



Blue Gem Wind

Erebus Floating Offshore Wind Farm



Blue Gem Wind

OWC

AN AQUALISBRAEMAR COMPANY



NON-TECHNICAL SUMMARY

December 2021

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Introduction

This Non-Technical Summary (NTS) provides a summary of the Environmental Statement (ES), which describes the Environmental Impact Assessment (EIA) process undertaken for a floating offshore wind farm known as Project Erebus. The Project is being advanced by Blue Gem Wind Ltd. (The Applicant), a joint venture between Simply Blue Energy and TotalEnergies, who have established a partnership to develop floating offshore wind (FLOW) projects in the waters of the Celtic Sea.

1. An EIA seeks to identify and describe likely significant effects, both positive and negative, that may result from a project. Where likely significant effects are identified, the ES provides a suite of mitigation measures, the purpose of which is to avoid, reduce or prevent impacts from occurring. These measures are then integrated into the design, programme or construction methodology for the Project.
2. The ES has been prepared in accordance with relevant legislation and guidance, including:
 - The Electricity Works (Environmental Impact Assessment) (England and Wales) Regulations 2017 (the Electricity Works EIA Regulations); and
 - The Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended) (the Marine Works EIA Regulations).
3. The ES for the Project is presented in a series of volumes as follows:
 - **Non-Technical Summary (NTS):** This document.
 - **Volume 1 - Environmental Statement:** A series of technical chapters containing sufficient information to enable the appropriate authority to assess the environmental impacts of the Project.
 - **Volume 2 - Figures:** Plans, drawings and figures are presented in a volume separate to the main document to facilitate the assessment and review process.
 - **Volume 3 - Technical Appendices:** This volume contains the technical appendices and reports that have been used to inform the assessment and drafting of the main chapters.
 - **Volume 4 - Confidential Technical Appendices and Figures.**



Availability of the Projects Environmental Statement

5. This NTS is presented in a format and wording accessible to the public. Paper copies of the NTS are available free of charge from the Applicant's office at Bridge Innovation Centre, Pembrokeshire Science and Technology Park, Pembroke Dock, Wales, SA72 6UN.
6. As of December 2021, COVID restrictions prevent inspection of hard copies at the Pembrokeshire County Council (PCC) and Pembrokeshire Coast National Park Authority (PCNPA) offices. Therefore, copies have been made available for inspection at the following locations:

Location	Opening Hours
Blue Gem Wind, Bridge Innovation Centre Pembrokeshire Science and Technology Park Pembroke Dock SA72 6UN	<ul style="list-style-type: none"> • 9:00 – 17:30 Monday to Friday • Closed Friday 24 December 2021 to Monday 3rd January 2022 inclusive.
The Riverside: Library, Gallery and Visitor Information Off Swan Square, Haverfordwest Pembrokeshire SA61 2AN Tel: 01437 775 244	<ul style="list-style-type: none"> • 10:00 – 17:00 Monday, Wednesday, Thursday, Friday, Saturday • 10:00 – 19:00 Tuesday • Closing at 16:00 on Friday 24th December 2021 • Closed Saturday 25th December 2021 to Monday 3rd January 2022 inclusive.

7. Volumes 1-3 of the ES are also available free of charge on the Applicant's website: <https://www.bluegemwind.com/planning/> and USB copies are available on request by email to David Jones, Blue Gem Wind Stakeholder Manager. Email: David.jones@bluegemwind.com
8. Due to the size of the documents, a reasonable copying charge of up to £2500 may be made for reproduction of any hard copies of the full ES including figures and technical appendices (up to £250 for Volume 1 – ES Chapters only).

Consenting Process

9. The key project consent applications are:
 - Section 36 consent under the Electricity Act 1989: to construct and operate an offshore generating station, with deemed planning permission for the associated onshore transmission infrastructure; and
 - Marine Licence under the Marine and Coastal Access Act 2009 ("MCAA"): to carry out certain activities in the marine environment, including construction works, depositing substances or articles, and dredging.
10. Planning and Environment Decisions Wales (PEDW), administering on behalf of the Welsh Ministers, is the consenting authority for the Section 36 Application. Natural Resources Wales (NRW), administering on behalf of the Welsh Ministers, is the consenting authority for the marine licence application.
11. Any representations on the Section 36 Application should be made directly to PEDW, by one of the following methods:

Email: PEDW.Infrastructure@gov.wales

Post: **Planning & Environment Decisions Wales, Welsh Government, Cathays Park, Cardiff CF13NQ**

Any representations in respect of the Marine Licence application should be made directly to NRW, by one of the following methods:

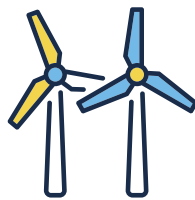
Email: marinelicensing@naturalresourceswales.gov.uk

Post: **Marine Licensing Team, Cardiff Permitting Service, Natural Resources Wales, 29 Newport Road, Cambria House, Cardiff CF24 0TP**

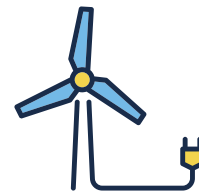
The Proposed Development

The Need for the Development

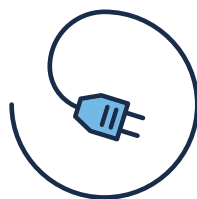
12. The UK has committed to net zero carbon emissions by 2050 through the Climate Change Act 2008 (as amended). The Welsh Government has also set a legal commitment to achieve net zero by 2050, with a stated ambition to “get there sooner”.
13. Renewable energy is seen as a primary method of reducing emissions of greenhouse gases (GHG), in particular carbon dioxide. The Climate Change Committee in the Sixth Carbon Budget (December, 2020) stated that offshore wind will become the backbone of the future energy system requiring 100+ Gigawatts (GW) of installed capacity by 2050. FLOW is predicted to deliver circa 50% of that capacity and become a key technology in achieving a cost-effective net zero with the UK Government announcing a specific FLOW target of one GW (one billion watts) of installed capacity by 2030.
14. The Offshore Renewable Energy Catapult (OREC) has stated that a stepping-stone approach to FLOW development is the most effective way to maximise local supply chain benefit and impacts to the local economy. Based on the OREC recommendation, the Project is proposed as the first in the Applicant’s ‘stepping-stone approach’ for FLOW development in the Celtic Sea.
15. The Project will have a total capacity up to 100 megawatts (MW). It is estimated that, once fully operational, the Project will produce enough renewable energy to power up to 93,217 UK homes per year; saving 151,767 tonnes of carbon emissions per year.
16. The purpose of the Project is to:
 - Demonstrate FLOW technology at Test and Demonstration scale in the Celtic Sea;
 - Maximise low carbon job creation and socio-economic impact within the local supply chain by utilising a stepping-stone approach to development;
 - Contribute to a COVID-19 Green Recovery; and
 - Contribute to the declared Climate Emergency, UK and Welsh Government’s 2050 Net Zero targets and the UK Government’s FLOW 2030 target.



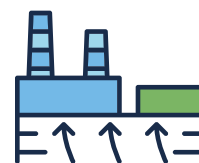
6 - 10 Wind Turbine Generators (WTGs) on semi-submersible platforms, located off the Pembrokeshire coast



Offshore cable route from the array to proposed landfall at West Angle Bay



Onshore cable route from proposed landfall to a new substation, situated near the existing Pembroke Power Station

