood risk). • Site comprises bedrock overlain by sand dunes; depth to bedrock uncertain. Peat present in west of site. • Presence of recorded archaeological remains. • Coastline is part of Scottish Seascape Area 4 (Scott *et al*., 2005) and locally designated as part of the Aberdeenshire SLA. • Scotstown Beach is a promoted recreational beach area. • Site located within 600m of (single) residential receptor. • Limited space nearshore for multiple offshore export cables. Offshore export cable route is reliant on passing through a pinch point that is mainly restricted by a pipeline crossing through the site and an area of Annex 1 reef habitat to the south of the pipeline, which further restricts the option of several offshore export cables. • Onshore export cable route would cross of an area of woodland adjacent to the A90, an area of peat, and a flood plain. • A90 runs along western edge of site c. 1km from shoreline. • Buried gas and water pipelines run through the area parallel to shoreline. • Land behind dunes up to 9m in elevation.	Considered to be an acceptable site with some features that will create environmental and construction challenges; most notably the proximity of over-wintering birds and onward onshore export cable installation. Nearshore export cable routing restrictions render this site a partial solution only, as the landfall is unlikely to be able to accommodate the maximum envelope infrastructure. **Retained**.
Lunderton	• Site has relatively low ecological sensitivity. • Site has partial overlap with area of extensive risk of surface water flooding adjacent to A90.	Relatively unconstrained site, at which neighbouring projects create

Site Option	Assessment	Conclusion
	• Site comprises bedrock overlain by sand dunes; depth to bedrock uncertain. • Potential for non-designated archaeological remains to be present within this area. • Coastline is part of Scottish Seascape Area 4 (Scott *et al*., 2005) and locally designated as part of the Aberdeenshire SLA. • Residential receptors within 200m of southern end of the site and 600m of the northwestern corner of the site. • Site is adjacent to Craigewan Links Golf Course. • Interaction with planned landing sites for Muir Mhor Offshore Wind Farm, Salamander Offshore Wind Farm and Green Volt Offshore Wind Farm. • Onshore export cable route likely to interact with planned routing for Muir Mhor Offshore Wind Farm and Green Volt Offshore Wind Farm. • Offshore export cable route likely to interact with planned routing for Muir Mhor Offshore Wind Farm, Salamander Wind Farm and Green Volt Offshore Wind Farm. • A90 runs along western edge of site c. 1km from shoreline. Temporary access road likely to be required. • Land behind dunes up to 15m elevation.	some uncertainty over sufficiency of available land. **Retained**.
Sandford Bay	• Southern half of Sandford Bay falls within the extent of the Buchan Ness to Collieston Coast SPA. Potential impacts to breeding birds. • No interaction with WFD water bodies, potable water or flood risk areas. • Site is adjacent to a locally designated SLA. • Recreational water sports and sailing in nearshore area. • Onward onshore export cable route is challenging due to high number of developments planned for local area, including EGL3 project (which will land at Sandford Bay). • Onward offshore export cable routing is challenging due to existing and planned infrastructure in nearshore area, including EGL2 and EGL3 projects, water pipelines and spoil ground at entrance to bay. The number of offshore cables that can pass through area is restricted.	Key consideration is the proximity of the landfall to the Buchan Ness to Collieston Coast SPA – a designated breeding ground for seabirds. Shoreline and onshore construction space highly limited. Partial solution only, requiring its own, dedicated export cable route. **Discounted**.

Site Option	Assessment	Conclusion
	• There is no route in common with LF3 landfalls, meaning that use of this site would significantly extend the onshore export cable route. • A90 runs along western edge of site c. 1km from shoreline. Temporary access road may be required. • Land behind shoreline up to 30m elevation. • Considered only a partial option, as the landfall is unlikely to be able to accommodate the maximum envelope infrastructure. • No clear nearshore route to landfall could be identified due to the presence of wrecks and a large, licensed disposal site located immediately offshore of Sandford Bay. The geophysical survey conducted for the Project in 2023 identified a concentration of debris to the south of the licensed disposal site boundary. This could imply that the material from the disposal site is dispersed beyond its demarcated boundary and consequently this reduced the Project's confidence in seeking a cable route in its vicinity.	

3.5.3.2 The comparative assessment strongly favoured those options to the north of Peterhead (Scotstown and Lunderton). Sandford Bay offered only limited space for the required landfall infrastructure, and there are existing assets and features both onshore and offshore that further constrain landfall construction. Proximity to the Buchan Ness to Collieston Coast SPA was also considered disadvantageous.

3.5.3.3 The Scotstown and Lunderton options, by contrast, were considered relatively favourable. In each case, the presence of a coastal dune system (and associated habitats) would be an obstacle, but not an unavoidable one in that a trenchless crossing method could be implemented. Both options fall within the North Aberdeenshire Coast SLA; however, this impact could be mitigated by installing the onshore export cables underground and reinstating any affected landscape features.

3.5.3.4 Of the two options, the Lunderton site was considered more favourable, due to the Scotstown site's proximity to known overwintering areas for birds, notably pink-footed geese, and because of the presence of a pipeline approaching the St. Fergus Gas Terminal and the Annex I reef habitat, which constrain the potential offshore export corridor through the nearshore area.

3.5.3.5 Responses received at Statutory Consultation 1 relating to the landfall did not explicitly favour any option in particular. Environmental protection, and construction methods and installation, were the most important topics to respondents (see **PAC Report**).

3.5.3.6 Specific comments made were generally in favour of minimising construction impact on the local environment and habitats. This would tend to support the case for the sites north of Peterhead, Lunderton in particular, because of the proximity of Sandford Bay to the Buchan Ness to Collieston Coast SPA.

3.5.3.7 During this period, it was confirmed that the preferred landing point for the EGL3 interconnector project was at Sandford Bay (this in addition to the EGL2 project, for which a planning application had been submitted).

3.5.3.8 Consultation with EGL2 and EGL3 project teams led to the conclusion that, following installation of the EGL projects, the remaining space would only be sufficient for one or two cables to land. Since the maximum project envelope was up to seven offshore export cables, this limited the suitability of Sandford Bay as a viable landfall for the Project. This was compounded by onshore routing constraints to the west of Sandford Bay, where a number of other recent and forthcoming developments created further pinch-points.

3.5.3.9 The decision was therefore taken at this time to exclude Sandford Bay from further consideration, and the Project boundary was adjusted at Statutory Consultation 2 to exclude the Sandford Bay landfall option and the associated offshore and onshore export cable corridor options.

3.5.3.10 The remaining options, Lunderton and Scotstown, were both retained at Statutory Consultation 2, flexibility and optimisation in relation to neighbouring projects remaining key drivers.

3.5.4 Selection stage 4: Establishment of the Red Line Boundary

3.5.4.1 Responses received at Statutory Consultation 2 (see **PAC Report**) relating to the landfall included the expression of a preference for a landfall at Lunderton, on the grounds that it would (as perceived) have the lowest impact on the local fishing industry.

3.5.4.2 This would align with the Project preference for a single landfall site that can accommodate the full Project infrastructure (and hence for Lunderton) as previously stated.

3.5.4.3 It was also suggested that a Horizontal Directional Drilling (HDD) (or otherwise trenchless) construction method would be advantageous, particularly if it extended offshore as far as possible (see **Section 3.11.4** for further discussion of landfall construction method to be employed).

3.5.4.4 A distinction was drawn at this stage between the north and south parts of the Lunderton landfall area with the division aligning with a local (unnamed) ditch / watercourse emerging on the coastline at the northern extent of the Craigewan Links Golf Course. A landfall at Lunderton south would need to cross the golf course site.

3.5.4.5 The landfall options that are assessed in this EIA Report are:

- Lunderton – all offshore export cable cables would make landfall at Lunderton, based on the following scenarios:
  - all export cable cables make landfall at Lunderton North; or
  - all export cable cables would make landfall at a combination of Lunderton North and Lunderton South;
- Scotstown and Lunderton – export cable cables would make landfall at a combination of Lunderton (North and / or South) and Scotstown.

3.5.4.6 The Lunderton and Scotstown landfall site options were therefore both retained in the establishment of a Red Line Boundary for EIA and consent applications.

3.5.4.7 Whilst Lunderton has sufficient spatial constraints in the offshore nearshore area, this may be utilised by other developers ahead of MarramWind and as such it is necessary to include Scotstown as an alternative. It should be noted that Scotstown has insufficient spatial constraints in the nearshore area to support the full 3GW with the current phasing scenarios.

3.5.4.8 Positive collaboration with neighbouring developers continued through this stage, but ultimately with the conclusion drawn that it is necessary to present more than one landfall option in this EIA Report due to the number of offshore wind farms seeking to make landfall in the vicinity of Peterhead.

3.5.4.9 The inclusion of multiple landfall options is intended to provide the Project with flexibility with regard to securing sufficient space, in appropriate locations, to construct the landfall and associated onshore and offshore export cables necessary to facilitate a 3GW Project, whilst ensuring any cumulative environmental impact is kept to a minimum. Whilst Lunderton has sufficient spatial constraints in the offshore nearshore area, this may be utilised by other developers ahead of the Project. As such, it is necessary to include Scotstown as an alternative. It should be noted that Scotstown has insufficient spatial constraints in the nearshore area to support the full 3GW with the current phasing scenarios.

3.5.4.10 **Plate 3.6** shows the landfalls retained in the Red Line Boundary: Scotstown, Lunderton North and Lunderton South.

Plate 3.6 Scotstown and Lunderton landfall site options

3.5.4.11 **Plate 3.7** provides an overview of the four selection stages as they relate to landfall selection.

Plate 3.7 Summary of landfall optioneering by selection stage

3.6 Site selection of NE7 for MarramWind

3.6.1.1 As described in **Section 3.4.2,** the boundary of NE7 was determined via the SMP in 2020 and secured as the OAA for the Project by the Applicant via ScotWind Leasing in 2022.

3.6.1.2 The OAA, shown in **Volume 2, Figure 3.1** is located between 75km to 110km offshore (at its nearest and farthest points from shore respectively) from the Aberdeenshire coast. It covers a surface area of 684km^2 and has a water depth ranging from 87.8m to 133.7m Lowest Astronomical Tide (LAT).

3.6.1.3 There are numerous other wind farms under development in the wider area (as shown in **Volume 2, Figure 3.1**), both from the ScotWind leasing process and also from a separate leasing process, INTOG, which aims to provide development areas for demonstrator and decarbonisation projects.

3.6.1.4 The area around the OAA, and between the OAA and the mainland, features other existing infrastructure including oil and gas platforms (not shown – see **Chapter 31: Civil and Military Aviation** and **Volume 2, Figure 31.3: Helicopter Main route indicators and oil and gas infrastructure in the vicinity of the Option Agreement Area** for details) and pipelines (not shown – see **Chapter 18: Infrastructure and Other Marine Users** and **Volume 2, Figure 18.3: Subsea cables and pipelines in relation to the Project** for details).

3.6.1.5 In the early stages of the ScotWind Leasing Round, independent studies were undertaken to evaluate and compare the Plan Options. These studies evaluated the power output potential of the Plan Options, their suitability for floating unit versus fixed base foundation technology, and the environmental characteristics of each site. Of particular interest were those characteristics that represented an environmental sensitivity or a technical challenge that could have potential to constrain future development.

3.6.1.6 A shortlist of Plan Options, was established and NE7 found perform well against the site selection criteria that were analysed. NE7 performed particularly well in relation physical characteristics such as having water depths suitable for floating units, adequate area for a large power output capacity, good ground conditions with low seabed mobility and therefore a reduced need for scour protection, good metocean conditions, and a reduced risk to ornithology due to the distance from coastal designations.

3.6.1.7 The studies also considered the key risks of each OAA that were identified in the SMP. For NE7, these included:

- a potential for socio-economic cost impacts associated with the loss of pelagic and demersal trawl fishing grounds arising from potential offshore wind development in NE7;
- a potential for radar interference from operational turbines in NE7; and
- a potential for impacts to transiting and migratory bird species, although it was recognised that the distance offshore reduces the potential risk to birds foraging in the area.

3.6.1.8 NE7 was subsequently taken forward under the name MarramWind. This enabled the selection stages for the wider offshore infrastructure to commence.

3.7 Site selection and consideration of alternatives within the OAA

3.7.1.1 For each of the offshore infrastructure components within the OAA, a market assessment was undertaken of currently available technology alongside future expected technology advancements and estimated timelines of delivery. With the Project being expected to be one of the first commercial scale floating offshore wind farms, it has been necessary to include a large degree of flexibility within the offshore design envelope to accommodate for advancements in future technologies.

3.7.1.2 Market engagement with suppliers and research and development centres (universities and government supported projects) has informed the design evolution of the offshore Project to date. This has endeavoured to establish historical timelines for technology advancement to understand what is credible or ambitious, alongside benchmarking against the oil and gas industry as it has been successfully operational in similar water depths for many years.

3.7.1.3 The alternatives considered relate to WTGs, the floating unts and their station keeping systems, and the array cables.

3.7.2 WTGs

3.7.2.1 The WTGs will be located within the OAA and the Project will have a total grid connection capacity of up to 3GW. The generating capacity of the offshore wind array depends upon a range of WTG specifications.

