Offshore Wind Leasing Round 4:

Regions Refinement Report

Annex A: Characterisation documents for excluded regions

38255-TCE-REP-026

Offshore
Wind
Leasing
Round 4

THE CROWN ESTATE

Resource and Constraints Assessment for Offshore Wind

Characterisation Area Report
Durham Coast

1

38255-TCE-REP-006

Characterisation Area Report: 1 - Durham Coast

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Version	Status	Issue date
1.1	Draft	July 2018
1.2	Draft	November 2018
1.3	Final	September 2019

The information included in this report should be read in conjunction with the *Resource and Constraints Assessment for Offshore Wind: Methodology Report* and the *Summary Stakeholder Feedback Report*. The trigger distance for constraints to be included in the constraints analysis section of this report is 1 nautical mile (NM).

The Crown Estate has undertaken the analysis in this report using the evidence available to it, internal expertise and support from external advisers where appropriate. The analysis does not obviate any potential need for any Habitat Regulations Assessment (HRA) or any project level consideration of the potential impact of development. The analysis does not supersede any statutory policies or marine plans. The analysis, including the data and information contained in this document, presents a point in time assessment with changes likely to both the presence and nature of constraints.

This report is provided for information purposes only and no party may rely on the accuracy, completeness or fitness of its content for any particular purpose. The Crown Estate makes no representation, assurance, undertaking or warranty in respect of the analysis in the report including all data and information contained in it.

Receptor rating		Area rating	
Receptor assessed but no interaction noted		Receptor assessed but no interaction noted	
Interaction acceptable with best practice/accepted mitigation		The constraint will present the need to implement best practice/accepted mitigation measures to enable acceptable development within the whole area	
Interaction acceptable with moderate mitigation		The constraint will present the need to implement moderate mitigation measures to enable acceptable development within the whole area	
Interaction acceptable with significant mitigation		The constraint will present the need to implement significant and/or strategic level mitigation measures to enable acceptable development within the whole area	
Significant/insurmountable issue that would be challenging to mitigate within the area of influence of a receptor		Significant/insurmountable issue that would be challenging to mitigate for any development within the whole area	
No data coverage across the area		No data coverage across the area	

Constraints analysis

Note that in addition to The Crown Estate leases/licences within this table, The Crown Estate has also identified key resource areas (KRAs) which may be suitable for the future development of different marine sectors. Information about overlapping KRAs that overlap this characterisation area is described in a latter section of this document.

Exclusions model — Hard constraints			Receptor rating	Area rating
	Present	Commentary		
The Crown Estate agreements	Blyth Offshore Wind Demonstration Site: within and adjacent to the northern edge of the characterisation area.	The cumulative impact of offshore wind farm (OWF) developments and associated cable infrastructure will need to be considered in this area as there may be concerns around wind resource and proximity to existing sites. Any new wind developments within 5 km will need to seek agreement with the incumbent party. No other projects in the southern portion of the area so assessed as low mitigation at the area level.		
	Creyke Beck A and Creyke Beck B Offshore Transmission Owners (OFTOs) transect the area landing south of the Tees estuary.	This infrastructure will need to be considered in proposals. Given the other opportunity in the area, this is not a significant issue at an area level. There may be cumulative impact issues at landing locations which should be considered in planning proposals in this area. Since cable crossings require cable protection (which may have adverse environmental effects), crossings should be minimised where practicable.		
Other energy infrastructure	No platforms within the trigger distance. The Ekofisk 2/4J to Teesside comes within 600 m of the characterisation area.	No oil and gas platforms in the area. There is a small overlap (< 1%) with the outer edge of one 6-9 NM helicopter consultation area. No new licence blocks awarded in the area. Impacts on the pipeline should be mitigated with standard practice.		
Navigation	None within the trigger distance			
Social	Filey Bay protected wreck — intersects, located to the north of Flamborough Head.	This constraint can be managed using standard mitigation.		
Restrictions model — Soft constraints			**Receptor rating**	**Area rating**
Economic tier				
Navigation	Dredging activity in Howden Yard on the Tyne, the port of Sunderland and Seaham Harbour occurs close to the characterisation area.	This is a sensitive receptor as denotes investment in maintaining navigation channels and routes to ports. These do not directly overlap the characterisation area so should not be impacted. However, development in approaches should be avoided.		
	Intersects numerous disposal sites linked to port and harbour authorities. However, the areas are not significant compared to the size of the characterisation area.	Could be significant and may be difficult to agree to move them if it increases costs/inhibits operations. The scale and nature of use will determine how much of an issue this may pose.		
	Intersects two anchorage areas - Tyne and Tees	These areas should be avoided if possible. Although they can be moved they are sited in areas that have appropriate shelter/seabed for safe anchoring. The extent of the area these cover in unlikely to have a significant impact on development here.		
	Intersects - a number of harbour authorities are situated around the area with Tees and Hartlepool Port Authority, Port of Tyne Authority, Port of Sunderland Authority and Seaham Port intersecting.	It will be difficult to construct in these parts of the characterisation areas due to the potential to impinge on safe port operations. The amount of area covered by these means that they are unlikely to have a significant impact on development in the area.		
Subsurface	Boulby Potash Mine — adjacent to the south-east boundary of the northern part of the characterisation area,	Would need to liaise with current rights holder on proximity of piling, but as the mine is not intersecting the area with mitigation development is possible.		
	Hundale Potash Mine/York Potash Ltd — adjacent to the southern part of the northern portion characterisation area,	Would need to liaise with current rights holder on proximity of piling but as the mine is not intersecting the area with mitigation development is possible.		
Fishing	See fisheries commentary below.		N/A	

Environmental tier							
The assessment of the sensitivity of Marine Protected Areas (MPAs) to pressures caused by offshore wind development and operation is assessed in a separate spreadsheet which will be made available as part of the Round 4 evidence base. Commentary has been noted in the relevant characterisation document where MPAs either overlap or are within 1 NM of the characterisation area and have been assessed as a yellow rating or above. For more information on the methodology for this assessment, please refer to the methodology report. Assessments Annex II species has not been made as part of the characterisation process. Such assessments will need to be undertaken at project level for individual developments within the characterisation area.							
Type of designation		Name of designation (distance to area)	Designated features/species	Conservation objectives	Commentary	Receptor rating	Area rating
European marine designations	Special Area of Conservation (SAC)	Durham Coast, Castle Eden Dene (1.6 km)			Assessed as low risk; details available in separate spreadsheet.		
		Flamborough Head	Reefs Vegetated sea cliffs Sea caves	Maintain/restore features as appropriate	The vegetated cliff features of this SAC are terrestrial features not exposed to activity within the characterisation area. The littoral and sublittoral reefs at this site are mostly chalk bedrock, boulder and cobble formations with high productivity as a result of the mixing of two fronts. The sea caves are littoral and sublittoral. The SAC area has been excluded from the characterisation area meaning that the reef and cave features are unlikely to be directly affected by array construction. It is also considered unlikely that cabling would affect the reef and cave features since the presence of steep chalk cliffs along this part of the coastline is likely to preclude landfall. The Wildlife Trusts have commented that chalk reef and cave features would be particularly sensitive to offshore wind development since damage to them would not be recoverable and that the SAC should be avoided.		
	Harbour porpoise Special Area of Conservation (SAC)	None within the trigger distance					
	Sites of Community Interest (SCIs)	None within the trigger distance					

	Ramsar	Northumbria Coast	Wetland type D (rocky marine shore) Little tern (breeding) Purple sandpiper (non-breeding) Turnstone (breeding) Arctic tern (breeding)	No specific conservation objectives/management measures - use those for Northumbria Coast Special Protection Area (SPA).	This site is comprised of essentially the same features (and the same level of protection) as the Northumbria Coast SPA. Coastal sand/shingle habitats are of importance for breeding tern, along with inshore foraging areas (which may coincide with offshore wind developments). Onshore structures including posts and coastal defences are important for roosting birds. The advice on operations indicates that changes to the hydrodynamic regime may have a significant impact on these habitats, and this may be possible if offshore wind developments take place close to the shore or if landfall is made through the site. In terms of direct impacts on birds, terns foraging offshore are known to come into contact with offshore wind (and to cause consenting issues - vis. Docking Shoal/Race Bank). Migration of sandpiper and turnstone may also bring them into contact with offshore wind developments. The overlap of the site with the characterisation area is therefore of concern, and it may be prudent to consider prioritising development on the outer edges of the characterisation area or on sections of the coast away from important beaches such as Low Newton. Impacts are more likely to be mitigable if this is undertaken.		
	Special Protection Areas (SPAs)	Northumbria Coast	Little tern (breeding) Purple sandpiper (non-breeding) Turnstone (breeding) Arctic Tern (breeding) - new feature	Conservation objectives focus on maintenance of habitat and food sources since this is the primary factor affecting bird usage of the site.	The majority of the SPA has been excluded from the characterisation area which means that impacts on birds from the site are likely to be minimised. Terns from the site may still feed within the characterisation area, which may need to be addressed as		

					part of project level HRA processes, but it is likely that the majority of the tern feeding area is to the north of the characterisation area. The location of the SPA in relation to the characterisation area (to the north) means that it is unlikely that landfall would be made through the SPA - and although coastal habitats are important for the breeding birds it is likely that impacts could be minimised through the timing of works in any case.		
	SPA	Northumberland Marine	Sandwich tern (Breeding) Roseate tern (Breeding) Common tern (Breeding) Arctic tern (Breeding) Little tern (Breeding) Common guillemot (Breeding) Atlantic puffin (Breeding) Seabird assemblage (breeding)	Conservation objectives are to maintain/restore as appropriate	The SPA has been designated to protect the foraging areas of breeding terns in coastal SPAs and the maintenance behaviours of puffin and guillemot around Coquet Island/The Farne Islands. The majority of the site lies to the north of the characterisation area and the intersection occurs around the existing Blyth Offshore Wind Demo lease area. This means that the interaction of birds within the SPA with new characterisation areas may be limited - and mitigation of potential impacts is likely to be possible. The site will have to be considered carefully as part of any HRA process at project level. Impacts on terns, puffins and guillemot have been highlighted as potentially significant for this site (auks in particular).		
	SPA	Teesmouth and Cleveland Coast (1.6 km)	Eurasian teal (wintering) Red knot (wintering) Common shelduck (wintering) Northern shoveler (wintering) Sanderling (wintering) Little tern (breeding) Common redshank (aggregation) Sandwich tern (aggregation) Great cormorant (wintering) Waterfowl Assemblage	Conservation objectives focus on maintenance of habitat and food sources since this is the primary factor affecting bird usage of the site.	Important habitats are sand/shingle, sandflats/mudflats, shallow coastal waters, saltmarsh and rocky shore. These features could all be affected by cabling/landfall through the site. Advice on operations focuses on maintenance of the coastal habitat, the avoidance of disturbance and the 'absence of obstruction to bird sight lines'.		

					Impacts on habitats within the SPA are likely to be mitigable/avoidable (although saltmarsh habitats are likely to be sensitive). Impacts on the birds offshore (e.g. whilst foraging) are likely to be of more concern, but given the distance between the site and the potential characterisation area, this is likely to be mitigable through site design. Impacts on sandwich tern have been highlighted as potentially significant for this site.		
	SPA	Flamborough and Filey Coast	Northern gannet (breeding) Black-legged kittiwake (breeding) Common guillemot (breeding) Razorbill (breeding) Seabird assemblage	Maintain/restore features as appropriate.	Formerly a Potential Special Protection Area (pSPA), it was declared a SPA on 23rd August 2018. The SPA is divided into two sections: the southern section extends north from South Landing around Flamborough Head to Speeton; the northern section covers the peninsula of Filey Brigg before extending north-west to Cunstone Nab. The seaward boundary extends 2 km throughout the two sections of the site into the marine environment, running parallel to the landward boundaries to include the adjacent coastal waters. The site qualifies under article 4.2 of the Directive (2009/147/EC) by supporting over 1% of the biogeographical populations of four regularly occurring migratory bird species. The site also regularly supports more than 20,000 seabirds during the breeding season, including over 2,000 northern fulmar Fulmarus glacialis. When taking into consideration the cumulative impact of existing and planned offshore wind projects in this region and nearby, Natural England considers that this site poses is a significant consenting risk to future projects in the North Sea and that imperative reasons of		

					overriding public interest (IROPI) is likely to be required.		
Marine Conservation Zones (MCZs)		Berwick to St Mary's (replaces Coquet to St Mary's)	Common eider (added in Tranche 3) High energy infralittoral rock High energy intertidal rock Intertidal coarse sediment Intertidal mixed sediments Intertidal mud Intertidal sand and muddy sand Intertidal under boulder communities Low energy intertidal rock Moderate energy circalittoral rock Moderate energy infralittoral rock Moderate energy intertidal rock Peat and clay exposures Subtidal coarse sediment Subtidal mixed sediments Subtidal mud Subtidal sand	The general management approach for this site is to maintain all features in a favourable condition. For the Common eider feature, the conservation objective is to recover the population to a favourable condition.	This site was designated in May 2019. It is an extension of the original Coquet to St Mary's MCZ designated in 2016 and includes Eider as a new feature. Rocky habitats and mixed sediments are likely to be particularly sensitive to impacts from offshore wind, although all features at the site have the potential to be affected by cabling/landfall at the site. Given the proximity of the site to the coastline it is likely that cabling would be the main impact, although there is a chance that array development in the Whitley Bay area could overlap the MCZ. Impacts are likely to be avoidable or mitigable. Eider are likely to be sensitive to displacement by activity in the site, and potentially vulnerable to collision. Placement of turbines within or near to the MCZ (or cabling through the MCZ) could have an impact. By avoidance of key areas this is likely to be mitigable at project level, especially since so little of the MCZ is overlapped by the characterisation area, and the main areas of importance for Eider are further north in the MCZ.		
Sites of Special Scientific Interest (SSSIs)		Harton Down Hill (1.4 km), Hawthorn Dene (400 m), Hawthorn Quarry (900 m), Cleadon Hill (1.8 km), Stony Cut to Cold Hesledon (1.8 km), Tynemouth to Seaton Sluice (50 m),			Assessed as low risk; details available in separate spreadsheet.		

	Castle Eden Dene (1.6 km),					
	Durham Coast	Cormorant (breeding) Fulmar (breeding) Kittiwake (breeding) Little tern (breeding) Purple sandpiper (non-breeding) Sanderling (non-breeding) Littoral sediment Vascular plant assemblage Fixed dunes Vegetated sea cliffs Geological/Earth Heritage Lowland grassland and fen	Features currently in 'favourable' or 'unfavourable' ('recovering') condition	Terrestrial features could be affected by landfall/cabling. The impacts are likely to be mitigable although the dunes may be sensitive. The bird features will need to be considered as part of the ornithological assessment of any windfarm in the characterisation area. Given the proximity of the site to potential windfarms this could be a consenting concern, but is likely to be mitigable. Most of the bird features at the site are also protected through SPA designation.		
	Northumberland Shore (50 m)	Golden plover (non-breeding) Purple sandpiper (non-breeding) Redshank (non-breeding) Ringed plover (non-breeding) Sanderling (non-breeding) Turnstone (non-breeding) Mudflats and sandflats Inlets and bays Reefs Sea caves	Majority of features currently in 'favourable' condition	Features at the site are also protected by SAC and SPA designations and would be subject to HRA/Appropriate Assessment. Terrestrial features could be affected by landfall/cabling. The impacts are likely to be mitigable or avoidable. The bird features are non-breeding, but they will need to be considered as part of the ornithological assessment of any windfarm in the characterisation area. Most of the bird features at the site are protected through SPA designation. Given the proximity of the site to potential windfarms this could be a consenting concern, but is likely to be mitigable.		
	Flamborough Head (1.4 km)	Geological/earth heritage reefs Vegetated sea cliffs Maritime cliff and slope Sea caves; Seabird assemblage Cormorant (breeding) Fulmar (breeding) Gannet (breeding) Kittiwake (breeding) Puffin (breeding)	Some units are in 'favourable' condition, others are in 'unfavourable' (either 'declining' or 'recovering'). It is notable that the majority of seabird features are in 'unfavourable' ('declining') condition	Habitat features at this site are onshore/nearshore and are not likely to be exposed to activity within the characterisation area. The extent of steep cliffs at the site make it unsuitable as a landfall point. Bird features within the SSSI are also protected by the overlapping Flamborough and		

		Razorbill (breeding) Shag (breeding)		Filey Coast SPA. There have been concerns about birds from Flamborough Head interacting with projects in the North Sea, especially Gannet which forage far offshore and have limited colonies within the UK). For the SSSI and overlying SPA the 'headroom' may be small for additional projects. The distance of the characterisation area from Flamborough Head may go some way to mitigating impacts for some species, but gannet, kittiwake and auk species remain a concern. Refer to commentary on the Flamborough and Filey Coast (FFC) SPA.		
Spawning and nursery grounds	One intersects with four overlapping high-intensity sites. The area intersects with a herring spawning ground around Flamborough head. There is also overlap in the northern part of the northern section and another spawning ground to the east which is only 6 km away. There is also a low-intensity cod spawning within a few km of the site.			These areas are generally identified as low-intensity spawning grounds, however, because of the sensitivity of cod to noise there may need to be seasonal restrictions applied to mitigate any noise impacts.		
Social tier						
Royal Yachting Association (RYA) Automatic Identification System (AIS) intensity	Some recreational AIS intensity from the Tyne and up the Northumberland coast.		Will need to be considered in the design of windfarms to allow safe passage of recreational vessels however intensities are relatively low. This will have some impact all over the area as it is so close to the coast, however it should be manageable.			
Marinas	Numerous adjacent - within 650 m in places.		Need to apply an appropriate buffer to development to maintain safe access to these areas.			
Bathing beaches	Numerous adjacent - within 70 m in places.		Need to apply an appropriate coastal buffer to development. Water Framework Directive (WFD) applies within 1 NM which should be considered in development. See separate WFD assessment below.			
Visibility from sensitive receptors	See visibility analysis below.					

Review layers

Visibility from landscape designations and from the coast

The bands of significant visual impact are taken from the OSEA3[1] environmental report. It should be noted that these bands were challenged through the statutory stakeholder engagement by the Statutory Nature Conservation Bodies (SNCBs) so further analysis and engagement should be conducted to understand the visual constraint in potential development areas more fully.

The visibility from landscape designations analysis has been conducted using designations which include protections for landscapes and settings namely: National Parks, Areas of Outstanding Natural Beauty (AONBs), Heritage Coasts and World Heritage sites. For more information on these, please consult the methodology report. The analysis draws on visibility from these designations but not the sensitivity of them to offshore wind developments. Proposals should draw on the relevant management plans or local policies to fully understand the level of constraint that exists in the vicinity of these landscape designations. As such, more analysis is required to fully understand the potential constraint.

	Band of significant visual impact	% of overlap with the characterisation area	Commentary	Area rating
Medium sensitivity receptors	0-13 km (3.6 MW turbines)	93%	Most of this area is within the identified distance from the coastline bands with 93% of the area within 13 km of the coast. This will cause significant issues to potential development especially if utilising larger turbines.	
	13-20 km (4-8 MW turbines)	6%		
	20-30 km (10-15 MW turbines)	1%		
High sensitivity receptors	0-30 km	100%		

Visibility of sea surface from landscape designations		Receptor rating	Area rating
The southern section of the area is visible from: • Flamborough Headland Heritage Coast The northern section of the area is visible from: • Durham, North Northumberland and North Yorkshire and Cleveland Heritage Coasts; • potentially the North York Moors National Park • Hadrian's Wall World Heritage Site • North Northumberland AONB	Despite the high number of landscape designations around the north-east, the characterisation area is visible from relatively few viewing points. However, the close proximity to shore makes visual impact a significant risk that may inhibit development. The whole area being close to shore limits the mitigation options to reduce visibility.		

Ornithology outside of Special Protection Areas (SPAs) for high-risk species

Joint Nature Conservation Committee (JNCC), Natural England and Royal Society for the Protection of Birds (RSPB) advise that there are a number of information sources which should be taken into consideration in the assessment of potential impacts from offshore wind development in this characterisation area. These are:

- Site Information Centres on the JNCC website (http://jncc.defra.gov.uk/page-6895) which provide up-to-date information on protected areas, their features and status.
- Marine Ecosystems Research Programme (MERP) seabird distribution maps (https://marine-ecosystems.org.uk/Research_outcomes/Top_predators)
- Future of the Atlantic Marine Environment (FAME) and Seabird Tracking and Research (STAR) tracking data from the RSBP (https://rspb.maps.arcgis.com/apps/Cascade/index.html?appid=d6c3aa1ec7184a2895a01cebf451c7b3)

[1] BEIS (2016), OESEA3 Environmental Report. Crown copyright 2016, p 291. URN 16D/033.

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	Site	Commentary on coverage	Area rating
Gannet	Flamborough and Filey Coast (FFC) SPA	The gannet mean maximum seaward foraging range extends 229 km from the source colony at the FFC SPA. This range encompasses five other characterisation areas in addition to wholly encompassing the Durham Coast area which lies in the north of the foraging radius. As a result, cumulative collision risk effects should be considered if development is taken forward in more than one characterisation area. Cumulative collision risk will also be affected by pre-application developments within this foraging range, e.g. Hornsea Project Three, Norfolk Boreas and Norfolk Vanguard West developments. Summer density increases to the north and east of the FFC SPA, most likely due to the foraging range of gannet from the Bass Rock colony in Scotland. The Durham Coast area lies along an area of increased gannet density, albeit still relatively low and not a 'hotspot' relative to the overall gannet distribution. However, impacts on gannet, in particular cumulative and cross-jurisdiction impacts, will be a key HRA consideration for development in the Durham Coast area.	
Kittiwake	Flamborough and Filey Coast (FFC) SPA	The kittiwake mean maximum seaward foraging range extends 60 km from the FFC SPA source colony. This mainly impacts the southern section of the area but the northern section slightly overlaps the maximum foraging range of kittiwake (120 km). Four other characterisation areas lie within this maximum range and, given concerns over the cumulative impacts of other North Sea offshore wind developments on the FFC kittiwake population, the species is likely to present a consent consideration for any development within the Durham Coast area. However, given the distance of the Durham Coast area from the FFC colony, any kittiwake impacts attributed to this FFC could potentially be argued to be *de minimis*. Summer density of kittiwake increases north of the FFC colony along the coast, continuing towards the Farne Island colony, and is likely to represent an intermingling of birds from each colony. Locating any development beyond the maximum FFC foraging range would help further reduce impacts on this SPA colony but would need to be balanced with minimising impacts on the Farne Islands colony.	
Kittiwake	Farne Islands SPA	The kittiwake mean maximum seaward foraging range extends 60 km from the source colony at the Farne Islands SPA. This range encompasses the northern extent of the Durham Coast area only. Given the impacts of other North Sea offshore wind developments on kittiwake (specifically the population at the FFC SPA), and the UK population status of kittiwake generally, cumulative and in-combination impacts of development in the Durham Coast area are likely to be a concern. The summer density of kittiwake is relatively high within the portion of the Durham Coast area that overlaps the Farne Islands SPA foraging range; locating any development south of the overlap (i.e. > 60 km from the SPA) would help reduce impacts on this SPA population.	
Sandwich tern	Farne Islands SPA; Coquet Island SPA; Teesmouth and Cleveland Coast SPA	The sandwich tern mean maximum seaward foraging range extends 49 km from the Farne Islands SPA, Coquet Island SPA, and Teesmouth and Cleveland Coast SPA. The Durham Coast area lies entirely within these overlapping foraging ranges. Given the relatively restricted foraging range of the species and limited existing offshore wind development, cumulative impacts of development within the Durham Coast area with other offshore wind development are likely to be less of a concern than with other sandwich tern colonies. Summer density of sandwich tern is relatively low and uniformly distributed across the Durham Coast area, with higher densities of the species occurring further north closer to the Farne Islands colony.	