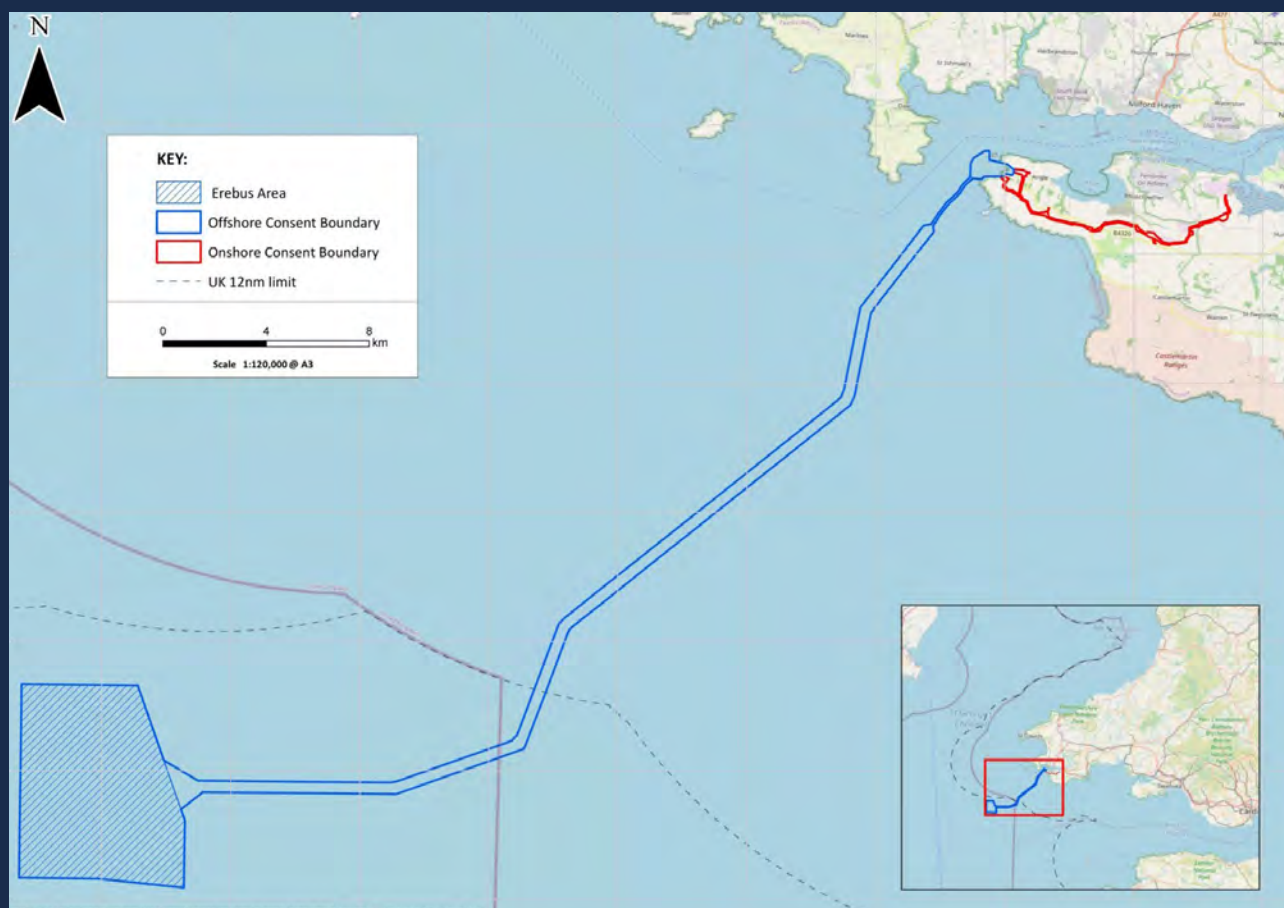


Connection from the new substation to Pembroke Power Station

Project Location and Description

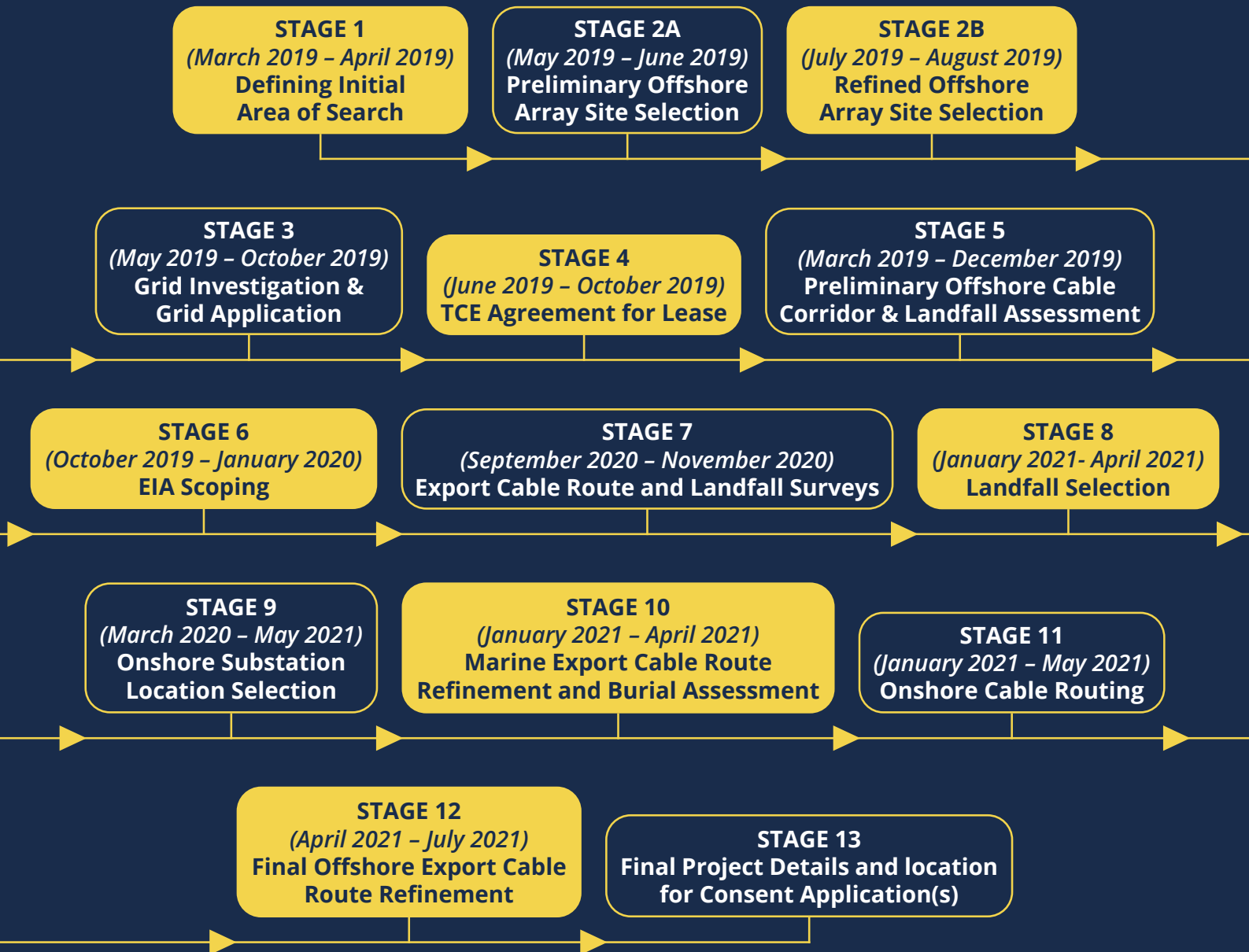
17. The Project location is provided in a map (Figure 1) below. The site of the wind farm itself is located approximately 35 km off the Pembrokeshire coastline, occupying an area of approximately 43 km² in the Celtic Sea.
18. The Project comprises up to ten Wind Turbine Generators (WTGs) with a total capacity of up to 100 MW. Each WTG is housed on a semi-submersible floating platform attached to the seabed by weighted mooring lines, up to 870 m in length, and an anchor. The platforms are connected by inter-array electrical cables. A single offshore export cable, up to 49 km in length, is proposed to make landfall at West Angle Bay, Pembrokeshire.
19. The onshore works comprise the onshore electrical cable route, substation near Pembroke Power Station, and ancillary works. Onshore Project components include the onshore 66 kilovolt (kV) cable, buried underground and following a route from landfall at West Angle Bay to the substation in the vicinity of Pembroke Power Station. The onshore site boundary runs for approximately 12.5 km from the landfall, through Castlemartin peninsula to the proposed onshore substation, located approximately 0.9 km east of Wallaston Cross toward Lambeeth Farm.
20. The new onshore substation will be connected to the 132 kV substation at Pembroke Power Station via a 132 kV cable which is approximately 870 m in length. The onshore cable route extends through the administrative boundaries of both PCNPA and PCC.
21. It is anticipated that construction of the Project will take approximately 18 months with commencement of operation anticipated in late 2026 or early 2027. The Project will then be operational for a period of 25 years, with an additional 18 months for decommissioning. Further details are provided in Volume 1, Chapter 4: Proposed Development Description.

Site Location Plan



Site Selection and Design

Offshore and Onshore Site Selection, Consultation and Design Process



Site Selection

22. Today, almost all of the offshore wind turbines in the world are fixed to the seabed by monopile or jacket foundations and can only be located in waters up to 60 meters deep.
23. Floating offshore wind combines two existing and proven technologies: oil and gas platforms and offshore wind turbines. Coupling these two technologies together unlocks the ability to place offshore wind farms in deeper waters where there are higher wind speeds and less visual impact. It opens up a whole new world of offshore renewables and can be an important technology to help achieve climate targets and the transition to a low carbon society.
24. A comprehensive study was undertaken to identify the most suitable site for a 100 MW floating offshore wind farm in the UK waters of the Celtic Sea. The study considered a range of economic, environmental and social aspects, including those listed in Table 1 below.

Parameter	Constraint
Technical	Water depth, wave height, engineering stress (water depth / wave height), tidal current speeds (annual mean spring peak), sediment type, exposed bedrock, sediment depth and wind speed.
Cost	Distance to grid supply point with capacity (straight line), grid access charging zones, distance from port (Operation and Maintenance (O&M)) and distance from port (tow out).
Environmental	Distance from Marine Protected Areas (Marine Conservation Zones, Ramsar, Special Areas of Conservation (SAC) and Special Protection Areas (SPA)), seabird sensitivities (summer), seabird sensitivities (winter), seabird suitability (breeding), seabird suitability (winter), marine mammal distributions (including grey seal and harbour porpoise) and visibility – distance from designated landscapes.
Other sea users	Airport buffer, cable crossings, other Crown Estate leases, radar stations buffer, other radar buffers (line of sight), Ministry of Defence designated areas, fishing effort and shipping route clearance.
Engineering and Environmental No Go Areas	Charted cables + 250 m buffer, shipping Lanes + 0.5 nm buffer, Existing Crown Estate leases + 5 km buffer and the proposed Greenlink Interconnector cable route + 250 m buffer.

25. As part of this process, the Applicant consulted a range of stakeholders, including NRW, Welsh Government, The Crown Estate, Ministry of Defence (MoD), Milford Haven Port Authority (MHPA), Local Authorities, fishing industry groups and environmental organisations.
26. Details of the site selection process are provided in Volume 1, Chapter 3: Site Selection and Alternatives of the ES. The study identified the preferred site for Project Erebus, as shown above. Once selected, this was presented to The Crown Estate in an application for lease of that area of seabed (known as an Agreement for Lease (AfL)). The Crown Estate granted the rights to develop the seabed to the Applicant in August 2020.

Selecting the Landfall Location

27. An initial study was completed in 2019 to identify suitable locations along the coast to bring a cable onshore. The study initially identified thirteen potential locations. These were examined from a technical and environmental perspective, to identify the most suitable locations.
28. Four shortlisted sites were selected and subjected to detailed technical and environmental assessment. The assessment used readily available studies as well as data acquired from an offshore survey undertaken for the Project in 2020. A site visit of each landfall option was conducted by engineering and environmental specialists.
29. The study identified West Angle Bay as the preferred landfall site for the Project. Local stakeholders were consulted, including PCNPA and Angle Community Council, to get their initial feedback. Once all feedback were considered, West Angle Bay was then selected as the preferred option.
30. The exact location and manner in which the cable comes ashore is yet to be fully determined, but it will be one of three options:
 - The preferred solution is to drill and install a duct underneath the car park and the beach, to a point beyond the low water mark that is approximately 5 meters deep. The cable will be pulled through the duct once installed. This preferred installation method is known as Horizontal Directional Drilling (HDD);
 - A second location on the headland to the south of West Angle Bay is also being considered as an alternate location to install the duct, in the unlikely event that the location behind the beach and car park is deemed technically unsuitable; and
 - However, rock type at both locations may be unsuitable for drilling. This is considered highly unlikely but cannot be ruled out at this point. If neither site can use HDD, then a trench will be dug on the beach at West Angle Bay to install the cable and filled in again.
31. All three options have been assessed for environmental impact, with measures proposed to ensure that the works will not significantly disrupt local communities and businesses or the environment in the area.

Selecting the substation location

32. Selecting the substation was determined by the necessity to locate it within 2 km of the existing substation at Pembroke. This was based on guidance from National Grid that states that single cable connections at a transmission voltage must be equal or less than 2 km in length.
33. An initial study was undertaken to identify suitable sites, using readily available data and a follow up site visit. This included a review of constraints such as: existing utilities; areas at risk of flooding; ground conditions; landscape and visual impacts considerations; coastal paths and walking routes; and sensitive environmental habitats. Of thirteen initial options, a shortlist of four sites was established.
34. The four shortlisted sites were examined in further detail and informed by data gathered from engineering and environmental site visits, as well as discussions with local landowners.
35. The preferred substation location was the most suitable option when taking account of land availability, environmental and technical constraints.

Connecting the wind farm to the landfall (Offshore Export Cable Corridor)

36. Studies were undertaken throughout 2019 and 2020 to identify the most suitable cable route to connect the wind farm to shore. This involved a review of existing datasets and reports, marine surveys, consultation with various stakeholders and governmental bodies. In 2020 a range of geophysical and environmental surveys were undertaken off the Pembrokeshire coast to examine seabed characteristics in the area. These surveys helped to inform the cable route and landfall selection.

37. Following confirmation of West Angle Bay as the preferred landfall, data from the 2020 marine surveys were used to further refine the corridor in which the cable will be sited. The purpose of this study was to avoid or minimise interactions with sensitive features like reef and sand wave crests.
38. The study also helped select a route that contains sufficient sediment depths to allow for the export cable to be safely buried for as much of the route as possible. Where sediment deposits are too shallow to bury the cable, it will be laid on the surface and protected using rock armoury or similar. Particular effort was made to ensure that the cable route avoids designated habitats off the coast of Pembrokeshire wherever possible.
39. The preferred route for the cable runs northeast from the wind farm site through an area known as Row's Rocks channel, which is near the entrance to Milford Haven. The preferred route follows this natural channel before entering West Angle Bay.

