# Offshore Wind Constraints Analysis

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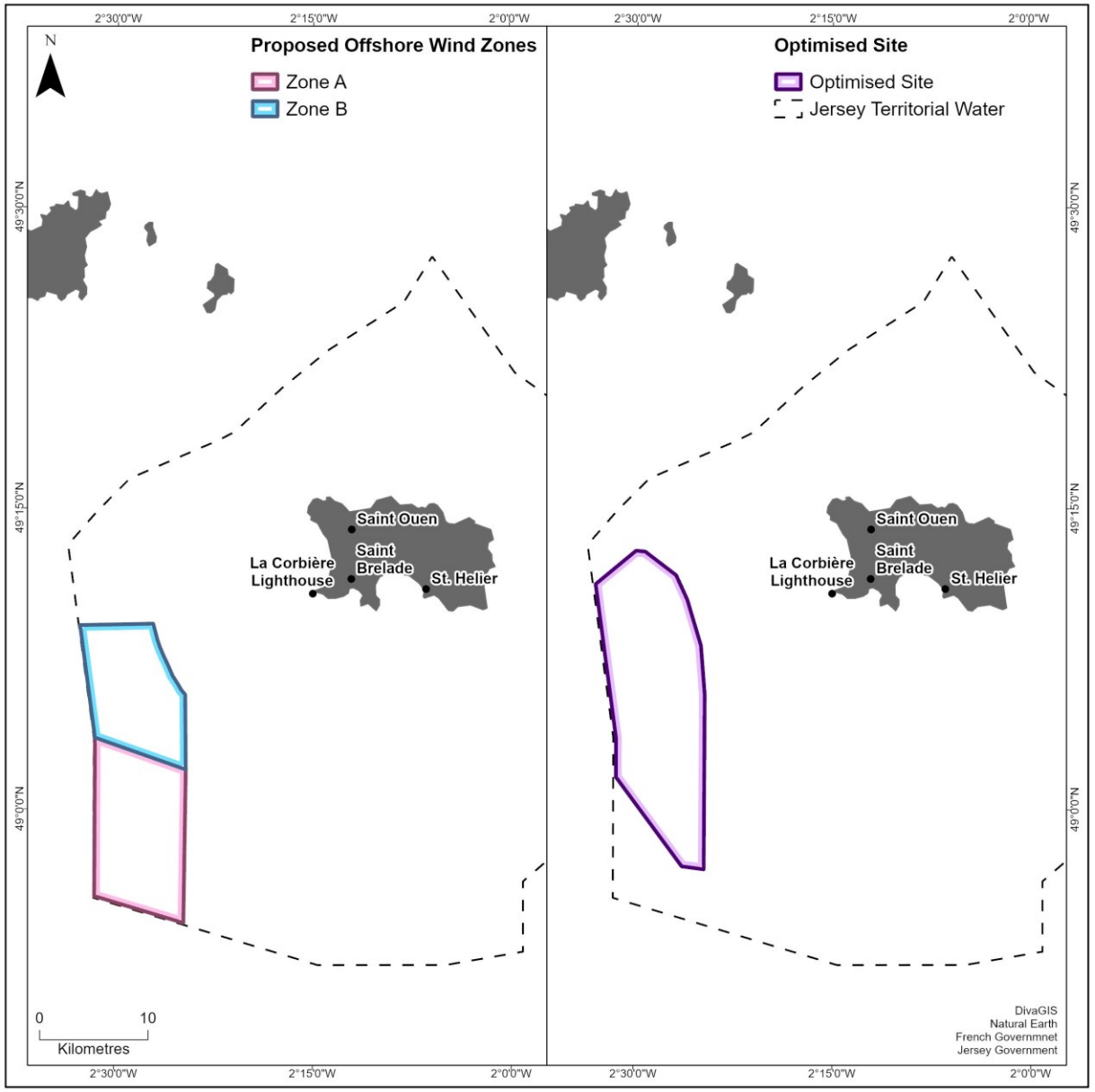
# Executive Summary

This report outlines the main constraints to offshore wind development in Jersey. Wind speed, human and environmental constraints are discussed with the intention of outlining key considerations and underpinning knowledge. ERM has used the zones identified in the ITPEnergised report as a baseline for this analysis, as shown on the map to the right. The intention of this analysis is to identify where within/around the currently proposed offshore wind zones a developer will most likely site a wind farm, which will then inform a detailed LCoE analysis.

The wind resource appears strong at present, however wake impacts are expected due to the recently commissioned St Brieuc wind farm and a potential additional French wind farm in a zone identified west of the identified zones. The LCoE analysis will investigate this further. Shipping routes pass through the southern zone in and out of St Malo, and a busy ferry route runs along the eastern boundary of both zones. AIS fishing data suggests a baseline of activity within the site, while VMS data published in GoJ's Maritime Activity Assessment Report shows high levels of crustacean netting activity within the zones. While there are no environmentally designated areas within the zones, sensitive habitats, marine mammals and seabirds within the vicinity makes the consideration environmental impacts highly important during project development. Subsea cables are found to the north of the zones, but any impact can typically be managed through layout mitigations and crossing agreements. Due to the small size and location of Jersey's sea area, visual impacts on Jersey and Brittany will remain a consideration going forward, especially given the presence of other wind farms, the potential for cumulative impacts and the growing size of wind turbines.

Overall, the south-western area of Jersey's exclusive economic zone presents the most likely area for a commercial scale offshore wind development. Whilst other areas around Jersey appear technically feasible, visual constraints will likely make development in these other areas challenging. Based on a detailed assessment of relevant constraints presented below, an optimised site has been identified by ERM which utilises unconstrained sea to the north of the original zones, and would accommodate an important navigation channel between St Brieuc and a potential Jersey wind farm.



# Contents

# Introduction

# Introduction

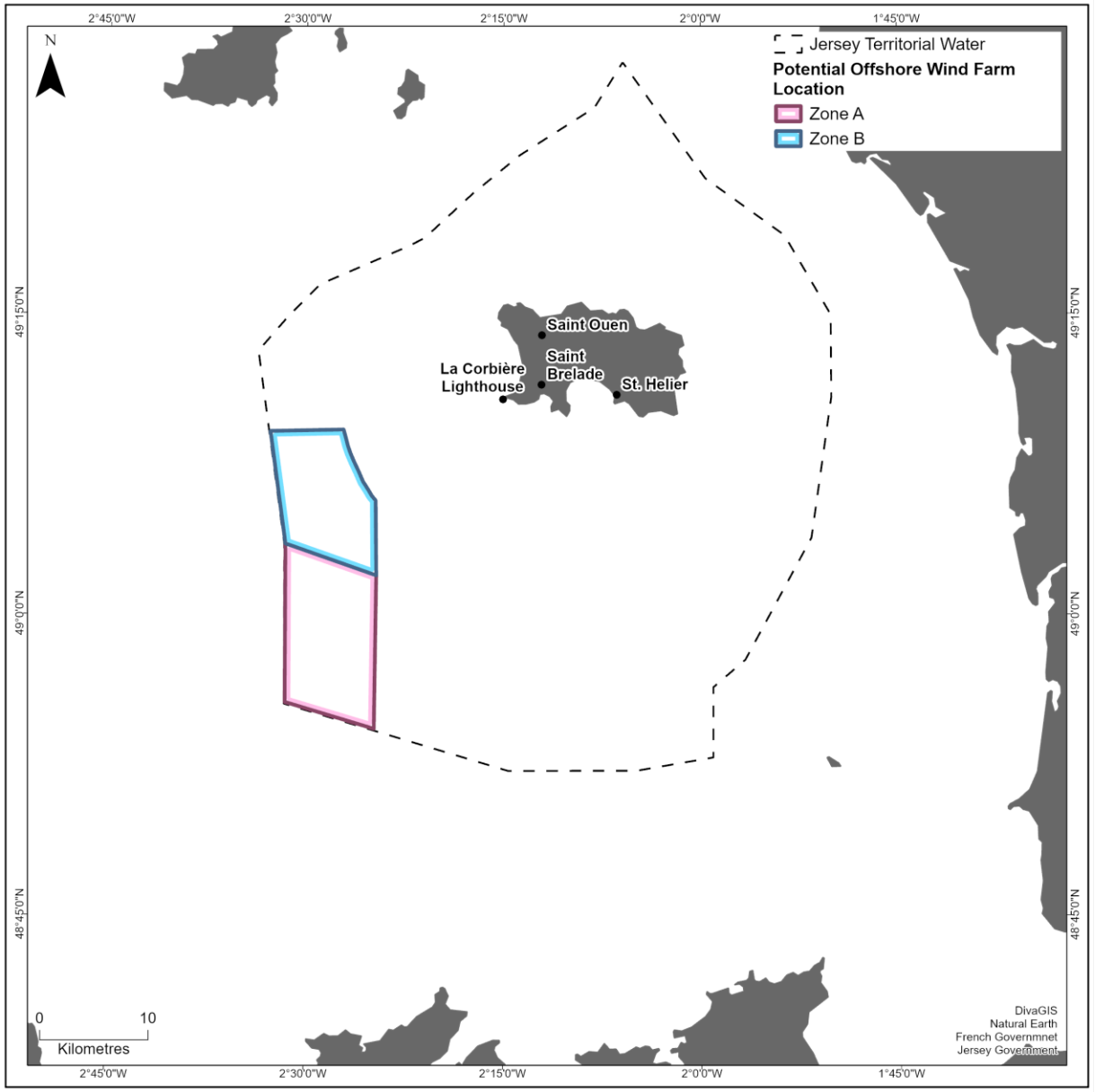
As part of ERM's wider scope of work on offshore wind in Jersey, an analysis of constraints to offshore wind development within Jersey waters has been commissioned. This analysis is based primarily on geospatial data, with consideration of other factors where relevant.

For each category of constraint, the following will be provided:

- A figure (map) of relevant data ERM has available.
- An explanation of the relevance of presented information in each figure. This is intended to build up the reader's understanding of offshore wind constraints.
- A brief overview of the conditions in Jersey waters as a whole.
- A discussion of the conditions in and around Jersey's proposed offshore wind zone.

Based on the information to be presented, ERM will leverage its experience of supporting offshore wind developers on site finding and assessment assignments to suggest the optimal site from a developer's point of view.

This site will later be used for the subsequent energy yield and LCoE analysis commissioned in tandem with this report.