Ministry of Defence (MoD) activity

	Issues when using 250 m tip heights	Issues when using 350 m tip heights	Receptor rating
Air traffic control (ATC)	Royal Air Force (RAF) Spadeadam Deadwater Fell Primary Surveillance Radars (PSR) concerns.	RAF Spadeadam Deadwater Fell PSR concerns. RAF Leeming PSR concerns. Berry Hill PSR concerns.	
Air defence radar (ADR)	Brizlee Wood ADR concerns across the characterisation area, Staxton Wold is also an issue to the south of the area.	Brizlee Wood ADR concerns across the characterisation area, Staxton Wold is also an issue to the south of the area	
Threat radar	Concerns – 250 m high turbines in the northern part of the Durham Coast area north of Morpeth will be detectable to the Brunton Airfield remote threat radar. There is no mitigation for this activity other than shut down of turbines during operations.	Concerns – 350 m high turbines in the northern part of the Durham Coast area north of Morpeth will be detectable to the Brunton Airfield remote threat radar. There is no mitigation for this activity other than shut down of turbines during operations.	
Low flying	No low flying concerns, however, there will be a lighting requirement.	No low flying concerns, however, there will be a lighting requirement.	
Ranges, danger and exercise Areas	Unexploded ordnance (UXO) should be taken into account. The MoD would need to review cable routes to ensure highly surveyed routes are not obstructed by cables or turbines.	UXO should be taken into account. The MoD would need to review cable routes to ensure highly surveyed routes are not obstructed by cables or turbines.	
Area commentary			Area rating
Significant air defence and mobile threat radar concerns at both tip height scenarios. There are also ATC issues. There will be a lighting requirement and consideration of UXO as per standard industry practice.			

Fishing activity

Gear type	Location and comments
Static gear	▪ This area hosts the only licensed drift net salmon fishery in the UK from Spern Head to the Scottish border. This fishery is particularly of interest to North Yorkshire fleet. The fishery is open between June to the last day of August from 0-6 NM. ▪ To the south of the area, there is only one drift net licence operating from Whitby. The remaining licenses are all active in the J net fishery close to the shore. ▪ Inshore area of Tyne to Hartlepool - there is an inshore crab and lobster fishery using pots over the whole area all year. ▪ Inshore waters from Boulby in the north to Spurn Head in the south are heavily fished for crabs and lobsters all year. ▪ Some lining off Filey. ▪ There is also gillnet fishery for white fish (Cod) over the whole area.
Mobile gear	▪ Some mobile gear fishing around the Tyne targeting Nephrops and white fish (trawling). ▪ There is some scalloping using mobile gear off Scarborough. Scallops in the area are targeted by local and visiting boats from other parts of the UK, amounting to a significant amount of activity at times.
General	▪ Productive herring spawning ground from Flamborough to Scarborough which is important. ▪ There is an active local fleet of boats operating from all the ports in the area and, at times, a large visiting fleet from all parts of the UK targeting the nephrop fishery.

Area commentary	Area rating
There are strong cultural associations with the fishing fleet in the area. There is also deployment of Succorfish units. There is a lot of activity by the inshore fleet in this area, but there may be some gaps that will minimise impacts if careful engagement is undertaken.	

Marine plans

	Spatially explicit policies	Issues	Area rating
	The policies for the north-east marine plan have not yet been produced. Therefore, the Marine Policy Statement is the default position which does not provide any spatial prescription for marine activities.	There are currently no spatial restrictions on where future offshore wind developments could be located.	

The Crown Estate key resource areas (KRAs) for other sectors

KRA category	Where	Commentary	Receptor rating	Area rating
Cables	Intersects all of the area	This KRA is significant in size due to the landing resource for cables generally being dictated by the shortest distance between connection points. Due to the significant number of alternative options for landing cables, the risk of sterilising valuable resource is deemed to be minimal.		
Carbon Capture Storage (CCS) stores	No interaction			
CCS infrastructure	Wide coverage across the area	This KRA is significant in size however there is significant opportunity for potential deployment of CCS infrastructure from industrial hubs around the Tees estuary, transporting captured CO2 through the characterisation areas to potential stores in the Southern North Sea. Proposals should consider potential impacts on these potential infrastructure corridors that may be developed in the near to medium term.		
Minerals	Overlap with the southern tip of the northern area and across the southern area. However, wide coverage across the area	The overlap with this KRA is minimal and not in an area where there is currently significant market interest, so is therefore a minimal interaction.		
Pipelines	Mostly covering the southern section of the area within 12 NM	This KRA is significant in size due to the landing resource for pipeline infrastructure generally being dictated by the shortest distance between connection points. Due to the significant number of alternative options for landing pipeline infrastructure, the risk of sterilising valuable resource is deemed to be minimal.		
Sandscaping	No interaction			
Tidal range	No interaction			
Tidal stream	No interaction			
Wave	No interaction			

National Air Traffic Services (NATs) radar overlap

% Overlap with Primary Surveillance Radar (PSR) assessment buffer (200 m turbines)	Commentary	Area rating
87.71%	Intersect throughout the area so site-specific mitigation is the only option to make impacts acceptable. Further assessment and consultation with aviation authorities will be required.	

Water Framework Directive (WFD)

Water bodies triggered	Water body details					
	Type	Is it heavily modified?	Overall status	Ecological status	Chemical status	Target date to achieve good status
Tyne and Wear	Coastal	No	Good	Good	Good	2015
Yorkshire North	Coastal	Yes	Moderate	Moderate	Good	2027
% of the area covered	Spatial overlap with the area					Area rating
6%	Stretching from Blyth to the north of Hartlepool and in Filey Bay		The northern part of the area is in a more sensitive water body as modifications have been minimal and the overall status is currently good. The area overlap is minimal, however.			

Marine cultural heritage

Heritage asset type	Where	Commentary on sensitivity from Offshore Wind development	Area rating
Maritime archaeology and wrecks	Significant potential across the characterisation area, with particular concentrations of known wrecks in proximity to Newcastle and Sunderland and along the coastal fringe.	Historic wrecks including known wrecks and assets on the seabed, and associated cultural material such as vessel contents, cargo, isolated finds, and historic losses all have potential to be affected by OWF development in the Durham Coast characterisation area. The area contains a large number of vessels associated with shipping routes and trade along the north-east coast of England to important centres at Newcastle and Sunderland, with particular concentrations of known wrecks and obstructions in the parts of the characterisation area in close proximity to these ports. There is potential for the recovery of remains from seafaring in the prehistoric period through to the present day, but with a particular dominance of steel and metal vessels in the known records from the 19th and 20th Centuries owing to their construction and survival. There are a significant number of wrecks across the characterisation area associated with losses in the First and Second World Wars; the characterisation area is located in the northern section of the East Coast War Channels (ECWCs) which were maintained and patrolled routes for civilian shipping between the Scottish border and the North Kent Coast and were in operation during the First and Second War Wars. The characterisation area therefore contains large numbers of heritage assets including known wreck sites and documented losses associated with the ECWCs. Established procedures exist to ensure that any historic wrecks and associated remains, both known and unknown, are identified as part of any proposed OWF development and impacts are mitigated and minimised.	

Aviation archaeology	Potential for recovery of aviation archaeological remains across the characterisation area.	There is potential within the area for the discovery of remains from crashed aircraft and associated cultural material. Although the density of losses in the area is not comparable to the south-east of England where a large percentage of aerial conflict occurred during the Second World War, there is still significant potential here as the North Sea formed an important axis in the defence of the country from the Luftwaffe. Several RAF bases were located in the area, including Middleton St. George, RAF Usworth, and RAF Acklington in Northumberland, from where aircraft engaged in defence of the northwest against Luftwaffe raids and provided protection of shipping in the ECWCs. While existing standard mitigation measures could be utilised for specific projects in the area, further site-specific mitigation including excavation and recovery of significant remains that are encountered and where impacts are unavoidable may be required. However, it should be noted that this is an extreme example and would only be undertaken following significant discussion with advisors and in those rare cases where preservation *in sit*u was not a feasible option.	
Submerged prehistoric landscapes	Potential across characterisation area, but with enhanced potential in areas near geomorphological features, such as palaeochannels, and in the parts of the characterisation area in closest proximity to the coast.	During periods of lower sea level caused by three major glaciations (the Anglian, Wolstonian and Devensian) the characterisation area would have been covered by ice sheets. There is therefore limited potential for recovery of cultural material associated with these periods. However, following the retreat of the Devensian ice sheet (c. 13,000 BP), much of the area would have provided accessible and attractive habitat for our Late Upper Palaeolithic and Mesolithic ancestors. Nationally significant Mesolithic remains have been found in close to the characterisation area at the scheduled site of Star Carr near Scarborough. As such, there is potential for remains from this period to be present and impacted by OWF development in the characterisation area. A number of established procedures exist to ensure that any submerged prehistoric landscapes, associated geographical and geomorphological features, and associated deposits, features and finds are identified as part of any proposed OWF development so any impacts can be mitigated and minimised.	
Area commentary			Area rating
There are extensive heritage assets and potential for recovery of further remains across the area, with concentrations of historic wreck losses in proximity to Newcastle and Sunderland. However, the application of standard mitigation measures on a strategic and project-specific basis should allow for lower constraint to occur in this area.			

Glossary of acronyms and abbreviations

ADR	Air Defence Radar
AONB	Area of Outstanding Natural Beauty
ATC	Air Traffic Control
CCS	Carbon Capture Storage
cSAC	Candidate Special Area of Conservation
ECWCs	East Coast War Channels
FAME	Future of the Atlantic Marine Environment
FFC	Flamborough and Filey coast
HRA	Habitat Regulations Assessment
IROPI	Imperative reasons of overriding public interest
J net fishery	A method of drift net fishing
JNCC	Joint Nature Conservation Committee
km	Kilometre
KRA	Key Resource Area
m	Metre
MCZ	Marine Conservation Zone
MERP	Marine Ecosystems Research Programme
MoD	Ministry of Defence
MPA	Marine Protected Area
MW	Mega watt
NATS	National Air Traffic Services
NM	Nautical Mile
OESEA3	Offshore Energy Strategic Environmental Assessment 3
OFTO	Offshore Transmission Owners
OWF	Offshore Wind Farm
pSPA	Potential Special Protection Area
PSR	Primary Surveillance Radar
Ramsar	Ramsar Convention on wetlands of international Importance especially as waterfowl habitat, also known as the ‘Convention on Wetlands’.
RAF	Royal Air Force
RSPB	Royal Society for the Protection of Birds
RYA AIS	Royal Yachting Association (RYA) Automatic Identification System (AIS)
SAC	Special Area of Conservation
SCI	Site of Community Importance
SNCB	Statutory Nature Conservation Body
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
STAR	Seabird Tracking and Research
Succorfish	Under 12m vessel tracking equipment
UXO	Unexploded Ordnance
WFD	Water Framework Directive

Offshore Wind **Leasing Round 4**

THE CROWN ESTATE

Resource and Constraints Assessment for Offshore Wind

Characterisation Area Report **Yorkshire Coast**

3

38255-TCE-REP-008

Characterisation Area Report: 3 – Yorkshire Coast

38255-TCE-REP-008 Characterisation Area Report: 3 – Yorkshire Coast		
Version	Status	Issue date
1.1	Draft	July 2018
1.2	Draft	November 2018
1.3	Final	September 2019

The information included in this report should be read in conjunction with the *Resource and Constraints Assessment for Offshore Wind: Methodology Report* and the *Summary Stakeholder Feedback Report*. The trigger distance for constraints to be included in the constraints analysis section of this report is 1 nautical mile (NM).

The Crown Estate has undertaken the analysis in this report using the evidence available to it, internal expertise and support from external advisers where appropriate. The analysis does not obviate any potential need for any Habitat Regulations Assessment (HRA) or any project level consideration of the potential impact of development. The analysis does not supersede any statutory policies or marine plans. The analysis, including the data and information contained in this document, presents a point in time assessment with changes likely to both the presence and nature of constraints.

This report is provided for information purposes only and no party may rely on the accuracy, completeness or fitness of its content for any particular purpose. The Crown Estate makes no representation, assurance, undertaking or warranty in respect of the analysis in the report including all data and information contained in it.

Receptor rating		Area rating	
Receptor assessed but no interaction noted		Receptor assessed but no interaction noted	
Interaction acceptable with best practice/accepted mitigation		The constraint will present the need to implement best practice/accepted mitigation measures to enable acceptable development within the whole area	
Interaction acceptable with moderate mitigation		The constraint will present the need to implement moderate mitigation measures to enable acceptable development within the whole area	
Interaction acceptable with significant mitigation		The constraint will present the need to implement significant and/or strategic level mitigation measures to enable acceptable development within the whole area	
Significant/insurmountable issue that would be challenging to mitigate within the area of influence of a receptor		Significant/insurmountable issue that would be challenging to mitigate for any development within the whole area	
No data coverage across the area		No data coverage across the area	

Constraints analysis

Note that in addition to The Crown Estate leases/licences within this table, The Crown Estate has also identified key resource areas (KRAs) which may be suitable for the future development of different marine sectors. Information about KRAs that overlap this characterisation area is described in a latter section of this document.

Exclusions model – Hard constraints			Receptor rating	Area rating
	Present	Commentary		
The Crown Estate agreements	Pipelines into Easington: numerous active and inactive pipelines intersect the characterisation area	The pipelines have been removed from the characterisation area and will need to be avoided; this should be possible with best practice/accepted mitigation. However, the large number of pipelines, particularly in the south-east and east of the characterisation area, may constrain the area available for new arrays.		
	Humber Gateway Wind Farm: surrounded on three sides by the western part of the characterisation area	The cumulative impact of offshore wind farm (OWF) developments and the associated cable infrastructure across all receptors will need to be considered in this area as there may be concerns around wind resource and proximity to the existing site. There will need to be a 5 km buffer around existing offshore wind projects – any new wind developments within 5 km will need the permission of the incumbent party.		
	Westermost Rough Wind Farm: within the western part of the characterisation area	The cumulative impact of OWF developments and the associated cable infrastructure across all receptors will need to be considered in this area as there may be concerns around wind resource and proximity to the existing site. There will need to be a 5 km buffer around existing offshore wind projects – any new wind developments within 5 km will need the permission of the incumbent party.		
	Hornsea Project One Wind Farm – Heron West: adjacent to the eastern boundary of the characterisation area	The cumulative impact of OWF developments and the associated cable infrastructure across all receptors will need to be considered in this area as there may be concerns around wind resource and proximity to the existing site. There will need to be a 5 km buffer around existing offshore wind projects – any new wind developments within 5 km will need the permission of the incumbent party.		
	Hornsea Project Two Wind Farm: adjacent to the eastern boundary of the characterisation area	The cumulative impact of OWF developments and the associated cable infrastructure across all receptors will need to be considered in this area as there may be concerns around wind resource and proximity to the existing site. There will need to be a 5 km buffer around existing offshore wind projects – any new wind developments within 5 km will need the permission of the incumbent party.		
	Hornsea Project Four Wind Farm: adjacent to the eastern boundary of the characterisation area	The cumulative impact of OWF developments and the associated cable infrastructure across all receptors will need to be considered in this area as there may be concerns around wind resource and proximity to the existing site. There will need to be a 5 km buffer around existing offshore wind projects – any new wind developments within 5 km will need the permission of the incumbent party.		
	OWF export cable routes (OFTOs): numerous within and adjacent to the characterisation area	The characterisation area cable routes should be avoided where possible and liaison would be required with existing customers. However, any concerns can likely be avoided with the use of best practice/accepted mitigation. Since cable crossings require cable protection (which may have adverse environmental effects), crossings should be minimised where practicable.		
	Aggregate area 514/1-4: within the south-western part of the characterisation area	This is an active dredging site so would require a 2 km buffer around it and negotiations with the customer.		
	Rough natural gas storage (NGS) site: within the central part of the characterisation area	This area would need to be avoided and may need a buffer distance around it. Liaison with the customer is required.		
Other energy infrastructure	Significant oil and gas activity – 30 platforms intersecting or within the 1 NM buffer distance of the area, and several additional oil and gas-related infrastructure installations in the area Intersection with the Rough NGS site	There is significant oil and gas activity in the area, with 0-3 NM and 3-6 NM helicopter consultation zones covering 68% of the area and potentially causing significant obstacles to development. Consideration should be given to the infrastructure associated with NGS when developing proposals in this area.		
Navigation	Navigational dredging at Bridlington Harbour – 1500 m away	The navigation dredging signifies a significant investment of access to the harbour facilities in this area. As such, significant engagement will be required around this receptor to ensure safe access is maintained.		
	Traffic separation schemes into the Humber – immediately to the west of the area	There is significant navigational activity in the area focusing on the Humber Estuary and approaches, but also transiting the area along short sea routes. Proposals for development will need to undertake careful planning and engagement to ensure no unacceptable impacts are presented to navigational activity.		
Social	None within the trigger distance			

Restrictions model – Soft constraints			Receptor Rating	Area Rating
Economic tier				
Navigation	Significant number of anchorage areas in and around the Humber intersects	These areas should be avoided if possible. Although they can be moved, they are sited in areas that have appropriate shelter/seabed for safe anchoring. However, the overall area covered by anchorage means that they will not have a huge impact on development.		
	Significant navigational activity in the area focusing around the Humber Estuary but also transiting the area	A large amount of traffic and existing developments necessitate significant planning and engagement with navigational stakeholders to ensure that cumulative effects do not present an unacceptable risk to or impact on navigation.		
Subsurface	Endurance Carbon Capture Storage (CCS) site: adjacent to the north-east boundary of the characterisation area	This would require liaison with the existing rights holder. This constraint will relate more to infrastructure associated with the activity rather than the store itself. As such, this constraint is unlikely to be a significant concern.		
Fishing	See fisheries commentary below		N/A	
Environmental tier				

The assessment of the sensitivity of Marine Protected Areas (MPAs) to pressures caused by offshore wind development and operation is assessed in a separate spreadsheet which will be made available as part of the Round 4 evidence base. Commentary has been noted in the relevant characterisation document where MPAs either overlap or are within 1 NM of the characterisation area and have been assessed as a yellow rating or above. For more information on the methodology for this assessment, please refer to the methodology report.

The National Trust considers that impacts on migratory purple sandpiper and turnstone from Cayton, Cornelian and South Bays Site of Special Scientific Interest (SSSI) need to be taken into account for this characterisation area. This SSSI is outside the buffer distance for the characterisation area and therefore, does not appear in the table below.

Assessments of Annex II species have not been made as part of the characterisation process. Such assessments will need to be undertaken at project level for individual developments within the characterisation area. The Wildlife Trusts (TWT) consider that white beaked dolphin, minke whale and harbour porpoise are particularly important for this characterisation area.

Type of designation		Name of designation (distance from area)	Designated features/species	Conservation objectives	Commentary	Receptor rating	Area rating
European marine designations	Special Area of Conservation (SAC)	Flamborough Head	Reefs Vegetated sea cliffs Sea caves	Maintain/restore features as appropriate	The vegetated cliff features of this SAC are terrestrial features not exposed to activity within the characterisation area. The littoral and sublittoral reefs at this site are mostly chalk bedrock, boulder and cobble formations with high productivity as a result of the mixing of two fronts. The sea caves are littoral and sublittoral. The SAC area has been excluded from the characterisation area meaning that the reef and cave features are unlikely to be directly affected by array construction. It is also considered unlikely that cabling would affect the reef and cave features since the presence of steep chalk cliffs along this part of the coastline is likely to preclude landfall. TWT have commented that chalk reef and cave features would be particularly sensitive to offshore wind development since damage to them would not be recoverable, and that the SAC should be avoided.		

					Consideration should also be given to the SNCB's report on cable sensitivity entitled 'Natural England and JNCC advice on key sensitivities of habitats and Marine Protected Areas in English Waters to offshore wind farm cabling within Proposed Round 4 leasing areas'.		
	Harbour porpoise SAC	Southern North Sea	Harbour porpoise	The conservation objectives for the Southern North Sea SAC are: to ensure that the integrity of the site is maintained and that it makes the best possible contribution to maintaining Favourable Conservation Status (FCS) for harbour porpoise in UK waters. In the context of natural change, this will be achieved by ensuring that: 1. Harbour porpoise is a viable component of the site 2. There is no significant disturbance of the species 3. The condition of supporting habitats and processes, and the availability of prey is maintained. This is similar to the protection afforded to harbour porpoise throughout their range by the European Protected Species (EPS) regulations in the UK. However, the Natura 2000 principles and HRA tests set the bar higher than EPS protection for impacts on the site as the protection is no longer solely considering effects on the population as a whole but making sure that the site is contributing positively to the species' Favourable Conservation Status.	Harbour porpoise could be affected by offshore wind development in the area, mainly through acoustic impacts (disturbance and hearing damage) from pile driving, UXO clearance and possibly some geotechnical surveys. Disturbance and barrier effects arising from vessel movements and presence of turbines may also occur. The noise disturbance during wind farm construction is likely to be significant if using pile-driving to install the turbine foundations, and there is also a risk from UXO clearance. There will be a need to consider population level effects of disturbance (mainly during construction), and there may be some additional requirements to investigate potential impacts on prey species. The designation of harbour porpoise SACs will undoubtedly have consequences as to how some activities operate, and measures may need to be put in place to reduce disturbance. Implementation of any disturbance management is likely to be challenging given the complexity of marine activities, regulatory arrangements and scientific uncertainty surrounding the significance of noise impacts on harbour porpoise. The approach recommended by SNCBs is that developers should ensure that there is sufficient time between the assessment and the start of construction for them to effectively implement mitigation/management, which could include: 1. Careful spatial planning and phasing of noisy activities. 2. Use of alternative foundations that do not require pile driving (e.g. suction buckets, gravity bases), noting that these may have other impacts. 3. Use of alternative methods of installation (e.g. vibropiling) to reduce the noise footprint. 4. Use of technology to reduce the sound levels at source or to minimise sound propagation and reduce the noise footprint. Harbour porpoise occur in elevated densities in some parts of the site compared to others during summer and winter. This may make mitigation slightly easier since summer is likely to be the most important construction season.		