3.7.2.2 Given the phased construction and energisation of the Project, it is probable that the WTG size and / or supplier may vary between phases. In addition, it is credible to consider that for Phase 1 a small number of WTG's may operate on alternative floating unit designs. The aim of this would be to allow demonstrators to be installed with a route to market, to aid knowledge for future phases/floating industry.

3.7.2.3 Depending on the final WTG size selected, the Project is expected to have in the region of 126 to 225 WTGs (assuming a typical overplanting of around 5 per cent). As WTG technology is continually evolving, it is difficult to definitively predict the generating capacity of WTGs that will be commercially available at the point of construction at least five years into the future from the point of writing, and which model(s) are likely to be available specifically for the floating industry (which may be different to that offered to the fixed wind industry at that time). The final number, size, capacity and layout of WTGs will be determined based upon further assessment of the optimum wind resource, prevailing site conditions, the capacity of each individual WTG and findings of environmental and engineering surveys.

3.7.2.4 The methodology for down selecting the alternate WTGs on the market considered the environmental consentability of the WTGs and business case assumptions.

3.7.2.5 The WTGs will be arranged in a suitable configuration for the site (for example strings, stars or loops). Whilst string / loop design is most common in fixed wind sites, following market engagement and early development of an operation and maintenance (O&M) strategy that included a reliability and availability assessment, it is now expected that a star configuration is the most credible to maximise availability, with the use of a power collector referred to as SDCs. This is due to the potential extensive repair time needed that may necessitate a tow-to-port to undertake Major Component Repairs. A star configuration would only remove one turbine in the event of failure, whereas a string or loop could impact a greater number of turbines. The WTGs and / or SDC will connect (via the array cables) to a substation platform located within the OAA. Technology readiness will be main criteria that will feed into this decision, and this will be progressed during the Concept Eng / front-end engineering design

phases of the Project. This sought to define a base case or minimum (for example, this being 100 per cent likely achievable in the timeframes proposed) and a stretch case or maximum (for instance, the maximum plausible case that may be possible in the 2030s based on the current market forecast. This analysis led to a minimum case of 14 megawatts (MW) and a maximum case of 25MW WTGs. These are the upper and lower limits for WTG size used for the design envelope as the basis of EIA Report.

3.7.3 Floating versus fixed foundation technology

3.7.3.1 During the OAA site selection stage, consideration was given to sites that had ground conditions and water depths suitable for floating units or fixed base foundations. Water depths exceeding 60m were considered suitable for floating units, and the area available at specific water depth ranges needed to be sufficiently large to enable a commercially viable project. Based upon the commercial and development objectives of the Applicants, this led to a focus on floating technology only for the Project, with fixed base foundations excluded for the WTGs.

3.7.4 Floating unit alternatives

3.7.4.1 Since the submission of the Scoping Report, the Project has undertaken an assessment to evaluate and reduce the type of floating concepts to be considered for the Project. Whilst there are numerous floating concepts in the market, they are at varying level of technical readiness, and often information is protected under intellectual property rights. This in itself makes it difficult to narrow down to a specific archetype of floating unit without a high level of engineering being undertaken. In addition, the Project also has varying water depths across the NE7 OAA, which potentially makes it suitable for different types of floating unit concepts.

3.7.4.2 In 2023, the Project evaluated approximately 40 different floating unit designs, ranging between proven technology designs such as semi-submersibles, to alternative novel designs that have potential to offer significant advantages.

3.7.4.3 During this process it was concluded that spars should be removed from the design envelope as they were deemed:

- not suitable for the Project because water depths across most of the OAA are too deep for this design; and
- not suitable for Scottish Infrastructure because most ports lack adequate draft depth.

3.7.4.4 A short list of 14 floating unit designs was selected, and a Request for Information process was undertaken floating unit design developers. The designs were evaluated against criteria including (but not limited to) technical credibility, design adaptability and cost.

3.7.4.5 A final short list of five designs has been taken forward, which includes options for semi-submersible, barge, and tension-leg, and other hybrid designs to take into account emerging / future technologies.

3.7.4.6 This short list will be re-evaluated in the detailed design stage and subject to market availability, so it is imperative that the design envelope for the EIA retains optionality for these options.

3.7.5 Air gap

3.7.5.1 The air gap (also referred to as tip clearance) of a WTG is the minimum distance that occurs between a turbine blade tip and the sea surface. The air gap is determined by the height of the nacelle and the length of the blades. The height of the nacelle is driven by the height of the tower, which introduces increased engineering complexity with increased heights. More complex and larger designs are likely to put pressure on the supply chain including in relation to the supplier base for component manufacturing, fabrication, assembly, and component transport logistics. In addition to engineering and supply chain considerations, air gap drives a key impact pathway for birds by influencing the rate of collision risk (see **Chapter 12: Offshore and Intertidal Ornithology** for detail).

3.7.5.2 The industry standard for minimum air gap is 22m. Within fixed wind projects this air gap has been increasing in recent years following stakeholder feedback and expected impact understood from desktop bird collision modelling. Within the Project's ScotWind bid submission (2021), a minimum air gap of 24m was stated. This value was carried through into the MarramWind EIA Scoping Report, which was submitted to MD-LOT in May 2023.

3.7.5.3 In determining the air gap for the Project, consideration was given to alternative designs that increased the tower length, increased the buoyancy of the floating unit to raise the base of the tower, and increasing the stiffness of the station keeping system. This concluded that shorter towers out-perform the other options in terms of ease of fabrication, feasibility of execution, offshore safety performance, and cost effectiveness.

3.7.5.4 It is recognised that increased air gaps can result in decreased collision risks. The Project therefore undertook collision risk modelling for seabirds, based on a range of air gaps from 22m to 30m to understand the difference between the different air gaps and to determine if it would be possible to extend the envelope to an air gap of 22m.

3.7.5.5 This work concluded that the rates of collision would be low for all air gaps considered, with the numbers impacted by a 22m air gap being considerably lower than other fixed foundation projects in the North Sea that have achieved consent.

3.7.5.6 These findings are influenced by the distance of the OAA offshore (over 75km from the Aberdeenshire coast) and consequentially the relatively sparse densities of seabirds found in this area (see **Chapter 12: Offshore and Intertidal Ornithology** for baseline data).

3.7.5.7 A review of the current supply chain for the Project has indicated limited confidence in the supply chain's capability to deliver components meeting a minimum 24m air gap specification and based on ongoing engagement with supply chain partners, the Applicant is therefore unable to commit to a minimum air gap of 24m at this stage of the Project.

3.7.5.8 This Project decision has implications for the findings of the **Report to Inform Appropriate Assessment**, so further detail on this is provided in the **Derogation Case Appendix B WTG Air Gap Supporting Document**.

3.7.6 Offshore platforms

Offshore substation foundations

3.7.6.1 At Scoping, gravity base and floating foundations were included as options for the offshore substation foundations alongside steel jackets secured by pin piles, and steel jackets secured by suction caisson buckets.

3.7.6.2 Design evolution since Scoping has determined the anticipated dimensions of the offshore substation topsides. Given their substantial size (**Chapter 4: Project Description**) and the water depths across much of the OAA, the gravity base design would have also needed to

be very substantial to ensure stability of the structure, with an extensive seabed contact as a result.

3.7.6.3 There are limited vendors to support the fabrication of a gravity base solution on the scale and quantity required for the Project, and the de-commissioning costs would be high. Gravity base foundations for offshore substations were therefore excluded from the design envelope as they present a greater environmental impact and delivery cost than other solutions such as the steel jacket.

3.7.6.4 Floating platforms have also been excluded from the design envelope for offshore substations due to the size and scale needed to support the topside. By comparison, the steel jacket presents a more reliable and cost-effective solution.

Accommodation platform

3.7.6.5 At Scoping, a bespoke platform was considered for the provision of permanent welfare, housekeeping, and accommodation facilities for personnel working on-site offshore during the O&M stage of the Project. It would have been located within the OAA, been of an equivalent or smaller size than the offshore substations, had a floating or fixed foundation, and been serviced by a helideck for personnel access.

3.7.6.6 Within the offshore wind industry, only one platform is currently in use in the North Sea at DanTysk operated by Vattenfall in the German Economic Area. Justification for its use was to mitigate impact of distance to shore on technician welfare where long sailing times can cause sickness and fatigue.

3.7.6.7 A standard approach to mitigate distance to shore is the use of a purpose-built Service Operations Vessel (SOV) where full-time technicians can be accommodated for several weeks at a time at site and transferred to offshore assets via a walk-to-work gangway system. SOVs typically have large welfare areas including rest areas and gyms, as well as wider operational facilities such as offices, warehouse, and workshops. SOVs are commonly used in other offshore industries such as oil and gas the SOV environment for offshore accommodation is not seen as detrimental to individual technician welfare.

3.7.6.8 Given the environmental impact and cost of constructing a bespoke accommodation platform within the OAA, and the conclusion that technician welfare can be well maintained through the use of SOVs, the accommodation platform was excluded from the design envelope for the EIA.

3.7.7 Layout within the OAA

3.7.7.1 The layout of the offshore infrastructure components within the OAA will be influenced by factors including the size and number of the WTGs and therefore the spacing and planting density requirements, local seabed conditions, and coexistence with other marine users.

3.7.7.2 A full site characterisation geophysical survey and shallow depth characterisation geotechnical survey has been undertaken to understand the seabed conditions across the OAA. See **Chapter 6: Marine Geology, Oceanography and Physical Processes** and **Appendix 6.3: Marine Geology, Oceanography and Physical Processes Baseline Report** for information on these surveys and their findings of relevance to the EIA.

3.7.7.3 The OAA is intersected by the Golden Eagle to Claymore oil export pipeline. It connects the Golden Eagle platform to the southwest of the OAA, to the Claymore platform to the northeast of the OAA and it is currently active. See **Volume 2, Figure 18.6: Hydrocarbons infrastructure in relation to the Project** for its location relative to the OAA.

3.7.7.4 Coexistence of the Project with this existing third party asset is essential. A standard safety zone of 500m has been adopted around this pipeline, and the layout within the OAA will be designed with infrastructure either side of the pipeline. No Project infrastructure (including anchors, SDCs, and platforms will be located within the 500m safety zone. Some cable crossings over the pipeline are anticipated to be required, which will be subject to crossing agreements with the pipeline operator.

3.8 Offshore export cable corridor selection

3.8.1 Selection stage 1: Scoping Boundary

3.8.1.1 With the OAA secured, selection stage 1 for the offshore export cable corridor needed to cover a broad search area between the OAA and the Aberdeenshire coast. This area needed to be sufficiently wide to accommodate potential onshore connections at both New Deer and Peterhead (as described in **Section 3.4.2** and **Section 3.5**).

3.8.1.2 The offshore Scoping boundary was therefore defined to include the entire NE7 OAA and a marine area of 3,847km^2, extending to the coast between Sandhaven (west of Fraserburgh) and Sandford Bay (south of Peterhead) (**Volume 2, Figure 3.2**).

3.8.1.3 The boundary of the offshore export cable corridor search area was designed to provide adequate flexibility for connecting the OAA to the grid connection point(s), and to allow sufficient space for export cable route optioneering to avoid and / or circumnavigate key areas of identified environmental sensitivity or construction risk along the route.

3.8.1.4 Where the offshore export cable corridor search area met the coast, an additional 2.5km buffer was included at each end of the landfall search area to allow for any possible future design flexibility.

3.8.1.5 Once the Scoping boundary was defined, a comprehensive offshore export cable route study was conducted to analyse offshore geological and environmental constraints and to determine an export cable route suitable to define the extent of preliminary marine site investigation surveys.

3.8.1.6 **Table 3.5** presents the constraints that were considered and grouped into six categories for the offshore export cable corridor.

Table 3.5 Constraints considered for the offshore export cable corridor

Constraint category	Constraint
Bathymetry and morphology	• seabed elevation; • slope gradient; and • seabed mobility.
Geology and geotechnics	• shallow geology; and • rocky substrate.
Seabed obstructions	• oil and gas wells; • oil and gas pipelines; • oil and gas platforms; • oil and gas other seabed infrastructure; • chartered wrecks and obstructions; • wind farms; • cables; and

Constraint category	Constraint
	• disposal sites.
UXO	Risk of UXO.
Environmental	• marine ecology – fish nursery and spawning grounds; • marine ecology – sensitive habitats and designated sites; • marine ecology – seal haul-out sites; • seabirds; • shellfish; and • aquaculture.
Commercial	• inshore fishing; • static fishing; • commercial fisheries; • anchorages; • existing seabed infrastructure and • harbour limits.

3.8.1.7 For the offshore export cable corridor constraints analysis, a quantitative approach was adopted that combined constraint heat mapping, professional judgement, and algorithmic Geographical Information System (GIS) analysis. The analysis generated route corridors that follow the least constrained route between a single point on the OAA boundary and a range of early landfall options. The analysis assessed whether varying the input data would change which routes were identified as least constrained.