Connecting landfall to the onshore substation (Onshore Export Cable Corridor)

40. A route selection exercise was undertaken to identify the most suitable route for the onshore cable that connects the landfall to the substation (Figure 2). This involved a review of existing environmental data for the area, site visits, detailed environmental surveys and discussions with landowners.
41. The proposed cable route avoids sensitive features such as woodlands and minimises disruption to local communities due to road closure, noise and other related construction impacts. The cable route is approximately 12.5 km in length, and has been refined to avoid environmental designations, particularly the Broomhill Burrows Site of Special Scientific Interest (SSSI), the Limestone Coast and South-West Wales SAC, and Castlemartin Coast SPA. The route refinement has also been informed by the EIA process itself, with adequate mitigation applied to reduce impacts identified by each topic assessment.

Project Design Envelope

42. There are certain elements of the Project that will need extensive engineering analysis and survey. This includes, for example, the number and size of turbines, the types of anchors that will be used, the size of the substation buildings and precise cable route within the corridors described above. These details will be set as the Project undertakes detailed engineering studies and identifies the most suitable technologies and designs.
43. To properly address this, the assessments undertaken for the Project consider a range of realistic minimum and maximum values for the Project. For example, the Project has assessed between 6 and 10 turbines, each with a maximum tip height of 270 m.
44. This approach is known as a 'Project Design Envelope' or 'Rochdale Envelope' and is commonly used to assess offshore wind farms.
45. If the Project is granted consent to be built and operated, the designs will be further refined, but must remain within the parameters or the 'Envelope' that have been assessed, as well as complying with any planning conditions that may accompany the consent.
46. Further site selection and project description details are provided in Volume 1, Chapter 3: Site Selection and Alternatives and Volume 1, Chapter 4: Proposed Development Description.

Forward Strategy & Community Benefits

47. FLOW will become a key technology in delivering the UK's net zero target. Whilst delivering essential low carbon energy, the Project represents significant inward investment in the region and will provide direct and indirect supply chain and job creation opportunities. Appreciating that FLOW technology is new to the region, the Applicant is working with development agencies, local companies, education providers, local and national Government to highlight and detail the necessary skills, training, business support and infrastructure upgrades that are required to maximise the FLOW opportunity in the region. The Applicant is committed to developing a Community Benefit Fund, linked to energy generation, and is working with relevant stakeholders to design a Fund that will have maximum local impact over the lifetime of the Project.



Consultation

48. The Applicant has implemented a proactive consultation process throughout the development of the Project and engaged key stakeholder groups that may be influenced or impacted by the Project. This includes citizens, local community groups & organisations, statutory consultees and government organisations.
49. This process has served to ensure that the public and key stakeholders have been kept informed and have had an input into the development of the Project and the assessments since its inception.
50. Public consultation events were held throughout the planning and development phase. An initial online exhibition¹ was held on the Project website www.bluegemwind.com in November 2020, with a follow up second virtual event held in July/August 2021. The online exhibitions were viewed by over 1,400 unique visitors.
51. Two in-person events were also organised: one in Hundleton Church Hall and one in Angle Village Hall, both in July 2021. The in-person Public Consultation event information was displayed on public exhibition boards. The boards displayed at the events were similar to those provided at the virtual public exhibition but providing updates where possible. The boards covered the following details:
- EIA overview and areas of assessment;
 - Project Description;
 - Onshore Substation details; and
 - Photomontages (high-quality photographs from selected viewpoints in the area, with digital imagery of the Project superimposed to show what it would look like when constructed).
52. Feedback from the public consultation process has been incorporated into the design and assessment of the Project. A full description of the consultation process is provided in Volume 3, Appendix 2.3 Consultation Report of the ES.

¹ <https://3dwtech.co.uk/dashboard/bluegem/erebus/exhibition/>

Environmental Impact Assessment (EIA)

Overview

53. The purpose of the EIA process is to inform decision-makers and the public of the environmental consequences of implementing a project. The process helps identify the possible environmental effects of a project and how those effects can be mitigated to acceptable levels. The EIA process comprises three stages: Screening, Scoping and Assessment.

- **Screening:** To determine whether the Project should be subject to EIA.
- **Scoping:** The Applicant submitted a Scoping Report to NRW in October 2019, to seek feedback on factors that should be considered and the methodologies to be used in assessing the environmental impact of the Project. A Scoping Opinion was received from NRW in January 2020 confirming agreement or otherwise. All feedback received in the Scoping process was considered and addressed in the assessment itself. The Scoping Report and Opinion are provided in Technical Appendices 2.1 and 2.2 of Volume 3 of the Environmental Statement.
- **Assessment:** The EIA for the Project comprises a series of assessments that have been undertaken by environmental experts and specialists. The assessments include:

- Details of the legislation, policies and guidelines relevant to the Project and the assessment;
- Description of the assessment methodology used to identify and describe potential impacts arising from the Project;
- A description of the existing environment and the characteristics of the area;
- Description of the likely effects arising from the Project;
- Proposed mitigation measures to reduce, offset or eliminate any significant effects; and
- A description of the residual effects arising from the Project once mitigation measures have been applied.

54. The EIA also considers in-combination effects, as well as the potential interactions between each component of the Project, as well as potential cumulative effects with other developments in the wider area.

55. The EIA presents a worst-case scenario in assessment. As such, refinement during the detailed design may reduce design parameters and consequently potential effects. The assessment takes into consideration responses received during the stakeholder and public consultation process.



Approach to Assessment of Effect Significance

56. In order to determine whether the potential effects of the Project are likely to be significant, a number of criteria are used, taking account of the following:

- International, national and local designations or standards;
- Relationship with planning policy;
- The sensitivity of the receiving environment;
- The magnitude of impact;
- Reversibility and duration of the effect;
- Mitigation measures;
- Proposed monitoring measures (where applicable); and
- Inter-relationship, transboundary and cumulative effects.

57. The sensitivity of receptors was combined with the anticipated magnitude of impacts to determine the significance of potential effects, as shown in the example effect significance matrix provided below (i.e. high magnitude and high sensitivity results in a major effect):

		SENSITIVITY			
		HIGH	MEDIUM	LOW	NEGLIGIBLE
MAGNITUDE	HIGH	MAJOR	MAJOR	MODERATE	MINOR
	MEDIUM	MAJOR	MODERATE	MINOR	MINOR
	LOW	MODERATE	MINOR	MINOR	NEGLIGIBLE
	NEGLIGIBLE	MINOR	MINOR	NEGLIGIBLE	NEGLIGIBLE

58. The specifics of the above matrix may vary slightly between technical topics, however the overall concept of effect significance being determined based on receptor sensitivity and magnitude of impact remains constant.

59. The following terms are used in the ES (unless otherwise stated in specific chapters) to determine the level of effects predicted to occur:

- **Major beneficial or adverse effect:** where the Project would result in a significant improvement or deterioration to the existing environment;
- **Moderate beneficial or adverse effect:** where the Project would result in a noticeable improvement or deterioration to the existing environment;
- **Minor beneficial or adverse effect:** where the Project would result in a small improvement or deterioration to the existing environment;
- **Negligible:** where the Project would result in no discernible improvement or deterioration to the existing environment; and
- An effect is deemed **significant** where the predicted impact is moderate or major.

60. Further information on the approach to EIA is provided in Volume 1, Chapter 2: Overview of EIA Methodology.



Habitats Regulations Assessment

61. In addition to the EIA Regulations mentioned above, the European Union (EU) Habitats and Birds Directives (the 'Nature Directives') require that certain habitats and species (i.e. those listed in various Annexes to the Directives) are protected through designation as features of either: SACs; or SPAs. Designated SACs and SPAs are collectively known as Natura 2000 sites.
62. The Nature Directives are transposed into domestic UK law through the Conservation of Habitats and Species Regulations 2017 (as amended) and the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended). These regulations require that, prior to being given consent, plans or projects with potential to affect habitats or species of Natura 2000 sites are subject to an assessment of their implications in view of the conservation objectives of relevant sites. This assessment comprises the following possible stages:
- **Stage 1 Screening:** To identify the likely impacts of a project on a Natura 2000 site and consider whether the impacts are likely to be significant;
 - **Stage 2 Appropriate Assessment:** To determine whether the 'integrity' of relevant Natura 2000 sites will be adversely affected;
 - **Stage 3 Assessment of Alternative Solutions:** Where it cannot be established that there will be no adverse effect on the integrity of Natura 2000 sites, establish if there are any alternative ways that the plan or project can be delivered which will result in a lesser effect; and
 - **Stage 4 Imperative Reasons of Overriding Public Interest (IROPI) and Compensatory Measures:** To establish whether it is necessary for the project to proceed where no alternative solutions can be found, despite adverse effects on the integrity of a Natura 2000 site. This stage requires confirmation that necessary compensatory measures can be secured to maintain the coherence of the Natura 2000 network.
63. This collective assessment process is referred to as a Habitats Regulations Assessment (HRA) and is the mechanism through which Natura 2000 sites are safeguarded from potentially damaging activities. Despite legislation having been passed to remove the domestic constitutional basis for EU law in the UK following the UK's exit from the EU and the end of the transition period on the 31 December 2020, such changes have not resulted in a material change to how HRAs are undertaken in the UK.
64. The approach to HRA for the Project, including methodology and consideration of specific screening thresholds, was informed by consultation with key stakeholders such as NRW, the Joint Nature Conservation Committee (JNCC) and The Wildlife Trusts.
65. The outcomes of Stage 1 Screening for the Project are presented in Volume 3, Technical Appendix 8.2: HRA Screening Report. Following screening, a Report to Inform Appropriate Assessment (RIAA) (Volume 3, Technical Appendix 8.3: Habitats Regulations Assessment: Report to Inform Appropriate Assessment) covering all elements of the Project was produced to provide the necessary information to enable the 'competent authorities' (NRW and the Welsh Ministers) to undertake an Appropriate Assessment (AA) as part of the determination of the marine licence and Section 36 consent with deemed planning permission applications.



66. The RIAA included consideration of the implications of the Project on designated features of all relevant SACs and SPAs, including:

Special Areas of Conservation

Pembrokeshire Marine/Sir Benfro Forol SAC (Annex I Habitats, Annex II Species (Migratory Fish, Marine Mammals and Terrestrial Mammals));

Limestone Coast of South West Wales/Arfordir Calchfaen de Orllewin Cymru SAC (Annex I Habitats, Annex II Onshore Mammals);

West Wales Marine/Gorllewin Cymru Forol SAC (Annex II Marine Mammals);

Pembrokeshire Bat Sites and Bosherton Lakes/Safleoedd Ystlum Sir Benfro a Llynnoedd Bosherton SAC (Annex II Onshore Mammals);

Cardigan Bay/Cae Ceredigion SAC (Annex II Marine Mammals);

Pen Llŷn a'r Sarnau/Lleyn Peninsula and the Sarnau SAC (Annex II Marine Mammals)

Special Protection Areas

Skomer, Skokholm and the Seas off Pembrokeshire/Sgomer, Sgogwm a Moroedd Penfro SPA (Annex I Seabirds);

Grassholm SPA (Annex I Seabirds);

Irish Sea Front SPA (Annex I Seabirds);

Bae Caerfyrddin/Carmarthen Bay SPA (Overwintering Birds);

Burry Inlet SPA ((Overwintering Birds);

Northern Cardigan Bay/Gogledd Bae Ceredigion SPA (Overwintering Birds);

Dyfi Estuary/Aber Dyfi SPA (Overwintering Birds);

Severn Estuary SPA (Overwintering birds);

Traeth Lafan/Lavan Sands, Conway Bay SPA (Overwintering birds);

The Dee Estuary SPA (Overwintering birds); and

Castlemartin Coast Special Protection Area (Annex I Terrestrial Birds)

67. The following potential impact pathways were considered and assessed within the RIAA:

- temporary, long term or permanent habitat loss/change/disturbance;
- accidental pollution /contamination;
- temporary increases in suspended sediments/smothering;
- colonisation of hard structures by Invasive Non-native Species (INNS);
- changes to physical processes;
- underwater noise;
- disturbance of species;
- displacement of species;
- barrier effects;
- collision risk; and
- entanglement.