# Constraints analysis

# Constraints Considered in Analysis

ERM considered all constraints pertinent to offshore wind development as part of this exercise, however only those that have directly impacted site refinement have been mapped in this report.

| Dataset | Comment | Dataset | Comment |
|---|---|---|---|
| Wind Resource | Mapped in report (Page 7) - Has potential to impact site layout | Wrecks and UXO | Not mapped in report. There are a number of wrecks that have been identified in and around the OSW zone, however this is a very common occurrence for offshore wind farms and can be mitigated. UXO data for the region is limited and should be investigated further as the project develops. |
| Shipping | Mapped in report (Page 9 and 11) – Has impacted site refinement | Visual Impacts | Mapped in report (Page 14) – Has impacted site refinement |
| Fishing | Mapped in report (Page 10 and 11) – Has impacted site refinement | Port Infrastructure | Not mapped, however there are several potential construction bases in France. Modelled/expected construction and O&M bases will be discussed in the LCoE analysis. |
| Environmental Designations | Mapped in report (Page 12) – Has not impacted site refinement | Marine mammal densities | Some data has been mapped (Page 12), however further studies, data collection and consideration is advised. |
| Cables and Pipelines | Mapped in report (Page 13) – Has impacted site refinement | Bird distributions and migration routes | Not available at this stage. Further studies, data collection and consideration is advised. |
| Ground Conditions | Not mapped in report. Ground conditions throughout the western portion of Jersey waters are seen as suitable for offshore wind development, although data is limited. Further analysis into the ground conditions will be undertaken as part of the LCoE exercise, as this will impact foundation selection. | Bathymetry | Not mapped in report. Water depths throughout the western portion of Jersey waters are seen as suitable for offshore wind development. Further analysis into the water depths will be undertaken as part of the LCoE exercise, as this will impact foundation selection. |
| Military Areas | Not mapped due to a lack of data. Military areas are often withheld from the public domain however, and consultation with military stakeholders is recommended at the earliest stage. | | |

# Wind speed

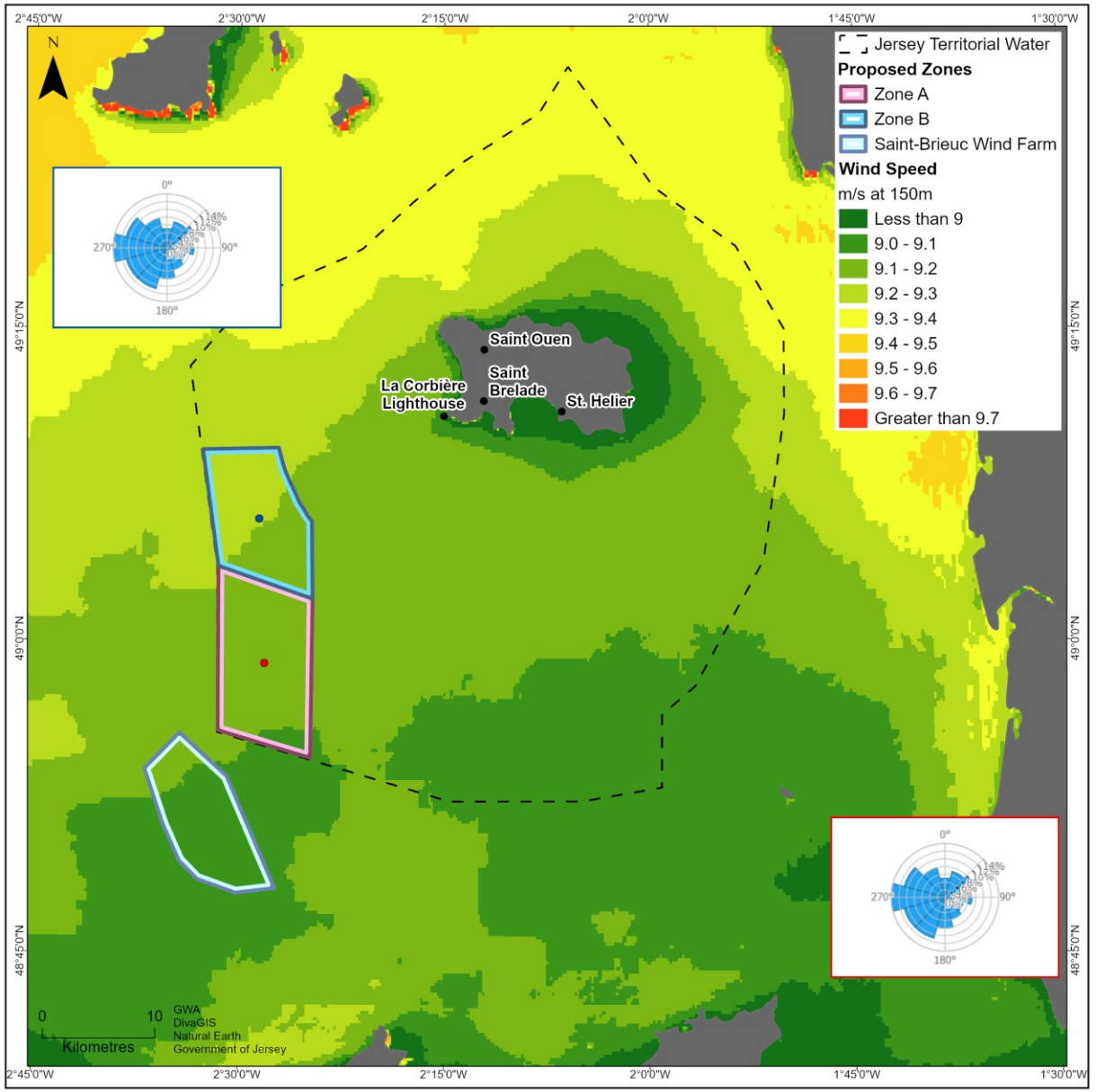
## Mean wind speed is a widely available measure of the available resource to offshore wind projects.

The wind conditions at an offshore wind site is a key factor contributing towards the energy production of the project. WTGs have a power rating, however this is only produced if the wind speed at the WTG is at or above its rated wind speed. Below this, less power is generated at each WTG, down to zero below the WTG cut-in speed.

For projects at this stage of development, ERM typically sources modelled wind speed data from Global Wind Atlas (GWA), a freely available resource developed by several contributors led by DTU (Danish Technical University). The online webmap allows the user to navigate various data layers and gauge wind speed at various heights above mean sea level (MSL). To align as closely as possible with expected WTG hub heights, ERM has used wind data at 150 m above MSL.

Although mean wind speed does not provide the full picture of expected energy yields, averages such as those seen in Jersey waters suggest a strong resource is present throughout. ERM generally considers mean wind speeds greater than 8 m/s as well suited to OSW development, and speeds in excess of 9 m/s as optimal.

From a resource perspective, the zones therefore appear well suited to OSW. This is subject to further study in the LCoE analysis, which will include an energy yield assessment and will account for other factors such as wind speed variability and current and future neighbouring wind farms, capturing wake effects which may reduce the resource in Jersey's OSW zone. This is expected to be an issue as the prevailing wind direction is from the west and south-west as shown in the wind roses, which illustrate the distribution of the wind direction on a time basis.



# Shipping

## Various shipping routes traverse Jersey waters.

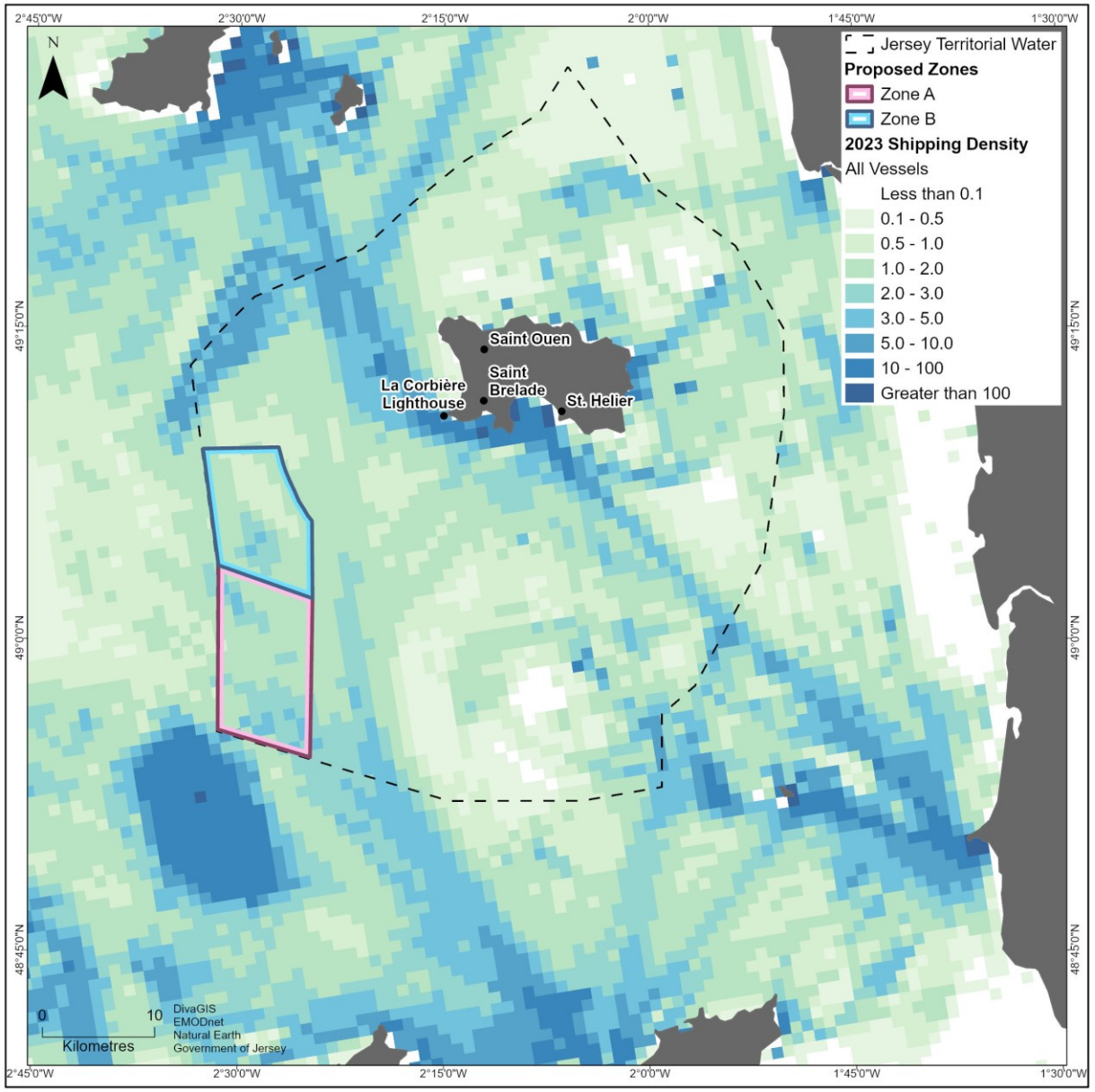
Conflict of use with other marine users can present a significant constraint to OSW development. Shipping, be it cargo, passenger or utility vessels, can be affected by OSW farms as the WTGs present navigational hazards and may require diversion. Diversions impact route length, increasing fuel costs and journey times.