3.8.1.8 The resultant route options were then analysed further by marine cable installation engineers to determine a preferred route. The analysis included the following cable installation specifications:

- A cable route should have a limited number of course alterations, separate by straight sections.
- Course alterations should be of sufficiently large radius so as to not limit the cable installation tools. A course alteration radius of 1000m was assumed for the purpose of cable corridor definition.
- Course alterations should be sufficiently far from crossings or other obstacles to avoid the cable being dragged or moved at the point of crossing or obstacle.
- The cable route should be perpendicular / sub-perpendicular to pipelines and cables at crossings, with an absolute minimum crossing angle of 45° but preferably closer to 90°.
- Landfall approach should be perpendicular / sub-perpendicular to the coastline.
- Prioritisation of a combined corridor for part of the route should be assumed, even if this is at the expense of total optimisation of every route (for instance, for corridor survey optimisation).
- Proximity to other infrastructure, especially in the vicinity of course alterations, should be limited.
- Some constraints may not increase with additional route length in a constrained area and therefore if a constraint cannot be avoided it may be preferable to route directly through an area, rather than extending route length around that area.

3.8.1.9 The final part of the offshore export cable corridor constraints analysis was to define an optimal route and a 2km wide corridor about that route, which would subsequently be used to further define the export cable corridor.

3.8.2 Selection stage 2: Statutory Consultation 1 boundary

3.8.2.1 The Scoping boundary and the initial export cable corridor analysis defined in selection stage 1 was used to define the scope of an offshore reconnaissance survey.

3.8.2.2 This included a common route from the OAA, departing in a south-westerly direction before splitting into a spur that connected to landfall zone LF2 (St. Combs to Rattray Head) and a spur that connected to landfall zones LF3 (north of Peterhead) and LF4 (south of Peterhead.

3.8.2.3 An offshore route to landfall zone LF1 (Fraserburgh vicinity) was not defined at this stage because the onshore site selection ongoing at that time was indicating high levels of environmental and technical constraint (see **Section 3.10** for further information), meaning that LF1 was being considered unlikely to be taken forward.

Marine survey

3.8.2.4 In 2023, a marine survey was commissioned in order to inform the site selection analysis for an export cable connection between the OAA and potential landfall zones along the Aberdeenshire coastline. This survey provided the first detailed and site-specific geophysical, geotechnical and environmental information on the areas of seabed of interest to the Project.

3.8.2.5 The scope of the survey was established to provide adequate coverage to inform a reasonable range of export cable route options for further development and as a data gathering exercise to establish environmental baseline information for use in this EIA Report. Consideration was given to surveying multiple corridor options and to expanding the corridor to allow flexibility over routing within the wider extent.

3.8.2.6 It was important to consider survey routes to all landfalls being considered in selection stage 2. However, recognising an eventual requirement for a single cable route from the OAA to landfall there was a need to optimise the survey by limiting the overall length of surveyed corridor. As a result, a common corridor from the OAA towards the coast was defined, with an inevitable division into two branches to access landfalls either side of the major ‘no-go’ constraints immediately east of the St Fergus Gas Terminal. These two branches remained common corridors to a subset of landfall zones until close to the coastline where further spur would inevitably be required to reach each individual landfall site. This approach minimised the environmental effect of surveying a larger area whilst simultaneously maintaining reasonable survey costs.

3.8.2.7 The survey corridor was 1km wide along much of its route and expanded to 2km wide in areas of uncertainty of particularly high constraint. This allowed for possible future design flexibility requirements where micro-siting may be necessary to avoid environmental features.

3.8.2.8 The offshore export cable corridor boundary presented at Statutory Consultation 1 showed this survey corridor within a wider area of search. This was to allow for any possible offshore export cable corridor refinement that might have been necessary following the analysis of the survey findings.

3.8.2.9 The boundary presented also included an additional nearshore route to Lunderton for consideration, which was designed to provide design flexibility in an area of high constraint and competition in the nearshore environment. The boundary presented at Statutory Consultation 1 is shown in **Volume 2, Figure 3.3: Statutory Consultation 1 boundary**.

3.8.3 Selection stage 3: Statutory Consultation 2 boundary

3.8.3.1 In selection stage 3, a cumulative constraints gap analysis was undertaken in the nearshore area around Peterhead and Sandford Bay to provide supplementary information regarding the additional nearshore route to Lunderton. This provided additional information on the heavily constrained area near Peterhead and Peterhead harbour, in particular in relation to the following constraints:

- seabed mobility;
- rocky substrate;
- cables;
- disposal sites;
- UXO;
- marine ecology;
- seabirds;
- inshore fishing;
- static fishing;
- commercial fishing; and
- harbour limits.

3.8.3.2 In relation to cables, the study gave consideration to potential export cable corridor alignments from the Green Volt, Muir Mhór, Salamander, and Hywind offshore wind farms as these had become available in the public domain since selection stage 1, and the EGL2 cable. Given the scale of the Project and therefore the number of cables required to make landfall, the routing of other projects and the subsequent competition for space in the nearshore environment had become an important factor in the Project's design evolution.

3.8.3.3 The study highlighted significant constraint to development from cable and pipeline crossings, disposal sites, rocky substrates, navigational risk from Peterhead harbour, and static fishing. As a result, the study fed into the definition of the boundary for Statutory Consultation 2, which included and retained the additional nearshore route to Lunderton but excluded Sandford Bay as a viable landfall. It was excluded because it was deemed to be too heavily constrained in the nearshore environment, particularly when considered against constraints to landfall and onward terrestrial cable routing in the onshore environment (see **Section 3.5.3**).

3.8.3.4 The boundary presented at Statutory Consultation 2 is shown in **Volume 2, Figure 3.4: Statutory Consultation 2 boundary**.

3.8.4 Selection stage 4: Establishment of the Red Line Boundary for EIA

3.8.4.1 Feedback received from nearshore fishers during Statutory Consultation 2 relating to the additional nearshore route to Lunderton resulted in this routing option being discounted from the Red Line Boundary for EIA. Technical challenges in cable routing parallel to the coast near to Peterhead also contributed to this design decision.

3.8.4.2 In refining a Red Line Boundary for the EIA in relation to the offshore export cable corridor, greater engineering definition was applied following further analysis and interpretation of the marine survey outputs. This allowed refinement of the corridor width, as required for the

number of cables being proposed including the need for the separation space required between them. This separation distance would typically be three times the water depth to allow for maintenance works, which naturally varies along the offshore export route. A design decision was made that a minimum redline boundary of 3.5km width would be sufficient for the cables necessary for a 3GW project. This allowed for water depth variability and any need to micro-site within the Red Line Boundary.

3.9 Reactive compensation platform site selection

3.9.1.1 If HVAC transmission technology is selected in Phase 2 of the Project, then the offshore export cable may require the installation of reactive compensation equipment to improve export power quality, voltage stability and transmission efficiency over distance.

3.9.1.2 Such equipment would need to be mounted on one or more RCP(s), located approximately midway along the offshore export cable route. The offshore export cables would connect into the RCP(s), and further cables would continue from the RCP(s) to the landfall site(s).

3.9.1.3 The optimum location for an RCP would be approximately 40 per cent to 60 per cent along the total export cable route between an offshore substation within the array and the onshore substation. An area of search has been identified that meets this criterion, as shown in **Volume 2, Figure 3.5: Reactive compensation platform search area**.

3.9.1.4 It is expected that the size and footprint of the RCP(s) topsides equipment will be smaller than, or equivalent in size to, the offshore substation platforms. This is because an RCP usually houses less equipment than for a full offshore substation. A smaller topside would then require a smaller foundation structure, however the type is expected to be similar, for example, fixed jacket foundation and as such the environmental considerations are similar. Being located closer to shore may mean that the water is shallower than within the OAA, and the height, and consequently breadth, of the substructure could also be reduced accordingly.

3.9.1.5 Installation activities will be comparable to those described for the offshore substation platforms (see Section 4.5.5 of **Chapter 4: Project Description**).

3.9.1.6 During the detailed design stage, and with a greater understanding of technology available at that time, it may be that HVAC technology can be later excluded from the design envelope for Phase 2. RCP platform(s) would consequently be excluded if HVDC was selected for Phase 2, as well as Phase 3.

3.10 Onshore substation site selection

3.10.1 Selection stage 1: Scoping Boundary

3.10.1.1 As noted in **Section 3.5**, during selection stage 1 the NESO HND in July 2022 confirmed a 1.5GW connection for the Project to a new substation in the vicinity of Peterhead, with the remaining 1.5GW being subject to the HND FUE. The location of this new SSEN substation was not known at this time.

3.10.1.2 A connection agreement for the remaining 1.5GW was expected to be awarded at this same SSEN substation, but this was not confirmed at the time of publication of the Scoping Boundary (the HND Report only having confirmed the first 1.5GW). A partial connection at New Deer therefore remained a possibility.

3.10.1.3 The potential connection point at New Deer was expected to be superseded on confirmation of the expected grid connection at Peterhead. The potential connection point in the vicinity of Peterhead was not known. There is an existing 275kV substation approximately 1km to

the south of Peterhead, and a second 400kV substation was also under construction (now operational), but it was clear that neither of these were allocated for the Project.

3.10.1.4 It was conceivable that SSEN would seek to site the new infrastructure close to the existing substations (to the south / southwest) of Peterhead, but also possible that a different location would be chosen, to align with one or more of the other developments planned by SSEN under the 'Pathway to 2030' banner.

3.10.1.5 There are significant technical advantages to be gained by locating the Project onshore substations close to the grid connection point, in that the need for certain types of conversion / transformation equipment may be required or reduced, and electrical losses may be minimised. A distance of 3km was established as a target maximum separation between the two points to enhance system reliability and ensure safe electricity transmission to the national grid.

3.10.1.6 Some preliminary work was undertaken at this time to screen out zones unlikely to provide viable onshore substation options, and to identify others that were expected to be possible candidates, but ultimately this could only be speculative until the grid connection location was known.

3.10.1.7 Ultimately a Project substation would be required in the vicinity of Peterhead. As a worst case, a second substation could potentially be needed in the vicinity of New Deer. The Scoping Boundary (see **Plate 3.12** and **Volume 2, Figure 3.2**) was therefore designed to incorporate a search area of 3km radius around New Deer substation, and an approximate 5km search area around Peterhead (to allow for uncertainty over the location of the new SSEN facility).

3.10.1.8 Environmental, commercial and technical constraints were also identified and mapped at this stage, in order to provide a framework for assessment and selection going forward. These are summarised in **Table 3.6**.

Table 3.6 Constraints considered for onshore substation selection

Constraint category	Constraint
Nature conservation	• designated sites; and • important habitats and species.
Residential and community	• residential properties; • community facilities; • planning policy and applications; • public access; and • amenity and recreation.
Ground conditions	• landfills; • contaminated land; • agricultural land; • geodiversity; • soils and peat; and • minerals.
Water environment	• WFD surface water bodies; • potable use; and • flood risk.
Landscape and visual	• landscape elements and characterisation;

Constraint category	Constraint
	• landscape designations; and • proximity to nearest residential properties, transport and recreational routes, tourist destinations.
Historic environment	• listed buildings; • scheduled monuments; • inventory battlefields; • inventory gardens; • properties in care of Scottish Ministers; • World Heritage Sites; and • areas of archaeological potential.
Commercial	• Land ownership.
Construction	• space required for construction; • change in elevation / slopes; • geohazards; • access; • utilities; and • Overhead lines (OHL).