					The SNCBs and The Wildlife Trusts have concerns over the potential cumulative impacts on harbour porpoise within this SAC, and note that currently there is no mechanism to ensure that a strategic approach to the management of impacts is taken. They consider that this could be a significant consenting risk for offshore wind development in the North Sea characterisation areas. In parallel to new offshore wind leasing, The Crown Estate has committed to fund a collaborative programme of strategic enabling actions to increase the evidence base and support sustainable and coordinated expansion of offshore wind. Underwater noise and its management, assessment of impacts on sensitive receptors, and approaches to modelling and assessment, are all likely to form a key priority area for further work, and we anticipate collaborating with stakeholders on new work streams The SNCBs and The Wildlife Trusts have concerns over the potential cumulative impacts on harbour porpoise within this SAC, and note that currently there is no mechanism to ensure that a strategic approach to the management of impacts is taken. They consider that this could be a significant consenting risk for offshore wind development in the North Sea characterisation areas. In parallel to new offshore wind leasing, The Crown Estate has committed to fund a collaborative programme of strategic enabling actions to increase the evidence base and support sustainable and coordinated expansion of offshore wind. Underwater noise and its management, assessment of impacts on sensitive receptors, and approaches to modelling and assessment, are all likely to form a key priority area for further work, and The Crown Estate anticipates collaborating with stakeholders on new work streams under the programme to help address outstanding evidence gaps.		
	Site of Community Importance (SCIs)	None within the trigger distance					
	Ramsar	None within the trigger distance					
	Special Protection Area (SPA)	Flamborough and Filey Coast (400 m)	Northern gannet (breeding) Black-legged kittiwake (breeding) Common guillemot (breeding) Razorbill (breeding) Seabird assemblage	Maintain/restore features as appropriate	Formerly a Potential Special Protection Area (pSPA), it was declared a SPA on 23rd August 2018. The SPA is divided into two sections: the southern section extends north from South Landing around Flamborough Head to Speeton; the northern section covers the peninsula of Filey Brigg before extending north-west to Cunstone Nab. The seaward boundary extends 2 km throughout the two sections of the site		

					into the marine environment, running parallel to the landward boundaries to include the adjacent coastal waters. The site qualifies under article 4.2 of the Directive (2009/147/EC) by supporting over 1% of the biogeographical populations of four regularly occurring migratory bird species. The site also regularly supports more than 20,000 seabirds during the breeding season, including over 2,000 northern fulmar Fulmarus glacialis. When taking into consideration the cumulative impact of existing and planned offshore wind projects in this region and nearby, Natural England considers that this site poses a significant consenting risk to future projects in the North Sea, and that imperative reasons of overriding public interest (IROPI) are likely to be required. The Royal Society for the Protection of Birds (RSPB) also considers that development within this characterisation area will be difficult to consent as a result of cumulative collision impacts on gannet and kittiwake and cumulative displacement of breeding auks (puffin, guillemot, razorbill) and gannet.		
	SPA	Greater Wash	Red-throated diver (Non-breeding) Common scoter (Non-breeding) Little gull (Non-breeding) Sandwich tern (Breeding) Common tern (Breeding) Little tern (Breeding)	SPA objectives: Protect wintering populations of red-throated diver, common scoter and little gull Protect feeding waters of breeding common, sandwich and little tern	Classified as a SPA March 2018. The species which form part of the designation are sensitive to offshore wind through disturbance and collision. Red-throated diver and common scoter are sensitive to displacement from both offshore wind areas and cable construction. Little gull are sensitive to collision. Terns are potentially sensitive to some impacts associated with cable installation and are also sensitive to collision. Impacts on these populations could make consenting offshore wind projects highly problematic. It is noted, however, that the majority of the SPA has been excluded from the characterisation area. RSPB notes that developments within this region will need to include consideration of in-combination displacement of non-breeding common scoter and red-throated diver and collision risk to little gull from this SPA. Natural England notes that displacement impacts on red-throated diver may be significant up to 8 km away from existing OWF. Natural England also notes that the overlap of the SPA with the characterisation area creates a significant risk of potential impacts on all of the features of the Greater Wash SPA. RSPB, Natural England and JNCC consider that offshore wind development in the North Yorkshire Coast, Wash and Southern North Sea characterisation areas could have impacts on this SPA.		

					The SPA covers the areas of highest density foraging for sandwich tern from the North Norfolk Coast SPA. Natural England has advised that the distribution of sandwich tern extends beyond the SPA boundary and developments in this region may still have impacts on them. Refer to Wilson et al 2014: Quantifying usage of the marine environment by terns Sterna sp. around their breeding colony SPAs. JNCC Report No. 500		
Marine Conservation Zones (MCZs)		Holderness Inshore			Assessed as low risk; details available in separate spreadsheet.		
		Holderness Offshore	North Sea glacial tunnel valleys Subtidal coarse sediment Subtidal sand Subtidal mixed sediments Ocean quahog (Arctica islandica)	The geological feature has a conservation objective to 'maintain' in favourable condition. All other features have conservation objectives to 'recover' to favourable condition	This MCZ was designated in May 2019. The MCZ overlaps a large part of the inshore part of the characterisation area and as such, it is likely that offshore wind development could affect the features within it – either in terms of turbine construction or cabling. However, only the ocean quahog feature is especially sensitive to offshore wind and its presence has only been recorded from the north of the site. Avoidance of construction in this area is likely to be able to mitigate impacts. TWT consider that cabling impacts in this MCZ could be significant owing to the current unfavourable condition of many of its features. They consider that the site should be avoided to aid recovery of features. Natural England also considered that benthic habitats within this site would be sensitive to impacts from cabling and that the location of the site parallel to shore makes it vulnerable to cabling impacts. Consideration should also be given to the SNCB's report on cable sensitivity entitled 'Natural England and JNCC advice on key sensitivities of habitats and Marine Protected Areas in English Waters to offshore wind farm cabling within Proposed Round 4 leasing areas'.		
Sites of Special Scientific Interest (SSSIs)	Flamborough Head (1.7 km)	Geological/Earth heritage reefs Vegetated sea cliffs Maritime cliff and slope Sea caves Seabird assemblage Cormorant (breeding) Fulmar (breeding) Gannet (breeding) Kittiwake (breeding) Puffin (breeding) Razorbill (breeding) Shag (breeding)	Some units are in 'favourable' condition, others are in 'unfavourable' (either declining or recovering). Notably, the majority of seabird features are in 'unfavourable' (declining) condition.	Habitat features at this site are onshore/nearshore and are not likely to be exposed to activity within the characterisation area. The extent of steep cliffs at the site make it unsuitable as a landfall point. Bird features within the SSSI are also protected by the overlapping Flamborough and Filey Coast SPA. There have been concerns about birds from Flamborough Head interacting with projects in the North Sea, especially gannet which forage far offshore and have limited colonies within the UK. For the SSSI and overlying SPA the 'headroom' may be small for additional projects. The distance of the characterisation area from Flamborough Head may		

				go some way to mitigating impacts for some species, but gannet, kittiwake and auk species remain a concern. Refer to commentary on the Flamborough and Filey Coast SPA.		
Spawning and nursery grounds	There is a maximum count of four high-intensity nursery and spawning overlaps, which is not significant. However, there is a herring spawning area around Flamborough Head which overlaps with a significant portion of the characterisation area. There is one spawning area for cod which overlaps with the north-west corner of the characterisation area.			Noise disturbance may be an issue, potentially requiring seasonal restrictions on piling during breeding seasons. It will depend on whether the spawning grounds are still active and their precise locations, which may need to be determined by surveys. Cod are particularly sensitive to noise impacts.		
Social tier						
Royal Yachting Association (RYA) Automatic Identification System (AIS) intensity	Some heavy usage to the north and west of the area but not intersecting.		The coverage of high-intensity sailing is not significant, so this is not a significant constraint.			
Marinas	Bridlington Harbour 1.5 km away from the area.		This requires caution so as to allow corridors maintaining navigation around Flamborough Head.			
Bathing beaches	Six ranging from 200 m to 1.6 km away from the area.		Standard mitigation should address any potential impacts. Water Framework Directive (WFD) will apply within 1 NM. However, the potential constraint to the overall characterisation area will be minimal.			
Visibility from sensitive receptors	See visibility analysis below.					

Review layers

Visibility from landscape designations and from the coast

The bands of significant visual impact are taken from the OSEA3[1] environmental report. It should be noted that these bands were challenged through the statutory stakeholder engagement by the Statutory Nature Conservation Bodies (SNCBs) so further analysis and engagement should be conducted to understand the visual constraint in potential development areas more fully.

The visibility from landscape designations analysis has been conducted using designations which include protections for landscapes and settings namely: National Parks, Areas of Outstanding Natural Beauty (AONBs), Heritage Coasts and World Heritage sites. For more information on these, please consult the methodology report. The analysis draws on visibility from these designations but not the sensitivity of them to offshore wind developments. Proposals should draw on the relevant management plans or local policies to fully understand the level of constraint that exists in the vicinity of these landscape designations. As such, more analysis is required to fully understand the potential constraint.

	Band of significant visual impact	% of overlap with the characterisation area	Commentary	Area rating
Medium sensitivity receptors	0-13 km (3.6 MW turbines)	5%	There is a proportion of this area that is visible from the coast; however 68% is more than 30 km from shore. This means that although there may be significant impact in the areas closer to shore that will require significant mitigation, there is a large amount of the area which presents a lesser level of constraint. Due to this variation within the characterisation area, a rating of moderate mitigation has been concluded for the area as a whole. Cumulative impacts of offshore wind development within this area will need to be carefully considered in the light of existing OWF that are present.	
	13-20 km (4-8 MW turbines)	11%		
	20-30 km (10-15 MW turbines)	16%		
High sensitivity receptors	0-30 km	32%		

Visibility of sea surface from landscape designations			
The western portion of the area is viewable from: • The Spurn Heritage Coast • Lincolnshire Wolds AONB • Flamborough Heritage Coast • Potentially from the Lincolnshire Wolds AONB	The data demonstrates that this area is visible from relatively few observation locations in landscape designations although there are some particularly sensitive areas, especially around the Flamborough Heritage Coast and to the north-west of the characterisation area. The National Trust has noted that the coastline is also valuable for its cultural heritage, and visual impacts from offshore wind may have significant effects on the setting of cultural assets (either alone or in combination with existing offshore wind projects). Impacts on the setting of cultural heritage assets should be taken into consideration in the assessment of the visual impact of developments in this area.		

Ornithology outside of Special Protection Areas (SPAs) for high-risk species

Joint Nature Conservation Committee (JNCC), Natural England and Royal Society for the Protection of Birds (RSPB) advise that there are a number of information sources which should be taken into consideration in the assessment of potential impacts from offshore wind development in this characterisation area. These are:

- Site Information Centres on the JNCC website (http://jncc.defra.gov.uk/page-6895) which provide up-to-date information on protected areas, their features and status.
- Marine Ecosystems Research Programme (MERP) seabird distribution maps (https://marine-ecosystems.org.uk/Research_outcomes/Top_predators)
- Future of the Atlantic Marine Environment (FAME) and Seabird Tracking and Research (STAR) tracking data from the RSBP (https://rspb.maps.arcgis.com/apps/Cascade/index.html?appid=d6c3aa1ec7184a2895a01cebf451c7b3)
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Species	Site	Commentary on coverage	Area rating
Gannet	Flamborough and Filey Coast (FFC) SPA	The gannet's mean maximum seaward foraging range extends 229 km from the source colony at FFC SPA. This range encompasses five other characterisation areas in addition to wholly encompassing the Yorkshire Coast area, which lies adjacent to the FFC colony. As a result, cumulative collision risk effects should be considered if development is taken forward in more than one characterisation area. The potential constraint of cumulative effects will also be affected by pre-application developments within the foraging range, e.g. Hornsea Project Three, Norfolk Boreas and Norfolk Vanguard West developments. Summer density is higher closer to the FFC SPA colony, with most of the Yorkshire Coast area lying in an area of higher gannet density. Some of this increased gannet density could also be related to foraging gannet from the Bass Rock colony in Scotland. Locating development in the southern and eastern parts of the characterisation area would help minimise impacts on the gannet population, due to the lower densities recorded in these locations. Impacts on gannets, in particular cumulative impacts, will be a key HRA consideration for development in the Yorkshire Coast area given the existing wind farm development within the FFC SPA gannet foraging range and wider North Sea. Data from the FAME/STAR databases (available from the RSPB and analysed in Cleasby *et al.* 2018) and from the Hornsea strategic monitoring tracking data should be used to inform future assessment of cumulative impact to the FFC SPA. Natural England also recommends the use of Sansom *et al.* 2018, Bradbury *et al.* 2014 and the modelled MERP seabird distribution maps. When taking into consideration the cumulative impact of existing and planned offshore wind projects in this area and nearby, Natural England considers that there is a significant consenting risk to future projects in this area and that it may not be possible to conclude no significant effect on the integrity of European sites. RSPB does not consider that there is any headroom for development of further offshore wind in this area owing to the potential scale of cumulative impacts to gannet and kittiwake from FFC SPA.	
Kittiwake	Flamborough and Filey Coast (FFC) SPA	The kittiwake's mean maximum seaward foraging range extends 60 km from the source colony and approximately half the Yorkshire Coast area is located within the FFC SPA foraging range. Given the kittiwake's conservation status, concerns over the cumulative impacts of other North Sea offshore wind developments on the FFC kittiwake population, and the fact that four other characterisation areas lie within the maximum kittiwake foraging range (120 km), cumulative impacts on the species will be a key consideration for development in the Yorkshire Coast area. Cumulative impacts will also be affected by pre-application developments within this range, e.g. Hornsea Project Four (currently still at pre-scoping). Summer kittiwake density increases east of the FFC colony, with an area of higher density continuing beyond the 60 km mean maximum foraging range; the Yorkshire Coast area overlaps with this area of increased kittiwake density. Locating any development to the south and east of this high-density area and beyond the mean maximum foraging range (i.e. more than 60 km from the SPA) would help minimise impacts on this SPA population; any development within the mean maximum foraging range is likely to face significant consent risk due to impacts on kittiwakes. Data from the FAME/STAR databases (available from the RSPB and analysed in Cleasby *et al.* 2018) and from the Hornsea strategic monitoring tracking data should be used to inform future assessment of cumulative impact to the FFC SPA. Natural England also recommends the use of Sansom *et al.* 2018, Bradbury *et al.* 2014 and the modelled MERP seabird distribution maps. When taking into consideration the cumulative impact of existing and planned offshore wind projects in this area and nearby, Natural England considers that there is a significant consenting risk to future projects in this area, and that it may not be possible to conclude no significant effect on the integrity of European sites. IROPI may be required. RSPB does not consider that there is any headroom for development of further offshore wind in this area owing to the potential scale of cumulative impacts to gannet and kittiwake from FFC SPA.	
Herring gull	Flamborough and Filey Coast (FFC) SPA	The herring gull mean maximum seaward foraging range extends 61 km from the source colony of FFC SPA, with approximately half the Yorkshire Coast area lying within this foraging range. Given the relatively restricted foraging range of the species and limited existing offshore wind development within this range, the cumulative impacts of development within the Yorkshire Coast area and other offshore wind development are likely to be less of a concern than with gannet and kittiwake features of the SPA. The summer density of herring gull tends to be concentrated along the coast, with a spur of increased density extending offshore and eastwards from the FFC colony. Locating any development within the Yorkshire Coast area east and south of this slightly increased density, and beyond the mean maximum foraging range (i.e. more than 61 km), would help to minimise impacts on this SPA colony.	

Ministry of Defence (MoD) activity

	Issues when using 250 m tip heights	Issues when using 350 m tip heights	Receptor rating
Air traffic control (ATC)	No ATC concerns.	Royal Air Force (RAF) Waddington Primary Surveillance Radar (PSR) concerns.	
Air defence radar (ADR)	Staxton Wold and Trimingham ADR concerns.	Staxton Wold and Trimingham ADR concerns.	
Threat radar	No threat radar concerns.	No threat radar concerns.	
Low flying	No low flying concerns, however, there will be a lighting requirement.	No low flying concerns, however, there will be a lighting requirement.	
Ranges, danger and exercise areas	UXO should be taken into account. The MoD would need to review cable routes to ensure highly surveyed routes are not obstructed by cables or turbines. The MoD would have concerns if the cable route came ashore or went through the Donna Nook D307 bombing range.	UXO should be taken into account. The MoD would need to review cable routes to ensure highly surveyed routes are not obstructed by cables or turbines. The MoD would have concerns if the cable route came ashore or went through the Donna Nook D307 bombing range.	

Area commentary	Area rating
ATC issues in the 350 m tip height scenario. ADR concerns at both tip height scenarios. This may be difficult to mitigate due to the cumulative impacts of other developments in the area. Need to avoid Donna Nook D307 bombing range when considering cable routing. There will be a lighting requirement and consideration of UXO as per standard industry practice.	

Fishing activity

Gear type	Location and comments
Mobile gear	▪ Whitby and Scarborough used to be white fish mobile gear but the fleet disbanded as cod stocks collapsed. The stocks have significantly recovered, which may lead to a recommissioning of the fleet. This decline in white fish has led to an increase in the shellfish sector activity, with boats from Whitby, Scarborough and Bridlington working up to 20-30 miles offshore at certain times of the year. ▪ There is year-round trawling activity in the area. ▪ The scallop fishery is targeted by local vessels and large numbers of visiting vessels at certain times of the year.
Static gear	▪ This area hosts the only licensed drift net salmon fishery in the UK from Spurn Head to the Scottish border. This fishery is particularly of interest to the North Yorkshire fleet. The fishery is open between June and the last day of August from 0-6 NM. Consideration of the cumulative impacts on this activity with the potential development on the Tweed salmon SAC should be considered. ▪ This area covers the largest crab and lobster fishery in the UK. The landings into Bridlington generate over £6 million in first-hand sales. There is also onshore processing which adds further value to the fishery. Grimsby on the south bank of the Humber also has a number of vessels involved in the fishery. There is also a whelk fishery off the Humber. This area is of significant importance to the shellfish sector and it has a large footprint due to the large number of pots deployed in the fishery. ▪ Fisheries stakeholders note that the extent and density of the crab and lobster fishery will present operational challenges for offshore wind development, especially in nearshore waters, and there may be significant cumulative effects with other developments in the area.

Area commentary	Area rating
There is moderate fishing activity with significant potting efforts in the area, but engagement should ensure that impacts are minimised. There are strong cultural associations to the fishing fleet in the area. There is also extensive deployment of Succorfish units.	

Future oil and gas

Licensing round	Commentary	Receptor rating	Area rating
28th and 29th rounds – mainly in the south of the area	Eight new oil and gas licences issued through the 28th and 29th licensing rounds. Block 48/1d licensed via the 29th supplementary round and 47/5e, 42/30c, 48/1b, 48/2b, 41/24, 47/9d, 47/14a via the 28th round. These licences mostly overlap with existing 0-6 NM helicopter buffers, so provide low additional constraint.		
30th round – central and western part of the area	In the 30th offshore licensing round there are 13 new licences which overlap with the Yorkshire Coast characterisation area. They are located in the central to western parts of the characterisation area and may present a significant additional constraint. However, not all of these will require platforms.		

Marine plans

East Marine Plan	Spatially explicit policies	Issues	Area rating
Aggregates	AGG3: within defined areas of high potential aggregate resource, proposals should demonstrate in order of preference: a) That they will not prevent aggregate extraction b) How, if there are adverse impacts on aggregate extraction, they will minimise these c) How, if the adverse impacts cannot be minimised, they will be mitigated d) The case for proceeding with the application if it is not possible to minimise or mitigate the adverse impacts.	The characterisation area, particularly the western and southern extents, overlaps with the optimal aggregate resource area identified in the East Marine Plan. Any new offshore wind development would need to consider impacts to the aggregates industry and negotiation with the sector would be required. Whilst The Crown Estate leases/licences seabed for offshore wind and aggregate extraction it should be noted that aggregates tendering rounds currently run every two years, and so the requirement for liaison between industries will be ongoing.	
Tidal energy	TIDE1: within defined areas of identified tidal stream resource, proposals should demonstrate, in order of preference: a) That they will not compromise potential future development of a tidal stream project b) How, if there are any adverse impacts on potential tidal stream deployment, they will minimise them c) How, if the adverse impacts cannot be minimised, they will be mitigated d) The case for proceeding with the proposal if it is not possible to minimise or mitigate the adverse impacts.	There is no overlap of the characterisation area with the area of identified tidal stream resource in the East Marine Plan.	
Aquaculture	AQ1: within sustainable aquaculture development sites (identified through research), proposals should demonstrate in order of preference: a) That they will avoid altering the seabed or water column in ways which would cause adverse impacts to aquaculture productivity or potential future aquaculture development b) How, if there are adverse impacts on aquaculture development, they can be minimised c) How, if the adverse impacts cannot be minimised they will be mitigated d) The case for proceeding with the proposal if it is not possible to minimise or mitigate the adverse impacts.	There is a very small area of overlap in the northern part of the characterisation area with the optimum sites of aquaculture potential identified in the East Marine Plan. However, the overlap is very small and is not considered to be a significant concern for future offshore wind development.	
Carbon Capture Storage (CCS)	CCS1: within defined areas of potential carbon dioxide storage, proposals should demonstrate in order of preference:	There is some overlap of the characterisation area with the areas of potential opportunity for CCS identified in the East Marine Plan. The overlap would need to	

	a) That they will not prevent carbon dioxide storage b) How, if there are adverse impacts on carbon dioxide storage, they will minimise them c) How, if the adverse impacts cannot be minimised, they will be mitigated d) The case for proceeding with the proposal if it is not possible to minimise or mitigate the adverse impacts.	be considered as part of any plans for future offshore wind development and negotiation with the sector would be required.	
Ports and shipping	PS2: proposals that require static sea surface infrastructure that encroaches upon important navigation routes should not be authorised unless there are exceptional circumstances. Proposals should: a) Be compatible with the need to maintain space for safe navigation, avoiding adverse economic impact b) Anticipate and provide for future safe navigational requirements where evidence and/or stakeholder input allows and c) Account for impacts upon navigation in-combination within other existing and proposed activities.	The characterisation area overlaps with the important navigation routes identified in the East Marine Plan. Any new offshore wind development would need to account for navigation routes when locating the project area.	