To gauge shipping activity, ERM has sourced vessel automatic identification system (AIS) density data from the European Marine Observation and Data Network (EMODnet). Note that AIS data is only generally required for vessels over 15 m in length, and smaller vessels will not be accurately reflected. Data is available by vessel type for each month of every year from 2019 to present. The data is provided in 1x1 km cells covering Europe and some neighbouring areas. Density is expressed as hours per square kilometre per month, i.e. the average monthly hours accrued by all relevant vessels in each cell. Data is shown for 2023.

Jersey's EEZ is generally a busy area, with passenger and cargo vessels serving the island as well as other routes passing through mainly related to ports in St Malo, Granville, Guernsey and various in southern England. The St Brieuc OSW farm is clearly visible in the map, likely owing to vessels related to the foundation and WTG installation works carried out in the period covered by the data, 2023.

Higher densities are observed in the southern OSW zone. These densities appear to be related to routes in and out of St Malo, with the most direct route into the English Channel traversing the zone. The installation of WTGs in the zone will require route diversion around the Jersey OSW project, the St Brieuc OSW farm, and a possible future OSW farm in the Roches Douvres zone, located west of Jersey's EEZ.

Engagement with the French Government and shipping stakeholders is advised to fully understand impacts, pushback and mitigations.



# Fishing

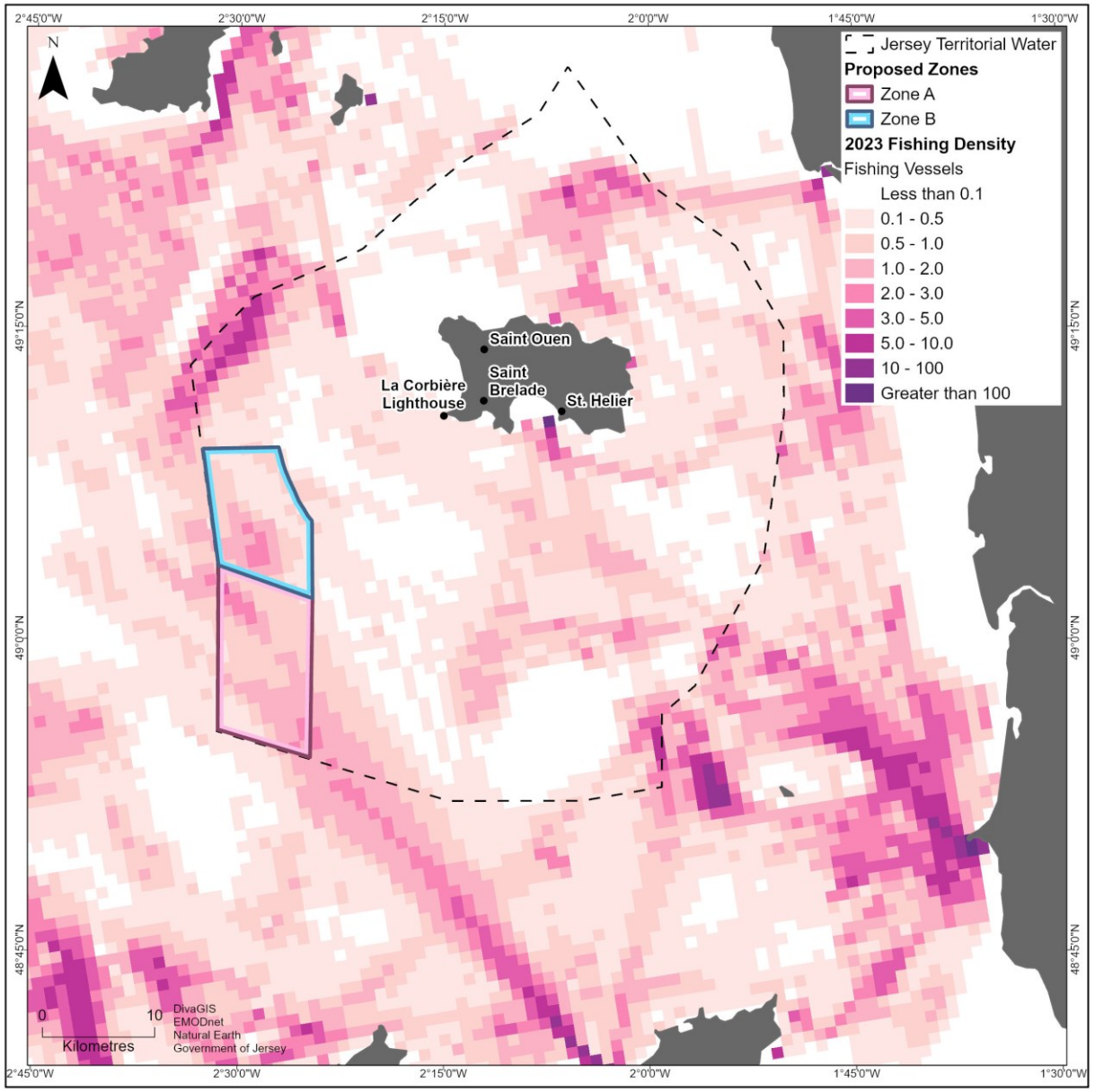
## AIS fishing data provides an overall indication of the activity of larger vessels but does not account for smaller vessels.

Similar to shipping, conflict of use of the sea area with fishing vessels can result in pushback from fishing communities, especially if fishing methods used in a conflicting area are incompatible with OSW.

Fishing data is also sourced from EMODnet. AIS data is available for fishing vessels with similar properties to the shipping data on the previous slide, with the same unit of hours per square kilometre per month. It is important to understand the limitations of this data however, as AIS is only mandatory for vessels over 15 m in length, which does not capture the movement of numerous smaller vessels used by local fishing communities. AIS devices are generally neglected on fishing vessels, frequently being left on low power mode or dropping in and out of signal. Furthermore, vessel monitoring service (VMS) data is more accurate, more reliable and most commonly used for fishing vessels, although its use was only made mandatory for all Jersey fishing vessels in April 2025. Prior to this, it was only mandatory for vessels exceeding 12 m in length. A better understanding of fishing vessel presence is therefore expected to be achieved in the near future.

The data indicates moderate AIS fishing vessel densities throughout Jersey waters. Increased densities are observed in and out of St Malo, most likely owing to transit routes. These appear to traverse the southern zone. A hotspot is seen north of the zones, suggesting the presence of a fishing ground in the area. Another fishing ground appears to be located north of Jersey, with some evidence of a transit route to this fishing ground from Barneville-Carteret to the east.

ERM understands GoJ is well aware of fishing stakeholders' opinions on the OSW zone. Pushback from fisheries is almost guaranteed in the industry and are expected for any offshore wind development in the western portion of Jersey's EEZ. Common mitigations include compensation payments for loss of income from the overlap of OSW farms with fishing grounds, coexistence agreements with some restricted fishing methods, and/or retraining opportunities for fishing communities, allowing for a career change into OSW operations. GoJ may or may not wish to consider one or several of these mitigation measures.



# Maritime Activity Assessment Report

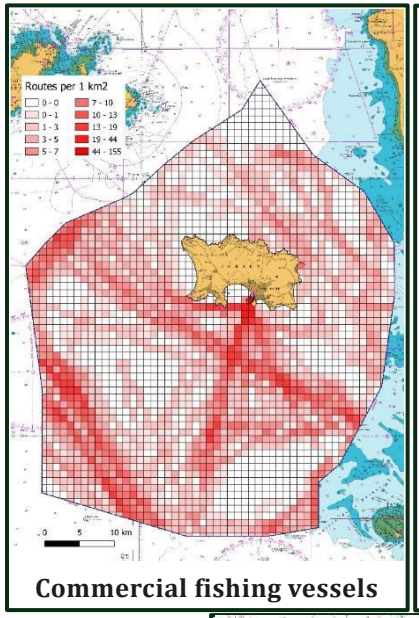
GoJ's Maritime Activity Assessment Report provides several figures of interest to this constraints analysis.

Significant commercial fishing vessel and utility vessel activity is observed within the zones. Should the zones be developed into an OSW farm, rerouting of this traffic will likely be required. The presence of the St Brieuc OSW farm and the potential for another in the Roches Douvres zone over the French boundary to the west, may lead to a significant impact on these routes in terms of increased transit times and costs to vessel operators. Pushback should be expected from these stakeholders and will require management.

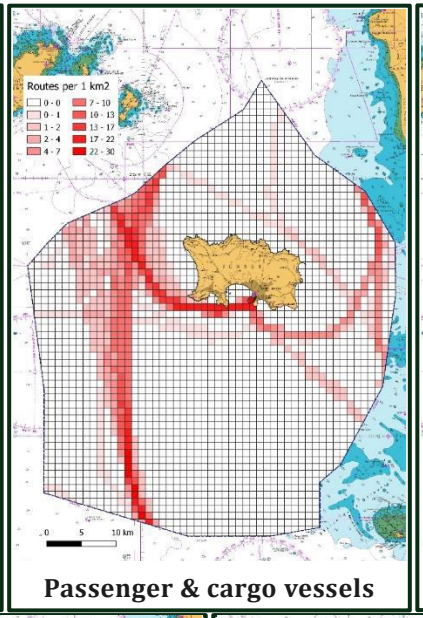
The passenger & cargo figure shows clearly the busy ferry routes from Guernsey and southern England to St Malo and Jersey. High activity is observed along the eastern boundary of the OSW zone. Comparing this activity to marine charts suggests the routes are already pressed against the navigation buoys marking the Minquiers. Expansion of the zone to the east is therefore not possible.