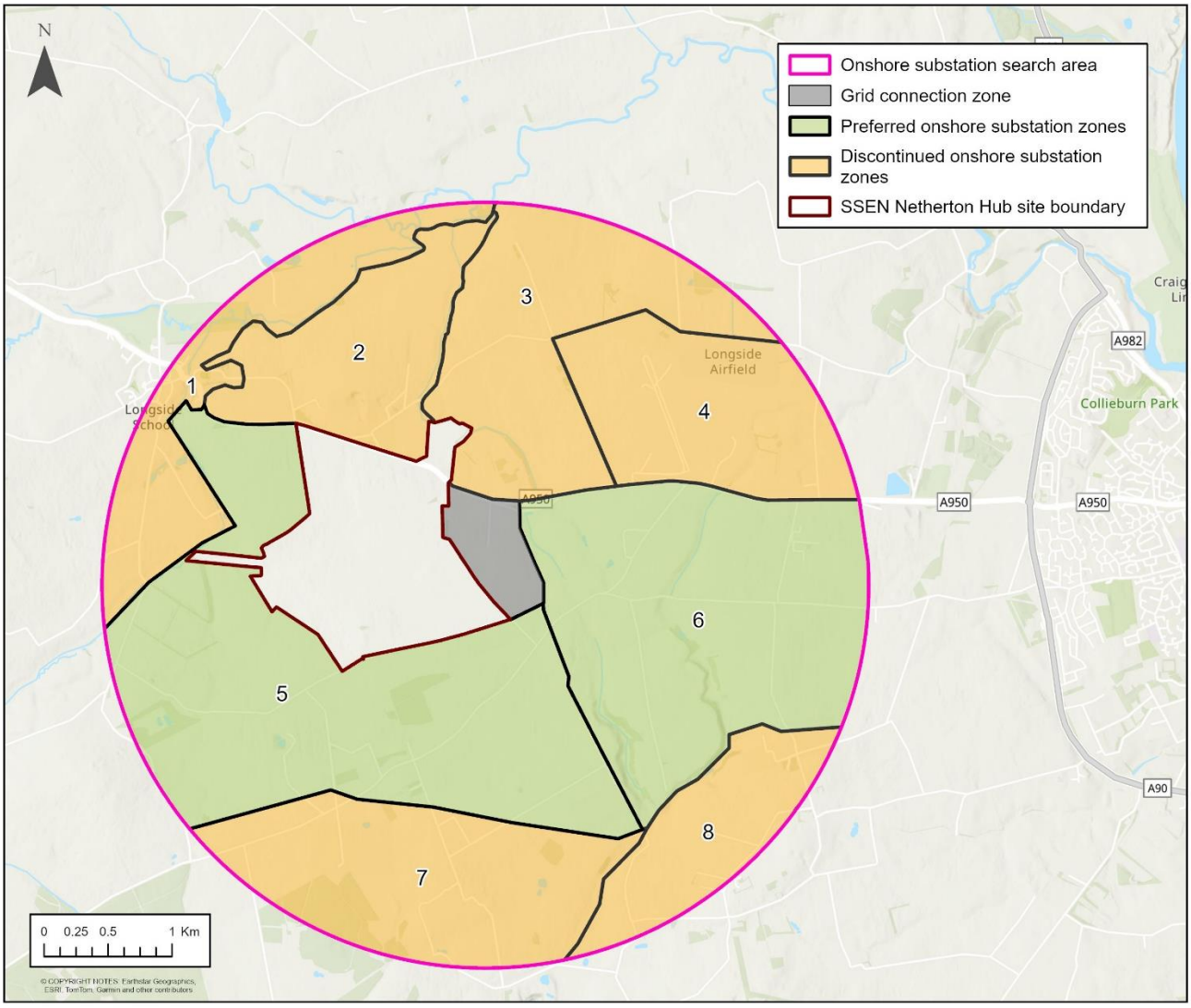
3.10.2 Selection stage 2: Statutory Consultation 1 boundary

3.10.2.1 As previously noted, the key developments at selection stage 2 were the publication, via SSEN's consultation materials (SSEN, 2023), of the location of the new SSEN substation site (SSEN Netherton Hub at Longside, near Peterhead), and publication of the NESO Beyond 2030 report, which confirmed the full 3GW connection for the Project would connect into the SSEN Netherton Hub.

3.10.2.2 With the substation location confirmed, a targeted search area for onshore substation options was defined as a 3km radius around the SSEN Netherton Hub site.

3.10.2.3 The search area was divided into eight Zones, each an area with approximately uniform characteristics in terms of risks and opportunities for onshore substation construction (as described below), for screening purposes. These are shown in **Plate 3.8**.

Plate 3.8 Onshore substations search area and zones



3.10.2.4 The SSEN Netherton Hub site itself was excluded from consideration, along with a small area to the east (labelled 'Grid Connection Zone'), which is expected to be used by multiple projects for cable access connection points at the Hub.

3.10.2.5 Six of the eight zones were excluded from further consideration on the following grounds:

- Zone 1 covers an area running along the northwest boundary of the search area. This includes the residential area of Longside, and a stretch of land separated from the remainder of the search area by South Ugie Water (to the north of Longside) and the Burn of Ludquham (to the south of Longside). The zone was discounted from further consideration because a substation in the zone would:
  - (a) be close to receptors at Longside; and
  - (b) require the onshore cable route to cross over and re-cross a watercourse that does not otherwise need to be crossed to connect to the landfall and to SSEN Netherton Hub; these are avoidable environmental risks.
- Zone 2 is an approximately triangular area to the north of SSEN Netherton Hub, which is bounded by the A950, South Ugie Water and the Burn of Faichfield. The southern end of the zone is constrained, and separated from the A950, by a series of residences / receptors, and there is a disused mineral extraction site in the middle. The northern part of the zone is distant from the road network, close to the river and highly visible from Longside, Flushing and the Formantine and Buchan Way core path and long-distance route. A substation in this area would have a number of environmental constraints; the zone was therefore discounted from further consideration.
- Zone 3 lies between the Burn of Faichfield and Longside Airfield, bounded to the south by the A950. The land is generally agricultural and features sparsely distributed farms and residences. Its major weakness, and the reason why the zone was discounted from further consideration, is that it is crossed by two major gas pipelines operated by National Grid. The routing of the pipelines is such that there are no areas of land of sufficient size for the Project substation that are free from interaction.
- Zone 4 covers the area in and around Longside Airfield, a former Royal Air Force (RAF) site that is still in use for recreational aviation. The southern part of the site is in commercial use for storage of building materials. The zone was considered carefully at this stage, particularly as the brownfield nature of the land offered opportunities for re-use that were not offered elsewhere. However, ultimately it was not carried forwards due to concerns about current commercial utilisation (including for aviation), historic contamination, potential UXO and archaeological significance relating to the former RAF site.
- Zone 7 is characterised by steeper slopes than are found in the rest of the search area and / or higher elevation. It also covers areas of woodland at Nether Kinmundy, which is expected to include environmentally sensitive habitats. It is not densely populated, but the distribution of the residences is such that it is difficult to find a land parcel of suitable size that is not in proximity to multiple receptors. If a substation were to be located in this southern part of the land parcel it would be exposed (due to the elevation), difficult to access, and the associated onshore export cable corridor would be longer, as it would lie well off any direct routes from the landfall options to the SSEN Netherton Hub. For these reasons it was discounted from further consideration.
- Zone 8 has similar characteristics to Zone 7, but it lies further to the east and beyond the Burn of Faichfield. Like Zone 7, it was discounted from further consideration because substation site options that are sufficiently distanced from residential receptors are limited. The land also slopes and undulates, presenting challenging conditions for substation development.

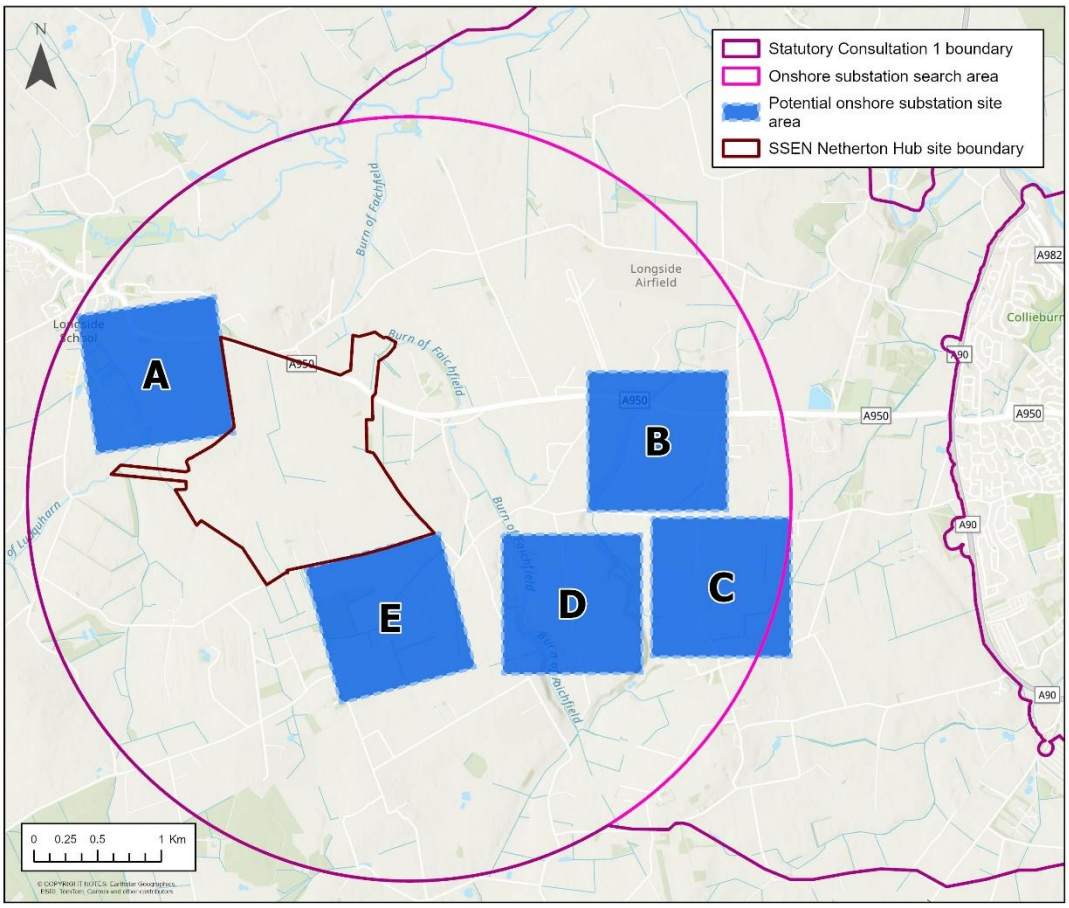
3.10.2.6 Two Zones were retained at this stage, with characteristics as follows:

- Zone 5 covers the land to the immediate south and west of the SSEN Netherton Hub. Its eastern extent is provided by the Burn of Faichfield. The land is agricultural with scattered residences and farm buildings and is crossed by gas pipelines. There are, however, some open areas providing adequate space for the substation, distanced from environmental constraints and residential receptors. Onshore substation site options within this zone would be geographically close to the SSEN Netherton Hub site, noting that there is the potential risk of interaction with other projects and transmission infrastructure connecting to the SSEN Netherton Hub, and that the zone lies on the far side of the Hub site from the coastline.
- Zone 6 is bounded by the A950 to the north, and it lies between Zone 5 and Peterhead. This area is generally (although not universally) a more industrial setting, although there are features of environmental sensitivity, including the Burn of Faichfield to the west and a tributary of the River Ugie that runs through the Zone. A substation in this zone would be close to the A950 and the A90 to the west, and it would lie on a fairly direct path from the landfall options under consideration at selection stage 1. There are several open areas that provide adequate space for the Project substations.

3.10.2.7 Substation site options were investigated within these two Zones, based on the land take required for the onshore substation infrastructure and taking into account the environmental commercial and technical constraints listed in **Table 3.6**. This process led to the identification of five site options: two falling within Zone 5 and three within Zone 6.

3.10.2.8 The substation site options are shown in **Plate 3.9**.

Plate 3.9 Onshore substation site options at Statutory Consultation 1



3.10.2.9 Five potential onshore substation site options, shown as search areas, were presented at Statutory Consultation 1, to allow consultees the opportunity to comment on options presented.

3.10.3 Selection stage 3: Statutory consultation 2 boundary

3.10.3.1 A comparative assessment of the five site options, in alignment with the National Grid Horlock Rules (National Grid, 2009), was carried out during selection stage 3, with the conclusion that the easternmost sites (options B and C) offered the greatest advantages. The assessment of the relative favourability of the sites is summarised in **Table 3.7**.

Table 3.7 Summary of onshore substation option assessment

Site Option	Assessment	Conclusion
A	• No interaction with environmentally designated areas. • Close to multiple private water supply sites; risk of contamination. • Burn of Cairngall (WFD water body) and associated flood plain run close to western edge. • No geological conservation designations, prime agricultural land or mapped areas of peat / peatland. • Numerous historic farmsteads, listed and non-designated historic buildings in vicinity. • Interaction with planned Spittal to Peterhead cable route. • Close to / visible from settlements at Longside and Flushing. • Potential for cumulative effects due to proximity to the SSEN Netherton Hub site. • Within 200m to 600m of residential receptors. • Close to A950; good access. • Export cable route access and egress challenging, • Buried gas pipelines pass through the northwestern part of site, and southeastern boundary. • Slopes of up to 8% in northern part of site.	Proximity to / visibility of the site from Longside and impact on local traffic is a key issue. The onshore export cable corridor lengthened by position of site distanced from planned connection point. **Discounted**.
B	• No interaction with environmentally designated areas. • Tributary of River Ugie runs along western edge of site. • Some areas of surface water flood risk. • No geological conservation designations, prime agricultural land or mapped areas of peat / peatland. • No recorded archaeological remains lie within the site. • Site lies on / close to planned route of export cables for the Buchan Offshore Wind Farm. • Area includes a range of development urban / industrial influences offering a better fit (than other options) with the existing landscape. • Potential for cumulative effects due to proximity to the SSEN Netherton Hub site.	Relatively flat site in partially industrialised setting. Good road access. **Preferred**.