The Crown Estate key resource areas (KRAs) for other sectors

KRA category	Where	Commentary	Receptor rating	Area rating
Cables	Intersects a small proportion of the area to the west	This KRA is significant in size due to the landing resource for cables generally dictated by the shortest distance between connection points. Due to the significant number of alternative options for landing cables, the risk of sterilising valuable resource is deemed to be minimal.		
Carbon Capture Storage (CCS) stores	The area overlaps with a number of 'Moderate' and 'Limited' rated stores sited across the area	These sites are not the most favourable in terms of development storage potential, so present little constraint.		
CCS infrastructure	Wide coverage across the area	This KRA is significant in size however there is significant opportunity for potential deployment of CCS infrastructure from industrial hubs around the Humber estuary, transporting captured CO2 through the characterisation areas to potential stores in the Southern North Sea. Proposals should consider potential impacts on these potential infrastructure corridors that may be developed in the near to medium term.		
Minerals	Covering most of the area	Pockets of interest are likely to be in this area, but this KRA is a larger zone of higher prospectivity that is less spatially defined than the resource in the other characterisation areas.		
Pipelines	Wide coverage across the area inside 12 NM	This KRA is significant in size due to the landing resource for pipeline infrastructure generally being dictated by the shortest distance between connection points. Due to the significant number of alternative options for landing pipeline infrastructure, the risk of sterilising valuable resource is deemed to be minimal.		

Sandscaping	Covers all of the area inside 12 NM	This KRA is significant in size due to the knowledge of potential sites and resources for sandscaping schemes not being well known currently. As such, significant conclusions cannot be drawn from this KRA.		
Tidal range	No interaction			
Tidal stream	No interaction			
Wave	No interaction			

National Air Traffic Services (NATs) radar overlap

% Overlap with Primary Surveillance Radar (PSR) assessment buffer (200 m turbines)	Commentary	Area rating
100.00%	Intersects throughout the area, so site-specific mitigation is the only option to make impacts acceptable. Further assessment and consultation with aviation authorities will be required.	

Water Framework Directive (WFD)

Water bodies triggered	Water body details					
	Type	Is it heavily modified	Overall status	Ecological status	Chemical status	Target date to achieve good status
Yorkshire South	Coastal	Yes	Moderate	Moderate	Good	2027

% of the area covered	Spatial overlap with the area	Commentary	Area rating
0.19%	Small intersection just off Bridlington Harbour	This area is not particularly sensitive with the water body already being highly modified and currently having an overall 'moderate' status. The overlap between the characterisation area and the water body is minimal.	

Marine Cultural Heritage

Heritage asset type	Where	Commentary on sensitivity from offshore wind development	Receptor rating
Maritime archaeology and wrecks	Significant potential throughout the characterisation area, with particular concentrations of known wrecks and potential in the western and southern parts of the area closer to the coast and the mouth of the Humber.	The Yorkshire Coast characterisation area has significant potential for the recovery of historic wrecks and associated cultural material such as isolated finds. A range of maritime archaeological receptors may be affected by OWF development in the area. The area contains a number of wrecks and obstructions, with particular concentrations of losses and known wrecks in proximity to the coast as opposed to further offshore, in particular to the south and west of the area in association with the mouth of the Humber. There is potential for the recovery of remains from the earliest seafaring in the prehistoric period to the present day, as evidenced by the recovery of some of the earliest examples of Bronze Age sewn plank boat remains from the wider Humber basin at Ferriby. As is commonplace throughout UK waters, there is a particular dominance of steel and metal vessels from the 19th and 20th centuries in the area owing to their construction and survival. There are also a significant number of wrecks associated with trade due to the proximity of the port of Hull, and with losses in the First and Second World Wars. The characterisation area is located along the East Coast War Channels (ECWCs), which were maintained and patrolled routes for civilian	

		shipping between the Scottish border and the North Kent coast, in operation during the First and Second War Wars. The characterisation area thus contains large numbers of heritage assets, both of known wreck sites and of documented losses associated with the ECWCs. A number of established procedures exist to ensure that any historic wrecks, both known and unknown, and associated remains, are identified as part of any proposed OWF development and impacts are mitigated and minimised.	
Aviation archaeology	Potential for recovery of aviation archaeological remains throughout the characterisation area.	There is potential within the Yorkshire Coast characterisation area for the discovery of the remains of crashed aircraft and associated cultural material from the birth of aviation up to the present. The greatest potential is associated with losses from the Second World War, and the numerous airborne battles, and defence of strategic locations, shipping routes and targets along the east coast of England that took place during this time. Several RAF bases were located close to the characterisation area (e.g. Donna Nook) from which defensive operations were mounted. Historic records indicate a significant number of aircraft losses from the Second World War off the Lincolnshire and Yorkshire coasts (118 – Lincolnshire; 216 –Yorkshire). While existing standard mitigation measures may be utilised for specific projects in the area, further site-specific mitigation may be required where impacts are unavoidable, including excavation and recovery of significant remains that are encountered. However, it should be noted that this is an extreme example and would only be undertaken following significant discussion with advisors and in rare cases where preservation *in sit*u was not a feasible option.	
Submerged prehistoric landscapes	There is potential for the recovery of remains across the characterisation area, with enhanced potential in areas close to geomorphological features such as palaeochannels and in the parts of the characterisation area closer to the coast.	There is limited potential for the recovery of cultural material associated with historic periods of lower sea levels, since the Anglian, Wolstonian and Devensian glaciations that caused these sea level changes would have covered the characterisation area with ice sheets. Any remains, if present, would be expected to be associated with geomorphological features such as palaeochannels and valleys, and the geological deposits from these periods. However, there is limited potential for the survival of *in situ* material from these periods. However, following the retreat of the Devensian ice sheet (c. 13,000 BP) much of the area would have provided accessible and attractive habitat for our late Upper Palaeolithic and Mesolithic ancestors. Nationally significant Mesolithic remains have been found close to the characterisation area at the scheduled site of Starr Carr near Scarborough. Significant deposits and possible finds may therefore be anticipated in association with the coast and the early Mesolithic channel systems and other geomorphological features that were present and exposed prior to marine transgression. As such, there is potential for remains from this period to be present and impacted by OWF development in the characterisation area. A number of established procedures exist to ensure that any submerged prehistoric landscapes, associated geographical and geomorphological features, and associated deposits, features and finds are identified as part of any proposed OWF development and that impacts are mitigated and minimised.	
Area commentary			Area rating
There are extensive heritage assets and potential for the recovery of further remains across the area, with particular concentrations of known wrecks and obstructions close to the mouth of the Humber Estuary and closer to the coast. The area is also an important location for the potential recovery of aviation and submerged prehistoric archaeology. Generally speaking, the application of standard mitigation measures on a strategic and project-specific basis will minimise the risk to underwater cultural heritage in this area.			

Glossary of acronyms and abbreviations

ADR	Air Defence Radar
AONB	Area of Outstanding Natural Beauty
ATC	Air Traffic Control
CCS	Carbon Capture Storage
ECWCs	East Coast War Channels
EPS	European Protected Species
FAME	Future of the Atlantic Marine Environment
FFC	Flamborough and Filey coast
HRA	Habitat Regulations Assessment
IROPI	Imperative reasons of overriding public interest
JNCC	Joint Nature Conservation Committee
km	Kilometre
KRA	Key Resource Area
m	Metre
MCZ	Marine Conservation Zone
MERP	Marine Ecosystems Research Programme
MoD	Ministry of Defence
MPA	Marine Protected Area
MW	Mega watt
NATS	National Air Traffic Services
NGS	Natural gas storage
NM	Nautical Mile
OESEA3	Offshore Energy Strategic Environmental Assessment 3
OFTO	Offshore Transmission Owners
OWF	Offshore Wind Farm
pSPA	Potential Special Protection Area
PSR	Primary Surveillance Radar
Ramsar	Ramsar Convention on wetlands of international Importance especially as waterfowl habitat, also known as the ‘Convention on Wetlands’.
rMCZ	Recommended Marine Conservation Zone
RAF	Royal Air Force
RSPB	Royal Society for the Protection of Birds
RYA AIS	Royal Yachting Association (RYA) Automatic Identification System (AIS)
SAC	Special Area of Conservation
SCI	Site of Community Importance
SNCB	Statutory Nature Conservation Body
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
STAR	Seabird Tracking and Research
Succorfish	Under 12m vessel tracking equipment
TWT	The Wildlife Trusts
UXO	Unexploded Ordnance
WFD	Water Framework Directive

Offshore Wind **Leasing Round 4**

THE CROWN ESTATE

Resource and Constraints Assessment for Offshore Wind

Characterisation Area Report
Thames Approaches

7

38255-TCE-REP-012

Characterisation Area Report: 7 – Thames Approaches

38255-TCE-REP-012 Characterisation Area Report: 7 – Thames Approaches		
Version	Status	Issue date
1.1	Draft	July 2018
1.2	Draft	November 2018
1.3	Final	September 2019

The information included in this report should be read in conjunction with the *Resource and Constraints Assessment for Offshore Wind: Methodology Report* and the *Summary Stakeholder Feedback Report*. The trigger distance for constraints to be included in the constraints analysis section of this report is 1 nautical mile (NM).

The Crown Estate has undertaken the analysis in this report using the evidence available to it, internal expertise and support from external advisers where appropriate. The analysis does not obviate any potential need for any Habitat Regulations Assessment (HRA) or any project level consideration of the potential impact of development. The analysis does not supersede any statutory policies or marine plans. The analysis, including the data and information contained in this document, presents a point in time assessment with changes likely to both the presence and nature of constraints.

This report is provided for information purposes only and no party may rely on the accuracy, completeness or fitness of its content for any particular purpose. The Crown Estate makes no representation, assurance, undertaking or warranty in respect of the analysis in the report including all data and information contained in it.

Receptor rating		Area rating	
Receptor assessed but no interaction noted		Receptor assessed but no interaction noted	
Interaction acceptable with best practice/accepted mitigation		The constraint will present the need to implement best practice/accepted mitigation measures to enable acceptable development within the whole area	
Interaction acceptable with moderate mitigation		The constraint will present the need to implement moderate mitigation measures to enable acceptable development within the whole area	
Interaction acceptable with significant mitigation		The constraint will present the need to implement significant and/or strategic level mitigation measures to enable acceptable development within the whole area	
Significant/insurmountable issue that would be challenging to mitigate within the area of influence of a receptor		Significant/insurmountable issue that would be challenging to mitigate for any development within the whole area	
No data coverage across the area		No data coverage across the area	

Constraints analysis

Note that in addition to The Crown Estate leases/licences within this table, The Crown Estate has also identified key resource areas (KRAs) which may be suitable for the future development of different marine sectors. Information about KRAs that overlap this characterisation area is described in a latter section of this document.

Exclusions model – Hard constraints			Receptor rating	Area rating
	Present	Commentary		
The Crown Estate agreements	Telecoms cables: numerous active and inactive cables intersecting the characterisation area as they head into Lowestoft and north Kent.	The cables have been removed from the characterisation area and should be avoided where possible by using best practice/accepted mitigation. However, the large number of cables may be a constraint on the area available for new arrays. Since cable crossings require cable protection (which may have adverse environmental effects), crossings should be minimised where practicable.		
	Greater Gabbard Wind Farm: adjacent to central part of the characterisation area.	The cumulative impact of offshore wind farm (OWF) developments and the associated cable infrastructure will need to be considered in this area as there may be concerns around wind resource and the proximity to the existing site. There will need to be a 5 km buffer around existing offshore wind projects – any new wind developments within 5 km will need the permission of the incumbent party.		
	Galloper Wind Farm: intersecting some of the central characterisation area.	The cumulative impact of OWF developments and the associated cable infrastructure will need to be considered in this area as there may be concerns around wind resource and the proximity to the existing site. There will need to be a 5 km buffer around existing offshore wind projects – any new wind developments within 5 km will need the permission of the incumbent party.		
	East Anglia TWO Wind Farm: adjacent to the north boundary of the characterisation area.	The cumulative impact of OWF developments and the associated cable infrastructure will need to be considered in this area as there may be concerns around wind resource and the proximity to the existing site. There will need to be a 5 km buffer around existing offshore wind projects – any new wind developments within 5 km will need the permission of the incumbent party.		
	OWF export cable routes (OFTOs): numerous within and adjacent to the north and north-western part of the characterisation area.	The characterisation area cable routes should be avoided where possible and liaison would be required with existing customers. However, any concerns can likely be avoided with best practice/accepted mitigation. Conflicts may arise where there are numerous export cable routes around the same landfall area as connections to the grid may be limited. New projects may look to use similar landing locations; however, this may cause cumulative impacts on the area from offshore wind farms. Since cable crossings require cable protection (which may have adverse environmental effects), crossings should be minimised where practicable.		
	Aggregates area 528/1-2: exploration and option agreement site to the west of the characterisation area.	This would require a 2 km buffer around it and negotiations with the customer.		
	Aggregates area 524: within the central part of the characterisation area.	This would require a 2 km buffer around it and negotiations with the customer.		
	Aggregates area 501: active dredging site adjacent to the south-east boundary of the characterisation area.	This would require a 2 km buffer on the north-western edge of the production area only and negotiations with the customer.		
	The Crown Estate has completed a plan-level Habitats Regulations Assessment for 2017 Offshore Wind Extensions and intends to grant right for: • Greater Gabbard Wind Farm (extension of up to 504 MW). • Galloper Wind Farm (extension of up to 353 MW). These extensions are situated around the western and central sections of the characterisation area.	As with other offshore wind farms, a 5 km buffer will be in place around the final area under lease for these extensions projects. Any new wind developments within 5 km will need the permission of the incumbent party. Proposals for projects coming forwards through new leasing should be cognisant of these extensions and potential cumulative impacts on all receptors. There is potentially a significant increase to deployed capacity through these projects in the area which could have a material impact on the level of constraint across the rest of the characterisation area.		
Other energy infrastructure	None triggered in the area.	There is no oil and gas infrastructure in this area and no new licences are under development.		
Navigation	Numerous traffic separation schemes around the region's boundaries manage traffic into the Port of London (to the west), Felixstowe and Harwich (to the east) defining the deep water route access into the southern North Sea.	The schemes mean that traffic is concentrated into defined routes due to the volume of vessels and safety reasons. Any impact on the traffic separation schemes should be avoided where possible.		
Social	None triggered in the area.			

Restrictions model – Soft constraints			Receptor rating	Area rating
Economic tier				
Navigation	There are two disposal sites intersecting the area.	These are not of a size or location that will cause significant constraint to development.		
	A large volume of traffic transects the area into the Thames Estuary, Harwich and Felixstowe and through the strait to access the North Sea.	Due to the scale of activity, the non-uniform nature of shipping tracks and the number of existing wind farms in the area potentially posing cumulative navigation impacts, further development in the area may be limited without significant mitigation.		
Subsurface	None within the trigger distance.			
Fishing	See fisheries commentary below.		N/A	
Environmental tier				

The assessment of the sensitivity of Marine Protected Areas (MPAs) to pressures caused by offshore wind development and operation is assessed in a separate spreadsheet which will be made available as part of the Round 4 evidence base. Commentary has been noted in the relevant characterisation document where MPAs either overlap or are within 1 NM of the characterisation area and have been assessed as a yellow rating or above. For more information on the methodology for this assessment, please refer to the methodology report.

Assessments of Annex II species have not been made as part of the characterisation process. Such assessments will need to be undertaken at project level for individual developments within the characterisation area.

Type of designation		Name of designation	Designated features/species	Conservation objectives	Commentary	Receptor rating	Area rating
European marine designations	Special Areas of Conservation (SACs)	Margate and Long Sands					
	Harbour porpoise Special Areas of Conservation (SACs)	Southern North Sea	Harbour porpoise	The conservation objectives for the Southern North Sea SAC are: to ensure that the integrity of the site is maintained and that it makes the best possible contribution to maintaining Favourable Conservation Status (FCS) for harbour porpoise in UK waters. In the context of natural change, this will be achieved by ensuring that: 1. Harbour porpoise is a viable component of the site 2. There is no significant disturbance of the species 3. The condition of supporting habitats and processes, and the availability of prey is maintained. This is similar to the protection afforded to harbour porpoise throughout their range by the European Protected Species (EPS) regulations in the UK. However, the Natura 2000 principles and HRA tests set the bar higher than EPS protection for	Harbour porpoise could be affected by offshore wind development in the area, mainly through acoustic impacts (disturbance and hearing damage) from pile driving, UXO clearance and possibly some geotechnical surveys. Disturbance and barrier effects arising from vessel movements and presence of turbines may also occur. The noise disturbance during wind farm construction is likely to be significant if using pile-driving to install the turbine foundations, and there is also a risk from UXO clearance. There will be a need to consider population level effects of disturbance (mainly during construction), and there may be some additional requirements to investigate potential impacts on prey species. The designation of harbour porpoise SACs will undoubtedly have consequences as to how some activities operate, and measures may need to be put in place to reduce disturbance. Implementation of any disturbance management is likely to be challenging given the complexity of marine activities, regulatory arrangements and scientific		

				impacts on the site as the protection is no longer solely considering effects on the population as a whole but making sure that the site is contributing positively to the species' Favourable Conservation Status.	uncertainty surrounding the significance of noise impacts on harbour porpoise. The approach recommended by SNCBs is that developers should ensure that there is sufficient time between the assessment and the start of construction for them to effectively implement mitigation/management, which could include: 1. Careful spatial planning and phasing of noisy activities. 2. Use of alternative foundations that do not require pile driving (e.g. suction buckets, gravity bases), noting that these may have other impacts. 3. Use of alternative methods of installation (e.g. vibropiling) to reduce the noise footprint. 4. Use of technology to reduce the sound levels at source or to minimise sound propagation and reduce the noise footprint. Harbour porpoise occur in elevated densities in some parts of the site compared to others during summer and winter. This may make mitigation slightly easier since summer is likely to be the most important construction season. The SNCBs and The Wildlife Trusts have concerns over the potential cumulative impacts on harbour porpoise within this SAC, and note that currently there is no mechanism to ensure that a strategic approach to the management of impacts is taken. They consider that this could be a significant consenting risk for offshore wind development in the North Sea characterisation areas. In parallel to new offshore wind leasing, The Crown Estate has committed to fund a collaborative programme of strategic enabling actions to increase the evidence base and support sustainable and coordinated expansion of offshore wind. Underwater noise and its management, assessment of impacts on sensitive receptors, and approaches to modelling and assessment, are all likely to form a key priority area for further work, and we anticipate collaborating with stakeholders on new work streams		
	Sites of Community Importance (SCIs)	None within the trigger distance					
	Ramsar	None within the trigger distance					
	Special Protection Areas (SPAs)	Outer Thames Estuary	Red-throated diver (wintering) Foraging areas for common tern (Breeding) and little tern (Breeding)	Maintain/enhance red-throated diver populations and supporting habitats. Conservation objectives for terns not yet available.	This site contains 38% of the British wintering population of red-throated diver. The presence of this SPA and the sensitivity of the red-throated diver offshore wind development/operation was the main reason why London Array II did not get consent – this should therefore be considered a		

					significant constraint for further offshore wind development in the area. It is noted however that the characterisation area excludes the majority of the SPA area which should go a long way to avoiding (or reducing) impacts on red-throated diver and should make the potential impact mitigable. Collision impacts on tern species will need to be taken into consideration for development within the characterisation area. Cable construction/vessel movement is also likely to be an important constraint even if offshore wind development avoids the SPA. This may be manageable with agreed best practice measures or mitigation. It should be noted that whilst the current Natural England advice is to use a 4 km buffer for red-throated diver, there is evidence of red-throated diver displacement from activity up to 12 km away. Royal Society for the Protection of Birds (RSPB) considers that red-throated diver at this site are very sensitive to offshore wind activity and the site should be considered a significant consenting risk. Both Natural England and JNCC have expressed a view that as a result of cumulative impacts from existing and consented offshore wind projects, adverse effects on integrity of red-throated diver from this site from future developments cannot be ruled out.		
Marine Conservation Zones (MCZs)		Kentish Knock East Foreland					
Sites of Special Scientific Importance (SSSIs)		None within the trigger distance					
Spawning and nursery grounds		There are few overlaps of high-intensity nursery and spawning grounds in the area (maximum is four); the most species overlaps occur to the north-west of the area. There is a herring spawning ground that covers a large proportion of the characterisation area and one cod area that intersects to the south-east.			Noise disturbance could be an issue with the potential for seasonal restrictions on piling during breeding. It will depend if the spawning grounds are still active and their precise locations, which may need to be determined by surveys. Cod are particularly sensitive to noise impacts.		
Social tier							
Royal Yachting Association (RYA) Automatic Identification System (AIS) intensity		There is an area of significant recreational traffic running to the west of the area around the Suffolk Coast Area of Outstanding Natural Beauty (AONB).			The interaction between this activity and the area is minimal and therefore does not pose a significant constraint.		
Marinas		None within the trigger distance.					
Bathing beaches		None within the trigger distance.					

Visibility from sensitive receptors	See visual analysis below.			

Review layers

Visibility from landscape designations and from the coast

The bands of significant visual impact are taken from the OSEA3[1] environmental report. It should be noted that these bands were challenged through the statutory stakeholder engagement by the Statutory Nature Conservation Bodies (SNCBs) so further analysis and engagement should be conducted to understand the visual constraint in potential development areas more fully.

The visibility from landscape designations analysis has been conducted using designations which include protections for landscapes and settings namely: National Parks, AONBs, Heritage Coasts and World Heritage sites. For more information on these, please consult the methodology report. The analysis draws on visibility from these designations but not the sensitivity of them to offshore wind developments. Proposals should draw on the relevant management plans or local policies to fully understand the level of constraint that exists in the vicinity of these landscape designations. As such, more analysis is required to fully understand the potential constraint.

	Band of significant visual impact	% of overlap with the characterisation area	Commentary	Area rating
Medium sensitivity receptors	0-13 km (3.6 MW turbines)	0%	A proportion of this area is within the 30 km band of significant visual impact; however, 89% is more than 30 km from shore. This means that although there may be some impact in specific areas, the majority of the area is relatively free from visual constraint.	
	13-20 km (4-8 MW turbines)	0%		
	20-30 km (10-15 MW turbines)	11%		
High sensitivity receptors	0-30 km	11%		

Visibility of sea surface from landscape designations		Receptor rating	Area rating
The west of the area may be visible from: • Suffolk Heritage Coast • Dedham Vale and Suffolk Coast and Heaths AONBs	The visible part of this area from designations is minimal however, where this does occur, significant mitigation will be required. There is a significant amount of this characterisation area that is not visible from these designations and hence the area rating is green.		

Ornithology outside of Special Protection Areas (SPAs) for high-risk species

Joint Nature Conservation Committee (JNCC), Natural England and Royal Society for the Protection of Birds (RSPB) advise that there are a number of information sources which should be taken into consideration in the assessment of potential impacts from offshore wind development in this characterisation area. These are:

- Site Information Centres on the JNCC website (http://jncc.defra.gov.uk/page-6895) which provide up-to-date information on protected areas, their features and status.
- Marine Ecosystems Research Programme (MERP) seabird distribution maps (https://marine-ecosystems.org.uk/Research_outcomes/Top_predators)
- Future of the Atlantic Marine Environment (FAME) and Seabird Tracking and Research (STAR) tracking data from the RSBP (https://rspb.maps.arcgis.com/apps/Cascade/index.html?appid=d6c3aa1ec7184a2895a01cebf451c7b3)
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[1] BEIS (2016), OESEA3 Environmental Report. Crown copyright 2016, p 291. URN 16D/033.