68. The assessment concluded that there would be **no adverse effect** of the integrity of relevant designated sites as a result of the Project (across all phases) either when considered alone, or in-combination with other relevant and reasonably foreseeable plans and projects. As such, assessment stages 3 and 4 are not required.

Summary of Environmental Effects

69. This section presents a summary of each assessment topic chapter in the ES. The conclusions for each topic chapter includes the significance of the potential effects (beneficial and adverse) that may arise from the construction, operation and maintenance and decommissioning the Project.
70. The conclusions take into account the mitigation detailed within each topic chapter and presents the findings of significance for each topic. The following terms have been highlighted to emphasise the relevant conclusions on environmental effects:
- **not significant**
 - **significant adverse**
 - **significant beneficial**
71. The section first considers the offshore assessments, followed by onshore assessments. Finally, overall assessments are considered.

Offshore

Marine and Coastal Processes

72. The assessment of the marine physical environment considered effects on sediment transport, waves, currents and tides arising from the Project during construction, operation and maintenance and decommissioning. A number of surveys, including geophysical and geotechnical, were undertaken in 2020 and 2021 to define the existing environment in terms of water depths, tidal and wave regime, seabed sediment types and features on the seabed, such as sandwaves or reefs.
73. Water depths ranged between 65 and 85 m in the array area and between 0 and 70 m along the export cable corridor. Seabed sediments varied across the site, with sandwaves (typically up to 6 m) in the northern part of the array area and along the export cable corridor. In other areas, sand and gravel habitats dominated, with some smaller areas of boulders.
74. Tidal currents in the study area are sufficiently energetic to mobilise the sandy sediments that characterise most of the array area and export cable corridor and this results in the migration of the (often) large sandwave features which are mapped in several locations along the cable corridor and within central/northern parts of the array area. Large waves associated with Atlantic storms are expected to be capable of mobilising sand at the seabed, even at the greater water depths encountered in the array area.
75. This information was used to assess if certain activities, for example the installation of the anchors or export cable, would cause the seabed to change and how long it would take to recover. A range of features and processes were assessed to understand if they would be affected, including changes such as sediment plumes, suspended sediment concentration, seabed changes, sandwaves levelling and changes in waves, tides and sediment transport.
76. The assessment concluded that the Project will result in no greater than minor adverse effects, which are **not significant**, to marine and coastal processes.
77. The assessment also considered how the Project may interact with other marine developments and potentially result in greater impacts, however it concluded there would be **no significant** cumulative effects with other projects.
78. Further details are provided in Volume 1, Chapter 6: Marine and Coastal Processes.

Marine Seabed and Water Quality

79. The assessment of potential effects to marine seabed and water quality considered changes in response to construction, operation and maintenance and decommissioning of the Project. The assessment was based on existing data and from Project specific surveys. Seabed samples taken in 2020 from within the site show that the sediment type is dominated by sand, with a higher mud content closer to land and the array area. Gravel content is low within the array area, but higher at intermittent locations closer to shore. There were no areas of high sediment contamination within the study area.
80. Water quality samples collected in 2020 indicated that suspended sediment concentration varied in space and time throughout the study area, dependent on patterns of weather, currents, waves, water depth and local sediment type.
81. The assessment considered a number of different potential impacts, including the extent and duration of sediment plumes associated with construction activities such as mooring system installation, changes in water quality from increases in suspended sediment concentration, the accidental release or mobilisation of contaminated sediments and the accidental release of pollutants.
82. The assessment concluded that the Project would result in no more than minor adverse effects, which are **not significant** either during construction, operation and maintenance or decommissioning.
83. The assessment also considered how the Project may interact with other marine developments and potentially result in greater impacts, however it concluded there would be **no significant** cumulative effects with other projects.
84. Further details are provided in Volume 1, Chapter 7: Marine Seabed and Water Quality.

Offshore Designated Sites

85. The assessment of potential effects to offshore designated sites focused on potential impacts on the species and habitats for which they are designated. These include seabirds, marine mammals, migratory fish and seabed habitats and are referred to as 'receptor groups'. The chapter highlights the key impacts associated with the construction, operation and maintenance, and decommissioning phases of the Project.
86. There are designated marine and coastal sites of local, national and international importance within the region of the Project. The sites afford protection to ensure that different pressures, including development, do not harm or damage the sensitive species or habitats they have been established to protect.
87. The assessment concluded that the Project would result in no more than minor adverse effects, which are **not significant** across all receptor groups either during construction, operation and maintenance or decommissioning.
88. Further details are provided in Volume 1, Chapter 8: Offshore Designated Sites.

Marine and Coastal Ecology

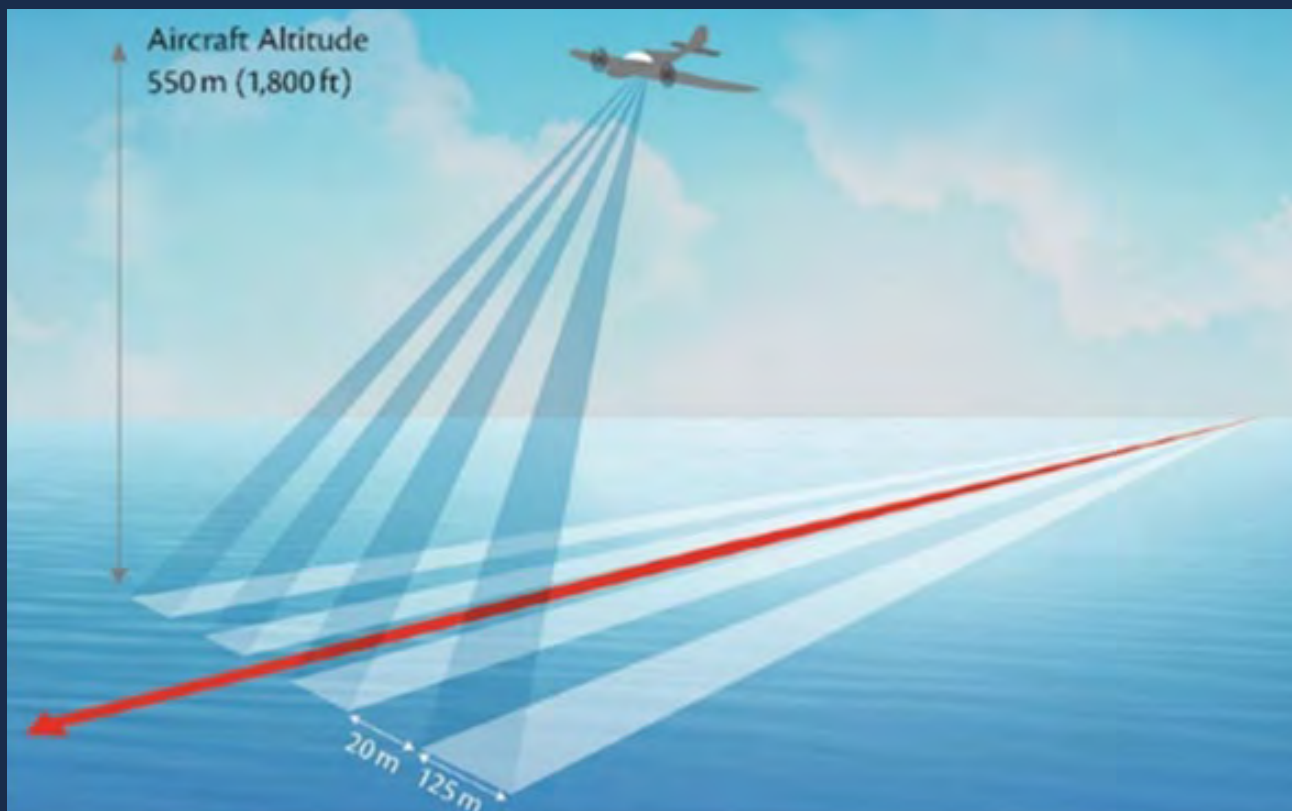
89. The marine and coastal ecology assessment considered the potential impacts which may occur on organisms that make up seabed communities e.g. sediments, seagrass communities and reef, known as benthic ecology, during the construction, operation and maintenance, and decommissioning phases of the Project.
90. EIA characterisation surveys were undertaken in 2020 and 2021 which concluded that a rich mosaic of intertidal and subtidal rocky and sedimentary seabed habitats and species are present across the study area. These included habitats that form part of the designation of local nature conservation sites, including Pembrokeshire Marine SAC.
91. A range of impacts were assessed including loss of habitat (temporary and long-term), habitat disturbance, the introduction and colonisation of invasive non-native species, and electromagnetic field (EMF) emission from power cables.
92. The assessment concluded that there would be no greater than minor adverse effects, which are **not significant**. The assessment also considered how the Project may interact with other marine developments and potentially result in greater impacts, however it concluded there would be **no significant** cumulative effects with other projects.
93. Further details are provided in Volume 1, Chapter 9: Marine and Coastal Ecology.

Fish & Shellfish Ecology

94. This assessment considered the potential impacts which may occur on fish and shellfish within the construction, operation and maintenance and decommissioning phases of the Project. The assessment identified that the area is currently occupied by a range of fish and shellfish species with areas potentially suitable as spawning and nursery grounds for a range of species. Notable species present in the study area include a wide range of commercially targeted species (crab, lobster, rays, bass), migratory species (salmon, sea trout, allis and twaite shad) and also species such as blue sharks and basking sharks.
95. The assessment considered a range of impacts across fish and shellfish receptors within the array area and export cable corridor, including loss of habitat (both temporary and permanent), sediment suspension and deposition, underwater noise via piling and Unexploded Ordnance clearance, fish aggregating device (FAD) effects, EMF effects and fisheries displacement effects.
96. The assessment concluded that there would be no greater than minor adverse effects, which are **not significant**. The assessment also considered how the Project may interact with other marine developments and potentially result in greater impacts, however it concluded there would be **no significant** cumulative effects with other projects.
97. Further details are provided in Volume 1, Chapter 10: Fish and Shellfish Ecology.

Offshore Ornithology

98. The Offshore Ornithology assessment considered the potential impacts on seabirds during the construction, operation and maintenance and decommissioning phases of the Project. 24 months of digital aerial surveys were undertaken over the period October 2019 to September 2021 to understand what species were present within the offshore array area (and 4 km buffer) and in what numbers. The assessment also recognised the importance of the area due to the colonies of seabirds including Manx shearwaters, Atlantic puffins and razorbills on the islands of Skomer, Skokholm and Grassholm, which are amongst many designated sites protected for seabirds in the region. Supplementary data was provided by researchers who have been studying seabirds on the islands for many years and this was used to inform the assessment in addition to the survey work and project specific modelling.