Site Option	Assessment	Conclusion
	• Within 200m to 600m of residential receptors. • Close to A950; good access. • Relatively flat site. • Gas and water pipelines along northern and western edges of site; OHL crosses southwest corner.	
C	• No interaction with environmentally designated areas. • Site contains a network of headwater ditches / streams which discharge into a tributary of a WFD water body (River Ugie) to the southeast. • No geological conservation designations or prime agricultural land. • Large area of peaty gleys in central and eastern part of site, where peat likely to be <50cm thickness. • Remains of two burnt mounds of unknown date recorded to south of site. Numerous historic farmsteads recorded in vicinity. • Possible interaction with planned EGL3 cable route. • The operational substations would be visible from four to five minor roads, part of the A950 and some of the nearest surrounding residential properties. • Within 200m to 600m of residential receptors. • Direct access relies on local roads, but site is close to both the A90 and the A950. • Site climbs northeast to southwest with slopes up to 8%. • OHL cross the site running north-south; these may need to be relocated / re-routed.	Relatively obscured site, some challenges with access and interaction with EGL3 route. **Retained as contingency**.
D	• No interaction with environmentally designated areas. The site is, however, located between woodland corridors to the immediate east and west which may contain sensitive habitats. • The Burn of Faichfield (WFD water body) runs along western side of site; tributary of same waterbody crosses site. Tributary of River Ugie runs along eastern boundary of site. • No geological conservation designations or mapped areas of peat / peatland. • Majority of site is classed as prime agricultural land. • Existing building in the north part of the site, which may have some local heritage interest.	Site considered problematic due to (a) proximity to woodland and watercourses plus associated habitats, (b) expected visual prominence, and (c) poor access by road.

Site Option	Assessment	Conclusion
	• Interaction with planned EGL3 cable route. • Operational site is likely to be visible from local minor roads and some of the surrounding residential properties. • Within 200m to 600m of residential receptors. • Export cable route access and egress challenging. • Site is located approximately 600m south of nearest local road (C38B). Site access appears to be dependent on the compliance of third parties. • Gas pipeline runs through western side of site; water pipes and telecoms cables run along access track through the middle of site. • The site climbs steadily from north to south with slopes up to 5%.	**Discounted**.
E	• No interaction with environmentally designated areas. The site includes areas of forestry / woodland that may contain sensitive habitats. • Site situated close to a main tributary of the Burn of Faichfield. Multiple Private Water Supplies (PWS) in proximity. • Small areas of peaty gleys in and around site. Large areas of poorly drained soil. • No recorded archaeological remains lie within the site. • Unlikely to be visible from Longside or the A950. Existing woodland may provide some screening. • Within 200m to 600m of residential receptors. • Interaction with planned EGL3 cable route. • Export cable route access and egress may be challenging, depending on the number of other projects also connecting at SSEN Netherton Hub. • Site access is via local roads only, which may require widening at a number of bends, with a potential for a proportion of these works to require third party land. • Buried gas pipeline runs close to east end of site. • Available space for export cable routing, drainage and planting around the substations is very limited. • The site rises from east to west with slopes up to 6%.	Key issue at this site is lack of space, particularly in light of multiple neighbouring projects (inc. EGL3) requiring access to SSEN Netherton Hub. **Discounted**.

3.10.3.2 Responses received at Statutory Consultation 1 (see **PAC Report**) relating to the onshore substation site options identified landscape and visual considerations as the topic of greatest importance to respondents. Environmental protection, onshore wildlife and construction methods were also notably important to consultees.

3.10.3.3 A number of respondents expressed a preference for site D in response to a free-text question. This was (reportedly) due to its remoteness, limited visual impact and low impact on surrounding communities. In contrast, concerns were raised about option A and its proximity to the village of Longside.

3.10.3.4 Despite the partial endorsement of site D at Statutory Consultation 1, it appeared on assessment that this site would carry the greatest associated environmental and landscape and visual impact; elements reported as important to stakeholders.

3.10.3.5 With the requirement at selection stage 2 to focus in on a smaller number of sites, the decision was taken to discount Site Options A and E. In each case there were significant questions over the degree to which required SSEN infrastructure (understood to be planned to cross the sites) could be accommodated. Furthermore, the visual impact of site A and the access challenges of site E made the sites B and C preferable as development options.

3.10.3.6 Moreover, the advantages of site D perceived by consultees (low visual and community impact) were considered to be delivered equally or more effectively by site B and C. Site D was therefore also discounted at this stage.

3.10.3.7 The Project preference was for site B, which offered advantages of direct access and lower elevation / slope over site C. The latter was, however, considered to remain a viable option, and the decision was taken to retain both options at Statutory Consultation 2.

3.10.4 Selection stage 4: Establishment of the Red Line Boundary for EIA

3.10.4.1 Responses received at Statutory Consultation 2 (see **PAC Report**) relating to the onshore infrastructure indicated that the most important development aspect to consultees was traffic and transport, followed by landscape and visual considerations.

3.10.4.2 As previously noted, site B was considered preferable because of its direct access to the A950, and because the relatively flat site would be easier to construct (and hence less disturbance, traffic and noise) than the alternative site C. Moreover, some of the land neighbouring site B, to the east and to the north, is already in industrial use.

3.10.4.3 From a traffic and transport perspective (the most important consideration to consultees), site B was preferrable. The direct A-road access would require minimal alteration or enhancement to establish. Site B is also close to the A90 where it acts as a ring road around Peterhead, minimising distances and durations for Project traffic from this truck road.

3.10.4.4 From a landscape and visual perspective, the higher elevation at site C would make it more prominent than site B from wider viewpoints. It is considered that site B would provide a more coherent, semi-industrial setting for a substation than site C.

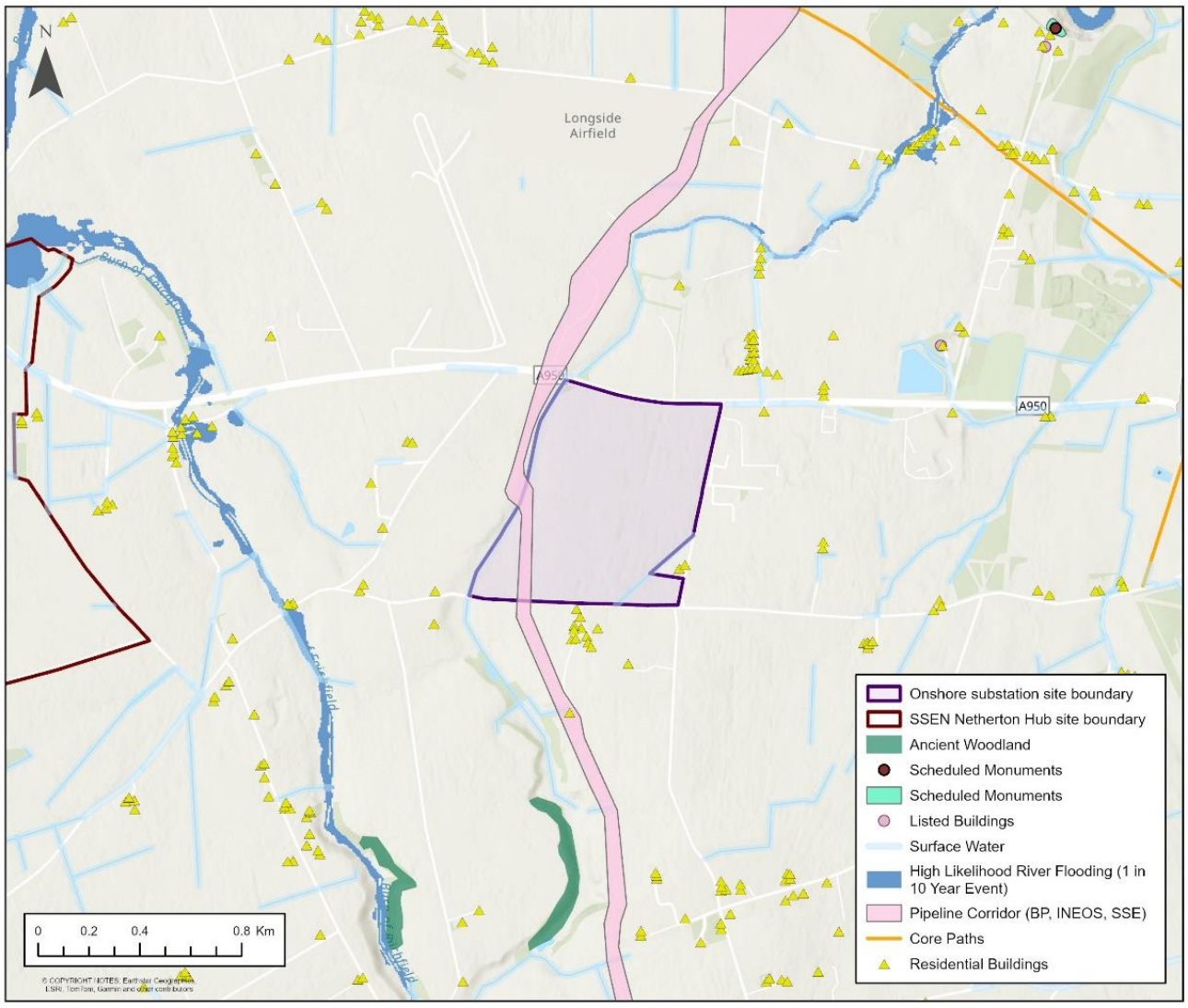
3.10.4.5 Since the two options are very close to one another, they are considered broadly comparable in most areas of consideration mentioned by consultees, including amenity and recreation, environmental protection, and biodiversity.

3.10.4.6 It is notable that the central part of site C is covered by a large area of peaty gleys, which could potentially complicate construction and require some environmental mitigation due to the potential presence of carbon rich soils (as protected by National Planning Framework 4 (Scottish Government, 2023)).

3.10.4.7 Whilst both options remain viable and potentially advantageous options for onshore substation siting and construction, the preference is site B, not only in terms of constructability and minimisation of potential environmental impacts, but also in terms of the issues reported as most critical to local consultees.

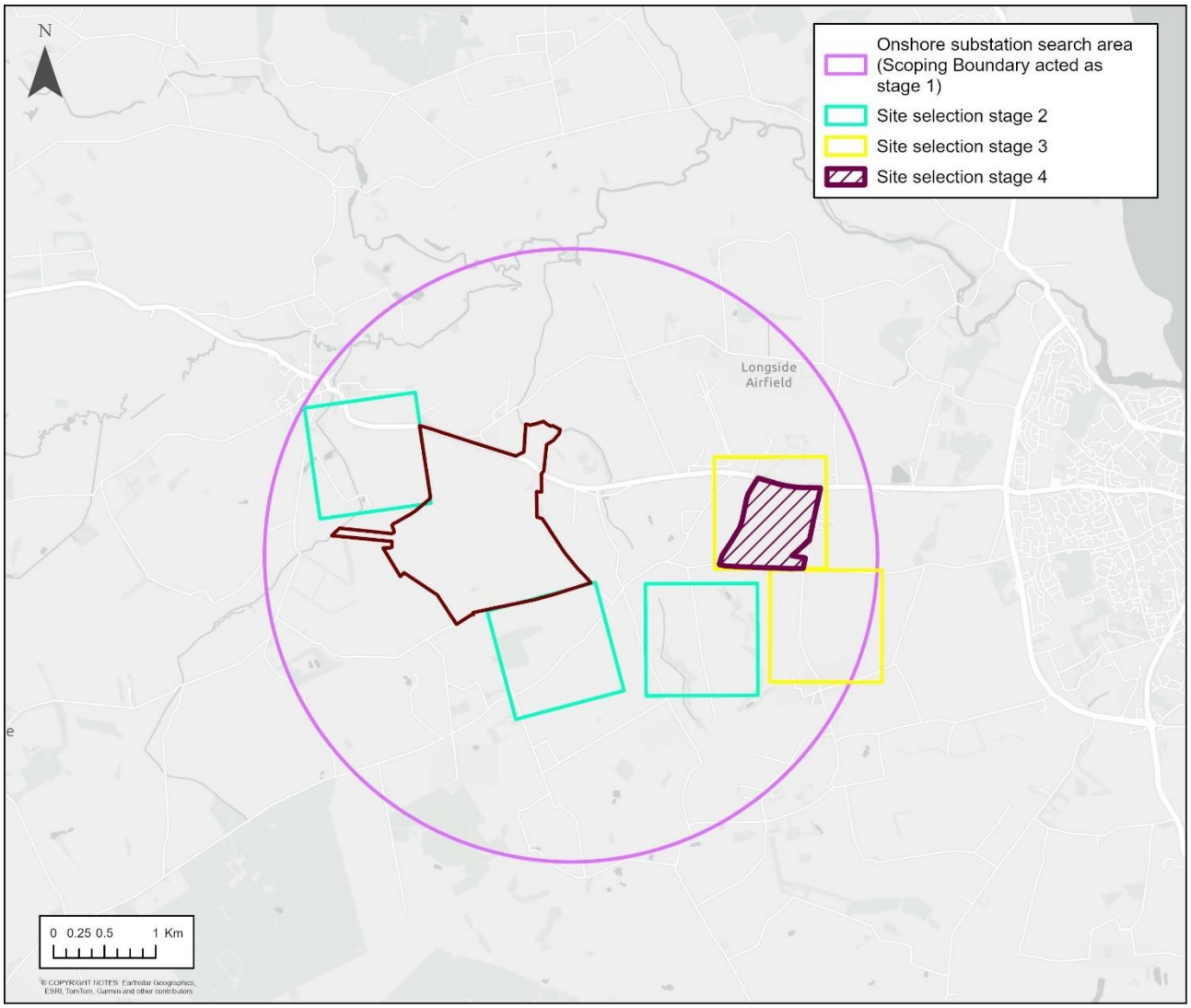
3.10.4.8 The decision was therefore taken to retain site B, with its subsequent inclusion in the establishment of a Red Line Boundary for EIA and consent applications. The site boundary was set at the full extent of the land parcel containing site B, as shown in **Plate 3.10**. Those parts of the land parcel not directly used for the substations and access roads may be used for planting / screening, landscaping and drainage systems.