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- Thaxter, C.B., Ross-Smith, V., Bouten, W., Clark, N., Conway, G., Rehfisch, M. & Burton, N. (2015) Seabird–wind farm interactions during the breeding season vary within and between years: A case study of lesser black-backed gull Larus fuscus in the UK. Biological Conservation 186: 347-358

Species	Species	Commentary on coverage	Area rating
Herring gull	Alde-Ore Estuary SPA	The herring gull mean maximum seaward foraging range extends 61 km from the Alde-Ore Estuary SPA, with the majority of the Thames Approaches characterisation area overlapping this foraging range and lying within the maximum range (92 km). Given the existing offshore wind development within the maximum range, cumulative impacts of development within the Thames Approaches area with other offshore wind development are likely to be a consent consideration. Cumulative collision risk will also be affected by planned developments within the range, i.e. Thanet Extension, East Anglia One North, and East Anglia Two. Summer density of herring gull within its foraging range is generally low, with some slightly increased density concentrated along the coast extending either side of the colony; this slightly increased density moves further offshore in the north of the foraging range. Given the Thames Approaches area is located within the low-density portion of the foraging range, impacts on this SPA colony are expected to be low; concentrating any development further offshore would likely reduce these impacts further.	
Lesser black-backed gull	Alde-Ore Estuary SPA	The lesser black-backed gull mean maximum seaward foraging range extends 141 km from the Alde-Ore Estuary SPA, with the entire Thames Approaches characterisation area encompassed within this foraging range. Given the high level of existing offshore wind development within this foraging range, the cumulative impacts of development within the Thames Approaches area with other offshore wind development are likely to be a key consent consideration. Cumulative collision risk will also be affected by planned developments within this range, i.e. Norfolk Boreas, Norfolk Vanguard, East Anglia One North, East Anglia Two, and Thanet Extension. The summer density of lesser black-backed gulls is relatively high across its foraging range, with patches of highest density concentrated along the coast extending either side of the colony, and overlapping the north of the Thames Approaches area. Locating any development toward the south and east of the characterisation area would help to minimise any impacts on this SPA colony.	
Sandwich tern	Alde-Ore Estuary SPA and Foulness (Mid-Essex Coast Phase 5) SPA	The sandwich tern's mean maximum seaward foraging range extends 49 km from the Alde-Ore Estuary SPA, with the western half of the Thames Approaches area overlapping this foraging range. The westernmost portion of the area also slightly overlaps with the Foulness (Mid-Essex Coast Phase 5) sandwich tern foraging range. Given the relatively restricted foraging range of the species, the cumulative impacts of development with other offshore wind development within this characterisation area are likely to be of less concern than for the North Norfolk Coast colony of sandwich terns. The summer density of sandwich terns is distributed relatively uniformly across the Alde-Ore foraging range, with a slightly higher density following the coast and extending to the offshore area by 18-35 km. Locating any development in the Thames Approaches area further offshore and beyond the foraging range of sandwich tern (i.e. more than 49 km), would help to reduce any impacts on this species.	

Ministry of Defence (MoD) activity

	Issues when using 250 m tip heights	Issues when using 350 m tip heights	Receptor rating
Air traffic control (ATC)	No ATC concerns.	No ATC concerns.	
Air defence radar (ADR)	No ADR concerns.	Trimingham ADR concerns in the northern part of the Thames Approach area.	
Threat radar	No threat radar concerns.	No threat radar concerns.	
Low flying	No low flying concerns, however, there will be a lighting requirement.	No low flying concerns, however, there will be a lighting requirement.	
Ranges, danger and exercise areas	UXO should be taken into account. The MoD would need to review cable routes to ensure highly surveyed routes are not obstructed by cables or turbines.	UXO should be taken into account. The MoD would need to review cable routes to ensure highly surveyed routes are not obstructed by cables or turbines.	

	The MoD would have concerns if the cables came ashore or passed through the Shoeburyness D138 danger area. Consideration should be given to the explosives dump east of Orford Ness.	The MoD would have concerns if the cables came ashore or passed through the Shoeburyness D138 danger area. Consideration should be given to the explosives dump east of Orford Ness.	

Area commentary	Area rating
ADR concerns in the 350 m scenario in the northern part of the area. The Shoeburyness D138 danger area should also be avoided in cable routing. There will be a lighting requirement and consideration of UXO as per standard industry practice.	

Fishing activity

Gear type	Location and comments
Mobile gear	▪ There is an important fishery for sole which Belgian, Dutch and UK beam trawlers target (e.g. Brixham fleet migrates to target this species).
Static gear	▪ There is significant small open boat activity from numerous ports around the Thames Estuary in this area.
General	▪ Existing developments have had displacement impacts on the existing fleet (Offshore Wind, Offshore Renewable Joint Industry Project [ORJIP] displacement work focused on this area). There are significant issues with the impacts on the small vessel fleet inside 12 NM from existing developments, but the fleet is now organised and have good communication through Fishing Liaison with Offshore Wind and Wet Renewables Group (FLOWW).

Area commentary	Area rating
Significant fishing activity in the outer estuary with numerous pressures from existing developments.	

Marine plans

East Marine Plan	Spatially explicit policies	Issues	Area rating
Aggregates	AGG3: within defined areas of high potential aggregate resource, proposals should demonstrate in order of preference: a) That they will not prevent aggregate extraction b) How, if there are adverse impacts on aggregate extraction, they will minimise these c) How, if the adverse impacts cannot be minimised, they will be mitigated d) The case for proceeding with the application if it is not possible to minimise or mitigate the adverse impacts.	The characterisation area, particularly in the south east, overlaps with the area of optimal aggregate resource area identified in the East Marine Plan. Any new offshore wind development would need to consider that impacts to the aggregates industry would require negotiation with the sector. Whilst The Crown Estate leases/licences seabed for offshore wind and aggregate extraction it should be noted that aggregates tendering rounds currently run every two years, and so the requirement for liaison between industries will be ongoing.	
Tidal energy	TIDE1: in defined areas of identified tidal stream resource, proposals should demonstrate, in order of preference: a) That they will not compromise the potential future development of a tidal stream project b) How, if there are any adverse impacts on potential tidal stream deployment, they will minimise them c) How, if the adverse impacts cannot be minimised, they will be mitigated d) The case for proceeding with the proposal if it is not possible to minimise or mitigate the adverse impacts.	The northern part of the characterisation area overlaps with the area of tidal stream resource identified in the East Marine Plan. However, the overlap is, very small and is not considered to be a significant concern for future offshore wind development.	

Aquaculture	AQ1: within sustainable aquaculture development sites (identified through research), proposals should demonstrate in order of preference: a) That they will avoid altering the seabed or water column in ways which would cause adverse impacts to aquaculture productivity or potential future aquaculture development b) How, if there are adverse impacts on aquaculture development, they can be minimised c) How, if the adverse impacts cannot be minimised they will be mitigated d) The case for proceeding with the proposal if it is not possible to minimise or mitigate the adverse impacts.	In the western part of the characterisation area, there is a small area of overlap with the optimum sites of aquaculture potential identified in the East Marine Plan. However, the overlap is very small and is not considered to be a significant concern for future offshore wind development.	
Carbon Capture Storage (CCS)	CCS1: within defined areas of potential carbon dioxide storage, proposals should demonstrate in order of preference: a) That they will not prevent carbon dioxide storage b) How, if there are adverse impacts on carbon dioxide storage, they will minimise them c) How, if the adverse impacts cannot be minimised, they will be mitigated d) The case for proceeding with the proposal if it is not possible to minimise or mitigate the adverse impacts.	There is no overlap of the characterisation area with the areas of potential opportunity for CCS identified in the East Marine Plan.	
Ports and shipping	PS2: proposals that require static sea surface infrastructure that encroaches upon important navigation routes should not be authorised unless there are exceptional circumstances. Proposals should: a) Be compatible with the need to maintain space for safe navigation, avoiding adverse economic impact b) Anticipate and provide for future safe navigational requirements where evidence and/or stakeholder input allows c) Account for impacts upon navigation in-combination within other existing and proposed activities.	The characterisation area, particularly the western and southern extents, overlaps with the important navigation routes identified in the East Marine Plan. Any new offshore wind development would need to account for navigation routes when locating the project area.	

The Crown Estate key resource areas (KRAs) for other sectors

KRA category	Where	Commentary	Receptor rating	Area rating
Cables	Intersects a small proportion of the area to the west.	This KRA is significant in size due to the landing resource for cables generally being dictated by the shortest distance between connection points. Due to the significant number of alternative options for landing cables, the risk of sterilising valuable resource is deemed to be minimal.		
Carbon Capture Storage (CCS) stores	Overlaps with an aquifer which is rated as ‘Limited’.	These sites are not the most favourable in terms of development potential so present little constraint.		
CCS infrastructure	Coverage across the west of the area.	This KRA is significant in size due to the opportunity for CCS infrastructure development generally being dictated by the shortest distance between connection points. Due to the significant number of alternative options for landing		

		CCS infrastructure, the risk of sterilising valuable resource is deemed to be minimal.		
Minerals	Coverage across the area with prime resource to the east of the area.	This is a very important aggregate resource for the London market, increasing in value as onshore aggregate reserves decrease. There is significant opportunity for offshore wind farm development across the rest of the area.		
Pipelines	No interaction.			
Sandscaping	Covers all of the area inside 12 NM.	This KRA is significant in size due to the knowledge of potential sites and resources for sandscaping schemes not being well known currently. As such, significant conclusions cannot be drawn from this KRA.		
Tidal range	No interaction.			
Tidal stream	No interaction.			
Wave	No interaction.			

National Air Traffic Services (NATs) radar overlap

% Overlap with Primary Surveillance Radar assessment buffer (200 m turbines)	Commentary	Area rating
4.91%	Very little overlap with this area. Further assessment is unlikely to be required.	

Water Framework Directive (WFD)

% of the area covered	Spatial overlap with the area	Commentary	Area rating
No intersect.			

Marine Cultural Heritage

Heritage asset type	Where	Commentary on sensitivity from offshore wind development	Receptor rating
Maritime archaeology and wrecks	Significant potential throughout the characterisation area, particularly in the west and south parts of the area close to the main navigational routes into London.	The area contains a significant number of known wrecks and obstructions, and there are a number of significant navigational hazards and sandbanks. A large number of isolated finds of maritime archaeological material are noted in the area, owing much to the presence of a number of marine aggregate licence areas and OWF. As is commonplace throughout UK waters, there is a particular dominance of steel and metal vessels from the 19th and 20th Centuries. There are a significant number of wrecks associated with 20th Century military activity and the East Coast War Channels (ECWCs), which were maintained and patrolled routes for civilian shipping between the Scottish border and the North Kent Coast, in operation during the First and Second World Wars. The characterisation area thus contains large numbers of heritage assets, both of known wreck sites and of documented losses associated with the ECWCs. The area has particular potential for the recovery of material associated with trade in London from at least the Roman period onwards. There is potential for the recovery of remains from the earliest seafaring in the prehistoric period to the present day, although the potential for seafaring craft from periods of prehistory at greater distances offshore is limited due to the capabilities of vessels at this time. Established procedures exist to ensure that any historic wrecks, both known and unknown, and associated remains, are identified as part of any proposed OWF development so that any impacts can be mitigated and minimised.	
Aviation archaeology	Significant potential for the recovery of remains throughout characterisation area as demonstrated by the recovery of numerous finds of this type in the vicinity of the area e.g. Thames Gateway recovery of a German aircraft.	There is potential within the area for the discovery of the remains of crashed aircraft and associated cultural material from the birth of aviation at the start of the 20th Century to the present day. The greatest potential is associated with losses from the Second World War, owing to activity in numerous airborne battles, and the contemporary defence of strategic locations and vital shipping routes along the Essex, Suffolk and Kent coast. Historic records indicate a significant number of aircraft losses from the Second World War in this area, including seventy-three losses off the coast of Suffolk, one hundred and twenty-three off the coast of Essex, and three hundred and eighty off the Kent coast. Additionally, several finds of aviation archaeological material have been reported from the area owing to the presence of several marine aggregate licence areas. Furthermore, in 2011/12 a number of finds representing a rare German Ju88 aircraft were recovered from a location ten miles to the south-east of Clacton during dredging for a new shipping channel for Thames Gateway. While not directly within the characterisation area, these finds indicate the great potential of the area as a former theatre of war and site of significant aerial conflict during the Second World War. As such, the characterisation area has great potential for the discovery of more material of this type. Any remains, if present, may be identified or impacted upon by wind farm development. While existing standard mitigation measures may be utilised for specific projects in the area, further site-specific mitigation may be required, including excavation and recovery of significant remains that are encountered and where impacts are unavoidable. However, it should be noted that this is an extreme example and would only be undertaken following significant discussion with advisors and in rare cases where preservation *in situ* was not a feasible option.	
Submerged prehistoric landscapes	Potential across the characterisation area with enhanced potential in areas close to geomorphological features such as the palaeochannels already being worked by the marine aggregate industry.	During periods of lower sea level caused by three major glaciations (the Anglian, Wolstonian and Devensian) the characterisation area would have been continually exposed and, as such, there is potential for the recovery of cultural material associated with the utilisation of the land surfaces during these periods. Any remains would be expected to be associated with geomorphological features and the geological deposits from these periods – recent research by the University of Southampton identified a number of Cromerian landscape features of potential significance in the Outer Thames Estuary. There is some potential for the survival of sediments and primary and secondary context artefactual material in areas where glacial activity has not eroded earlier sedimentary deposits. A large amount of prehistoric faunal remains has been recovered by trawling in the area, and the characterisation area has significant potential to reveal the preservation of submerged palaeo landscapes of the Pleistocene and Holocene ages. Faunal remains and cultural material in the form of worked flint tools and hand axes have also been recovered from the region. Significant deposits and possible finds may therefore be anticipated in association with Pleistocene and early Holocene channel systems and geomorphological features that were present and exposed prior to marine transgression. Therefore, there is potential for remains from this period to be present and impacted by OWF development in the characterisation area. Established procedures exist to ensure that any submerged prehistoric landscapes, associated geographical and geomorphological features, and associated deposits, features and finds are identified as part of any proposed OWF development and impacts are mitigated and minimised.	
Area commentary			Area rating
There are extensive heritage assets and the potential for recovering further remains across the area, with particular potential for the recovery of historic wrecks, aviation archaeological material, and submerged prehistoric landscapes and associated cultural material. The main issue for this area lies in the potential cumulative impact of further OWF development on submerged prehistoric resources, and as such, consideration needs to be given to the cumulative effects on this resource at a strategic level across the area. Strategic mitigation may include the exclusion of certain parts of the characterisation area, so as to reduce the cumulative effects of further wind farm development on submerged prehistoric resources. However, further research may be required to better understand the cumulative impacts of development on this receptor.			

Glossary of acronyms and abbreviations

ADR	Air Defence Radar
AONB	Area of Outstanding Natural Beauty
ATC	Air Traffic Control
CCS	Carbon Capture Storage
cSAC	Candidate Special Area of Conservation
ECWCs	East Coast War Channels
EPS	European Protected Species
FAME	Future of the Atlantic Marine Environment
FLOWW	Fishing Liaison with Offshore Wind and Wet Renewables Group
HRA	Habitat Regulations Assessment
JNCC	Joint Nature Conservation Committee
km	Kilometre
KRA	Key Resource Area
m	Metre
MCZ	Marine Conservation Zone
MERP	Marine Ecosystems Research Programme
MoD	Ministry of Defence
MPA	Marine Protected Area
MW	Mega watt
NATS	National Air Traffic Services
NM	Nautical Mile
OESEA3	Offshore Energy Strategic Environmental Assessment 3
OFTO	Offshore Transmission Owners
ORJIP	Offshore Wind, Offshore Renewable Joint Industry Project
OWF	Offshore Wind Farm
pSPA	Potential Special Protection Area
PSR	Primary Surveillance Radar
Ramsar	Ramsar Convention on wetlands of international Importance especially as waterfowl habitat, also known as the ‘Convention on Wetlands’.
RSPB	Royal Society for the Protection of Birds
RYA AIS	Royal Yachting Association (RYA) Automatic Identification System (AIS)
SAC	Special Area of Conservation
SCI	Site of Community Importance
SNCB	Statutory Nature Conservation Body
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
STAR	Seabird Tracking and Research
UXO	Unexploded Ordnance
WFD	Water Framework Directive

THE CROWN ESTATE

Resource and Constraints Assessment for Offshore Wind

Characterisation Area Report
Kent Coast

8

38255-TCE-REP-013

Characterisation Area Report: 8 – Kent Coast

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Version	Status	Issue date
1.1	Draft	July 2018
1.2	Draft	November 2018
1.3	Final	September 2019

The information included in this report should be read in conjunction with the *Resource and Constraints Assessment for Offshore Wind: Methodology Report* and the *Summary Stakeholder Feedback Report*. The trigger distance for constraints to be included in the constraints analysis section of this report is 1 nautical mile (NM).

The Crown Estate has undertaken the analysis in this report using the evidence available to it, internal expertise and support from external advisers where appropriate. The analysis does not obviate any potential need for any Habitat Regulations Assessment (HRA) or any project level consideration of the potential impact of development. The analysis does not supersede any statutory policies or marine plans. The analysis, including the data and information contained in this document, presents a point in time assessment with changes likely to both the presence and nature of constraints.

This report is provided for information purposes only and no party may rely on the accuracy, completeness or fitness of its content for any particular purpose. The Crown Estate makes no representation, assurance, undertaking or warranty in respect of the analysis in the report including all data and information contained in it.

Receptor rating		Area rating	
Receptor assessed but no interaction noted		Receptor assessed but no interaction noted	
Interaction acceptable with best practice/accepted mitigation		The constraint will present the need to implement best practice/accepted mitigation measures to enable acceptable development within the whole area	
Interaction acceptable with moderate mitigation		The constraint will present the need to implement moderate mitigation measures to enable acceptable development within the whole area	
Interaction acceptable with significant mitigation		The constraint will present the need to implement significant and/or strategic level mitigation measures to enable acceptable development within the whole area	
Significant/insurmountable issue that would be challenging to mitigate within the area of influence of a receptor		Significant/insurmountable issue that would be challenging to mitigate for any development within the whole area	
No data coverage across the area		No data coverage across the area	

Constraints Analysis

Note that in addition to The Crown Estate leases/licences within this table, The Crown Estate has also identified key resource areas (KRAs) which may be suitable for the future development of different marine sectors. Information about overlapping KRAs that overlap this characterisation area is described in a latter section of this document.

Exclusions model — Hard constraints			Receptor rating	Area rating
	Present	Commentary		
The Crown Estate agreements	Telecoms cables: numerous active and inactive cables with landfall around the east and north Kent Coast.	The cables have been removed from the characterisation area and should be avoided where possible by using best practice/accepted mitigation. The large number of cables may be a constraint on the area available for new arrays. Since cable crossings require cable protection (which may have adverse environmental effects), crossings should be minimised where practicable.		
	London Array One Wind Farm: adjacent to the northern boundary of the characterisation area.	The cumulative impact of offshore wind farm (OWF) developments and associated cable infrastructure will need to be considered in this area as there may be concerns around wind resource and proximity to the existing site. There will need to be a 5 km buffer around existing offshore wind projects – any new wind developments within 5 km will need the permission of the incumbent party.		
	Thanet Wind Farm: within the northern part of the characterisation area.	The cumulative impact of OWF developments and associated cable infrastructure will need to be considered in this area as there may be concerns around wind resource and proximity to the existing site. There will need to be a 5 km buffer around existing offshore wind projects – any new wind developments within 5 km will need the permission of the incumbent party.		
	OWF export cable routes (OFTOs): London Array and Thanet OFTOs within and adjacent to the northern part of the characterisation area.	The OWF cable routes should be avoided where possible and liaison would be required with existing customers. However, any concerns can likely be avoided with best practice/accepted mitigation. Conflicts may arise where there are numerous export cable routes around the same landfall area as connections to the grid may be limited. Since cable crossings require cable protection (which may have adverse environmental effects), crossings should be minimised where practicable.		
	NEMO Link® interconnector: intersecting the central part of the characterisation area.	This interconnector route will need to be avoided where possible and liaison would be required with existing customers. However, any concerns can likely be avoided with best practice/accepted mitigation.		
	Aggregate Area 521: exploration and option site intersecting the central part of the characterisation area (for Dover Harbour Board).	Would require a 2 km buffer around it and negotiations with the customer.		
	Aggregates area 528/1-2: exploration and option agreement site to the north of the characterisation area.	Would require a 2 km buffer around it and negotiations with the customer.		
	The Crown Estate has completed a plan-level Habitats Regulations Assessment for 2017 Offshore Wind Extensions and intends to grant right for: • Thanet Wind Farm (extension of up to 300 MW). The Crown Estate intends to grant rights for this project subject to the outcomes of a plan level HRA process.	As with other OWFs, a 5 km buffer will be in place around the final area under lease for this extension project. Any new wind developments within 5 km will need the permission of the incumbent party. Proposals for projects coming forwards through new leasing should be cognisant of this extension and potential cumulative impacts on all receptors. There is potentially a significant increase to deployed capacity through this project in this relatively small area which could have a material impact on the level of constraint across the rest of the characterisation area.		
Other energy infrastructure	None within the trigger distance.	No existing oil and gas infrastructure and no new licences under development in this area.		
Navigation	There is significant navigational dredging in and adjacent to the area related to the port of Ramsgate.	There is sufficient potential available in the area to allow mitigation or avoidance of interaction through appropriate siting.		
	The Channel traffic separation schemes and deep-water route run adjacent to the area.	Need to be cautious not to inhibit traffic in the channel area as it is important to the UK and European economies; although there appears to be sufficient potential within the characterisation area taking account of these constraints.		

Social	There are five designated wrecks intersecting the area (between Dover and Deal).	There is sufficient potential available in the area to allow mitigation or avoidance of interaction through appropriate siting.		
Restrictions model — Soft constraints			Receptor rating	Area rating
Economic tier				
Navigation	The area intersects with two anchorage areas just outside the Port of London Authority.	These areas should be avoided if possible. Although they can be moved they are sited in areas that have appropriate shelter/seabed for safe anchoring. The amount of area covered by these means that they will not have a huge impact on development in the area.		
	The area is within 1.8 km of Dover, Ramsgate and Port of London Harbour Authority Areas.	There is sufficient potential available in the area to allow mitigation/avoidance of interaction through appropriate siting.		
	There is a large volume of traffic navigating through the channel including through the area.	Need to be cautious not to inhibit traffic in the channel area as it is of significant importance to the UK and European economies. The traffic is not constrained to the navigation channels and may cause a significant constraint to development in the area.		
	There is one disposal site in the area which is not significant in size.	There is sufficient potential available in the area to allow mitigation/avoidance of interaction through appropriate siting.		
Subsurface	None within the trigger distance.			
Fishing	*See fisheries commentary below.*		N/A	
Environmental tier				

The assessment of the sensitivity of Marine Protected Areas (MPAs) to pressures caused by offshore wind development and operation is assessed in a separate spreadsheet which will be made available as part of the Round 4 evidence base. Commentary has been noted in the relevant characterisation document where MPAs either overlap or are within 1 NM of the characterisation area and have been assessed as a yellow rating or above. For more information on the methodology for this assessment, please refer to the methodology report.