99. This information was used as a baseline for the assessment which considered impacts including collision, displacement, barrier effects, disturbance from vessels and underwater noise and impacts on prey and habitat loss. A number of species were assessed based on those recorded during the surveys and agreed in consultation with NRW, JNCC, Royal Society for the Protection of Birds (RSPB) and the Wildlife Trust of South and West Wales.
100. The assessment concluded that most of the seabirds present are from the colonies on Skomer, Skokholm and Grassholm. Although present within the array area, the Project will not have a significant effect on seabird populations or result in significant mortalities. The assessment concluded that there would be no greater than minor adverse effects, which are **not significant**. Monitoring will be undertaken to verify the findings of the assessment and inform ongoing research into the impacts associated with offshore wind in the region.
101. The assessment also considered how the Project may interact with other marine developments and potentially result in greater impacts, however it concluded there would be **no significant** cumulative effects with other projects.
102. Further details are provided in Volume 1, Chapter 11: Offshore Ornithology.

Marine Mammals

103. The assessment considered the potential effects on marine mammals which may occur within the construction, operation and maintenance, and decommissioning phases of the Project. 24 months of digital aerial surveys were undertaken over the period October 2019 to September 2021 which collected data on types and numbers of marine mammals present within the array area and 4 km buffer.
104. A total of four marine mammal species were recorded via these surveys and so are expected to be present in the area year-round: common dolphins, harbour porpoise, bottlenose dolphins and grey seals. In addition to this, minke whales are expected to be present in the summer months. The site-specific surveys found common dolphins to be the most abundant marine mammal species in the area. These were found in high densities across the survey area throughout the year.
105. The assessment for marine mammals considered the impacts arising from the Project including direct impacts (from vessels or underwater noise, including Unexploded Ordnance); indirect impacts (for example changes in prey species abundance); and cumulative impacts (where underwater noise from various offshore energy developments all combine to create a more significant impact).
106. Throughout the construction, operation and maintenance, and decommissioning phases of the Project, the assessment concluded that there would be no greater than minor adverse effects, which are **not significant**.
107. The assessment also considered how the Project may interact with other marine developments and concluded there would be **no significant** cumulative effects with other projects.
108. Further details are provided in Volume 1, Chapter 12: Marine Mammals.



Seascape and Visual Impacts

109. The seascape and landscape visual impact assessment identified and assessed potential change to the seascape character and landscape character and on people's views and visual amenity. The assessment considered all phases of the Project including construction, operation and decommissioning. To understand the extent of the seascape and visual impacts, a study area of 50 km radius from the array area was established, which included the Celtic Sea, the West and South Pembrokeshire Coastal Waters and Islands, Milford Haven, and the Pembrokeshire coastline between St David's Head in the north to Stackpole Head in the south.
110. The assessment recognised the special qualities of the Pembrokeshire Coast National Park (PCNP) and sensitivities such as the importance of dark skies and views from the Pembrokeshire Coast Path. Surveys were completed to inform the assessment and a series of photographs were taken from key viewpoints along the coast, from the Islands of Skomer and Skokholm and from higher points inland. These photographs were used to model what the Project would look like when built, known as photomontages, and used to inform the assessment. All photomontages are included in Volume 2 of the Environmental Statement.
111. The assessment concluded that there would be no greater than minor adverse effects, which are **not significant**, so will not cause significant changes to the seascape or landscape character areas or views from the coast or islands.
112. A separate assessment was undertaken to consider the impact on the special qualities of the PCNP or the impact of additional marine renewable energy projects. These were also concluded to be minor adverse effects which are **not significant**.
113. The assessment also considered how the Project may interact with other developments and potentially result in greater impacts, however it concluded there would be **no significant** cumulative effects with other projects.
114. Further details are provided in Volume 1, Chapter 13: Seascape Visual Impact Assessment. A photomontage extract from Freshwater West Beach is provided below for illustrative purposes only; full-scale photomontages from all representative viewpoints are provided in ES Volume 2.

Offshore Archaeology and Cultural Heritage

115. The assessment considered the Project's potential effects on offshore archaeology which may occur within the construction, operation and maintenance, and decommissioning phases of the Project. Geophysical and geotechnical surveys were undertaken in 2020 which informed the offshore archaeology assessment. From the surveys it was possible to identify a series of known and potential remains relating to offshore archaeology, specifically submerged maritime and aviation archaeology and maritime infrastructure, intertidal and coastal sites.



Photomontage Extract from Freshwater West Beach

116. Offshore, distinctive geological features were recorded including glacial deposits, channel features and fills. Within the study area archaeological sites were recorded, including aviation losses and a wreck (HMS Leda) on the rocks at West Angle Bay. Along the coast there are also sites including prehistoric and early medieval scheduled remains.
117. The Project's approach to offshore archaeology and cultural heritage is to avoid known sites by micro siting the offshore export cable around features and allowance has been made for this in the Project design. On the basis that the Project will avoid and/or minimise any impacts the assessment concluded that there would be no greater than minor adverse effects, which are **not significant**, on offshore archaeology and cultural heritage.
- The assessment also considered how the Project may interact with other marine developments and potentially result in greater impacts, however it concluded there would be **no significant** cumulative effects with other projects.
118. Further details are provided in Volume 1, Chapter 14: Offshore Archaeology and Cultural Heritage.

Commercial Fisheries

119. This assessment considered the potential impacts which may occur on commercial fisheries within the construction, operation and maintenance and decommissioning phases of the Project. A review of the existing baseline concluded that the offshore array area is an area of relatively low importance for commercial fishing activity when compared to other areas of Welsh waters within the Celtic Sea. Activity is mainly associated with mobile vessels, including beam and otter trawls, with vessels from the UK, France, Belgium and Ireland.
120. Activity along the offshore cable corridor is also associated with mobile vessels. The nearshore and inshore section of the export cable corridor supports moderate numbers of smaller vessels deploying static gear for crab, lobster and whelk.
121. The potential pressures considered by the assessment include the loss of access to fishing grounds, displacement of fishing activity, increased steaming times and snagging risks. The assessment concluded the effect of these pressures would be no greater than minor adverse, which are **not significant**. The assessment also recognised that mutually beneficial supply chain opportunities for commercial fisheries operators may arise during the different phases of the Project. These would include opportunities to deploy as guard vessels, debris recovery, navigational marker buoy deployment, servicing and recovering, vessels for environmental monitoring activities and crew transfers.
122. The assessment also considered how the Project may interact with other marine developments and potentially result in greater impacts, however it concluded there would be **no significant** cumulative effects with other projects.
123. Further details are provided in Volume 1, Chapter 15: Commercial Fisheries.



Shipping and Navigation

124. The shipping and navigation assessment considered the Project's potential impacts during the construction, operation and maintenance and decommissioning phases to all vessel types that operate within and around the array area and cable route. This includes cargo vessels, fishing vessels, passenger vessels, recreational vessels, project-related vessels, tug and service vessels and tankers.
125. The baseline environment for the shipping and navigation assessment was characterised through a desk-based study, stakeholder consultation and project-specific marine vessel traffic surveys, which recorded how many and types of vessels present within the array area.
126. The survey data and desktop review indicated that most shipping routes pass clear of the array area and export cable corridor. The surveys recorded tankers waiting offshore before entering the Port of Milford Haven and activity associated with larger vessels, but due to the distance offshore there were very few recreational vessels. Inshore a relatively high number of small commercial fishing vessels were recorded operating out of local ports and recreational craft were active around the coast.
127. A number of potential impacts on shipping and navigation were identified. These included vessel-to-vessel collision due to the presence of Project related vessels, displacement of vessels from the Project area, vessels contact with offshore Project structures and snagging and damage to anchors and/or fishing gear on offshore Project structures.
128. The assessment concluded that there would be no greater than minor adverse effects, which are **not significant**, in respect of shipping and navigation.
129. The assessment also considered how the Project may interact with other marine developments and potentially result in greater impacts, however it concluded there would be **no significant** cumulative effects with other projects.
130. Further details are provided in Volume 1, Chapter 16: Shipping and Navigation.

Aviation and Radar

131. The aviation and radar assessment considered the impacts associated with all phases of the Project, construction, operation and maintenance and decommissioning on airports and aircraft, and military and civil radar systems. A desk based study was undertaken and identified several aviation and radar activities within the study area and confirmed the Project would be situated in an area of Class G (i.e., uncontrolled) airspace.
132. A technical assessment was undertaken to understand whether the maximum height WTG proposed for the Project would be within the Line of Sight (LOS) of radar systems based on a WTG with a maximum blade height of 270 m. It was confirmed the Project would be within line of sight of the Ministry of Defence (MoD) Hartland Point Primary Surveillance Radar (PSR) and may cause interference with the radar system. Additional consultation was undertaken by the Project with the MoD to understand the significance of this impact and to identify mitigation measures that could be implemented to minimise the impact, the details of which will be finalised through the consenting process.
133. The chapter considered the findings of the technical assessment and impacts, including the creation of aviation obstacles, and the interference with radar systems were assessed to understand the implications of the Project. Standard mitigation, such as circulating Notice to Airmen (NOTAM), lighting of the WTGs and recording the presence of the WTGs on aeronautical charts and the UK's database of tall structures (the DVOF) will be implemented.

134. With these mitigation measures in place, it is considered likely that the Project would result in no greater than minor adverse effects, which are **not significant**, on aviation and radar receptors.
135. The assessment also considered how the Project may interact with other developments and potentially result in greater impacts, however it concluded there would be **no significant** cumulative effects with other projects.
136. Further details are provided in Volume 1, Chapter 17: Aviation and Radar.

Coastal and Marine Infrastructure and Other Users

137. The coastal and marine infrastructure and other users assessment considered the potential impacts which may occur during the construction, operation and maintenance and decommissioning phases of the Project. A desk based study was undertaken to identify other sea and marine users within the study area, including other marine renewable projects, military and subsea cables potentially affected by the Project.
138. The desk based study identified several marine renewable projects in the region, including the Marine Energy Test Area (META) and the Bombora Wave demonstration project. It is also recognised that further projects are likely to be developed in the future following a recent Crown Estate announcement regarding the development of floating offshore wind in the region. The assessment also considered the implications where the offshore export cable corridor interacts with Castlemartin Firing Range. The final receptor group, subsea cables, identified the presence of the SOLAS cable (a fibre optic submarine telecommunications cable) within the array area and the Greenlink interconnector (an interconnector linking the power markets in Ireland and Great Britain), both of which the Project offshore export cable would cross.
139. Once identified, the assessment considered how sensitive each receptor was to impacts from the Project. The following impacts were considered as part of the assessment: the disturbance and obstruction to other marine renewable project activities and military activities arising from the use of the Port of Milford Haven; construction, operation and maintenance and decommissioning vessels and associated safety zones during all phases of the Project; and damage or disturbance to existing cables during all phases of the Project.
140. The assessment concluded that there would be no greater than minor adverse effects, which are **not significant** on coastal and marine infrastructure and other users over the lifetime of the Project.
141. The assessment also considered how the Project may interact with other marine developments and potentially result in greater impacts, however it concluded there would be **no significant** cumulative effects with other projects.
142. Further details are provided in Volume 1, Chapter 18: Coastal and Marine Infrastructure and Other Users.