Plate 3.10 Site option B



3.10.4.9 **Plate 3.11** provides an overview of the four selection stages as they relate to onshore substation site selection.

Plate 3.11 Summary of onshore substation site optioneering by selection stage



3.11 Onshore export cable corridor selection

3.11.1 Selection stage 1: Scoping Boundary

3.11.1.1 As with the onshore substation site selection, the onshore export cable corridor optioneering could only be speculative at selection stage 1, the geographical grid connection location(s) being unconfirmed at this time.

3.11.1.2 The onshore export cable corridor is also generally responsive to the preferred locations for the landfall and onshore substation. Although a landfall or onshore substation option may be evaluated poorly on the grounds that it is difficult to establish onshore export cable corridor access, it is more commonly the case that the onshore export cable corridor will connect the preferred onshore substation and landfalls rather than drive their selection.

3.11.1.3 This being the case, it was necessary at the Scoping stage to define a Scoping Boundary that allowed adequate coverage for export cable routing between (a) New Deer and the identified landfall zones and (b) all reasonable areas which might become the site of the new SSEN substation and the identified landfall zones.

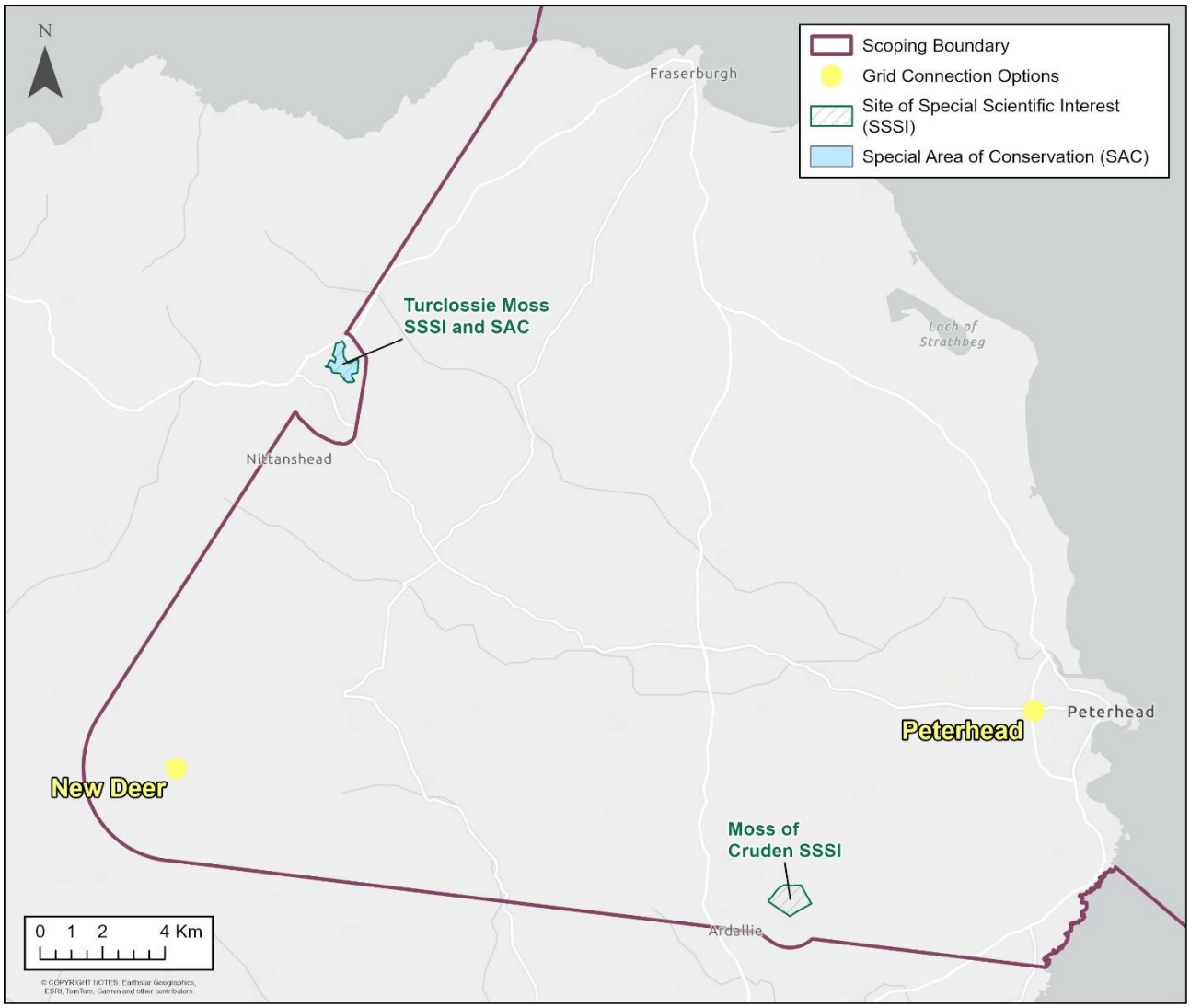
3.11.1.4 In the vicinity of the potential grid connection points, this meant the inclusion of the speculative search area around New Deer substation, and the 5km radius search area around Peterhead. At the coastline, this meant the inclusion of all landfall zones under consideration.

3.11.1.5 The area between New Deer and the coastline (and Peterhead, with buffer) was covered continuously by the boundary, creating an approximately triangular shape with New Deer at one corner, Peterhead at another and Fraserburgh (the northern extent of the landfall search area) providing the third.

3.11.1.6 A deviation was made to the otherwise straight-line boundary near New Pitsligo, to avoid an area, Turclossie Moss, designated as a Special Area of Conservation and SSSI and surrounded by areas of ancient woodland. A second deviation was made at Moss of Cruden, to allow space to circumnavigate the extents of the SSSI.

3.11.1.7 **Plate 3.12** shows the extent of the onshore part of the Scoping Boundary, effectively serving as the onshore export cable corridor search area at selection stage 1.

Plate 3.12 Onshore Scoping Boundary



3.11.1.8 Environmental, commercial and technical constraints were also identified and mapped at this stage, in order to provide a framework for assessment and selection going forward. These are summarised in **Table 3.8**.

Table 3.8 Constraints considered for onshore export cable corridor selection

Constraint category	Constraint
Nature conservation	• designated sites; and • important habitats and species.
Residential and community	• residential properties; • community facilities; • planning policy and applications; • public access; and • amenity and recreation.
Ground conditions	• landfills;

Constraint category	Constraint
	• contaminated land; • agricultural land; • geodiversity; • soils and peat; and • minerals.
Water environment	• WFD surface water bodies; • potable use; and • flood risk.
Landscape and visual	• landscape elements and characterisation; • landscape designations; and • proximity to nearest residential properties, transport and recreational routes, tourist destinations.
Historic environment	• listed buildings; • scheduled monuments; • inventory battlefields; • inventory gardens; • properties in care of Scottish Ministers; • World Heritage Sites; and • areas of archaeological potential.
Commercial	• Land ownership.
Construction	• space required for construction; • change in elevation / slopes; • geohazards; • access; • utilities; and • OHL.

3.11.2 Selection stage 2: Statutory Consultation 1 boundary

3.11.2.1 At selection stage 2, grid connection location having been confirmed at SSEN Netherton Hub by SSEN for the full 3GW Project, the onshore export cable corridor search area was reduced dramatically to focus in on Peterhead and landfall Zones 3 and 4.

3.11.2.2 At this stage, five potential onshore substation sites within a search area of 3km radius around SSEN Netherton Hub were identified. Similarly, northern landfall Zones 1 and 2 were discounted in favour of (preferred) Zones 3 and 4 that lie close to Peterhead.

3.11.2.3 To respond to the multiplicity of site (landfall and onshore substation) options to be connected by the onshore export cable corridor, a preliminary network of links was created to explore the optimum routes that might serve any combination. This was achieved by the creation of a heat map of risks and constraints reflecting the onshore export cable corridor assessment criteria (see **Table 3.8**). A GIS platform was used to autogenerate paths with minimal interaction with mapped constraints. The resultant network was then reviewed and adjusted as necessary to ensure that it was robust from a construction perspective.

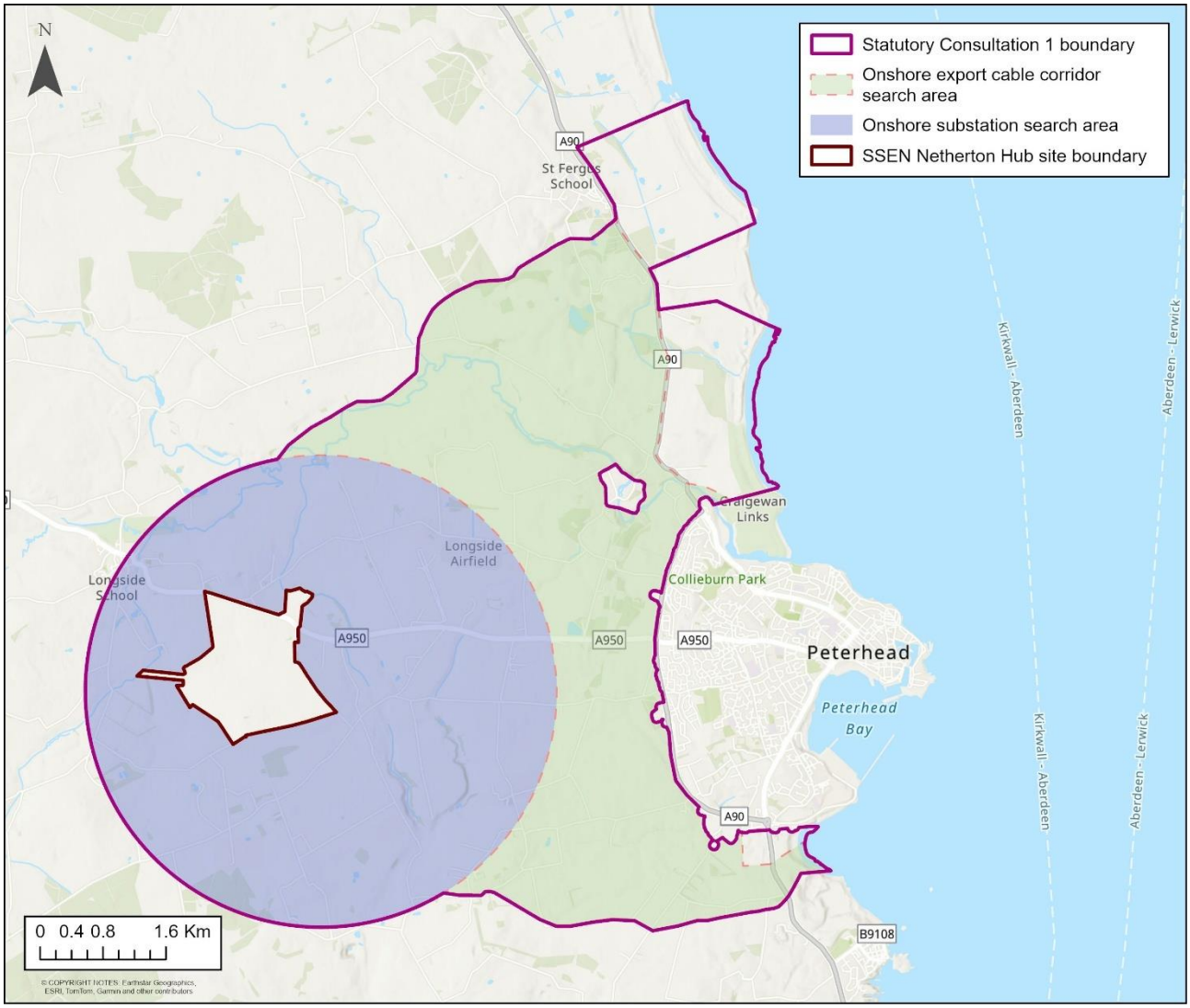
3.11.2.4 An initial assessment, to compare the different route options, was carried out at this stage, however since the selection would depend heavily on the onshore substation and landfall

sites selected, it was decided that it would be premature and potentially confusing to present onshore export cable corridor alternatives at Statutory Consultation 1.

3.11.2.5 The Statutory Consultation 1 boundary was therefore set to include all paths in the onshore export cable corridor network (with a reasonable buffer applied). The onshore substation search area extent was also included, to allow for flexibility in accessing any of the onshore substation site options under consideration, and the landfall Zones were also included in full.

3.11.2.6 The Statutory Consultation 1 boundary, which effectively doubles as the onshore export cable corridor search area at selection stage 2, is shown in **Plate 3.13**.