Assessments of Annex II species have not been made as part of the characterisation process. Such assessments will need to be undertaken at project level for individual developments within the characterisation area.

Type of designation		Name of designation	Designated features/species	Conservation objectives	Commentary	Receptor rating	Area rating
European marine designations	Special Areas of Conservation (SAC)	Thanet Coast (450 m), Sandwich Bay (900 m), Dover to Kingsdown Cliffs					
	SAC	Margate and Long Sands	Subtidal sandbanks	Maintain/restore as appropriate	The sandbank features are considered sensitive to pressures exerted by offshore wind development and operation (including cabling) and an assessment of impact will need to be made at project level. The area will be sensitive to significant changes in sediment dynamics as well as direct impacts on the features. Impacts are likely to be avoidable or mitigable with appropriate foundation choice and location of project/cabling, especially since the majority of the site has been excluded from the characterisation area. Consideration should also be given to the SNCB's report on cable sensitivity entitled 'Natural England and JNCC advice on key sensitivities of habitats and Marine Protected Areas in English Waters to offshore wind farm cabling within Proposed Round 4 leasing areas'.		

	Harbour porpoise SAC	Southern North Sea	Harbour porpoise	The conservation objectives for the Southern North Sea SAC are: To ensure that the integrity of the site is maintained and that it makes the best possible contribution to maintaining Favourable Conservation Status (FCS) for harbour porpoise in UK waters. In the context of natural change, this will be achieved by ensuring that: 1. Harbour porpoise is a viable component of the site; 2. There is no significant disturbance of the species; and 3. The condition of supporting habitats and processes, and the availability of prey is maintained. This is similar to the protection afforded to harbour porpoise throughout their range by the European Protected Species (EPS) regulations in the UK. However, the Natura 2000 principles and HRA tests set the bar higher than EPS protection for impacts on the site as the protection is no longer solely considering effects on the population as a whole but making sure that the site is contributing positively to the species' Favourable Conservation Status.	Harbour porpoise could be affected by offshore wind development in the area, mainly through acoustic impacts (disturbance and hearing damage) from pile driving, UXO clearance and possibly some geotechnical surveys. Disturbance and barrier effects arising from vessel movements and presence of turbines may also occur. The noise disturbance during wind farm construction is likely to be significant if using pile-driving to install the turbine foundations, and there is also a risk from UXO clearance. There will be a need to consider population level effects of disturbance (mainly during construction), and there may be some additional requirements to investigate potential impacts on prey species. The designation of harbour porpoise SACs will undoubtedly have consequences as to how some activities operate, and measures may need to be put in place to reduce disturbance. Implementation of any disturbance management is likely to be challenging given the complexity of marine activities, regulatory arrangements and scientific uncertainty surrounding the significance of noise impacts on harbour porpoise. The approach recommended by SNCBs is that developers should ensure that there is sufficient time between the assessment and the start of construction for them to effectively implement mitigation/management, which could include: 1. Careful spatial planning and phasing of noisy activities. 2. Use of alternative foundations that do not require pile driving (e.g. suction buckets, gravity bases), noting that these may have other impacts. 3. Use of alternative methods of installation (e.g. vibropiling) to reduce the noise footprint. 4. Use of technology to reduce the sound levels at source or to minimise sound propagation and reduce the noise footprint. Harbour porpoise occur in elevated densities in some parts of the site compared to others during summer and winter. This may make mitigation slightly easier since summer is likely to be the most important construction season. The SNCBs and The Wildlife Trusts have concerns over the potential cumulative impacts on harbour porpoise within this SAC, and note that currently there is no mechanism to ensure that a strategic approach to the management of impacts is taken. They consider that this could be a significant consenting risk for offshore wind development in the North Sea characterisation areas. In parallel to new offshore wind leasing, The Crown Estate has committed to fund a collaborative programme of strategic enabling actions to increase the evidence base and support sustainable and coordinated expansion of offshore wind. Underwater noise and its management, assessment of impacts on sensitive receptors, and approaches to modelling and assessment, are all likely to form a key priority area for further work, and we anticipate collaborating with stakeholders on new work streams.		
	Sites of Community Interest (SCIs)	None within the trigger distance					

	Ramsar	Thanet Coast and Sandwich Bay (900 m)	No specific conservation objectives/management measures - use those for Thanet Coast and Sandwich Bay Special Protection Area (SPA)		Site essentially has the same features (and the same level of protection) as the Thanet Coast and Sandwich Bay SPA. Commentary for the Thanet Coast and Sandwich Bay SPA is reproduced below. The site contains rocky chalk shore, estuaries, dunes, saltmarsh and grassland. Given the distance from the characterisation area, it is unlikely that habitats at the site will be affected by offshore activity, although they may be sensitive to cable landfall (dunes sand saltmarsh may be particularly sensitive). Impacts of landfall would probably be avoidable or mitigable. Impacts on turnstone and plover are likely to be limited since these species do not forage far offshore, although they may be on passage through offshore arrays. Impacts on little tern may be more serious since they may forage further offshore, and this species has been a consenting issue for offshore wind projects in the past. The impact may be mitigable however, since the foraging range of little tern is not likely to extend far into the characterisation area.		
	Special Protection Areas (SPAs)	Outer Thames Estuary	Red-throated diver (wintering) Foraging areas for common tern (Breeding) and little tern (Breeding)	Maintain/enhance red throated diver populations and supporting habitats. Conservation objectives for terns not yet available.	This site contains 38% of the British wintering population of red-throated diver. The presence of this SPA and the sensitivity of the red-throated diver offshore wind development/operation was the main reason why London Array II did not get consent - this should therefore be considered a significant constraint for further offshore wind development in the area. It is noted however that the characterisation area excludes the majority of the SPA area which should go a long way to avoiding (or reducing) impacts on red-throated diver and should make the potential impact mitigable. Collision impacts on tern species will need to be taken into consideration for development within the characterisation area. Cable construction/vessel movement is also likely to be an important constraint even if offshore wind development avoids the SPA. This may be manageable with agreed best practice measures or mitigation. It should be noted that whilst the current Natural England advice is to use a 4 km buffer for red-throated diver, there is evidence of red-throated diver displacement from activity up to 12 km away. Royal Society for the Protection of Birds (RSPB) consider that red-throated diver at this site are very sensitive to offshore wind activity and the site should be considered a significant consenting risk. Both Natural England and JNCC have expressed a view that as a result of cumulative impacts from existing and consented offshore wind projects, adverse effects on integrity of red-throated diver from this site from future developments cannot be ruled out.		
	SPA	Thanet Coast and Sandwich Bay (900 m)	Ruddy turnstone (wintering) European golden plover (wintering) Little tern (breeding)	Maintain/restore as appropriate - includes the birds and their supporting habitats	The site contains rocky chalk shore, estuaries, dunes, saltmarsh and grassland. Given the distance from the characterisation area, it is unlikely that habitats at the site will be affected by offshore activity, although they may be sensitive to cable landfall (dunes sand saltmarsh may be particularly sensitive). Impacts of landfall would probably be avoidable or mitigable. Impacts on turnstone and plover are likely to be limited since these species do not forage far offshore, although they may be on passage through offshore arrays. Impacts on little tern may be more serious since they may forage further offshore, and this species has been a consenting issue for offshore wind projects in the past. The impact may be mitigable however,		

					since the foraging range of little tern is not likely to extend far into the characterisation area.		
	Potential Special Protection Area (pSPA)	None within the trigger distance					
Marine Conservation Zones (MCZs)		Thanet Coast Foreland					
MCZ		Dover to Deal	High energy intertidal rock Intertidal coarse sediment Intertidal sand and muddy sand Intertidal under boulder communities Littoral chalk communities Low energy intertidal rock Moderate energy infralittoral rock Moderate energy intertidal rock Native oyster (Ostrea edulis) Subtidal chalk Subtidal mixed sediments Subtidal sand Blue mussel beds High energy circalittoral rock Moderate energy circalittoral rock Ross worm (Sabellaria spinulosa) reefs	The general management approach for the site is to maintain all features in favourable condition. Features added in the Tranche 3 consultation (mussel beds, high and moderate energy circalittoral rock and Sabellaria) need to recover to favourable condition.	It is noted that much of the MCZ area is excluded from the characterisation area which will limit the impact on habitats within the MCZ; the main effects would be likely to arise from cables cross the site. Rocky habitats and mixed sediments are likely to be particularly sensitive to such impacts, although all features have the potential to be affected by cabling/landfall at the site. Impacts are likely to be avoidable or mitigable. TWT note that the features at this site would be sensitive to impacts from cabling (either from this characterisation area or from the South East characterisation area). Features currently in unfavourable condition should be considered particularly sensitive. Consideration should also be given to the SNCB's report on cable sensitivity entitled 'Natural England and JNCC advice on key sensitivities of habitats and Marine Protected Areas in English Waters to offshore wind farm cabling within Proposed Round 4 leasing areas'.		
MCZ	Goodwin Sands	Subtidal sand Subtidal coarse sediment Blue mussel (Mytilus edulis) beds English Channel Outburst Flood Features (Quaternary fluvio-glacial erosion features) Moderate energy circalittoral rock Ross worm (Sabellaria spinulosa) reefs	Conservation Objectives for Circalittoral rock, sabellaria and blue mussel features are to recover to favourable condition. All other features have a conservation objective to maintain in favourable condition	This MCZ was designated in May 2019. There is a significant overlap between this MCZ and the characterisation area, and features within the MCZ may be highly sensitive to offshore wind development (particularly the circalittoral rock and blue mussel beds, since these are not currently in favourable condition). Given the relatively limited distribution of these sensitive features, it is possible that they could be avoided and impacts mitigated. Consideration should also be given to the SNCB's report on cable sensitivity entitled 'Natural England and JNCC advice on key sensitivities of habitats and Marine Protected Areas in English Waters to offshore wind farm cabling within Proposed Round 4 leasing areas'.		
Sites of Special Scientific Interest (SSSIs)	Sandwich Bay to Hacklinge Marshes (900 m)	Golden plover (non-breeding) Grey plover (non-breeding) Ringed plover (non-breeding)	Feature condition ranges from favourable to unfavourable (declining)	Given the distance between the site and the characterisation area, the majority of features at the site are not considered sensitive to offshore wind activity unless landfall is made through the site. Cabling impacts are likely to be mitigable/avoidable, although saltmarsh and dune systems may be quite sensitive.		

		Sanderling (non-breeding) Reefs Sea caves Saltmarsh & associated invertebrates Vascular plant assemblage Geological/Earth Heritage Ditches Fixed and mobile dunes & associated vegetation Woodland Grassland & associated invertebrates		It is possible that some of the bird features at the site could be affected by offshore arrays, although the species are shoreline foragers rather than offshore foragers so their exposure would be limited. Some of the bird features are also protected through the overlapping Thanet Coast and Sandwich Bay SPA.		
SSSI	Dover to Kingsdown Cliffs (825 m)	Fulmar (breeding) Kittiwake (breeding) Lesser black-backed gull (breeding) Reefs Vascular plant assemblage Grassland Geological/Earth Heritage Vegetated cliffs & crevices House Martin (nesting)	Feature condition ranges from favourable to unfavourable (no change)	Given the distance between the site and the characterisation area, the majority of features at the site are not considered sensitive to offshore wind activity unless landfall is made through the site - this may be unlikely given the presence of cliffs. Cabling impacts are likely to be mitigable/avoidable. It is possible that some of the bird features at the site could be affected by offshore arrays. The birds are not protected as part of a SPA designation, and the distance between the site and potential arrays is likely to be sufficient to allow mitigation of potential impacts.		
SSSI	Thanet Coast (1.5 km)	Little tern (breeding) Grey plover (non-breeding) Ringed plover (non-breeding) Sanderling (non-breeding) Turnstone (non-breeding) Aggregations of birds on passage Algae assemblage Coastal vegetated shingle Reefs Sea caves Littoral sediment Saline coastal lagoons Vascular plant assemblage Geological/Earth Heritage Grassland Woodland Cliffs	Where the condition of features has been assessed, it is favourable.	Given the distance between the site and the characterisation area, the majority of features at the site are not considered sensitive to offshore wind activity unless landfall is made through the site (which may be unsuitable owing to the presence of cliffs). Cabling impacts are likely to be mitigable/avoidable. It is possible that some of the bird features at the site could be affected by offshore arrays, although most of the species are shore foragers rather than offshore foragers so their exposure would be limited. The exception to this is the breeding little tern population which may forage a distance offshore. Some of the bird features (including the little tern) are also protected through the overlapping Thanet Coast and Sandwich Bay SPA.		
Spawning and nursery grounds		There are few overlaps of high-intensity nursery and spawning grounds in the area (maximum is four). There are more species using the northern part of the area for spawning and nursery activities		This data does not show this area to be of significant sensitivity so should be viewed as a minimal constraint.		
Social tier						
Royal Yachting Association	This is relatively heavy recreational vessel traffic transiting through the area.	There is sufficient potential available in the area to allow mitigation/avoidance of interaction through appropriate siting.				

(RYA) Automatic Identification System (AIS)				
Marinas	None within the trigger distance.			
Bathing beaches	There are three bathing beaches close to the area.	There is sufficient potential available in the area to allow mitigation/avoidance of interaction through appropriate siting.		
Visibility from sensitive receptors	See visual analysis below.			

Review layers

Visibility from landscape designations and from the coast

The bands of significant visual impact are taken from the OSEA3[1] environmental report. It should be noted that these bands were challenged through the statutory stakeholder engagement by the Statutory Nature Conservation Bodies (SNCBs) so further analysis and engagement should be conducted to understand the visual constraint in potential development areas more fully.

The visibility from landscape designations analysis has been conducted using designations which include protections for landscapes and settings namely: National Parks, Areas of Outstanding Natural Beauty (AONBs), Heritage Coasts and World Heritage sites. For more information on these, please consult the methodology report. The analysis draws on visibility from these designations but not the sensitivity of them to offshore wind developments. Proposals should draw on the relevant management plans or local policies to fully understand the level of constraint that exists in the vicinity of these landscape designations. As such, more analysis is required to fully understand the potential constraint.

	Band of significant visual impact	% of overlap with the characterisation areas	Commentary	Area rating
Medium sensitivity receptors	0-13 km (3.6 MW turbines)	50%	Virtually all of this area is visible from the coast with a half within 13 km. Mitigation options will be limited, and consideration needs to be given to cumulative impacts with numerous existing assets also located in this small area.	
	13-20 km (4-8 MW turbines)	30%		
	20-30 km (10-15 MW turbines)	19%		
High sensitivity receptors	0-30 km	99%		

Visibility of sea surface from landscape designations		Receptor rating	Area rating
The relevant designations in this area are: • Dover-Folkestone Heritage Coasts • South Foreland Heritage Coasts • Kent Downs AONB	The number of viewpoints that this characterisation area is visible from is relatively low in the model however the short close proximity to shore suggests that this area will be challenging from a visual constraint perspective especially in the southern section of this characterisation area.		

Ornithology outside of Special Protection Areas (SPAs) for high-risk species

Joint Nature Conservation Committee (JNCC), Natural England and Royal Society for the Protection of Birds (RSPB) advise that there are a number of information sources which should be taken into consideration in the assessment of potential impacts from offshore wind development in this characterisation area. These are:

- Site Information Centres on the JNCC website (http://jncc.defra.gov.uk/page-6895) which provide up-to-date information on protected areas, their features and status.
- Marine Ecosystems Research Programme (MERP) seabird distribution maps (https://marine-ecosystems.org.uk/Research_outcomes/Top_predators)
- Future of the Atlantic Marine Environment (FAME) and Seabird Tracking and Research (STAR) tracking data from the RSBP (https://rspb.maps.arcgis.com/apps/Cascade/index.html?appid=d6c3aa1ec7184a2895a01cebf451c7b3)
- Wakefield, E., Owen, E., Baer, J., Carroll, M., Daunt, F., Dodd, S., Green, J., Guilford, T., Mavor, R., Miller, P., Newell, M., Newton, S., Robertson, G., Shoji, A., Soanes, L., Votier, S., Wanless, S. & Bolton, M. (2017) Breeding density, fine-scale tracking, and large-scale modeling reveal the regional distribution of four seabird species. Ecological Applications https://doi.org/10.1002/eap.1591
- Cleasby, I.R., Owen, E., Wilson, L.J., Bolton, M. (2018) Combining habitat modelling and hotspot analysis to reveal the location of high density seabird areas across the UK: Technical Report. RSPB Research Report no. 63
- Kober, K., Webb, A., Win, I., Lewis, M., O'Brien, S, Wilson, L.J, Reid, J.B. (2010) An analysis of the numbers and distribution of seabirds within the British Fishery Limit aimed at identifying areas that qualify as possible marine SPAs. JNCC Report 431 (and the distribution maps therein) (http://jncc.defra.gov.uk/page-5622)

[1] BEIS (2016), OESEA3 Environmental Report. Crown copyright 2016, p 291. URN 16D/033.

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- Thaxter, C.B., Ross-Smith, V., Bouten, W., Clark, N., Conway, G., Rehfisch, M. & Burton, N. (2015) Seabird–wind farm interactions during the breeding season vary within and between years: A case study of lesser black-backed gull Larus fuscus in the UK. Biological Conservation 186: 347-358

Species	Site	Commentary on coverage	Area rating
Herring gull	Alde-Ore Estuary SPA	The herring gull mean maximum seaward foraging range extends 61 km from the Alde-Ore Estuary SPA, with the northern end of the Kent Coast characterisation area, a small proportion of the area overall, overlapping this foraging range. The majority of the remainder of the characterisation area lies within the maximum range (92 km). Given the existing offshore wind development within the maximum range herring gull range, cumulative impacts of development within the Kent Coast area with other offshore wind development are likely to be a consent consideration. Cumulative collision risk will also be affected by planned developments within the range, i.e. Thanet Extension, East Anglia One North, and East Anglia Two. Summer density of herring gull within its foraging range is generally low, with some slightly increased density concentrated along the Kent coastline and extending northwards towards the London Array development. Much of the Kent Coast area overlaps this increased density; however, given the distance from the Alde-Ore colony, and that this increase represents only a slightly higher bird density, this is not expected to add substantially to consent risk.	
Lesser black-backed gull	Alde-Ore Estuary SPA	The lesser black-backed gull mean maximum seaward foraging range extends 141 km from the Alde-Ore Estuary SPA, with the entire Kent Coast characterisation area encompassed within this foraging range. Given the high level of existing offshore wind development within this foraging range, cumulative impacts of development within the Kent Coast area with other offshore wind development are likely to be a key consent consideration. Cumulative collision risk will also be affected by planned developments within this range, i.e. Norfolk Boreas, Norfolk Vanguard, East Anglia One North, East Anglia Two, and Thanet Extension. Summer density of the lesser black-backed gull is relatively high through much of its foraging range, with patches of highest density lying to the north of the Kent Coast area; the characterisation area itself is in an area of low lesser black-backed gull density. Locating any development within the Kent Coast area towards the south would help increase the distance from the Alde-Ore Estuary SPA and so help minimise any impacts on the colony.	
Sandwich tern	Foulness (Mid-Essex Coast Phase 5) SPA	The sandwich tern mean maximum seaward foraging range extends 49 km from the Foulness (Mid-Essex Coast Phase Five) SPA, with the north-western part of the Kent Coast area overlapping this foraging range. Given the relatively restricted foraging range of the species, and changes between the consented and as-built developments within this range, cumulative impacts of development within this characterisation area with other offshore wind development are likely to be of less concern than with the North Norfolk coast colony. Summer density of sandwich tern is relatively uniformly distributed across the Foulness foraging range, with a slightly higher density concentrated around the colony itself. The majority of the Kent Coast area overlaps an area of slightly increased density. Locating any development in the Kent Coast area further offshore and beyond the mean maximum foraging range of sandwich tern (i.e. > 49 km), would help minimise any impacts on the Foulness SPA colony.	

Ministry of Defence (MoD) activity

	Issues when using 250 m tip heights	Issues when using 350 m tip heights	Receptor rating
Air traffic control (ATC)	No ATC concerns.	No ATC concerns.	
Air defence radar (ADR)	No ADR concerns.	No ADR concerns.	
Threat radar	No threat radar concerns.	No threat radar concerns.	
Low flying	No low flying concerns, however, there will be a lighting requirement.	No low flying concerns, however, there will be a lighting requirement.	
Ranges, danger and exercise areas	UXO should be taken into account. The MoD would need to review cable routes to ensure highly surveyed routes are not obstructed by cables or turbines or pass through any danger areas.	UXO should be taken into account. The MoD would need to review cable routes to ensure highly surveyed routes are not obstructed by cables or turbines or pass through any danger areas.	

Area commentary	Area rating
There will be a lighting requirement and consideration of UXO as per standard industry practice.	

Fishing activity

Gear type	Location and comments
Mobile gear	▪ There is an important fishery for sole which Belgian, Dutch and UK beam trawlers target (e.g. Brixham fleet migrates to target this species).
Static gear	▪ There is significant small open boat activity from numerous ports around the Thames Estuary in this area.
General	▪ Existing developments have had displacement impacts on the existing fleet (Offshore Wind, Offshore Renewable Joint Industry Project [ORJIP] displacement work focused on this area). There are significant issues with the impacts on the small vessel fleet inside 12 NM from existing developments, but the fleet is now organised and have good communication through Fishing Liaison with Offshore Wind and Wet Renewables Group (FLOWW).

Area commentary	Area rating
This is a complex area with various interests but there are gaps available that could be identified with engagement with local fishers.	

Marine plans

South East (inshore) Marine Plan (in progress)	Spatially explicit policies	Issues	Area rating
	The policies for the South East Marine Plan have not yet been produced. Therefore, the Marine Policy Statement is the default position which does not provide any spatial prescription for marine activities.	There are currently no spatial restrictions on where any future offshore wind developments could be located.	

The Crown Estate key resource areas (KRAs) for other sectors

KRA category	Where?	Commentary	Receptor rating	Area rating
Cables	Intersects a very small proportion of the area to the west.	This KRA is significant in size due to the landing resource for cables generally dictated by the shortest distance between connection points. Due to the significant number of alternative options for landing cables, the risk of sterilising valuable resource is deemed to be minimal.		
Carbon Capture Storage (CCS) stores	No interaction.			
CCS infrastructure	Slight intersection to the north of the area.	This KRA is significant in size due to the opportunity for CCS infrastructure development generally dictated by the shortest distance between connection		

		points. Due the significant number of alternative options for landing CCS infrastructure, the risk of sterilising valuable resource is deemed to be minimal.		
Minerals	Intersection within the centre of the area with a slight coverage to the north and east of the area.	An important aggregate resource for London market, increasing in value as onshore aggregate reserves decrease. There is significant opportunity for offshore wind development across the rest of the area.		
Pipelines	No interaction.			
Sandscaping	Slight coverage on the western side of the area.	This KRA is significant in size due to the knowledge of potential sites and resources for sandscaping schemes not being currently well known. As such, significant conclusions cannot be drawn from this KRA.		
Tidal range	No interaction.			
Tidal stream	Very slight interaction to the south of the area.	This overlap is slight and in an area that currently has no current development interest.		
Wave	No interaction.			