Regarding the fishing activity figures in the Maritime Activity Assessment Report, the trawling activity map shows dense tracks to the north of the OSW zone, as well as some within the zone. Crustacean netting activity is seen in dense tracks within the zone, and crucially almost nowhere else in Jersey waters. Continued engagement with fishing communities is advised regarding these two potential conflicts of use.

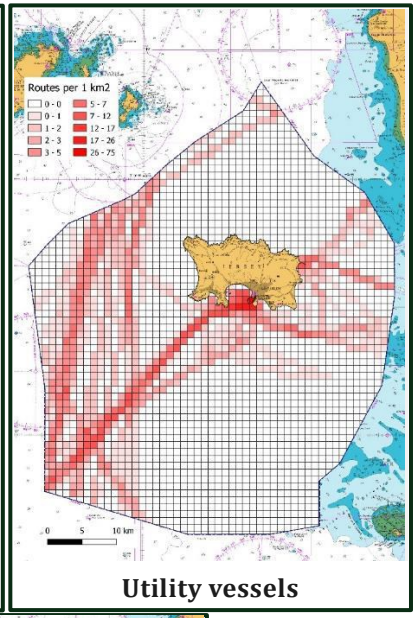
A description of crustacean netting was provided by GoJ as this is not a fishing method known to ERM. This is a static net method, with 220 m nets deployed around 2-4 m above the seabed aiming to catch spider crab. Up to 40 km of nets can be fished during a single trip by a fishing vessel. In terms of impacts, while static gear fishing is usually simpler to accommodate within an OSW farm, due to the size of these nets this may not be the case. In some cases, mobile gear fishing channels can be accommodated between array cabling.



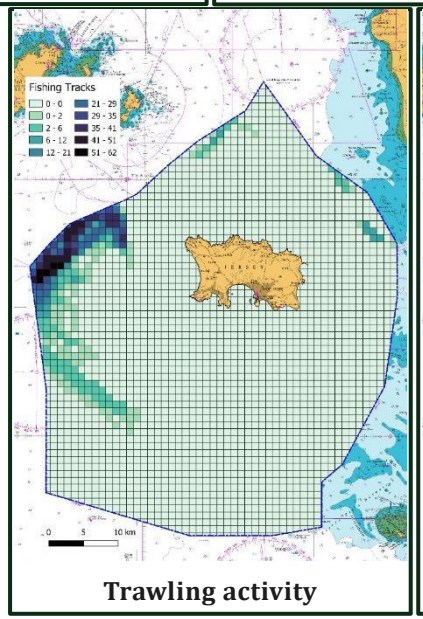
Commercial fishing vessels



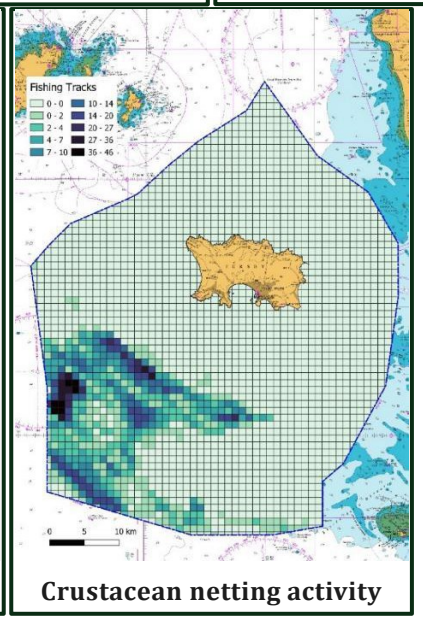
Passenger & cargo vessels



Utility vessels



Trawling activity



Crustacean netting activity

# Environmental designations

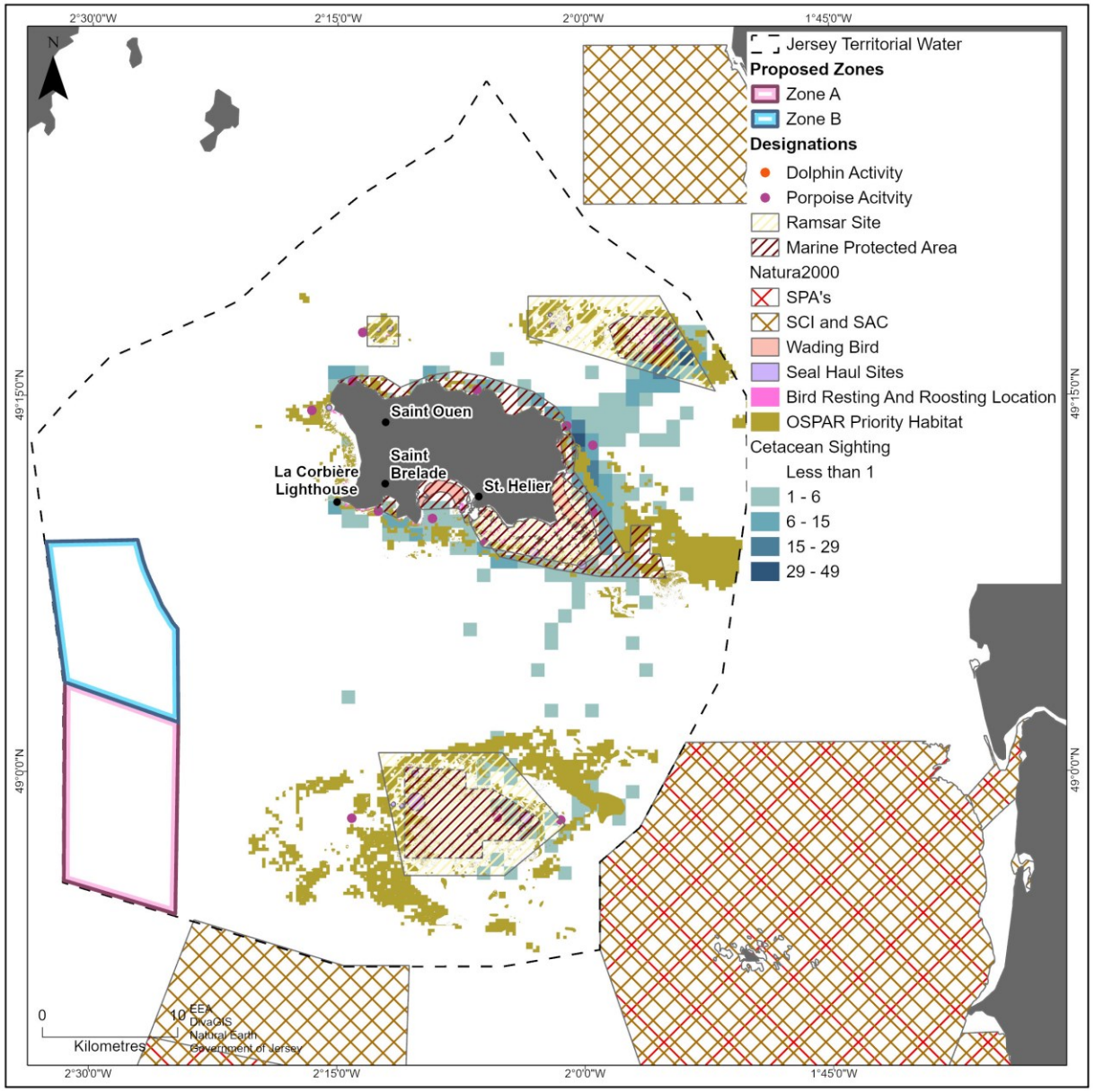
## Various environmentally sensitive areas are located within proximity of the proposed OSW zone.

Environmentally designated areas can present a varying level of constraint in the context of OSW. Some areas in the UK, such as the Dogger Bank SAC, have seen large scale OSW farms developed within them with careful consideration of the reasons for designation. In contrast, areas designated, for example, under the Ramsar convention or Natura 2000 are protected by law from construction within them, and are often treated as hard constraints for OSW development. Depending on GoJ's priorities and existing laws, the level of protection given to environmentally designated areas can vary. As there is no direct overlap between the OSW zone in Jersey and these designated areas, they are not seen as a hard constraint. However proximity to protected areas in Jersey and France, and the potential for export cable crossings should be considered carefully.

Depending on the habitats and species within them, environmentally sensitive areas are typically impacted primarily by construction work such as cable trenching and foundation piling. Marine mammals can be affected by piling in particular even at great distances due to the related noise levels. Haul out sites are particularly sensitive to this as they can serve as breeding grounds among other crucial functions to local populations.

All but the western shoreline of the island is designated as one of several NMGZs (No Mobile Gear Zones, also referred to as Marine Protected Areas), with a Ramsar site also covering waters off the south-east coast. This complicates cable routing; however, a solution can usually be reached for this type of work. Further Ramsar sites and NMGZs are located around the Minquiers and islands north of Jersey.

In addition to the environmental areas within Jersey's EEZ, consideration of surrounding Natura 2000 areas is likely to be necessary throughout the development of an OSW project. Out of the three mapped areas (Chasey SPA/SAC, Cap d'Erquy-Cap Fréhel SAC and Banc et récifs de Surtainville SAC), all of them include marine mammals under their reasons for designation. Impacts from a Jersey OSW project may also be felt on various bird and bat populations related to these areas which should be explored in detail as part of any HRA or EIA.