Plate 3.13 Statutory Consultation 1 boundary



3.11.3 Selection stage 3: Statutory Consultation 2 boundary

3.11.3.1 Responses received at Statutory Consultation 1 (see **PAC Report**) did not include any feedback on specific routing risks, although onshore export cable corridors were identified as one of the most important aspects of the Project to consultees.

3.11.3.2 Feedback from Statutory Consultation 1 and further review of environmental and technical constraints did, however, support the further down selection of onshore substation options to the extent that only two (options B and C, see **Section 3.10**) were carried forward for inclusion in the more refined boundary prepared for Statutory Consultation 2. Additionally, the decision was taken at selection stage 3 to discount Sandford Bay (Landfall Zone LF4) from further consideration.

3.11.3.3 The reduction of landfall and onshore substation site options simplified the onshore export cable corridor network. Paths from Sandford Bay became redundant, as did any links accessing SSEN Netherton Hub from the north, west and (largely) south.

3.11.3.4 Further assessment and refinement of the potential routes to onshore substation options B and C from the landfall areas, and onwards to SSEN Netherton Hub, led to the emergence of two main onshore export cable corridor branches: one to the north and west of Longside Airfield and one to the east.

3.11.3.5 The airfield itself was avoided for routing purposes, as it had been for onshore substation site selection, because of the risks arising from the commercial use of the airfield site, and potential presence of historic items of UXO and / or archaeological significance.

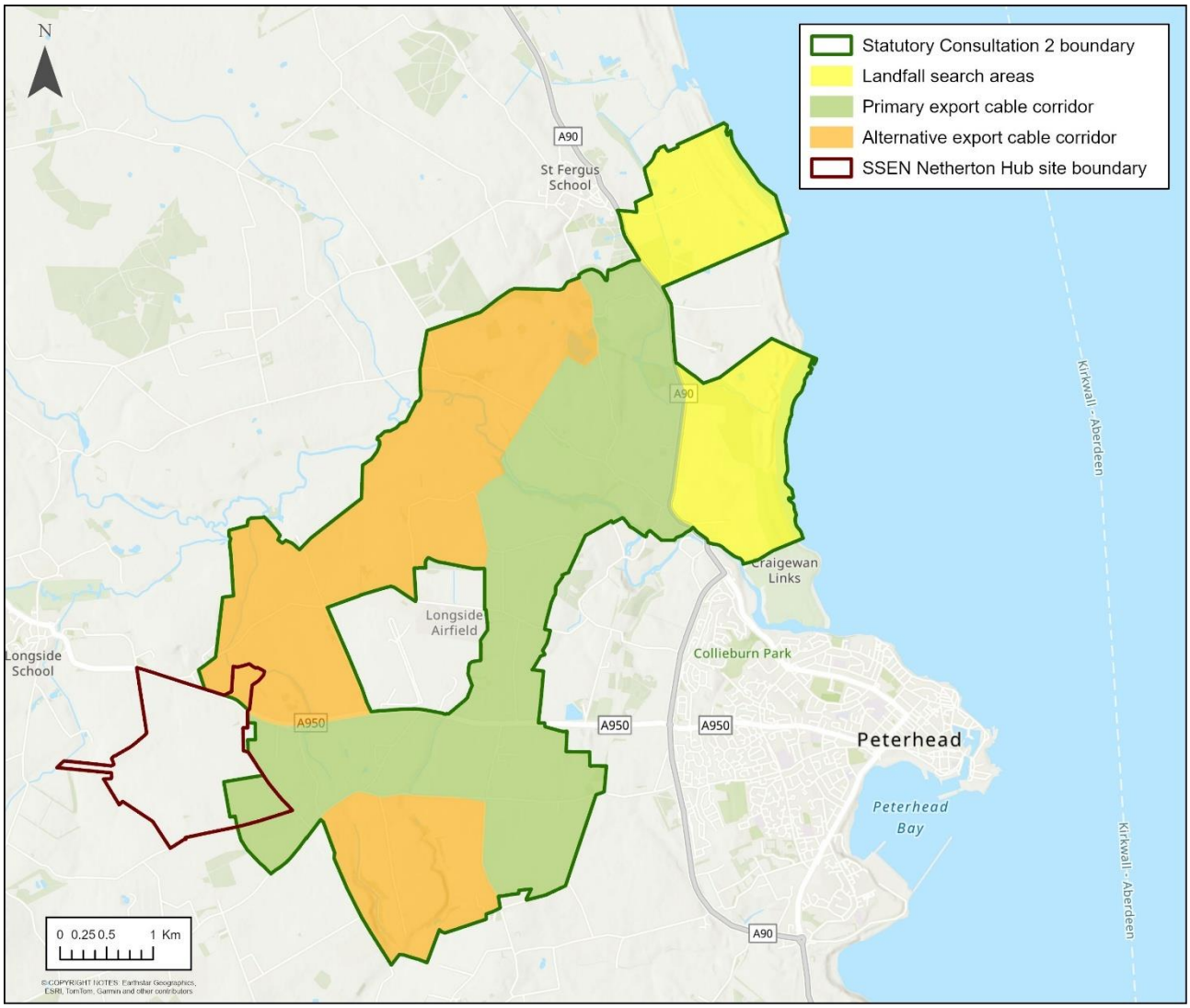
3.11.3.6 The shorter route to the east was viewed as preferable as it was more direct, and more easily accessible for construction traffic. Whilst both routes cross a number of unavoidable features, including the River Ugie and the Burn of Faichfield, the western route interacts more significantly with the Burn, and would also require additional crossings of buried pipelines that run through the area.

3.11.3.7 Consequently, although the western route is considered viable, the eastern route was preferred and was therefore presented as the ‘primary’ route at Statutory Consultation 2 (the western route being labelled ‘alternative’).

3.11.3.8 The boundary at Statutory Consultation 2 was developed to align, where appropriate, with field boundaries.

3.11.3.9 **Plate 3.14** shows the Statutory Consultation 2 boundary, which is determined principally by the onshore export cable corridor primary and alternative routes.

Plate 3.14 Statutory Consultation 2 boundary



3.11.4 Selection stage 4: Establishment of the Onshore Red Line Boundary for EIA

3.11.4.1 Key decisions taken after Statutory Consultation 2 (see **PAC Report**) included the selection of a single preferred onshore substation site (site B) and the retention of all landfall options within Zone LF3 (with some refinement of boundaries).

3.11.4.2 As noted in **Section 3.10**, responses received at Statutory Consultation 2 relating to the onshore infrastructure indicated that the key development considerations to consultees were traffic and transport and landscape and visual.

3.11.4.3 These consultee priorities support the (already established) preference for the primary onshore export cable corridor to the east of Longside Airfield. Having the route run closer to Peterhead and the A90 trunk road would reduce traffic impact and also reduce the need for disturbance on local roads. Visually, the eastern route would generally run through and closer to semi-industrial areas, rather than open fields and farmland, and the degree to which construction would be visible from the Formantine and Buchan way Core Path and Long Distance Route would also be less. In addition, the primary route would be shorter

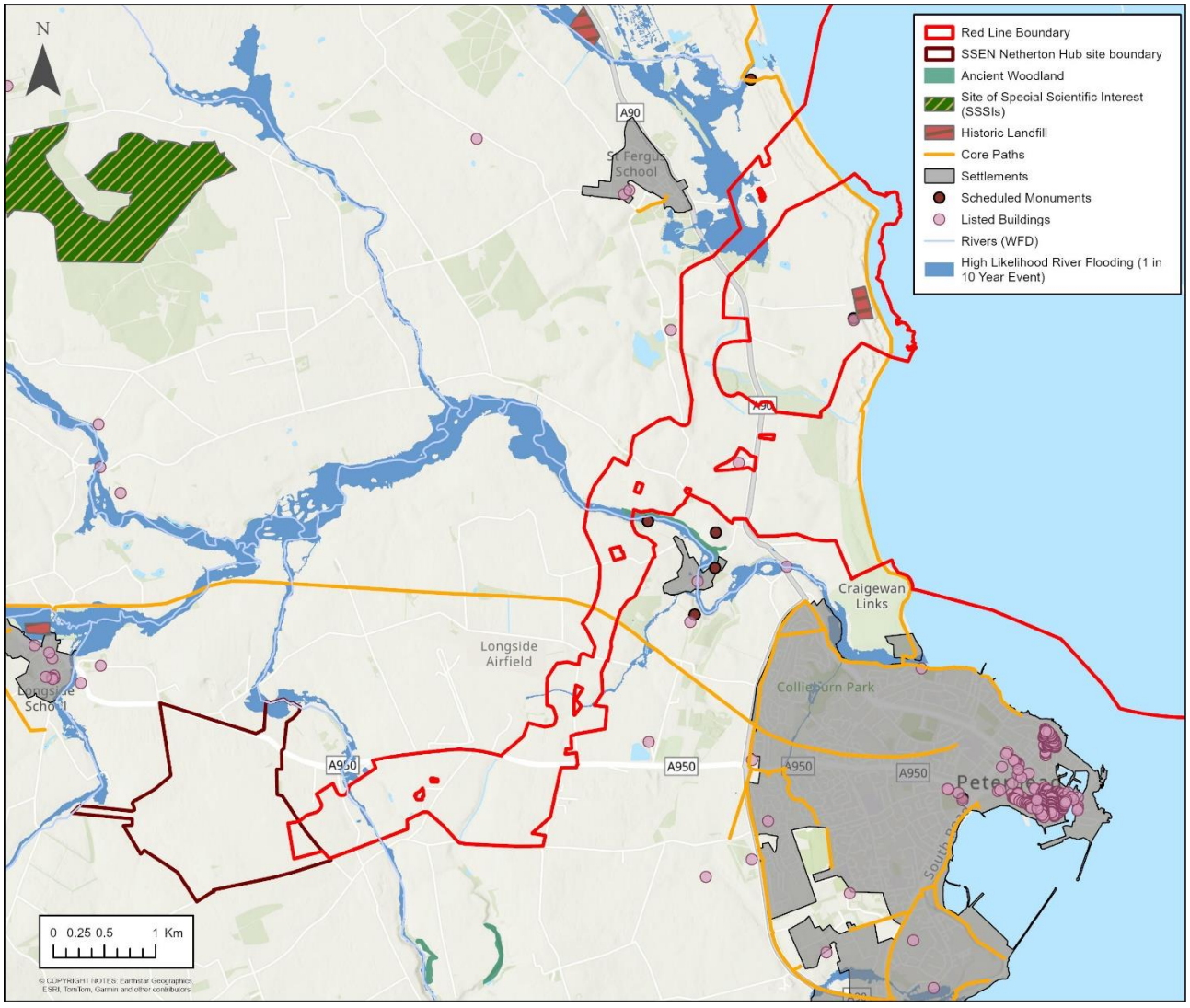
and more direct and consequently have a smaller footprint, thus minimising the overall environmental impact during construction.

3.11.4.4 The establishment of the Onshore Red Line Boundary considered hard constraints, including the avoidance of pipelines via HDD crossings where necessary, excluding large woodland areas where possible, and ensuring appropriate buffers were maintained around Listed Buildings and Scheduled Monuments. Where future road access may be required, the Onshore Red Line Boundary was expanded in localised areas to ensure this could be achieved.

3.11.4.5 The decision was therefore taken to discount the alternative western route around the airfield in favour of the primary eastern onshore export cable corridor.