National Air Traffic Services (NATs) radar overlap

% Overlap with Primary Surveillance Radar assessment buffer (200 m turbines)	Commentary	Area rating
30.74%	Some moderate overlap to the east of the area means further assessment may be required. There is significant other opportunity in the area to site potential projects outside of the consultation area.	

Water Framework Directive (WFD)

Water bodies triggered	Water body details					
	Type	Is it heavily modified	Overall status	Ecological status	Chemical status	Target date to achieve good status
Kent North	Coastal	Yes	Moderate	Moderate	Good	2015
Kent South	Coastal	Yes	Moderate	Moderate	Good	2027

% of the area covered	Spatial overlap with the area	Commentary	Area rating
22%	Significant proportion of the Kent Coast area	This characterisation area is not particularly sensitive with the intersecting water bodies already being highly modified and currently at moderate overall status. The overlap with the characterisation area is quite large so may be an issue of note.	

Marine Cultural Heritage

Heritage asset type	Where?	Commentary on sensitivity from offshore wind development	Receptor rating
Maritime archaeology and wrecks	Significant potential throughout the characterisation area, but in particular in association with a large number of losses on the Goodwin Sands. There is high potential for recovery of significant historic wooden wrecks and associated remains on the Sands, as demonstrated by the large number of losses and the discovery and presence of a number of significant protected wrecks.	Maritime archaeology including known wrecks, historic losses and associated cultural material such as isolated finds, cargo etc. all have potential to be affected by OWF development in the Kent Coast characterisation area. The area contains a significant number of wrecks and obstructions, with particular concentrations of historic losses and casualty records associated with the Goodwin Sands. There are also a number of protected historic wreck on the Sands, and the area has great potential for producing further significant ships and vessels. The presence of a number of protected wrecks indicates the potential for recovery of wooden wrecks from the medieval period and the great age of sail in the 16th to 18th Centuries. The area has particular potential for the recovery of wreck, vessels and material associated with trade in London, and of wrecks and associated cultural material associated with the First and Second World Wars. There is potential for the recovery of remains from the earliest seafaring in the prehistoric period through to the present day, as indicated by the recovery of a Bronze Age sewn plank boat from Dover, thought to have been capable of seafaring. With respect to the Goodwin Sands, established procedures are not considered sufficient mitigation, given the sheer scale, density and significance of wrecks and other material than may be anticipated on the Goodwin Sands. As such, the presence of an OWF in this part of the characterisation area would represent a significant risk to maritime archaeology that may be insurmountable.	
Aviation archaeology	High potential for recovery of remains throughout characterisation area, but in particular in association with the Goodwin Sands owing to the large number of losses off the Kent coast, the discovery of coherent aircraft remains here previously and the general preservation potential.	There is potential within the Kent Coast characterisation area for the discovery of remains of crashed aircraft and associated cultural material from the birth of aviation at the start of the 20th Century to the present. The greatest potential is associated with losses from the Second World War, owing to aerial activity that took place along the Essex, Suffolk and Kent coast. Historic records indicate a significant number of aircraft losses from the Second World War in this area including 380 losses of Royal Air Force (RAF) aircraft alone off the Kent coast. The 2013 salvage of a German Dornier 17 bomber from the Goodwin Sands demonstrates that under the correct conditions, archaeologically significant and coherent aviation sites can be discovered in a marine context. It also demonstrates the archaeological potential of the Goodwin Sands. This find indicates the potential of the area as a theatre of war and site of significant aerial conflict during the Second World War. As such the characterisation area has potential for discovery of more material of this type. While existing standard mitigation measures may be utilised for specific projects in the area, further site-specific mitigation including excavation and recovery of significant remains that are encountered and where impacts are unavoidable may be required, although it should be noted that this is an extreme example and would only be undertaken following significant discussion with advisors and in rare cases where preservation *in sit*u was not a feasible option.	
Submerged prehistoric landscapes	Potential across characterisation area, with enhanced potential in areas in close proximity to geomorphological features	During periods of lower sea level caused by three major glaciations (the Anglian, Wolstonian and Devensian) the characterisation area would have been continually exposed and as such there is potential for recovery of cultural material associated with the utilisation of the land surfaces from these periods. Any remains would be expected to be associated with geomorphological features such as palaeochannels and valleys, and the geological deposits from these periods.	

	such as palaeochannels and in closer proximity to the coast.	The valleys and terraces associated with the palaeochannels are thought to be the sites where prehistoric artefacts and objects might be likely to have survived. There is potential for the survival of sediments and primary and secondary context artefactual material. A large amount of prehistoric faunal remains has been recovered by trawling in the area. Significant deposits and possible finds may therefore be anticipated in association with Pleistocene and early Holocene channel systems and geomorphological features that were present and exposed prior to marine transgression. As such, there is potential for remains from this period to be present and impacted by OWF development in the characterisation area. Established procedures exist to ensure that any submerged prehistoric landscapes, associated geographical and geomorphological features, and associated deposits, features and finds are identified as part of any proposed OWF development so any impacts can be mitigated and minimised.	
Area commentary			Area rating
There are extensive known and documented heritage assets and potential for recovery of additional significant remains across the area, notably historic wreck, and aviation archaeological materials on the Goodwin Sands. As noted above, given the sheer scale of potential archaeological material present within the Goodwin Sands standard mitigation practices are unlikely to be sufficient in dealing with the scale and significance of the remains that may be encountered. Given the high risk to maritime and aviation archaeology in this particular location, it is recommended that this part of the characterisation area is excluded at a strategic level to ensure the protection of the marine historic environment.			

Glossary of acronyms and abbreviations

ADR	Air Defence Radar
AONB	Area of Outstanding Natural Beauty
ASSI	Area of Special Scientific Interest
ATC	Air Traffic Control
BMAPA	British Marine Aggregate Producers Association
CCS	Carbon Capture Storage
Cefas	Centre for environment, fisheries and aquaculture science
CRM	Collision Risk Model
cSAC	Candidate Special Area of Conservation
DAERA	Department of Agriculture, Environment and Rural Affairs (Northern Ireland)
EA ZAP	East Anglia Zone Appraisal and Planning document
ECWCs	East Coast War Channels
EPS	European Protected Species
ETI	Energy Technologies Institute
FAME	Future of the Atlantic Marine Environment
FEED	Front End Engineering Design
FLOWW	Fishing Liaison with Offshore Wind and Wet Renewables Group
FFC	Flamborough and Filey coast
GCHQ	Government Communications Headquarters
HRA	Habitat Regulations Assessment
IFCA	Association of Inshore Fisheries and Conservation Authorities
IMO	International maritime organisation
IROPI	Imperative reasons of overriding public interest
J net fishery	A method of drift net fishing
JNCC	Joint Nature Conservation Committee
km	Kilometre
KRA	Key Resource Area
m	Metre
MCZ	Marine Conservation Zone
MERP	Marine Ecosystems Research Programme
MoD	Ministry of Defence
MPA	Marine Protected Area
MPS	Marine Policy Statement
MW	Mega watt
NATS	National Air Traffic Services
NFFO	National Federation of Fishermen's Organisation
NGS	Natural gas storage
NM	Nautical Mile
NNC	North Norfolk Coast
OESEA3	Offshore Energy Strategic Environmental Assessment 3
OFTO	Offshore Transmission Owners
OGA	Oil and Gas Authority
OLS	Obstacle Limitation Surface
ORJIP	Offshore Wind, Offshore Renewable Joint Industry Project
OWF	Offshore Wind Farm
PAR	Precision Approach Radar
pSPA	Potential Special Protection Area
PSR	Primary Surveillance Radar

Ramsar	Ramsar Convention on wetlands of international Importance especially as waterfowl habitat, also known as the ‘Convention on Wetlands’.
rMCZs	Recommended Marine Conservation Zone
RAF	Royal Air Force
RNAS	Royal Navy Air Service
RNLI	Royal National Lifeboat Institution
RSPB	Royal Society for the Protection of Birds
RYA AIS	Royal Yachting Association (RYA) Automatic Identification System (AIS)
SAC	Special Area of Conservation
SCI	Site of Community Importance
SEA	Strategic Environmental Assessment
SNCB	Statutory Nature Conservation Body
SPA	Special Protection Area
SSA	Strategic Site Appraisal
SSSI	Site of Special Scientific Interest
STAR	Seabird Tracking and Research
Succorfish	Under 12m vessel tracking equipment
TWT	The Wildlife Trusts
UAVs	Unmanned Air Vehicles
UKFIM	UK Fisheries Information Mapping
UK Offshore Energy SEA	UK Offshore Energy Strategic Environmental Assessment
UXO	Unexploded Ordnance
WFD	Water Framework Directive

Offshore Wind **Leasing Round 4**

THE CROWN ESTATE

Resource and Constraints Assessment for Offshore Wind

Characterisation Area Report
West of Isle of Wight

10

38255-TCE-REP-015

Characterisation Area Report: 10 - West of Isle of Wight

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Version	Status	Issue date
1.1	Draft	July 2018
1.2	Draft	November 2018
1.3	Final	September 2019

The information included in this report should be read in conjunction with the *Resource and Constraints Assessment for Offshore Wind: Methodology Report* and the *Summary Stakeholder Feedback Report*. The trigger distance for constraints to be included in the constraints analysis section of this report is 1 nautical mile (NM).

The Crown Estate has undertaken the analysis in this report using the evidence available to it, internal expertise and support from external advisers where appropriate. The analysis does not obviate any potential need for any Habitat Regulations Assessment (HRA) or any project level consideration of the potential impact of development. The analysis does not supersede any statutory policies or marine plans. The analysis, including the data and information contained in this document, presents a point in time assessment with changes likely to both the presence and nature of constraints.

This report is provided for information purposes only and no party may rely on the accuracy, completeness or fitness of its content for any particular purpose. The Crown Estate makes no representation, assurance, undertaking or warranty in respect of the analysis in the report including all data and information contained in it.

Receptor rating		Area rating	
Receptor assessed but no interaction noted		Receptor assessed but no interaction noted	
Interaction acceptable with best practice/accepted mitigation		The constraint will present the need to implement best practice/accepted mitigation measures to enable acceptable development within the whole area	
Interaction acceptable with moderate mitigation		The constraint will present the need to implement moderate mitigation measures to enable acceptable development within the whole area	
Interaction acceptable with significant mitigation		The constraint will present the need to implement significant and/or strategic level mitigation measures to enable acceptable development within the whole area	
Significant/insurmountable issue that would be challenging to mitigate within the area of influence of a receptor		Significant/insurmountable issue that would be challenging to mitigate for any development within the whole area	
No data coverage across the area		No data coverage across the area	

Constraints Analysis

Note that in addition to The Crown Estate leases/licences within this table, The Crown Estate has also identified key resource areas (KRAs) which may be suitable for the future development of different marine sectors. Information about overlapping KRAs that overlap this characterisation area is described in a latter section of this document.

Exclusions model – Hard constraints			Receptor ratings	Area ratings
	Present	Commentary		
The Crown Estate agreements	Perpetuus Tidal Energy Centre (PTEC): adjacent to the eastern boundary of the characterisation area.	May need a buffer around the site, however unlikely to be a significant concern for future offshore wind development.		
	Portland Bill tidal site: adjacent to the central part of the characterisation area.	The site has not progressed and is unlikely to be a significant concern for future offshore wind development.		
	Telecoms cables: there are a small number of active and inactive cables adjacent to the west of the site but also intersecting the eastern section.	Mostly outside of the characterisation area, but some inactive cables are located in the eastern half. This is not considered to have any significant impact on future development of offshore wind within the area. Since cable crossings require cable protection (which may have adverse environmental effects), crossings should be minimised where practicable.		
	Aggregate area 500/1-4: active dredging site within the eastern part of the characterisation area.	Would require a 2 km buffer around it and negotiations with the customer.		
	Aggregate area 137: active dredging site within the eastern part of the characterisation area.	Would require a 2 km buffer around it and negotiations with the customer.		
	Aggregate area 522: exploration and option agreement site within the eastern part of the characterisation area.	Would require a 2 km buffer around it and negotiations with the customer.		
	Aggregate area 527: active dredge site within the western part of the characterisation area.	Would require a 2 km buffer around it and negotiations with the customer.		
Other energy infrastructure	None within the trigger distance.	No existing oil and gas infrastructure.		
Navigation	None within the trigger distance.			
Social	There are two protected wrecks (Church Roscks, near Teignmouth and West Bay in Lyme Bay) that intersect the area, and one other protected wreck within 1 km (HM submarine A3) located between Portland and Worth Matravers.	There is sufficient seabed available in the characterisation area for interactions to be minimised/avoided.		
Restrictions model – Soft constraints			Receptor ratings	Area ratings
Economic tier				
Navigation	There are a number of anchorages clustered from Brixham running down to Teignmouth. There are also other clusters of anchorages situated around Weymouth.	These areas should be avoided if possible. Although they can be moved they are sited in areas that have appropriate shelter and seabed for safe anchoring. The amount of area covered by these means that they will not have a huge impact on development in the area.		
	The area intersects with two Harbour Authority Areas (Torbay and Dartmouth Harbours). It is also within 1.4 km of three other Harbour Authority Areas; Teignmouth, Bridport, and Portland (including Portland Outer Harbours).	There is sufficient potential available in the area to allow mitigation/avoidance of interaction through appropriate siting, however development within these jurisdictions will present a significant constraint.		

	There is significant vessel traffic into Southampton and Portsmouth. Some of this exits to the west of the Isle of Wight.	The density of vessels to the east of this area will present a significant constraint to development, however there are still some opportunities in between traffic lanes.		
	There are two small disposal sites that intersect the area.	There are sufficient other opportunity in the areas for interactions to be minimised/avoided.		
Subsurface	None within the trigger distance.			
Fishing	*See fisheries commentary below.*		N/A	

Environmental tier							
The assessment of the sensitivity of Marine Protected Areas (MPAs) to pressures caused by offshore wind development and operation is assessed in a separate spreadsheet which will be made available as part of the Round 4 evidence base. Commentary has been noted in the relevant characterisation document where MPAs either overlap or are within 1 NM of the characterisation area and have been assessed as a yellow rating or above. For more information on the methodology for this assessment, please refer to the methodology report. Assessments of Annex II species have not been made as part of the characterisation process. Such assessments will need to be undertaken at project level for individual developments within the characterisation area.							
Type of designation		Name of designation	Designated features/species	Conservation objectives	Commentary		
European designations	Special Area of Conservation (SACs)	Dawlish Warren (600 m); Chesil and the Fleet, Isle of Portland to Studland Cliffs, Lyme Bay and Torbay Sidmouth to West Bay, Crookhill Brick Pit (1.7 km); South Hams			Assessed as low risk; details available in separate spreadsheet.		
	SAC	Wight-Barfleur Reef	Reefs	Conservation objective is to restore the reef to a favourable condition	The advice on operations for the site indicates that the reef feature has a moderate vulnerability to permanent constructions such as wind farms and associated cables. However, it is noted that the SAC area has been largely excluded from the characterisation area, and that it lies to the south of the characterisation area (i.e. between the characterisation area and France). It is therefore considered unlikely that the SAC will be affected by development in the characterisation area since no array can be constructed there and cables from arrays within the characterisation area are likely to run in a northwards direction to make landfall in the UK.		
	SAC	Beer Quarry and Caves (900 m)	Lesser horseshoe bat Greater horseshoe bat Bechstein's bat	Maintain/restore features as necessary	This SAC is of importance for bat species which hibernate within the caves. If arrays are proposed for nearshore locations within the characterisation area, impacts on the bats may be something that Natural England would want investigated at a project level, since bats have been observed around offshore turbines. However, from previous experience this is unlikely to be a major consenting issue since there is little evidence for habitual use of offshore arrays as foraging areas for bats and not all species are migratory.		
	SAC	Studland to Portland	Reefs	The reefs are currently in favourable condition and the conservation objective is to maintain this.	The site contains two sections of bedrock reef, ranging from chalk, shale, clay, limestone and cementstone. The reefs are very diverse topographically and support diverse and sometimes unusual communities. The reef areas have been excluded from the characterisation area, although the characterisation area does extend up		

					to the coast between the two discrete sections of reef. The reefs are unlikely to be directly affected by offshore wind development, and indirect effects are likely to be mitigable. Given the rocky/cliff nature of the coastline behind the reefs, it is unlikely that cabling would be planned through them (especially since there are gaps between them which would be more suitable routes to the coast).		
	SAC	South Wight Maritime	Reefs Vegetated sea cliffs Sea caves	Maintain/restore features as appropriate. The original (2001) Reg 33 advice for the site has a conservation objective to maintain the reef features.	The site includes a number of subtidal reefs that extend into the intertidal zone. To the west and south-west some of the most important subtidal British chalk reefs occur, representing over 5% of Europe's coastal chalk exposures. Since the SAC area has largely been excluded from the characterisation area the rocky (largely chalk) reefs are not likely to be directly affected by development. The reefs may be sensitive to cabling, but impacts are likely to be avoidable - especially since the cliffs/rocky nature of much of the shore are likely to make landfall through the SAC unlikely.		
	Sites of Community Importance (SCIs)	None within the trigger distance					
	Harbour porpoise Special Area of Conservation (SAC)	None within the trigger distance					
	Ramsar	Chesil Beach and The Fleet (300 m)	Criterion 1 – Rare lagoon habitat and saltmarsh habitat Criterion 2 – Specialist lagoon species and rare plants Criterion 3 – Barrier-built saline lagoon Criterion 4 – Supports post-larval and juvenile Bass (*Dicentrarchus labrax*) Criterion 6 – Wintering Dark-bellied brent goose Criterion 8 – Nursery for bass (*Dicentrarchus labrax*)	No specific conservation objectives/management measures – use those for the overlapping Site of Special Scientific Interest (SSSIs), SAC and Special Protection Area (SPA).	The Ramsar site is underpinned by Chesil and The Fleet SSSI, Chesil Beach and the Fleet SPA and Chesil and The Fleet SAC. The main features of the site are The Fleet Lagoon behind Chesil Beach and the species which it supports (including bass). These features are therefore not exposed to impacts from projects developed in the characterisation area. The morphology and dynamic nature of Chesil Beach are likely to make the area unsuitable for cable landfall, and it is concluded that the risk of exposure of features is very low. Dark-bellied brent geese (which are also protected under the SPA designation) are the exception to this, since they winter in The Fleet but may be exposed to arrays in the characterisation area when on passage. Impacts on this species could be significant depending on the location of migration pathways, but may be mitigable with array location and turbine design. Since the species migrates between the UK and northern Russia it is likely that migration pathways are lie across the North Sea rather than the characterisation area.		
	Ramsar	Exe Estuary	Criterion 5 – Waterfowl assemblage Criterion 6 – Dark bellied brent goose (wintering)	No specific conservation objectives/management measures – use those for the overlapping SPA	This Ramsar site is also a SPA and a SSSI. The majority of the site has been excluded from the characterisation area, which means that impacts on habitats within the site would be limited to impacts of cabling (which are likely to be mitigable). Impacts on bird features within the SSSI are likely to be manageable, since the majority of species are terrestrial or are waders and wildfowl which are		

					less exposed to offshore arrays because they do not forage offshore. Impacts to species on passage are likely to be avoidable/mitigable.		
	Special Protection Area (SPA)	Chesil Beach and The Fleet	Dark-bellied brent goose (wintering)	Maintain/restore features as appropriate	The site supports around 1.1% of the UK wintering dark-bellied brent goose population (which is also a feature of the Ramsar site). The geese winter in The Fleet but may be exposed to arrays in the characterisation area when on passage. Impacts on this species could be significant depending on the location of migration pathways, but may be mitigable with array location and turbine design. Since the species migrates between the UK and northern Russia it is likely that migration pathways are lie across the North Sea rather than the characterisation area.		
	SPA	Exe Estuary	Avocet (wintering) Black-tailed godwit (wintering) Dark-bellied brent goose (wintering) Dunlin (wintering) Grey plover (wintering) Oystercatcher (wintering) Slavonian grebe (wintering) Wintering waterbird assemblage	Maintain/restore as appropriate	This SPA is also a Ramsar site and a SSSI. The majority of the site has been excluded from the characterisation area, which means that impacts on habitats within the site would be limited to impacts of cabling (which are likely to be mitigable). Impacts on bird features within the SSSI are likely to be manageable, since the majority of species are terrestrial or are waders and wildfowl which are less exposed to offshore arrays because they do not forage offshore. Impacts to species on passage are likely to be avoidable/mitigable.		
Marine Conservation Zones (MCZs)		Chesil Beach and Stennis Ledges South Dorset Otter Estuary Axe Estuary	High energy infralittoral rock High energy intertidal rock Intertidal coarse sediment Intertidal mixed sediments Intertidal sand and muddy sand Moderate energy circalittoral rock Moderate energy infralittoral rock Moderate energy intertidal rock Pink sea-fan (Eunicella verrucosa) Spiny lobster (Palinurus elephas) Subtidal coarse sediment Subtidal mud Subtidal sand	The general management approach for this site is to recover moderate energy circalittoral rock and spiny lobster features to favourable condition, and to maintain all other features in favourable condition.	The majority of this site has been excluded from the characterisation area and given its location in comparison to the characterisation area, it is considered unlikely that any cables would come ashore through the site. Some of the features of the site would be highly sensitive to cabling activity (especially pink sea fan).		