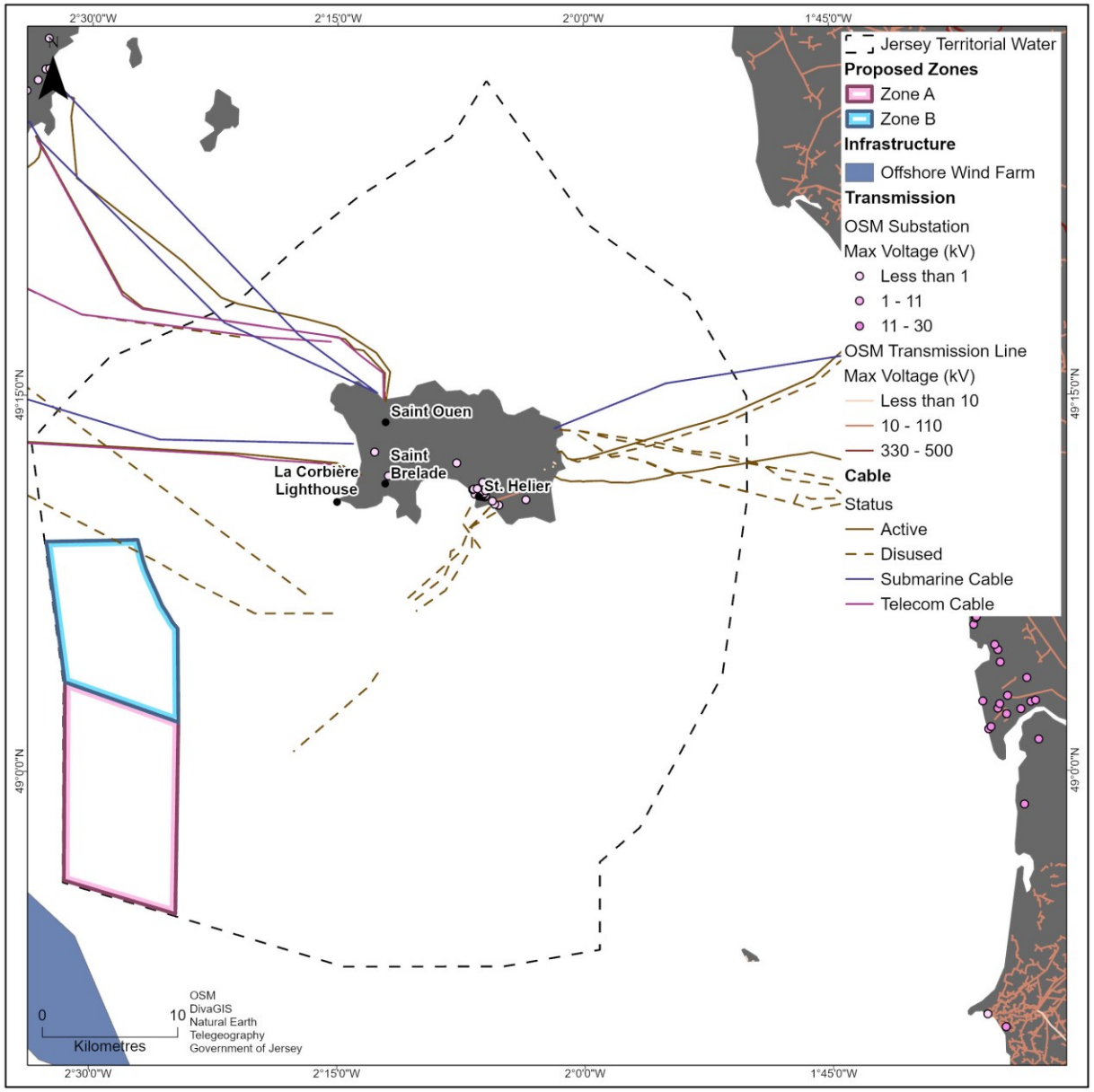
# Infrastructure

## Existing marine infrastructure presents a conflict of use of the seabed.

Jersey has numerous telecommunications and power cables connecting it to other land masses. While structures such as these occupy part of the seabed, their footprint is generally very small and can either be avoided or, if some overlap with array or export cables is necessary, can be subject to crossing agreements. Where a cable or pipeline intersects through a site, a buffer is typically applied around it and it is incorporated into the array/export cable plans, which usually aim to minimise the number of crossovers and favour 90-degree angles between crossing structures to reduce complexity.

Most cables are located to the east of Jersey, connecting it to mainland France, as well as off the west coast where cables connect Jersey with Guernsey and the UK.

Various disused cables appear to pass through or near the identified OSW zone. These will still require consideration during project development; however, they are typically easier to accommodate than active cables. Several active cables are also seen north of the OSW zone. As there is an adequate buffer between these and the zone, and an export cable is not expected to traverse them, ERM does not see them as an issue to project development.



# Visual impacts

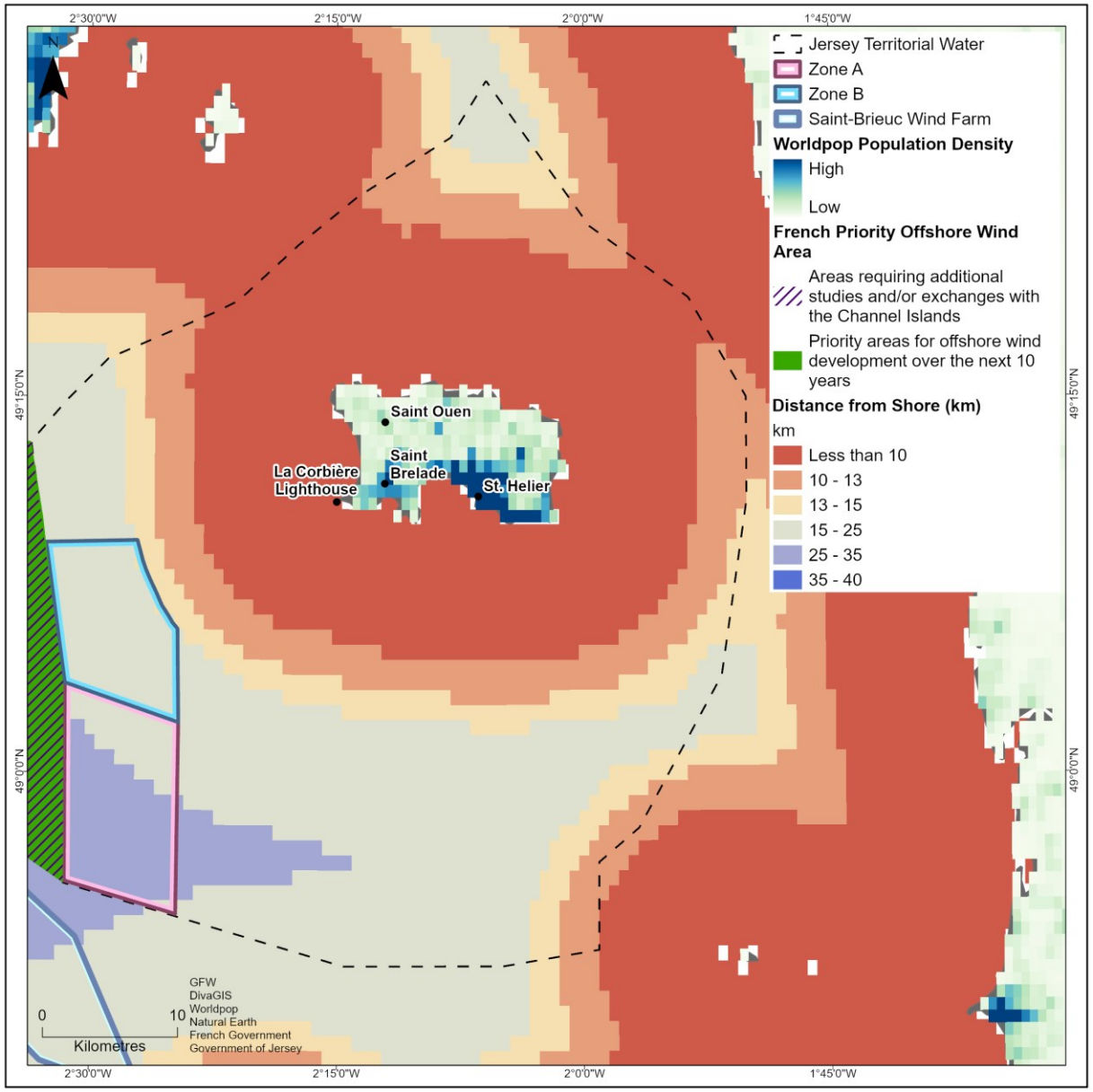
## The Jersey OSW zone is located approximately 13-30 km from shore.

Potential visual impacts on nearby communities can lead to significant pushback from local stakeholders. This is particularly the case when WTGs are visible from areas of recreational value due to their natural landscape, wealthier residential areas or holiday homes, among others. The magnitude of impact is also dependent on visibility, which is increased during clear weather, with larger rotor diameters and with greater hub heights. Navigational lights can also be more visible at night. ERM usually recommends OSW projects are sited 30 km from land to reduce impacts, with 50 km a good threshold to generally consider impacts as minimal. However, several projects have been developed and built within these thresholds.

Recent history in the OSW industry has shown fast growth in WTG sizes (including hub height, rotor diameter and blade tip height), with current WTGs typically around 15 MW in capacity, 150 m in hub height and 220-240 m in rotor diameter. For comparison, 2015 WTGs typically sat around 8 MW in capacity and 140 m in rotor diameter. Hub heights are less dependent on WTG generation and more so on site conditions and the clearance required below the blades.

As Jersey's EEZ is small relative to other jurisdictions, and due to its proximity to Brittany and Normandy, Jersey waters are all relatively close to shore in OSW terms. The furthest distances from land are found in the south-western corner of the EEZ, which itself only extends 30 km from shore at the furthest point considering France. Visual impacts will therefore require careful consideration for any OSW farm within Jersey's EEZ. Cumulative visual impacts can also result from multiple OSW farms located in the same region. As Jersey's OSW zone is near the St Brieuc OSW farm, cumulative impacts are likely. Furthermore, France has sited the Roches Douvres OSW zone along the western boundary of Jersey's EEZ. Precise details about the size of a potential project in this zone are not certain at this time, however given that a wind farm is not likely to be commissioned in the zone for a number of years, WTGs are likely to be larger than turbines being installed today. The cumulative visual impacts of a cluster of OSW farms with various WTG sizes are foreseen as high.

With the two French OSW projects in mind, it may be the case that visual impacts on Jersey are unavoidable. While public sentiment on this may be negative, it could make way for public support if a Jersey OSW farm located in front of existing WTGs bring benefit to the island.