Onshore

Onshore Geology, Hydrogeology and Hydrology

143. The onshore geology, hydrogeology and hydrology chapter details the assessment of potential changes to these receptors arising from the construction, operation and maintenance and decommissioning of the Project.
144. The assessment comprised a desk based study, site walkover and consultation with the Local Authorities, relevant stakeholders and landowners. A geotechnical campaign was undertaken in 2021, which comprised boreholes and trial pits over the entire cable route and substation area to gain an understanding of ground conditions and groundwater levels within the onshore study area. Walkover surveys were undertaken in 2021 to identify watercourses and Private Water Supplies (PWS) across the onshore Project site.
145. A range of standard mitigation measures have been applied to the Project in order to minimise potential impacts on onshore geology, hydrogeology and hydrology receptors. Mitigation measures to protect local PWS will be implemented. This includes a pre-development, construction and post-development groundwater sampling and monitoring schedule to be carried out in agreement with the relevant planning authorities. A Construction Environmental Management Plan (CEMP) has been prepared to highlight control measures to prevent polluting activities and avoid impacts on watercourses and PWS.
146. At the end of the Project's operational life, the onshore substation will either be retendered for continued use or the site will be decommissioned. Prior to decommissioning, a Decommissioning Environmental Management Plan (DEMP) will be produced to reflect the current legislation and policy and will be agreed with the relevant statutory authorities.
147. The impact from the Project on the soils and geology within the study area have been determined to be negligible and **not significant**. Impacts on groundwater resources have been determined to be temporary and no more than minor adverse, which is **not significant**.
148. A detailed Flood Consequence Assessment has been undertaken to identify potential flood risks to the site as well as determining whether the Project may impact on flood risk elsewhere. The design of the Project has taken into consideration potential flooding in the design and construction methodology to ensure the Project will not be impacted by flooding or cause additional flooding impacts and the effects are therefore **not significant**.
149. The construction works for the project has the potential to impact on three PWS in the area. Of these there is one location within 250 m of the works that has the potential for **significant** effects. Therefore, additional mitigation measures are proposed for construction works within the vicinity of this PWS, including pollution prevention and monitoring measures. Implementing these additional mitigation measures will ensure that the residual effect is no more than minor adverse which is **not significant**.
150. Further details are provided in Volume 1, Chapter 19: Onshore Geology, Hydrogeology and Hydrology.



Terrestrial and Coastal Ecology and Onshore Ornithology

151. The terrestrial biodiversity assessment identified likely effects associated with the construction, operation and maintenance and decommissioning of the onshore elements of the Project. The assessment focused on habitats and protected or notable species, with particular focus placed on Important Ecological Features (IEFs).
152. The assessment comprised a desk based study of readily available data and the findings of extensive habitat, mammal and bird surveys undertaken throughout 2020 and 2021. Ecological features identified in the assessment of local or higher value are considered an IEF.
153. The Project has been designed to minimise impacts on important habitats or protected species. In the first instance the cable route and substation location have been sited to avoid IEFs. Notwithstanding, some interaction with IEFs may occur, given that vegetation removal to construct the cable route may impact on bats and dormice, both protected species.
154. Therefore, feature specific mitigation measures have been incorporated into the Construction and Environmental Management Plan (CEMP) to ensure enhancement of hedgerows and field margin habitats and to ensure that species protected under legislation do not experience significant effects from the Project. A Mitigation Strategy has been prepared to ensure the protection of dormice during construction and throughout the Project's operational lifetime.
155. An Ecological Clerk of Works (ECoW) will be employed during the construction phase to conduct specialist surveys and ensure the implementation of mitigation measures will be incorporated into the CEMP, together with any Species Protection Plans (in addition to the Dormouse Mitigation Strategy).
156. Additional feature specific mitigation includes enhancement measures which are considered to improve the connectivity and quality of hedgerows and other habitats impacted by the Project. This will result in moderate beneficial effects for local biodiversity.
157. With the implementation of mitigation and enhancement measures the Project's potential for adverse impacts on onshore biodiversity has been assessed as **not significant**.
158. Further details are provided in Volume 1, Chapter 20: Terrestrial and Coastal Ecology and Onshore Ornithology.

Landscape and Visual Impact

159. The Landscape and Visual Impact Assessment (LVIA) has considered design of the onshore elements of the Project and the potential for impacts during its construction, operation and maintenance and decommissioning phases. The key elements include the proposed substation, onshore export cable and landfall (where the offshore export cable will meet the onshore export cable).
160. Landscape effects potentially arise from the introduction of new onshore elements which may be visible and how they impact the perceived character of the landscape. These may result in permanent effects from the onshore elements, or temporary effects, such as the construction compounds or gaps in hedgerows prior to their reinstatement.
161. The assessment also considered visual effects potentially arising from the introduction of the Project on views, and the resultant effects on visual amenities experienced by people. Visual impacts receptors include groups of people (such as within settlements, using transport routes or recreational trails) and representative viewpoints. A series of viewpoints were assessed, following consultation with PCC, PCNPA, and NRW.
162. In addition to the above, cumulative effects may arise where the study areas for two or more projects overlap so that they are experienced at a proximity where they may have a greater incremental effect, or where projects may combine to have a sequential effect.
163. The Project will give rise to **significant** effects on some visual receptors during the construction phase. For the onshore cable corridor these significant construction effects are temporary, localised and are limited to close proximity visual effects of high sensitivity receptors. For the onshore substation these also occur for visual receptors at close proximity. Effects on landscape character from the construction phase of the project are assessed as **not significant**.
164. For the operation and maintenance phase of the Project, the LVIA has assessed that residual effects to the landscape and visual resource as a result of the onshore cable corridor are **not significant**. The LVIA also concluded landscape character effects as a result of the onshore substation would be **not significant**. However, the assessment found that the operation and maintenance of the onshore substation would give rise to very localised **significant** residual visual effects in the early stages of operation (assessed at year 1). All developments of this scale are likely to give rise to some effects on landscape character and visual amenity and it is considered that for the Proposed Development, all of the effects experienced would be localised and that significant effects would be limited in both extent and number.
165. A number of mitigation measures have been brought forward to reduce the significance of effect resulting from the Project, including:
- The siting and alignment of the proposed substation in close proximity of existing electricity overhead lines and a wind turbine, and the relatively close proximity of existing industrial development to the north at the Pembroke Power Station;
 - The agreement of detailed design and materials selection, including colour and finish and other design solutions to blend the onshore substation into the landscape, making it less visually prominent; and
 - Preparation and implementation of a Landscape and Ecological Management Plan (LEMP). This will be designed in detail post-consent as part of the discharge of consent conditions. It will include detailed mitigation measures with regard to the re-establishment of hedgerows and planting of mitigation landscaping.

166. In year 15, once mitigation planting has matured, residual visual effects resulting from the substation on surrounding viewpoints are anticipated to be **not significant**.
167. Further details are provided in Volume 1, Chapter 21: Landscape Visual Impact Assessment.
168. Photomontage extracts are included as Graphics below. These are provided for illustrative purposes only; full-scale photomontages are provided in ES Volume 2.



Indicative View of Substation viewed from Goldborough Road east of Wallaston Cross at year 1 (with no planting mitigation)

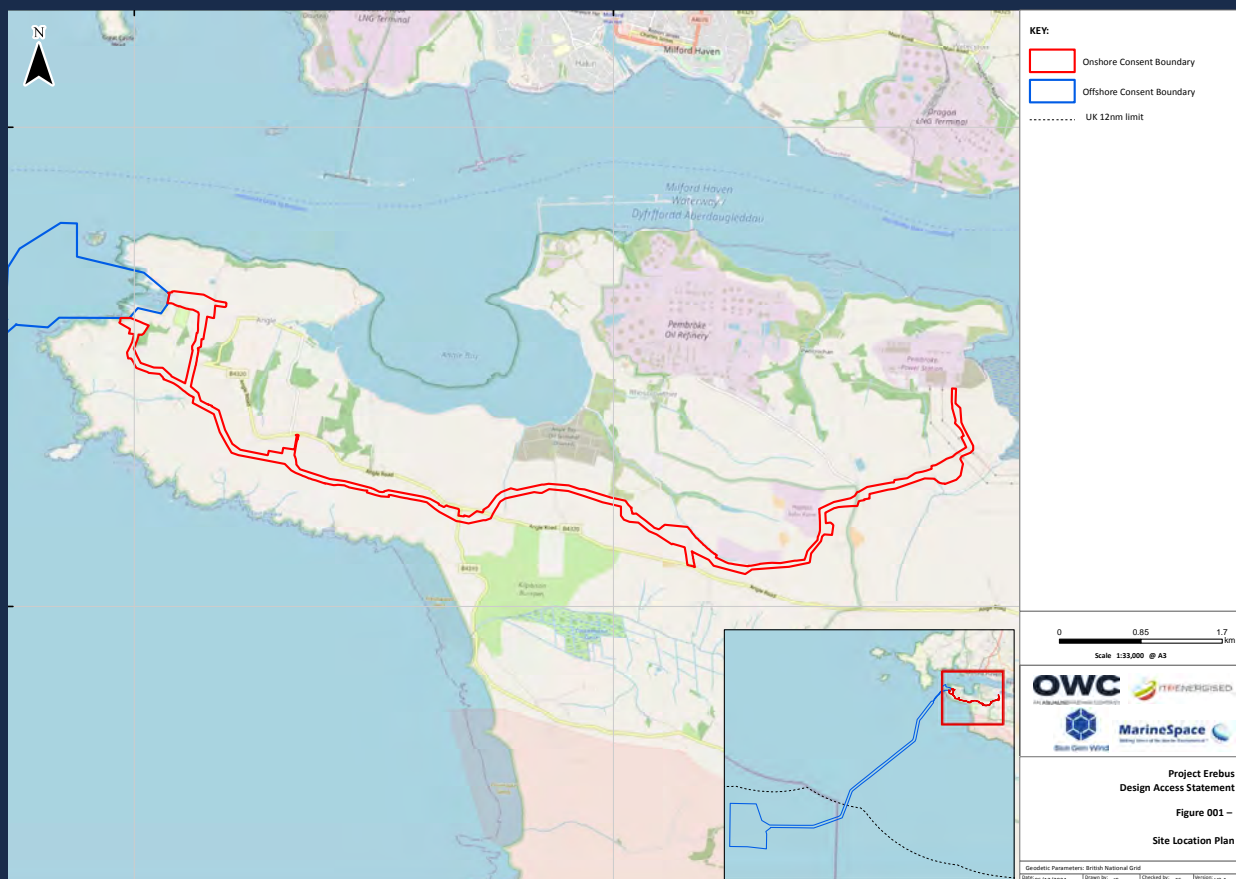


Indicative View of Substation viewed from Goldborough Road near Moreston at year 15 (with planting mitigation)

Onshore Noise and Vibration

169. The onshore noise and vibration assessment considered potential noise impact associated with the construction, operation and maintenance and decommissioning of the Project. The assessment provides an overview of existing noise conditions in the area, and identifies noise sensitive receptors (NSR), including residential and business properties within the potential to be affected by the Project.
170. The assessment includes a desk based study, detailed noise survey and prediction of construction and operational phase impacts. The detailed noise survey was undertaken during a 14 day period in July 2021 at locations considered representative of the NSR. The surveys were of sufficient duration to ensure that noise levels were measured across a range of weather conditions. The methodology and assessment were developed in consultation with the PCC Environmental Health Officer. The assessment was conducted using relevant guidance, including British Standard (BS) 4142.
171. The assessment has concluded that the main noise sources will relate to construction impacts, including at landfall during Horizontal Directional Drilling activities. Noise specific mitigation will be integrated into the CEMP, including site-specific solutions such as the use of best practice construction methods, selection of low noise plant and machinery, and screening and temporary noise barriers during construction at the landfall and substation site. With mitigation measures in place, the effects of the construction and decommissioning activities on nearby noise sensitive receptors are assessed as no more than minor adverse and therefore **not significant**.
172. During the operational phase, the onshore substation is the only onshore element of the Project that will generate noise emissions. The substation components and the site will be designed to ensure that operational noise levels generated by the substation will be close to or at background noise levels when measured at the nearby noise sensitive receptors. Design measures may include the procurement of low noise equipment and plant, as well as enclosures, noise barriers and landscaped bunds. The assessment has concluded that with the inclusion of specific mitigation, the effects of the operational phase will be negligible and **not significant**.
173. Further details are provided in Volume 1, Chapter 22: Noise and Vibration.