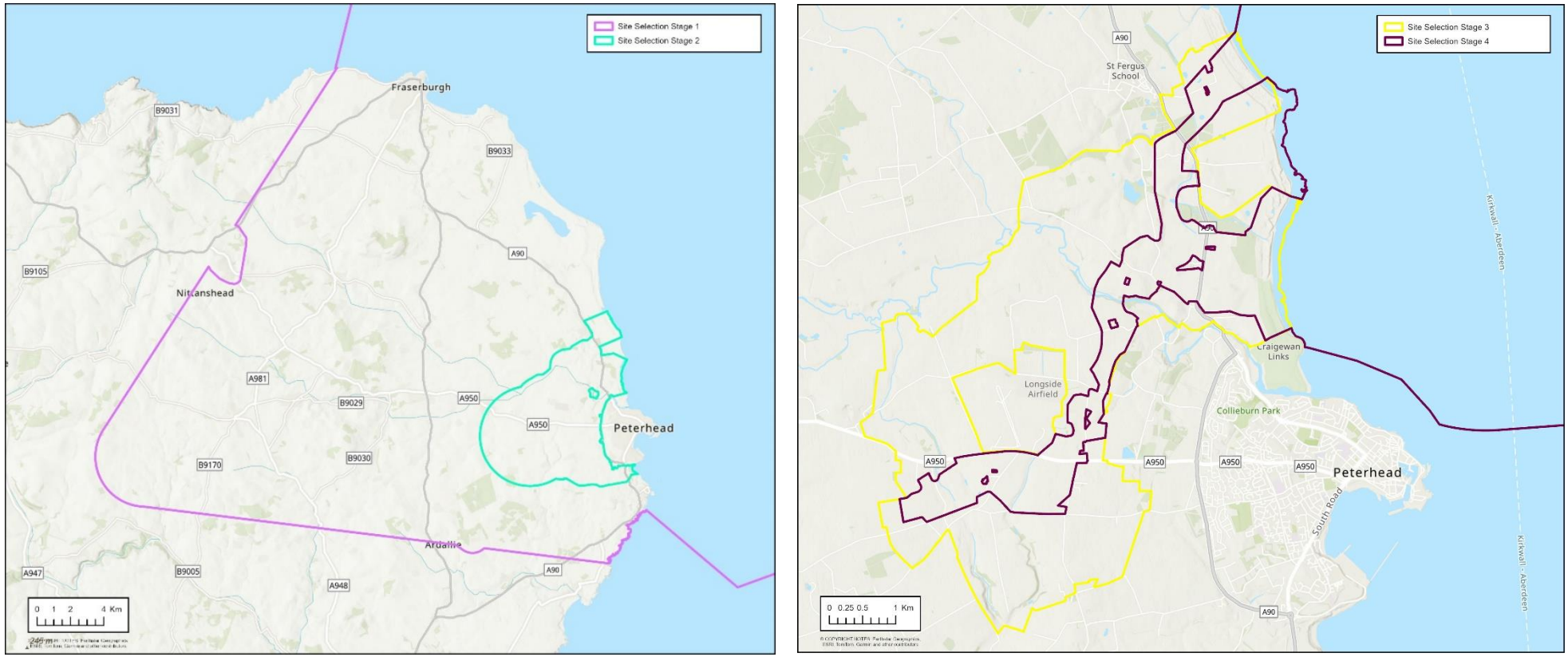
3.11.4.6 The extent of the primary onshore export cable corridor was also refined significantly at this stage, reflecting the desire to provide greater certainty to affected landowners and move towards a final construction corridor. In some areas, residential and farm building land parcels were removed from the boundary. This resulted in the identification of a preferred onshore export cable corridor retained in the establishment of a Red Line Boundary for EIA and consent applications as shown in **Plate 3.15**.

Plate 3.15 Onshore export cable corridor Red Line Boundary



3.11.4.7 **Plate 3.16** provides an overview of the four selection stages as they relate to onshore export cable corridor selection.

Plate 3.16 Summary of onshore export cable corridor optioneering by selection stage



3.12 Development design and technologies

3.12.1 Landfall construction

3.12.1.1 To reduce the environmental impact of the landfall, the Applicant has committed to a trenchless solution in relation to the installation of cable ducts at the landfall(s), this will minimise impacts to dune systems and avoids habitat loss or modification to these potentially sensitive communities. From a landscape and visual perspective, implementation of a trenchless cable installation methodology, such as HDD, would also minimise the loss of sensitive landscape elements (including dune and associated vegetative cover). Additionally, visual effects and potential impacts on access during construction would be reduced for receptors on the beach and Core Paths. Furthermore, while the final location of the landfall(s) and the route of the associated landfall ducts have not been determined, the pillboxes and anti-tank blocks at the landfalls would also be avoided through implementation of HDD.

3.12.2 Onshore export cables

3.12.2.1 To minimise the landscape and visual impact of the onshore infrastructure, the Applicant has committed to the onshore export cables being installed underground. Although overhead power lines are cheaper than underground cables, overhead power lines are considered to have a higher environmental impact, particularly with regard to the landscape and visual impact.

3.12.3 Onshore crossing methods

3.12.3.1 There are road, watercourse, footpath, third party services, and other crossings along the onshore export cable corridor. Open cut trenching will predominantly be used for minor crossings, unless ground conditions, stakeholder or owner requirements, or environmental sensitivities dictate otherwise.

3.12.3.2 Trenchless crossings are to be used for main watercourses, such as the River Ugie and its tributaries, key third-party services such as gas mains and the crossing of the A90 and A950 roads. The locations of proposed trenchless crossings are identified in **Volume 3, Appendix 4.1: Crossings Register**. The selection of a trenchless crossing methodology for installing onshore export cable ducts across natural or built infrastructure such as watercourses and roads has considered various key environmental aspects. These include:

- disruption and disturbance due to road closures and noise; and
- loss of or disturbance to environmentally sensitive areas such as protected or sensitive habitats, designated sites, and buried archaeology.

3.13 Conclusion

3.13.1.1 The site selection and consideration of alternatives for the Project has been undertaken in line with the requirements of the EIA Regulations, as outlined in Section 2.3 of **Chapter 2: Legislation and Policy Context**).

3.13.1.2 The site selection process described in this Chapter has provided for the refinement of a Project boundary that has evolved in line with key Project milestones at Scoping and the two Statutory Consultation stages. The conclusion of this work is the Red Line Boundary presented for EIA, as the boundary within which the offshore and onshore Project infrastructure is proposed for the relevant offshore and onshore consent applications.

3.13.1.3 The Applicant has considered stakeholder feedback obtained through Statutory Consultation and wider stakeholder engagement, and this has fed into site selection and design evolution throughout the EIA process.

3.13.1.4 Alternative designs and technologies have been considered across the offshore, onshore and landfall components of the Project infrastructure. Some alternatives have been retained since Project inception right through the consent application, whilst others have been discounted from the design envelope during the EIA process.

3.13.1.5 As described in **Chapter 4: Project Description,** the Applicant intends to apply the Rochdale envelope principle to the EIA, which will provide the reasonable worst-case parameters or scenario that will encompass the flexibility required for relevant Project infrastructure. The Project design envelope therefore inherently retains feasible alternatives to allow design flexibility associated with the phased build-out and energisation of the Project.

3.13.1.6 The Project design envelope has been established for the purposes of EIA, to enable a maximum design scenario to inform the specification of reasonable worst-case scenarios relevant to each technical aspect. However, further Project development will continue to be ongoing into the post-consent period and into the detailed design stage. This will allow for necessary micro-siting and will take into consideration the acquisition of additional data, obtained through further site-specific surveys, desk-based reviews and further consultation prior to construction. This approach will ensure that any new information is considered and integrated into the final design before construction begins.

3.13.1.7 Whilst design refinement will be ongoing, the final Project design will be within the maximum design scenario presented for EIA such that the findings and conclusions of this EIA Report remain valid into the post-consent period.

3.14 References

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3.15 Glossary of terms and abbreviations

3.15.1 Abbreviations

Acronym	Definition
CES	Crown Estate Scotland
EGL	Eastern Green Link
EIA	Environmental Impact Assessment
EIA Report	Environmental Impact Assessment Report
FUE	Follow Up Exercise
GIS	Geographical Information System
GW	Gigawatt
HDD	Horizontal Directional Drilling
HND	Holistic Network Design
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
INTOG	Innovation and Targeted Oil and Gas
km	kilometre
kV	kilovolt
LAT	Lowest Astronomical Tide
LF	Landfall
m	metre
MD-LOT	Marine Directorate – Licensing Operations Team
MLWS	Mean Low Water Springs
MPA	Marine Protected Area
MW	Megawatt
NE7	North East 7
NESO	National Electricity System Operator
O&M	Operation and maintenance
OAA	Option Agreement Area
OHL	Overhead Line

Acronym	Definition
PAC	Pre-Application Consultation
RAF	Royal Air Force
RCP	Reactive Compensation Platform
SLA	Special Landscape Area
SMP	Sectoral Marine Plan
SOV	Service Operations Vessel
SPA	Special Protected Area
SSEN	Scottish and Southern Electricity Networks
SSSI	Site of Special Scientific Interest
UK	United Kingdom
UXO	Unexploded Ordnance
WFD	Water Framework Directive
WTG	Wind Turbine Generator

3.15.2 Glossary of terms

Term	Definition
Array cables	Array cables will be used to connect the WTGs to one another in a string, star or loops and to the offshore subsea substation(s). The cables will have a requirement to withstand both dynamic conditions at the floating units as well as static lay and burial in or on the seabed.
Environmental measures	Measures that are proposed to prevent, reduce and where possible offset any significant adverse effects (or to avoid, reduce and if possible, remedy identified effects).
Environmental Impact Assessment	The process of evaluating the likely significant environmental effects of a proposed project or development over and above the existing circumstances (or 'baseline').
Environmental Impact Assessment Report	The outcome of the Environmental Impact Assessment (EIA) process is reported within a document called an EIA Report.
Export cable corridor	The broad linear area through seabed (seaward of Mean High Water Springs (MHWS)) and land (landward of MHWS) connecting the Project OAA offshore to the proposed point of connection onshore, and within which electrical export cables will be located.
Horizontal directional drilling	An engineering technique for laying cables that avoids open trenches by drilling between two locations beneath the ground's surface.

Term	Definition
Landfall	The generic term applied to the entire coastal area between the limit of MLWS and the position of the transition joint bays located above the limit of MHWS, inclusive of all construction works, including the offshore and onshore export cable corridor, intertidal working area and landfall temporary construction compound.
Mean High Water Springs	The average throughout a year of the heights of two successive high waters during those periods of 24 hours (approximately once a fortnight) when the tidal range is greatest.
Mean Low Water Springs	The average throughout a year of the heights of two successive low waters during those periods of 24-hours (approximately once a fortnight) when the tidal range is greatest.
Offshore	The offshore elements of the Project refer to works seaward of Mean High Water Springs (MHWS).
Offshore export cables	Subsea export cables connect the offshore substation(s) to the landfall site(s) where a transition joint bay links the offshore subsea cables to the onshore underground cables. This cable system is necessary to export power from the offshore wind farm through the onshore substation to the existing grid network.
Offshore substation	Offshore substations are installed to collect the energy generated by the WTGs and house transmission equipment. The latter is required to convert the wind farm electricity to higher voltages necessary for long distance transmission through subsea cables to the onshore grid. Offshore substations can be above the sea surface on a platform and/or subsea. Several platforms may be required for the Project.
Onshore export cables	These are underground cables that connect from the landfall transition joint bays to the onshore substations. As with the offshore export cables, the type and number of cables will depend on the transmission technology used. Cables are typically installed in ducts in a standard buried trench arrangement where possible. Horizontal Directional Drilling (HDD) or other tunnelling methods may be necessary to cross sensitive features such as watercourses, roads and pipelines.
Onshore substation	Three new onshore substations are required to transform / convert the onshore export cable voltage to the 400kV required to connect to the proposed SSEN Netherton Hub substation.
Option Agreement Area	Term for the wind farm site upon the seabed at a location specified in the Option Agreement between the Crown Estate Scotland and a developer. It is the agreement that allows the developer the rights to undertake such tests, survey and site investigations that do not entail the temporary or permanent installation of any works or structures on the seabed.
Pre-Application Consultation Report	A document required to be submitted at the submission stage that presents how pre-application consultation and stakeholder engagement was delivered in line with statutory minimum requirements or any additional requirements set out by the consenting body in their response to the Proposal of Application Notice.
Project	The MarramWind Offshore Wind Farm that is the subject of this EIA Report, as described in Chapter 4: Project Description.

Term	Definition
Reactive compensation platform	For HVAC transmission, there is an upper limit of offshore export cable route length, beyond which the electrical losses incurred during transmission become prohibitive. This limit can be increased using reactive power compensation equipment connected through a separate substation(s) along the export cable route, typically around the mid-point between the offshore substation(s) and onshore substations
Red Line Boundary	The Red Line Boundary is a geographical area within which the offshore wind farm; associated onshore and offshore infrastructure will be located. It represents the boundary identified for the relevant planning and consent applications.
Scoping Boundary	The area within which the Project and electrical infrastructure will be located, including the temporary work areas.
ScottishPower Renewables UK Limited	Part of the Iberdrola group and 100% owner of the MarramWind Limited project.
Spar	A large diameter floating wind turbine unit that uses three vertical cylinders for buoyancy, with a deep draft and ballast at the bottom to aid structure stability in response to oceanographic conditions.
Statutory Consultation	The undertaking of a consultation that is delivered in line with or beyond the minimum requirements of the relevant consenting regime(s) to obtain stakeholder feedback on the Project.
Subsea distribution centres	Subsea distribution centres comprise a foundation support structure and protection structure. The subsea distribution centres allow cables from multiple WTGs to connect, with a single array cable then going from the subsea distribution centre to the offshore substation.
Subsea substations	Subsea substations comprise of a foundation support structure and protection structure, which is secured subsea to support associated distribution equipment. Given the access restrictions from being subsea they will be designed for ease of access and consider the need for operation and maintenance activities through life.
Unexploded ordnance	Explosive weapons (for example bombs, shells, grenades, land mines, naval mines) that did not explode when they were employed or discarded and still pose a risk of detonation, potentially many decades later.
Wind Turbine Generators	WTGs convert wind energy to electricity. Each floating WTG will comprise a tower (potentially assembled in sections), a rotor with three blades attached to a nacelle. The nacelle typically houses a gearbox, generator, converter, transformer, and control equipment.
Wind Turbine Generator floating unit	Each WTG is supported by a floating unit that is positively buoyant and moored in position on the seabed. A number of floating unit concepts are currently under consideration.
Wind Turbine Generator station keeping system	Each WTG on its floating unit will be secured in place using a station keeping or mooring system, involving anchors and mooring lines. Typically, multiple mooring lines will spread out radially from the floating structure, each ending in an anchor point on the seabed.

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