# Visual impacts analysis

# Global context

## The Jersey OSW zone is located approximately 13-30 km from shore.

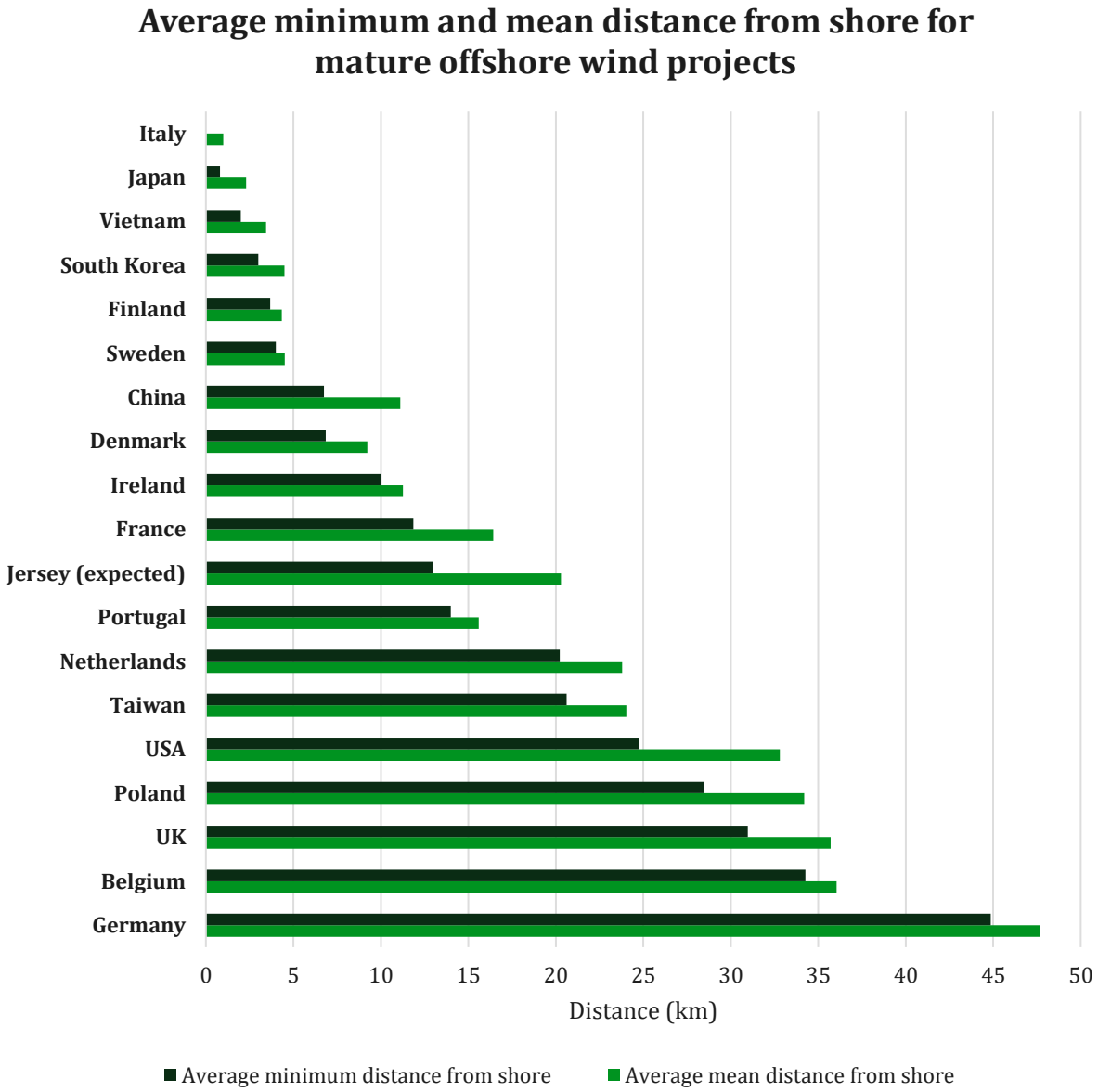
The chart to the right shows data for “mature” offshore wind projects. In this context, mature means projects that are in the later stages of development that have a defined route to market,  are in construction, are operational or have been decommissioned. Mature projects have been selected as there are numerous examples of speculative projects globally that are not likely to progress to operation and therefore are not useful as a benchmark.

The minimum and mean distance from shore was calculated for each mature project site. Mean averages were then taken for these by country and plotted.

The results in the chart show significant variation in minimum and mean distances from shore by market. Some of these, such as Italy and Japan can be attributed to nearshore demonstration/proof of concept projects, typically with only one or a few WTGs. Others, such as France and Denmark, demonstrate more lenient attitudes towards visual impacts from offshore wind farms.

A Jersey project would be likely be located 13-15 km from shore at the nearest point. This would put Jersey roughly in the middle of the chart, and on an individual project basis the result would likely be similar.

The limitations of this analysis include different WTG sizes and total project capacities. Mature projects are likely to utilise older, smaller generation WTGs and most will not reach 1 GW in scale.



# Sensitive viewpoints

An OSW farm would be highly visible from several popular areas.

Various studies have been conducted on the visibility of OSW farms however the rapid growth of WTGs has quickly devalued the results. Various calculations can be made to estimate visibility at certain distances and elevations, but ultimately the ability to see a wind farm is not always the most important aspect. It is often more crucial how the wind farm's appearance affects the observer. This primarily depends on how dominating the wind farm appears in the context of the landscape or seascape, which is affected by the distance between wind farm and observer, the observer's elevation, visibility (which varies due to atmospheric conditions), and rotation of the blades.

It can be assumed that at less than 15 km distances a modern (assuming current or future-generation WTGs) OSW farm would be very visible to the naked eye. Perceptions at this distance are typically negative when viewed from natural landscapes/seascapes or areas known for their natural beauty. However, as the backdrop to more urban or industrial scenery, they can often be perceived less negatively. On the other end of the spectrum, at 50 km distances between the wind farm and observer, even in very clear conditions visibility becomes difficult with the naked eye. Visibility at distances between these two extremes are ultimately subjective, however the transition from a predominant feature to a detail of the overall seascape is typically taken at around 30-40 km.

Given all this information, it is expected that various viewpoints along the south and west coast will be affected by an OSW farm in the identified area. Clear days will be the most affected, which will coincide with increased levels of use of the various recreational viewpoints such as those listed to the right. The rotation of the blades will draw attention to the wind farm in these situations, in particular within around 20-30 km. Visual impacts are therefore likely to be reduced along the south coast beyond St Helier.

**Sample of viewpoints and their minimum distance with a direct line of sight to the optimised site and original zones**

| Viewpoint | Distance from optimised site (km) | Distance from original zones (km) |
|---|---|---|
| La Corbière Lighthouse | 13 | 14.9 |
| La Rocco Tower | 14.7 | 16.6 |
| Ouaisné Bay | 17.3 | 18.3 |
| Portelet Common | 17.2 | 18.4 |
| Noirmont Point | 18.3 | 19.4 |
| St Helier Harbour | 23.1 | 23.4 |
| Grosnez Castle | 16.3 | 18.9 |
| Green Island Beach | 25 | 25.6 |
| La Rocque Harbour | 28.3 | 28.6 |
| L'Étacq | 16.1 | 18.5 |

It should be noted that visual impacts of an offshore wind farm in Jersey should be considered in the context of ongoing offshore wind development in French waters. The Saint Brieuc wind farm is already visible and with additional projects planned in French waters off the Jersey coast visual impacts from these additional projects is inevitable.

# Optimised site

# Optimised site

## Overall, the zone has decreased in size by 7.7 km$^2$, from 215 km$^2$ to 208 km$^2$.

Based on the constraint analysis carried out, ERM have held a number of internal workshops with subject matter experts in order to identify a refined site area, which represents the most likely area offshore wind developers will target.

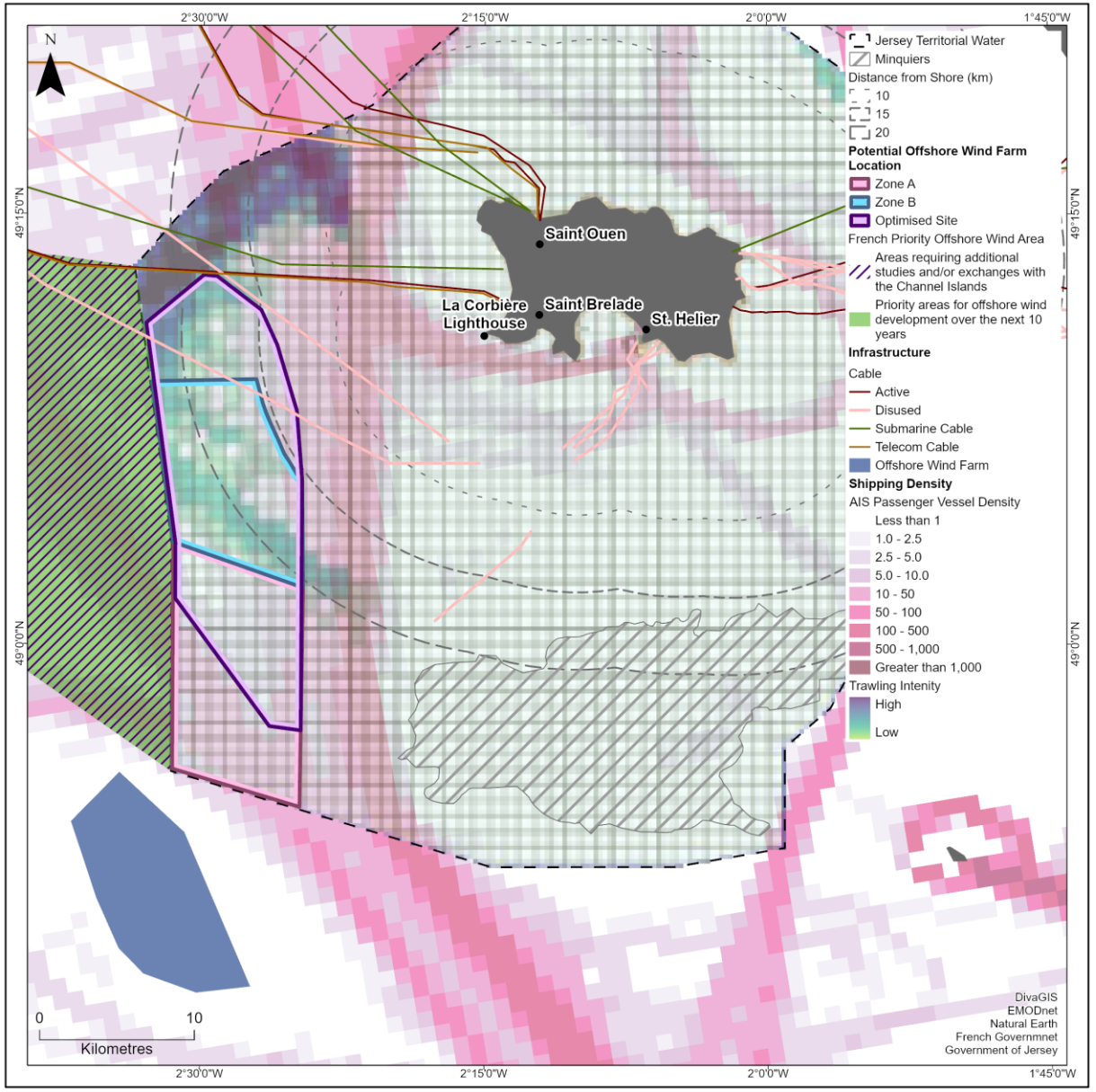
A refined site has been selected based on the following key drivers:

- Northern boundary expansion: based on the available data, the area immediately north of Zone B appears relatively unconstrained. A disused cable passes through the site, however this is not expected to pose a significant complication to project development and allows for a relatively large area to be exploited. The new northern boundary is based on another disused cable and a hotspot of trawling activity (based on the Maritime Activity Assessment Report).
- Southern boundary retraction: AIS data and marine charts suggests the southern area of Zone A is likely to cause navigational challenges for vessels approaching and leaving St Malo.