Onshore Site Boundary





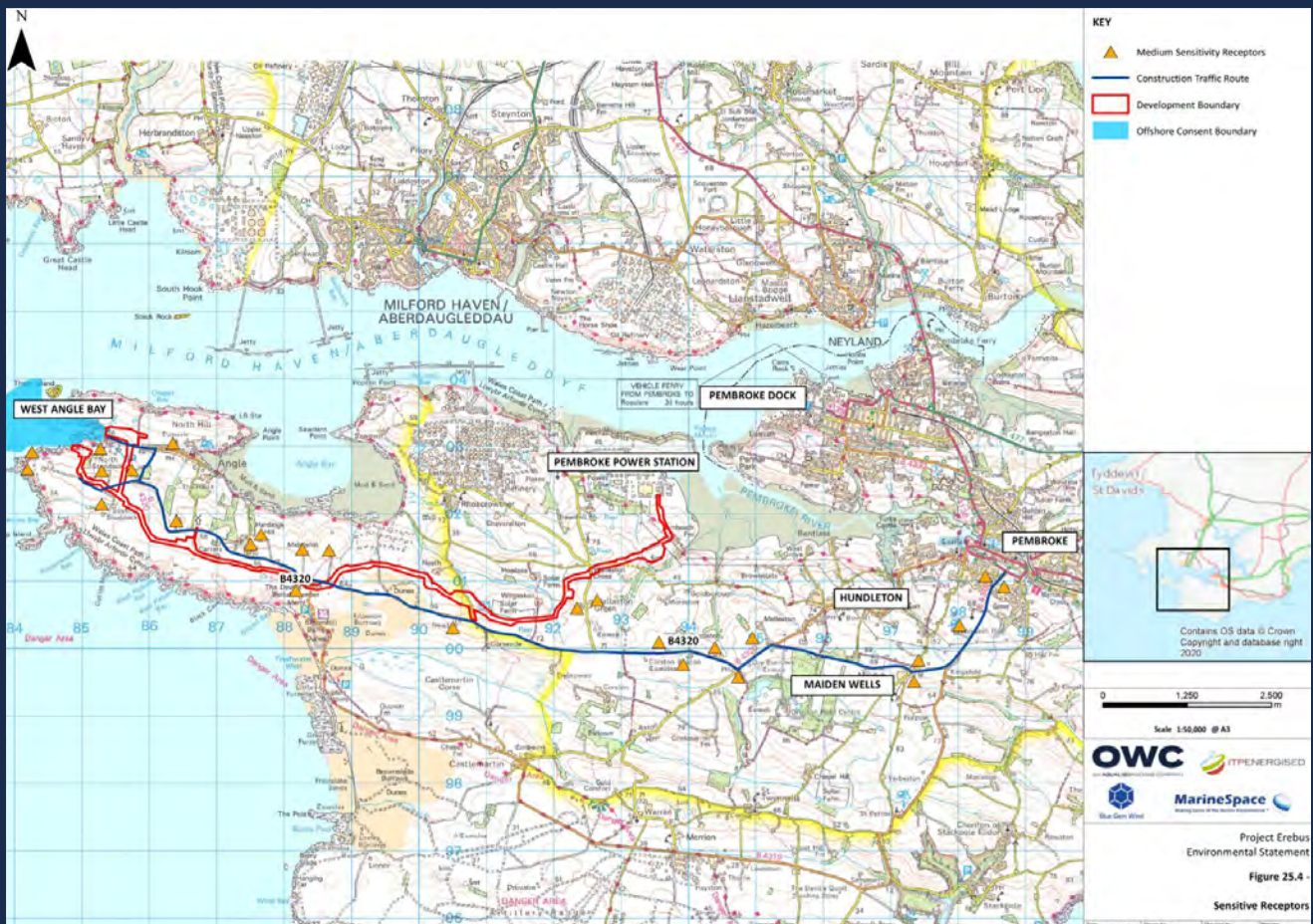
Onshore Archaeology and Cultural Heritage

174. The onshore archaeology and cultural heritage assessment considered impacts on archaeological and cultural heritage resources during construction, operation and maintenance and decommissioning phases of the Project. The assessment comprised a desktop study, site walkover and consultation with the PCNPA and PCC.
175. This assessment provides a description of the general archaeological background of the area and identifies designated and non-designated features within the vicinity of the Project. The assessment identifies forty-seven archaeological receptors with the potential to be impacted by construction works and categorises them according to importance or value.
176. The onshore cable route and substation have been located to avoid known archaeological and cultural heritage features, with archaeological baseline information taken into account in the route and site selection. The Project also will integrate standard mitigation into the CEMP to minimise construction impacts on known and potential archaeological features.
177. Of the forty-seven archaeological receptors identified, the assessment identifies that the Project has the potential to cause moderate impacts on four features considered of medium value. This may result in **significant** effects if these features extend into the footprint of the construction works. Consequently, project specific mitigation measures will be applied, including additional mitigation specifically for these sites, which include preliminary geophysical survey, potentially followed by trenched archaeological evaluation prior to construction. Following evaluation, the final cable route design will be micro-sited to avoid features, or the features shall be preserved through record (archaeological excavation).
178. With the provision of standard and project specific mitigation measures, the Project will cause no more than minor adverse effects on the archaeological heritage of the area, which is **not significant**.
179. This substation has the potential to result in minor visual impacts on the historic landscape character of the area of Rhoscrowther, as well as minor impacts on views from the grade II listed Somerton Farmhouse and two scheduled monuments nearby (Corston Beacon Round Barrow and Wallaston Round Barrows). The sensitivity of these receptors may result in **significant** effects. Therefore, specific mitigation measures will be included in the final substation design, including materials, distribution, lighting and screening. The provision of these mitigation measures will result in no more than minor adverse effects on the cultural heritage of the area and these effects are **not significant**.
180. Further details are provided in Volume 1, Chapter 23: Onshore Archaeology and Cultural Heritage.

Land Use

181. The Land Use Assessment considered the impacts of the Project on existing land use during the construction, operation and maintenance and decommissioning phases of the Project. The assessment focused on land use and tenure, and potential impacts on agricultural productivity.
182. The Project is designed to allow for the cable to be buried to sufficient depths to allow normal farming practices to continue (i.e. arable crop production and livestock management).
183. Construction will involve the temporary stripping and storage of topsoil and subsoil to excavate trenches to the required width and depth to install cable circuits. Following completion of the works, the working width will be fully reinstated as near as practically possible to its former condition.
184. There will be no permanent change of land use with the operational onshore export cable, with the exception of the transition joint bay and joint bays and inspection chambers along the route. A 12 m wide easement over the onshore export cable will be established to allow access for maintenance, though normal farming practices will be allowed to continue. Following the full reinstatement of areas impacted by construction activities, the effect on agricultural operations associated with the cable easement is assessed to be negligible, and **not significant**.
185. Land take associated with transition joint bays at the landfall will result in the permanent loss of approximately 0.0144 hectares (144 square metres, or approximately 0.04 acres). The construction of the substation and associated drainage and landscaping works will result in the permanent change of up to 3 hectares of agricultural land. This will result in no more than minor adverse effects on land use in the region and are **not significant**.
186. Further details are provided in Volume 1, Chapter 24: Land Use.

Traffic and Transport Sensitive Receptors



Traffic and Transport

187. The Traffic and Transport assessment considered impacts from the construction, operation and maintenance and decommissioning phases of the Project on the transport network within the vicinity of the Project.
188. The assessment comprised a desk based study, consultation with the local authority and other stakeholders, video survey of the local highway network and topographical surveys. The assessment follows relevant guidelines and considers feedback from the consultation process. The assessment considers two elements. The first is potential impacts resulting from additional traffic generated by the Project, with impacts such as driver delay, pedestrian delay, pedestrian amenity, accident and safety considered. The second is a review of the local network to determine that abnormally large loads, such as the substation components, can be delivered to the site via the local road network.
189. The assessment determined that construction and decommissioning activities will generate a minimal number of additional trips over the course of an average day and will therefore meet relevant guidelines. Effects are assessed as negligible, and **not significant**. The assessment also confirmed that the local road network, including the bridge at Ferry Point can accommodate the delivery of abnormal loads to the site. During the operational phase, trips to and from the site are negligible and **not significant**.
190. An outline Construction Traffic Management Plan (CTMP) is provided as Appendix 26.2 in Volume 3 of the ES. This will be developed prior to the commencement of construction in consultation with the local authorities. The appointed contractor will also liaise any other developers constructing in the area to ensure that the works will not cause significant traffic impacts during the construction phase.
191. Further details are provided in Volume 1, Chapter 25: Traffic and Transport.

Air Quality

192. The air quality assessment considered potential impacts to air quality arising due to the construction, operation and maintenance and decommissioning of the Project and their associated potential impacts upon human and ecological receptors.
193. The assessment included a review of baseline air quality within the study area which shows that existing levels of pollutants of concern are low, and significantly below relevant Air Quality Standards.
194. Potential impacts that could result from the construction of the Project include dust generation and deposition on sensitive ecological receptors, dust generation and deposition (nuisance) on nearby residential and commercial properties and associated human health impacts from inhalation of airborne dust. The assessment confirmed that any such impacts will be restricted to the construction and decommissioning phase and are temporary.
195. In order to minimise the significance of effects on human and ecological receptors, a number of mitigation measures have been proposed for inclusion within the CEMP. These include good construction practices, stakeholder communication, dust management, inspections and monitoring, use of screens or barriers as appropriate, covering of soil stockpiles, suitable materials storage, and water-assisted street sweeping where required.
196. The assessment has concluded that with the inclusion of standard mitigation and some location-specific mitigation, the effects of the construction phase at designated ecological receptors and human receptors (residential and commercial properties) are temporary and negligible, and therefore **not significant**.
197. Further details are provided in Volume 1, Chapter 26: Air Quality.