Note that the navigation channel does not account for the Roches Douvres zone. If the southern area of this is developed, then no channel will be available for safe passage through the Jersey site and the southern boundary may be re-extended.

The EEZ boundary lies along the western edge of the site. The shipping activity along the eastern boundary is already pressed against the Minquiers, with no obvious route alternative. Therefore, no expansion is possible to the east here. The optimised site comes slightly closer to shore in the north-eastern corner. While this may appear to exacerbate visual impacts, ERM considers the difference this is likely to make in the context of the region to be minimal.

Assuming a power density of 5 MW/km$^2$ yields a project capacity of ~ 1 GW, which will be the basis of LCoE modelling.



# Risk assessment

# Risk assessment process

## ERM's established risk assessment process has been used in most markets for clients including most major OSW developers.

The process aims to gauge relative project development risk levels across OSW sites. In other words, this is a tool for ranking a collection of sites from a development perspective, rather than attempting to comprehensively gauge all applicable risks to each site.

The process focusses on perceived key risks which are expected to be the most useful differentiators. Universal risks are not considered in the scoring, but some of the main ones are described on the following slide.

For each key risk category, a probability and impact score is allocated to each site. Overall risk levels for each category (very low – very high) are then used to allocate relative weightings and subsequently overall risk scores. Finally, these overall site risk scores are used to rank all sites.

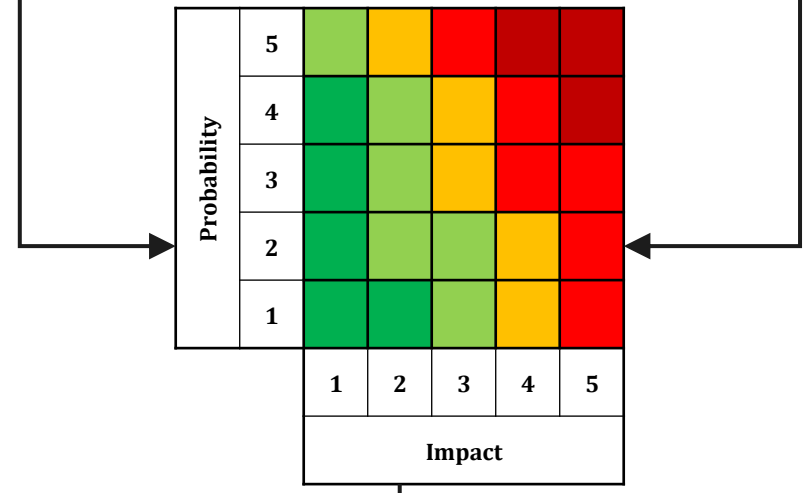
For each risk for each site, an overview of the overall thinking and drivers behind the risk scoring is provided.

Several graphics related to this process are provided on the right. The process illustrated in the graphics is applied to each category for each site.

ERM typically provides relative risk scores as an output from this process, scored from 1 as the lowest risk site up to any number (typically 3-4 or so for adequately sited project areas in suitable markets). However, for a comparison of only two sites this step is not seen as beneficial due to the small sample size.

| Probability Score | Probability % range |
|---|---|
| 1 | 0% to <20% |
| 2 | 20% to <40% |
| 3 | 40% to <60% |
| 4 | 60% to <80% |
| 5 | 80% to 100% |

| Impact Score | Description |
|---|---|
| 1 | Zero to slight impact on development |
| 2 | Minor impact on development |
| 3 | Moderate impact on development |
| 4 | Major impact on development |
| 5 | Severe impact on development |




| Risk Level | Relative Weighting |
|---|---|
| VH | 1 |
| H | 0.5 |
| M | 0.2 |
| L | 0.1 |
| VL | 0 |

# Universal risks

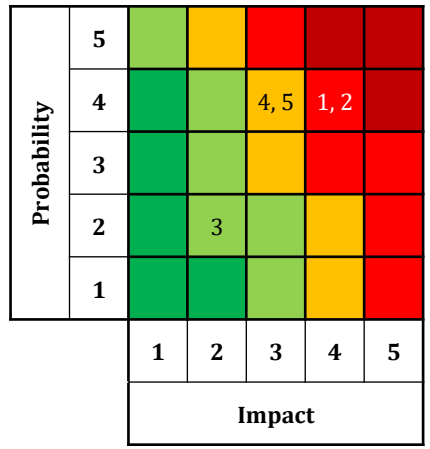
Some risks apply to both sites, however either because of data limitations or due to a lack of differentiation across the sites they have not been examined in the probability-impact scoring.

| Constraint | Description |
|---|---|
| Ornithology | Data for seabirds is generally unavailable or not comprehensive until offshore surveys have taken place, typically for projects such as offshore wind. Furthermore, the presence of birds cannot be narrowed down to specific areas so any attempt to distinguish between risk levels across the two sites would be trivial. |
| Marine mammals | Similar to seabirds, the presence of marine mammals is difficult to gauge without survey data. Heatmaps and environmental designations can be used to infer some regional information, however this would be inadequate to distinguish between the two sites. |
| Seabed conditions (bathymetry, substrates, bedrock lithology…) | Seabed conditions feed into the engineering design of deployed foundations. Modelled bathymetry data is available and has been considered, however this is not seen as being significantly different across the sites. Modelled substrate and bedrock lithology is also available but due to the level of certainty from the modelling process is also not seen as a useful way of distinguishing between the sites. |
| Ports & supply chain | Jersey's EEZ is very well situated to benefit from various aspects of the French OSW supply chain. This includes ports such as Brest, Cherbourg and Le Havre, and various manufacturing facilities in France and the surrounding countries. There is no distinction of risk between the two sites. A level of risk always remains until installation plans have been fleshed out however. |
| Military | Conflict of use with military stakeholders can present a significant risk in some regions, particularly where the sea is used for training grounds and firing ranges. Data for these areas can often be withheld from the public domain, and direct consultation with military organisations (MoD for Jersey/UK) at the earliest stage possible is always advised. |
| UXO | Legacy of conflict, in particular from WW1 and WW2 in Europe, can bring about a risk of unexploded ordnance (UXO) such as sunken mines, dumped munitions and chemical dumping grounds. Hurd Deep presents a documented example of this near Jersey, however record keeping of these sites is often poor. UXO survey campaigns prior to construction works are common practice in the OSW industry. |
| Interconnection | This is subject to further study in other ERM deliverables. Regardless of this, the variation of risk between the two sites is trivial. |
| Metocean conditions | Wind, wave, tide and currents will inform the WTG and foundation designs. Site surveys are typically done for OSW projects, although modelled data can help gauge overall conditions at a high level. ERM is not able to distinguish between risk levels at the sites using this data however. |

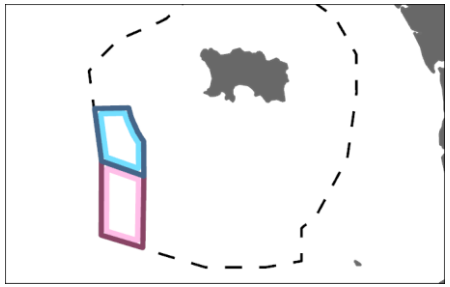
# Risk overview – original zones

| | Risk | Consideration | P | I |
|---|---|---|---|---|
| 1 | **Shipping & Navigation** | Ferry routes pass along the eastern boundary, however beyond some logistical considerations during the installation of an export cable into Jersey or Normandy no significant risk is perceived from this. The original zones, specifically the southern zone, do not allow for a passage channel between the St Brieuc OSW farm and a Jersey project. Other shipping vessels within the site are expected to be commercial fishing vessels, with no other major routes through the site. | 4 | 4 |
| 2 | **Resource** | The site wind roses show a prevailing westerly wind with strong south-westerly and west-north-west components. It is expected that a future French OSW farm will be located west of the site, making wake effects significant and likely of concern to a future developer due to lower energy yields from reduced wind speeds and increased maintenance costs from higher turbulence. The southern subzone is also expected to be impacted by the St Brieuc OSW farm during times of south-westerly winds. | 4 | 4 |
| 3 | **Cables** | The north-eastern corner of the northern subzone has a small overlap with an indicative disused telecommunications cable route. Some consideration in site layouts may be required from this, and a crossing agreement may be necessary for any array cables that overlap, however the overall impacts are low. An export cable to Jersey may also required a crossing agreement. | 2 | 2 |
| 4 | **Visual Impacts** | The original zones are located approximately 15-35 km from the Jersey shoreline and 25 km from France at the nearest point. The St Brieuc and another future OSW farm in the Roches Douvres zone will likely be visible along the horizon, and a Jersey project will appear in front of these. At 15 km from shore, large modern WTGs will be very visible. | 4 | 3 |
| 5 | **Fishing** | AIS data suggests some large commercial fishing vessels traverse the southern zone. VMS data from GoJ's Maritime Activity Assessment report indicates some trawling activity in the northern zone and crustacean netting throughout both zones. Pushback from fisheries is to be expected, but common measures such as compensation payments and potentially retraining personnel into maintenance crew can mitigate impacts on fishing communities. | 4 | 3 |