Entire Project (Onshore and Offshore)

Socio-Economics, Tourism and Recreation

198. The socio-economic, tourism and recreation assessment considered potential impacts on commercial and recreational activities in the vicinity of the Project. The assessment also considered potential impacts on human health that may arise from the Project. The assessment included a desk based study and consultation with local authorities and stakeholders, including local businesses and communities in the region and wider area.
199. Impacts to tourism and recreation in the vicinity of the project considered potential disruption or reduced access for activities such as chartered vessel, coastal recreational users, coastal tourism, terrestrial recreational users and businesses. Impacts to Socio-economic receptors considered the effects on employment, supply chain sectors, skills and training, use of green energy and energy security. For impacts to health, the assessment considered specific effects such as EMF from cables as well as indirect impacts resulting from such as beneficial health effects associated with increased economic activity and employment, and well-being of future generations associated with renewable energy generation.
200. The assessment recognised the importance of tourism and recreation in the region, including the beaches on the Angle Peninsula, Pembrokeshire Coast National Park and coastal / marine activities. The assessment considers the temporary impact caused during the construction phase. With the implementation of mitigation measures including timing of works, the assessment concluded that there would be no greater than minor adverse effects, which are **not significant**.
201. The socio-economic element of the assessment considered impacts on the local and regional economy. The Project is expected to support the development of supply chains in the region and encourage businesses to relocate to the local area. This would create direct and indirect employment, including the creation of highly skilled and professional roles. The assessment concluded that the Project is likely to provide a significant beneficial effect to the local area.
202. The Human Health element of the assessment concluded that the Project will have a minor beneficial effect on the health outcomes of the population, due to increased employment opportunities and income levels. Direct impacts, such as effects from electromagnetic frequency were determined to be negligible **not significant**.
203. Further details are provided in Volume 1, Chapter 27: Socio-Economics, Tourism and Recreation.

Climate Change, Major Accidents and Disasters

204. In accordance with the EIA regulations, an assessment of the potential risks of major accidents and disasters that could result from or be associated with the construction, operation and maintenance and decommissioning of the Project has been made. The resulting effect on the environment from such risks has been considered and assessed.
205. The Project is being designed to adequately future proof it against events such as flooding and increased sea levels as a result of climate change. In addition, the Project area is not prone to natural disasters such as earthquakes and landslides. As such, the Project's vulnerability to accidents and disasters is considered negligible.
206. The focus of the assessment was, therefore, on the Project's potential to cause a major accident that would result in significant adverse effects on the environment. Potential impacts include increased risk of vessel collisions, contamination risks (onshore and offshore), interaction with unexploded ordnance, failure in towing of the floating platforms, and failure of the floating platform mooring systems or the wind turbine generators during operation. Risks associated with climate change include storms, floods, and sea level rise affecting equipment.

207. Information on the potential for the Project to result in major accidents and disasters was drawn from other technical assessments. Additionally, consultation was undertaken with relevant bodies including the Maritime and Coastguard Agency, Trinity House Lighthouse Service, Milford Haven Port Authority, NRW, and major industrial and pipeline operators.
208. Standard mitigation measures which the Project has already implemented, or is committed to implementing, minimise potential impacts from major accidents and disasters. These measures include, but are not limited to, suitable Project design, implementation of a Construction Environmental Management Plan and Operational Environmental Management Plan, good construction practices, engagement with and notification of relevant local stakeholders, ensuring that all vessels comply with relevant regulations and operational conventions, deployment of navigational aids, and use of safety zones during construction, major maintenance and decommissioning.
209. With the specified mitigation measures in place, the effects of major accidents and disasters associated with the Project are assessed as **not significant**.
210. In respect of climate change effects, the Project has an operational lifespan of approximately 25 years and whilst it is difficult to predict the level of change to climate conditions, the direct impact on the Project is expected to be marginal. Importantly, the Project has the potential to reduce carbon emissions, contribute to national and international targets and lessen the impacts of climate change, through generation of approximately 325 GWh per year of renewable electricity (enough to power approximately 93,217 homes).
211. Further details are provided in Volume 1, Chapter 28: Climate Change, Major Accidents and Disasters.

Cumulative Effects

212. A summary of anticipated cumulative effects is provided in Chapter 30: Cumulative Effects Assessment. Detailed technical assessments of cumulative effects (i.e. the combination of effects of the Project with other existing, approved or planned projects) for each topic are provided within respective ES chapters (i.e. Chapters 6 to 27). This includes consideration of transboundary effects (i.e. those that may have an impact on the environment in European Economic Area (EEA) states) where applicable.
213. The assessment concluded that no effects would act cumulatively with the residual effects of the Project. As such, the assessment determined that cumulative effects would be **not significant**.



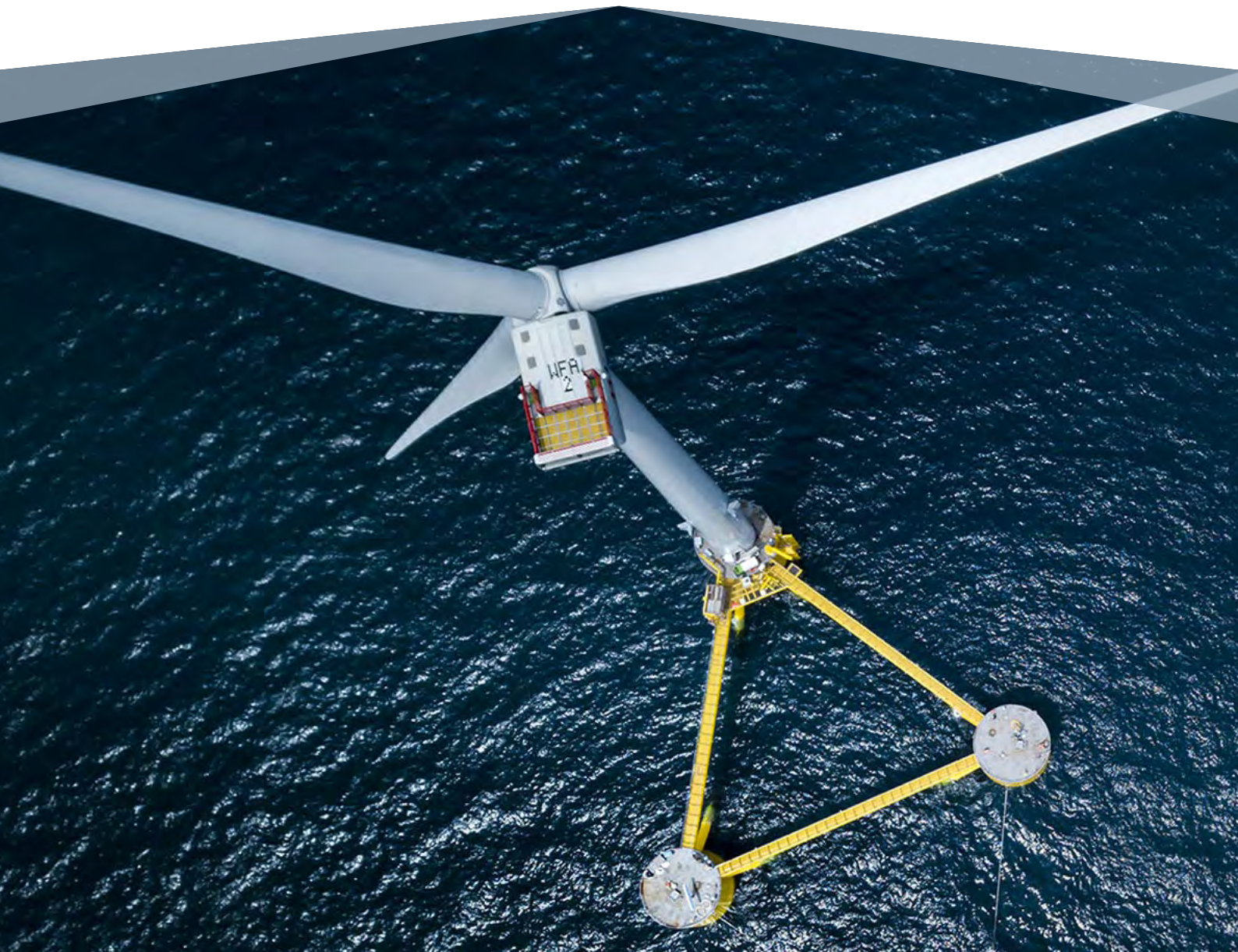


Benefits of the Project

214. The Climate Change Committee in the Sixth Carbon Budget (December, 2020) stated that offshore wind will become the backbone of the future energy system requiring 100+ Gigawatts of installed capacity by 2050. FLOW is predicted to deliver circa 50% of that capacity and become a key technology in achieving a cost-effective net zero.
215. The Celtic Sea will play a critical role in delivering Welsh and UK low carbon targets and policy with an estimated 50 GW of realisable wind resource. This will drive regional development, creating new supply chain opportunities, a just energy transition, energy security and a significant portion of the UK's 29,000 floating wind jobs forecast by 2050. The Offshore Renewable Energy Catapult (OREC) has stated that a stepping-stone approach to FLOW development is the most effective way to maximise local supply chain benefit and impacts to the local economy. Based on the OREC recommendation, the Project is proposed as the first in the Applicant's 'stepping-stone approach' for FLOW development in the Celtic Sea which will begin a new low carbon offshore energy sector in the region.
216. The Project will have a total capacity up to 100 MW and it is estimated will produce enough renewable energy to power up to 93,217 UK homes and saving 151,767 tonnes of carbon emissions per year.
217. The purpose of the Project will be to:
- Demonstrate FLOW technology at Test and Demonstration scale in the Celtic Sea;
 - Maximise low carbon job creation and socio-economic impact within the local supply chain by utilising a stepping-stone approach to development;
 - Contribute to a COVID-19 Green Recovery; and
 - Contribute to the declared Climate Emergency, UK and Welsh Government's 2050 Net Zero targets; and the UK Government's FLOW 2030 target.

Conclusion

218. Project Erebus is subject to the EIA Regulations. Therefore, it has been assessed to identify and describe potential likely significant effects, both positive and negative, that may result from a project.
219. The benefits of the Project are clear, through demonstrating the deployment of FLOW and progressing investment towards commercial deployment of the technology in the Celtic Sea region. This aligns with the Welsh Government's aim for Wales to become a world leader in renewable energy technologies, support investment and reduce carbon emissions. The Project also supports the Future Wales focus on new strategic energy development, including marine energy.
220. A positive planning balance has been evidenced throughout the Planning Statement and where the ES identifies significant effects, appropriate mitigation has been included to reduce such effects to acceptable levels.
221. The Project has been designed in a manner that minimises potential adverse effects on the surrounding environment and local communities. This includes careful site selection for the wind farm itself as well as the cable routes and onshore substation. The design and construction methodology have also been developed in a manner that will minimise impacts, with the inclusion of mitigation measures where necessary to do so.
222. In consideration of the above, the Project is a sustainable form of development that accords with the relevant policies and ambitions of the Welsh Government, PCC and PCNPA.





Blue Gem Wind



Floating wind images courtesy of Principle Power. Artist:DOCK90

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