## Risk matrix




## Site area



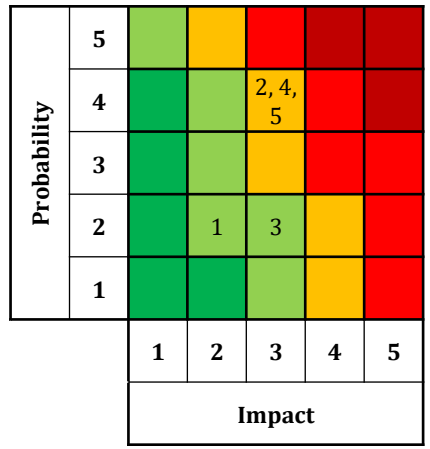
## Risk result

2 out of 2

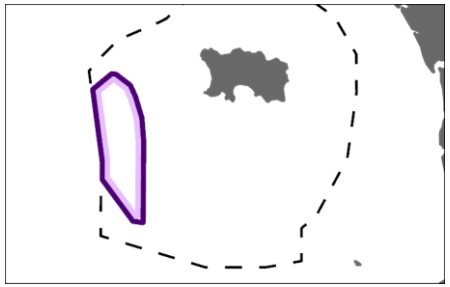
# Risk overview – optimised site

| | Risk | Consideration | P | I |
|---|---|---|---|---|
| 1 | **Shipping & Navigation** | Ferry routes pass along the eastern boundary, however beyond some logistical considerations during the installation of an export cable into Jersey or Normandy no significant risk is perceived from this. The retraction of the southern boundary allows space for a passage channel linking St Malo to the potential shipping lane to the west of the site. Other shipping vessels within the site are expected to be commercial fishing vessels, with no other major routes through the sites. | 2 | 2 |
| 2 | **Resource** | Impacts from a future French OSW farm west of the site are still expected, however the overall impacts are somewhat reduced as there is an increased buffer between the southern area of the site and the St Brieuc OSW farm. | 4 | 3 |
| 3 | **Cables** | The northern area of the site is separated from the rest by an indicative disused telecommunications cable route. Mitigations may be required in the WTG and array cable layouts, although this is commonly done in other markets and is expected to have minimal overall impact. An export cable to Jersey may also require a crossing agreement. | 2 | 3 |
| 4 | **Visual Impacts** | The optimised site is located approximately 13.5-29 km from the Jersey shoreline and 30 km from France at the nearest point. Considering the landscape as a whole, the difference in visual impacts between the originally identified zones and the optimised site are not expected to be noticeable. | 4 | 3 |
| 5 | **Fishing** | AIS data suggests some large commercial fishing vessels traverse the site. VMS data from GoJ's Maritime Activity Assessment report indicates some trawling activity along the northern site boundary, with some lower levels within the site, and crustacean netting throughout. Pushback from fisheries is to be expected, but common measures such as compensation payments and potentially retraining personnel into maintenance crew can mitigate impacts on fishing communities. | 4 | 3 |

## Risk matrix




## Site area



## Risk result

1 out of 2

# Conclusions

# Conclusions

## The area identified provides a strong opportunity for offshore wind development

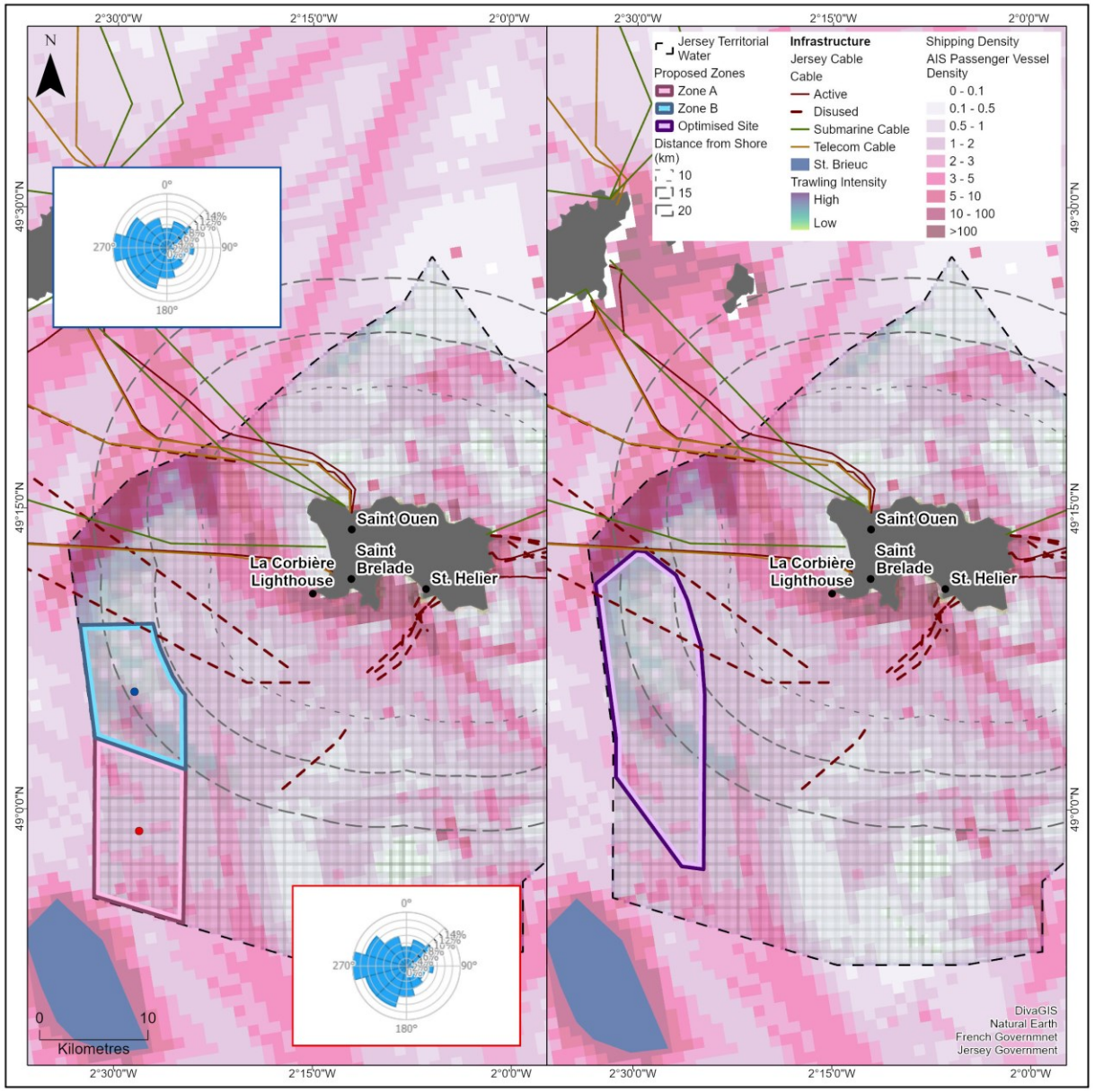
Based on the data available to ERM at the time of writing, the Jersey EEZ appears to offer relatively little flexibility in siting an OSW project. This is primarily due to its small size in comparison to other markets, as well as the island's reliance on ferry services and cargo shipping. Several intertidal island clusters act as sensitive habitats for numerous species and further constrain viable vessel routes.

Due to its location in the English Channel with Brittany to the south and Normandy to the east, Jersey is also surrounded by constraints from other jurisdictions. Natura 2000 areas surround the EEZ from the south and east, and the St Brieuc and a potential aditional French OSW farm encroach on the western boundary. The northern area of the EEZ is small and constrained by fishing and shipping activity, and the Jersey and Guernsey interconnector landfall. Cumulative impacts are therefore expected and will be investigated in a separate work package.

However, the overall area outlined by GoJ in the south-west of the EEZ appears attractive for a future OSW leasing round. As is the case in all of Jersey's waters, the wind resource is strong, although wake effects will concern interested developers. This is discussed in the LCoE report.

While the identified OSW zones are at least somewhat constrained by shipping and fishing activity, ERM is confident the optimised site presents a strong candidate for development. This site expands into a relatively unconstrained area to the north and mitigates a clash with shipping routes in and out of St Malo. Coordination may be necessary with the French Government regarding this vessel traffic. The risk scoring carried out indicates that the shipping risk has been somewhat mitigated with the site now in a less constrained area in this regard. Some encroachment on a trawler fishing ground to the north may have arisen, however at this stage ERM does not see this as a material increase in development risk. Wake effects may also be partially mitigated through the inclusion of the shipping buffer between the St Brieuc OSW farm and the Jersey site.

Using a relatively loose power density of 5 MW/km$^2$, a project capacity of 1 GW appears achievable at this stage, however this is subject to change until wake effects are further understood, and project attrition is taken into account.



# Thank you

## Contacts


**Dr Huw Powell**

Partner, Southampton

Mobile +44 7385 375677

Huw.Powell@erm.com

**James Taylor**

Principal Consultant, Southampton

Mobile +44 7799 111193

James.Taylor@erm.com

**Taliesin Slatter**

Consultant, Southampton

taliesin.slatter@erm.com

# Glossary

| Abbreviation | Definition |
|---|---|
| AIS | Automatic Identification System |
| AoI | Area of Interest |
| CapEx | Capital Expenditure |
| COD | Commercial Operation Date |
| CPI | Consumer Price Index |
| DevEx | Development Expenditure |
| EIA | Environmental Impact Assessment |
| EEZ | Exclusive Economic Zone |
| EMODnet | European Marine Observation and Data Network |
| EPC | Engineering, Procurement and Construction |
| ERM | Environmental Resources Management |
| EV | Electric Vehicle |
| FDI | Foreign Direct Investment |
| GHG | Greenhouse Gas |
| GIS | Geospatial Information System |
| GoJ | The Government of Jersey |
| GW | Gigawatt |
| GWA | Global Wind Atlas |

| Abbreviation | Definition |
|---|---|
| HVAC | High Voltage Alternating Current |
| HVDC | High Voltage Direct Current |
| IMMA | Important Marine Mammal Area |
| IPP | Independent Power Producer |
| IREP | Integrated Renewable Energy Planning |
| ISO | Independent System Operator |
| LCoE | Levelized Cost of Energy |
| LNG | Liquefied Natural Gas |
| MPA | Marine Protected Area |
| MSL | Mean Sea Level |
| MW | Megawatt |
| NCF | Net Capacity Factor |
| NDC | Nationally Determined Contribution (under the Paris Agreement) |
| O&G | Oil and Gas |
| O&M | Operations and Maintenance |
| OEM | Original Equipment Manufacturer |
| OpEx | Operational Expenditure |

| Abbreviation | Definition |
|---|---|
| OSW | Offshore Wind |
| PPA | Power Purchase Agreement |
| RE | Renewable Energy |
| RPO | Renewable Purchase Obligations |
| TJ | Terajoule |
| TL | Transmission Line |
| TW | Terawatt |
| USD | United States Dollars |
| VAT | Value-Added Tax |
| VMS | Vessel Monitoring Service |
| WTG | Wind Turbine Generator |