MCZ	Skerries Bank and Surrounds	Intertidal coarse sediment Intertidal mixed sediments Intertidal mud Intertidal sand and muddy sand Intertidal under boulder communities Long snouted seahorse (Hippocampus guttulatus) Low energy intertidal rock Moderate energy intertidal rock Native oyster (Ostrea edulis) Peat and clay exposures Seagrass beds Subtidal mud	The general management approach for this site is to recover subtidal mud, seagrass and seahorse features to favourable condition, and to maintain all other features in favourable condition.	The majority of this MCZ has been excluded from the characterisation area, but features within it could be exposed to impacts from cabling. Some of the features within the MCZ are likely to be particularly sensitive to cable landfall, including seagrass and seahorse features (which are not currently in favourable condition). It is likely however that impacts could be mitigable/avoidable with landfall location and cabling methodology.		
MCZ	Torbay	Portland Deep geological feature Subtidal sand High energy circalittoral rock Moderate energy circalittoral rock Subtidal coarse sediment Subtidal mixed sediments	Subtidal sand and geological features have conservation objectives to maintain in favourable condition. All other features have conservation objectives to recover to favourable condition.	This MCZ was designated in May 2019. Although the overlap between the MCZ and the characterisation area is relatively small, the MCZ is effectively surrounded by the characterisation area and could be affected by cabling (as well as a small amount of direct development). Some of the features within the site are likely to be sensitive (especially rock features, which are currently in an unfavourable condition). Significant impacts are likely to be avoidable by careful cable routing.		
MCZ	South of Portland	High energy intertidal rock Intertidal coarse sediment Moderate energy intertidal rock Peacock's tail (Padina pavonica) Stalked jellyfish (Haliclystus spp) Subtidal coarse sediment Subtidal mixed sediments Black seabream (Spondyliosoma cantharus) Maerl beds	Black sea bream and maerl features have conservation objectives to recover to favourable condition. All other features have conservation objectives to maintain in favourable condition.	This MCZ was designated in May 2019. The overlap between the MCZ and the characterisation area is very small, but it is possible that export cabling from developments within the characterisation area could run through the site (although the rocky nature and steep cliffs of the coast make this less likely). Maerl and intertidal stalked jellyfish would be particularly sensitive to impacts from cabling, but impacts are likely to be mitigable or avoidable through careful choice of route and installation methodology. A key feature of this site is black bream, which is a hearing-sensitive species and could be affected by piling within the characterisation area. Impacts on black bream have been manageable at other offshore wind sites (usually through piling restrictions during spawning) and given the distance between the MCZ and the likely location of offshore wind projects it is considered likely that mitigation would also be possible in this case.		

MCZ	Purbeck Coast	Subtidal coarse sediment Subtidal mixed sediments	Conservation objectives for all features are to recover to favourable condition.	This MCZ was designated in May 2019. There is a large overlap between this MCZ and the characterisation area, and it is possible that turbine installation could occur within the site as well as cable installation. The features of the site are not especially sensitive to offshore wind development, but the fact that the features are currently in unfavourable condition could make consenting more complex. Impacts are likely to be mitigable/avoidable provided that project sites are large enough to allow micrositing (or loss of MCZ area altogether if needs be). Alternatively, TCE might like to consider removing the MCZ site from the characterisation area.		
MCZ	Albert Field	Subtidal sand	Conservation objective for subtidal sand is to recover to favourable condition.	This MCZ was designated in May 2019. Approximately half of the MCZ is overlapped by the characterisation area. It is on the southern boundary of the characterisation area, so the main impacts are likely to arise from the construction of arrays and inter-array cabling. Subtidal sand is not particularly sensitive to offshore wind development, although the feature is currently in an unfavourable condition which could make consenting more complex. However, experience from other offshore wind projects suggests that development on subtidal sand features is possible.		
MCZ	East of Start Point	High energy infralittoral rock High energy intertidal rock Intertidal coarse sediment Intertidal mixed sediments Intertidal sand and muddy sand Moderate energy circalittoral rock Moderate energy infralittoral rock Moderate energy intertidal rock Pink sea-fan (Eunicella verrucosa) Spiny lobster (Palinurus elephas) Subtidal coarse sediment Subtidal mud Subtidal sand	The general management approach for this site is to recover moderate energy circalittoral rock and spiny lobster features to favourable condition, and to maintain all other features in favourable condition.	The majority of this site has been excluded from the characterisation area, and given its location in comparison to the characterisation area it is considered unlikely that any cables would come ashore through the site. Some of the features of the site would be highly sensitive to cabling activity (especially pink sea fan).		
Sites of Special Scientific Interest (SSSIs)	Budleigh Salterton Cliffs (300 m); Froward Point, Dawlish Cliffs (300 m); Portland Harbour Shore (1.2 km); Hope's Nose to Wall's Hill (900 m),			Assessed as low risk; details available in separate spreadsheet.		

	Dawlish Warren (500 m); Isle of Portland, Chesil and The Fleet Ladram Bay to Sidmouth (350 m); Otter Estuary, Sidmouth to Beer Coast, Axmouth to Lyme Regis Under Cliffs, Abbotsbury Castle (700 m); West Dorset Coast, Abbotsbury Blind Lane (1.8 km); Scabbacombe (950 m); Spring Head, Axmouth (1.5 km); Burton Bradstock (200 m); Shapwick Grange Quarry (1.4 km)					
SSSI	Exe Estuary	Avocet (non-breeding) Black-tailed godwit (non-breeding) Brent goose (dark-bellied) (non-breeding) Ringed plover (non-breeding) Wigeon (non-breeding) Assemblages of terrestrial breeding birds Geological/Earth Heritage Floodplain fen (lowland) Littoral sediment Outstanding dragonfly assemblage Saltmarsh	The majority of features are in favourable condition.	This SSSI is also protected as part of the Exe Estuary SPA and Exe Estuary Ramsar site. The majority of the site has been excluded from the characterisation area, which means that impacts on habitats within the site would be limited to impacts of cabling (which are likely to be mitigable). Impacts on bird features within the SSSI are likely to be manageable, since the majority of species are terrestrial or are waders and wildfowl which are less exposed to offshore arrays because they do not forage offshore. Impacts to species on passage are likely to be avoidable/mitigable.		
SSSI	Beer Quarry and Caves (800 m)	Geological/Earth Heritage Barbastelle bat (hibernating) Bechstein's bat (hibernating) Greater Horseshoe bat	The majority of features are in favourable condition.	This SSSI is of importance for bat species which hibernate within the caves. If arrays are proposed for nearshore locations within the characterisation area, impacts on the bats may be something that Natural England would want investigated at a project level, since bats have been observed at offshore turbines. However, from previous experience this is unlikely to be a major consenting issue since there is little evidence for habitual use of offshore arrays as foraging areas for bats and not all species are migratory.		

		(hibernating) Lesser Horseshoe bat (hibernating)				
SSSI	Berry Head to Sharkham Point	Guillemot (breeding) Geological/Earth Heritage Vegetated sea cliffs Dry heaths Dry grasslands and scrubland facies: on calcareous substrates Caves not open to the public Lichen assemblage Lowland calcareous grassland and scrub Greater horseshoe bat Vascular plant assemblage (including rare species)	Many features have not been recently assessed, but of those that have, the majority are in favourable condition.	The site is part of the South Hams SAC. The majority of features at the site are terrestrial, and given the distance of the site from the characterisation area impacts are likely to be minimal (since the cliffs at the site probably make it unsuitable as a landfall location). If arrays are proposed for nearshore locations within the characterisation area, impacts on the greater horseshoe bat may be something that Natural England would want investigated at a project level, since bats have been identified at offshore turbines. However, greater horseshoe bats are not a migratory species and this is unlikely to be a major consenting issue. At the time of designation, the guillemot colony was the largest on the south coast, and this colony could be affected by nearshore wind development. Impacts on the colony are likely to be mitigable based on location of project and turbine design.		
Spawning and nursery grounds		This area is relatively unimportant from a nursery and spawning perspective with only the east of the area showing two species using it for spawning and nursery.		No significant impact anticipated.		
Social tier						
Royal Yachting Association (RYA) Automatic Identification System (AIS) Intensity		There is a significant level of recreational sailing activity all along the South Coast and some lower density around Lyme Bay.		This constraint would be significant due to the density of traffic, but there are some options for alternative siting locations around the area or site specific mitigations which would avoid interactions.		
Marinas		There are nine marinas around the area at Weymouth and Teignmouth.		There is sufficient other opportunity in the areas for interactions to be minimised/avoided.		
Bathing beaches		There are 34 bathing beaches around the area.		The impacts on these are mitigable through appropriate siting of developments.		
Visibility from sensitive receptors		*See visual analysis below.*				

Review layers

Visibility from landscape designations and from the coast

The bands of significant visual impact are taken from the OSEA3[1] environmental report. It should be noted that these bands were challenged through the statutory stakeholder engagement by the Statutory Nature Conservation Bodies (SNCBs) so further analysis and engagement should be conducted to understand the visual constraint in potential development areas more fully.

The visibility from landscape designations analysis has been conducted using designations which include protections for landscapes and settings namely: National Parks, Areas of Outstanding Natural Beauty (AONBs), Heritage Coasts and World Heritage sites. For more information on these, please consult the methodology report. The analysis draws on visibility from these designations but not the sensitivity of them to offshore wind developments. Proposals should draw on the relevant management plans or local policies to fully understand the level of constraint that exists in the vicinity of these landscape designations. As such, more analysis is required to fully understand the potential constraint.

	Band of significant visual impact	% of overlap with the characterisation area	Commentary	Area rating
Medium sensitivity receptors	0-13 km (3.6 MW turbines)	55%	A significant proportion of this characterisation area is within 13 km of the coast with the rest of the area inside 30 km. This limits opportunity for mitigating visual impacts by siting.	
	13-20 km (4-8 MW turbines)	28%		
	20-30 km (10-15 MW turbines)	17%		
High sensitivity receptors	0-30 km	99%		

Visibility of sea surface from landscape designations		Receptor ratings	Area ratings
The area is visible from numerous landscape designations**:** • New Forest National Park • Isle of Wight AONB • Dorset AONB • East Devon AONB • South Devon AONB • Tennyson Heritage Coast • Purbeck Heritage Coast • West Dorset Heritage Coast • East Devon Heritage Coast • South Devon Heritage Coast • Hamstead Heritage Coast • The Dorset and East Devon World Heritage Site	The significant number of landscape designations and the proximity to shore of the characterisation area means that visual impact will be a material constraint. There are some opportunities to avoid sensitive areas, but these are very limited.		

[1] BEIS (2016), OESEA3 Environmental Report. Crown copyright 2016, p 291. URN 16D/033.

Ornithology outside of Special Protection Areas (SPAs) for high-risk species

Joint Nature Conservation Committee (JNCC), Natural England and Royal Society for the Protection of Birds (RSPB) advise that there are a number of information sources which should be taken into consideration in the assessment of potential impacts from offshore wind development in this characterisation area. These are:

- Site Information Centres on the JNCC website (http://jncc.defra.gov.uk/page-6895) which provide up-to-date information on protected areas, their features and status.
- Marine Ecosystems Research Programme (MERP) seabird distribution maps (https://marine-ecosystems.org.uk/Research_outcomes/Top_predators)
  Future of the Atlantic Marine Environment (FAME) and Seabird Tracking and Research (STAR) tracking data from the RSBP (https://rspb.maps.arcgis.com/apps/Cascade/index.html?appid=d6c3aa1ec7184a2895a01cebf451c7b3)
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Species	Site	Commentary on coverage	Area rating
Sandwich tern	Chichester and Langstone Harbours SPA; Solent and Southampton Water SPA.	The sandwich tern mean maximum seaward foraging range extends 49 km from the Chichester and Langstone Harbours SPA, and the Solent and Southampton Water SPA. The eastern end of the West of Isle of Wight characterisation area overlaps these foraging ranges. Given the relatively restricted foraging range of the species and limited existing offshore wind development within the foraging range, cumulative impacts of development within the West of Isle of Wight area with other offshore wind development is likely to be less of a concern than with other sandwich tern colonies. Summer density of sandwich tern is relatively low across the two SPA foraging ranges, with a slightly higher density of the species occurring around the Isle of Wight, extending to the east and west. A relatively small portion of the West of Isle of Wight area overlaps the slightly increased sandwich tern density, with the remainder overlapping with an even lower sandwich tern density. Locating any development in the West of Isle of Wight area, in the central and western parts of the area, and beyond the mean maximum foraging range (i.e. > 49 km) would minimise any impacts on these SPA colonies.	
Gannet	Grassholm SPA	The gannet mean maximum seaward foraging range extends 229 km from the source colony at Grassholm SPA. This range overlaps six other characterisation areas in addition to overlapping the western end of the West of Isle of Wight characterisation area, which lies in the southeast of the foraging radius. Cumulative collision risk effects should be considered if development is taken forward in more than one of these characterisation areas. However, the limited existing offshore wind development in this foraging range means that cumulative impacts will most likely focus on the cumulative effects of new development in the characterisation areas. Summer density tends to be concentrated around the coastline, with the western end of the West of Isle of Wight area overlapping an area of slightly increased gannet density. Locating any development further east in the characterisation area beyond the Grassholm mean maximum foraging range (i.e. > 229 km) will help minimise any impacts on this SPA colony.	

Ministry of Defence (MoD) activity

	Issues when using 250 m tip heights	Issues when using 350 m tip heights	Receptor rating
Air traffic control (ATC)	Royal Navy Air Service (RNAS) Portland Primary Surveillance Radar (PSR) concerns. Wembury PSR concerns that in a small area in the south-west part of the West of Isle of Wight area of interest (to the east of Start Bay, South Devon).	RNAS PSR concerns. Wembury PSR concerns that in a small area in the south-west part of the West of Isle of Wight area of interest (to the east of Start Bay, South Devon).	
Air defence radar (ADR)	No ADR concerns.	No ADR concerns.	
Threat radar	No threat radar concerns.	No threat radar concerns.	
Low flying	No low flying concerns, however, there will be a lighting requirement.	No low flying concerns, however, there will be a lighting requirement.	

Ranges, danger and exercise areas	Concerns relating to the test facilities at Portland Bill. 250 m high turbines within Lyme Bay and the entire area to the south and east of Portland Bill would affect the precision compass calibrator and acoustic maritime ranges at Portland Bill. Unexploded Ordnance (UXO) should be taken into account. The MoD would need to review cable routes to ensure highly surveyed routes are not obstructed by cables or turbines. Concerns would be raised if the cable route were to pass through or come ashore near firing ranges at Lulworth and Chickerell. The explosives dump at St Catherine's Deep south of the Isle of Wight should be considered.	Concerns relating to the test facilities at Portland Bill. 350 m high turbines within Lyme Bay and the entire area to the south and east of Portland Bill would affect the precision compass calibrator and acoustic maritime ranges at Portland Bill. UXO should be taken into account. The MoD would need to review cable routes to ensure highly surveyed routes are not obstructed by cables or turbines. Concerns would be raised if the cable route were to pass through or come ashore near firing ranges at Lulworth and Chickerell. The explosives dump at St Catherine's Deep south of the Isle of Wight should be considered.	
Statutory safeguarding	No statutory safeguarding zones extend over this area.	No statutory safeguarding zones extend over this area.	
Area commentary			Area rating
ATC and test facilities at Portland Bill are a concern covering the majority of the west of the area. There will be a lighting requirement and consideration of UXO as per standard industry practice.			

Fishing activity

Gear type	Location and comments
Mobile gear	▪ Some beam trawling in Poole Bay and to the west and south of the area. ▪ Numerous species targeted in the area including very high-value cuttlefish. ▪ The west of the area is a heavily fished with increasing importance to the UK fleet and fished by the French, Dutch, Danish and Irish fleets.
Static gear	▪ The east of this area is mainly dependent on shellfish with mobile gear targeting scallops, and static gear targeting crab and lobster. ▪ The area off of Portland is dominated by potting and handlining (targeting bass). ▪ There is an agreement between the French and the South Devon and Mid Channel Shellfish Association, allowing active trawl and beam trawl fishery around the crab boxes by the French and UK vessels. This arrangement has been in existence for over 30 years. ▪ At the western end of the area around Start Point there is a potting area with a similar arrangement to the mid-channel potting boxes, the resource is shared between mobile gear fisheries, beam trawling, scallop fishery and the static gear fishery. Most potting vessels are based in Salcombe and Dartmouth and also in the east toward Portland along the shoreline where potting is the dominant fishery.
General	▪ Brixham is the top port in England with an expected £50million turnover on first-hand sales in 2017. ▪ This area contains the biggest fishing effort in English waters with major ports in Plymouth, Newlyn and Brixham. Effort is generally focussed to the west of Portland Bill. There is a French, Dutch, Danish and Belgian presence in the area. ▪ The cuttlefish fishery has become a major fishery. It's not new, as it existed before there was a market for them. However, the market is now worldwide, with China becoming a major consumer of fish and shellfish exported from the UK. The cuttlefish ground is fished all over throughout the year. It starts along the shoreline and is often caught in traps, and then migrates slowly offshore and west as the season progresses. This is a non-pressure stock and this year attracted vessels large and small from all parts of the United Kingdom and Ireland. The fleet and landings exceeded what Brixham market could handle, the overflow had to be landed into Plymouth market.
Area commentary		Area rating
Significant value and effort in the area. Maybe some opportunities in the east of the area.		

Future oil and gas

Licensing round	Commentary	Receptor rating	Area rating
28th, 29th and 31st rounds – central and east of the area	Licence block 98/11a intersects the characterisation area. This block was awarded in 2012 and there has been subsequent interest in this area through later leasing rounds. It is not clear yet whether oil and gas infrastructure will be installed in this area, but helicopter access is unlikely to be required due to the proximity of the licence blocks to shore, so this is unlikely to significantly constrain offshore wind development. Blocks 98/11b and 98/12 also intersect the area.		

Marine plans

South Marine Plan	Spatially explicit policies	Issues	Area rating
Aggregates	SAGG03: proposals in areas where high potential aggregate resource occurs should demonstrate that they will in order of preference: a) avoid; b) minimise; c) mitigate significant adverse impacts on aggregate extraction; and, d) if it is not possible to mitigate significant adverse impacts, proposals should state the case for proceeding.	The eastern part of the characterisation area overlaps with areas of future technical opportunity for marine aggregates as identified in the South Marine Plan. Any new offshore wind development would need to consider impacts to the aggregates industry and negotiation with the sector would be required. Whilst The Crown Estate leases/licences seabed for offshore wind and aggregate extraction it should be noted that aggregates tendering rounds currently run every two years, and so the requirement for liaison between industries will be ongoing.	
Aquaculture	SAQ01: proposals in existing or within potential aquaculture production areas must demonstrate consideration of and compatibility with aquaculture production. Where compatibility is not possible, proposals should demonstrate that they will in order of preference: a) avoid; b) minimise; c) mitigate significant adverse impacts on aquaculture; and, d) if it is not possible to mitigate significant adverse impacts, proposals should state the case for proceeding.	There is some overlap of the characterisation area with the potential aquaculture areas identified in the South Marine Plan, particularly around the western extent of the area, Weymouth Bay and Poole Bay. Should proposals for offshore wind come near the potential aquaculture areas potential impacts to the aquaculture would need to be considered and negotiation with the aquaculture sector would be required.	
Ports and shipping	SPS03: proposals that require static sea surface infrastructure or that significantly reduce under-keel clearance which encroaches on high-density navigation routes, or that pose a risk to the viability of passenger services, must not be authorised unless there are exceptional circumstances.	The eastern part of the characterisation area intersects with a few high-density navigation routes as defined in the South Marine Plan. Where there is an intersection it is unlikely that static infrastructure would gain consent, but the overlap is relatively small and the majority of the characterisation area would be unaffected.	

The Crown Estate key resource areas (KRAs) for other sectors

KRA category	Where	Commentary	Receptor ratings	Area ratings
Cables	There is some intersection with the cables KRA to the west of the area.	This KRA is significant in size due to the landing resource for cables generally being dictated by the shortest distance between connection points. Due to the significant number of alternative options for landing cables, the risk of sterilising valuable resource is deemed to be minimal.		
Carbon Capture Storage (CCS) stores	No interaction.			
CCS infrastructure	No interaction.			
Minerals	There is some intersection with the aggregates resources to the east of the area, off of Portland Bill and Exmouth.	These are important resources which are being utilised. Offshore wind development should avoid these areas if possible.		

Pipelines	No interaction.			
Sandscaping	Two areas of coverage around Bournemouth and Exmouth.	This KRA is significant in size due to the knowledge of potential sites and resources for sandscaping schemes not being well known currently. Significant conclusions cannot be drawn from this key resource area.		
Tidal range	No interaction.			
Tidal stream	Some overlap to the east of the area.	This resource hosts the PTEC demonstration site and intersects some tidal races around the Isle of White. There is significant opportunity for offshore wind development elsewhere in the area for this to not be deemed a significant issue.		
Wave	No interaction.			

National Air Traffic Services (NATs) radar overlap

% Overlap with Primary Surveillance Radar (PSR) assessment buffer (200m turbines)	Commentary	Area rating
2.58%	Little overlap with this area. Further assessment is unlikely to be required.	

Water Framework Directive (WFD)

Water bodies triggered	Water body details					
	Type	Is it heavily modified?	Overall status	Ecological status	Chemical status	Target date to achieve good status
Lyme Bay West	Coastal	No	Good	Good	Good	2015
Dorset / Hampshire	Coastal	No	Moderate	Moderate	Good	2021
Devon South	Coastal	No	Good	Good	Good	2015
Lyme Bay East	Coastal	No	Good	Good	Good	2015
Otter	Transitional	No	Moderate	Moderate	Good	2027
Dart	Transitional	Yes	Moderate	Moderate	Good	2027

% of the area covered	Spatial overlap with the area	Commentary	Area rating
5%	Intersection along the coast from Portland Bill to Dartmouth.	This characterisation area intersects mainly unmodified water bodies in good to moderate overall condition. The overlap with these water bodies is minimal.	

Marine cultural heritage

Heritage asset type	Where	Commentary on sensitivity from offshore wind development	Receptor rating
Maritime archaeology and wrecks	Significant potential throughout characterisation area, and in particular in the parts of the area closest to Torquay and Brixham, Exmouth, Portland Poole and Weymouth, with several protected wrecks also noted in the area.	There is significant potential across the West Isle of Wight Characterisation area for offshore wind development to impact on known wrecks, historic losses and associated cultural material such as isolated finds. The area contains a significant number of wrecks and obstructions, with particular concentrations in the areas closer to the coast and near to Torquay and Brixham, Portland and Poole (north of the characterisation area itself). Portland saw the first Viking raids on the country in 789AD and incursions became a frequent occurrence in the 9th Century. While no confirmed Viking ships have been recovered from British waters to date there remains potential across the characterisation for the recovery of finds and wreck associated with this period. Archaeological evidence from the Iron Age has also been recovered from Poole Harbour in 1964. The presence of a number of protected wrecks indicates the potential for recovery of significant wrecks and material from the medieval period and the great age of sail, up to the present. Remains may be associated with trade and military activity at important ports and strategic locations along the coast (e.g. Poole, Weymouth, Exmouth, Torquay etc). The area also played an important role in the defence of Britain, and particularly during the Second World War and as such, there is significant potential for the recovery of wrecks, vessels and material associated with this period from the area. Established procedures exist to ensure that any historic wrecks, both known and unknown, and associated remains, are identified as part of any proposed offshore wind development and impacts are mitigated and minimised.	
Aviation archaeology	Potential for recovery of aviation archaeological remains throughout characterisation area.	There is potential within the West of Isle of Wight characterisation area for the discovery of remains of crashed aircraft and associated cultural material from the birth of aviation at the start of the 20th Century to present day. The greatest potential is associated with losses from the Second World War and historic records indicate a significant number of aircraft losses from this period. Known sites of crashed aircraft on the seabed remain rare, however there are a number of recorded losses from the area. The characterisation area has great potential for discovery of more material of this type and any remains that are present may be identified or impacted upon by wind farm development. While existing standard mitigation measures may be utilised for specific projects in the area, where impacts are unavoidable, further site-specific mitigation including excavation and recovery of significant remains that are encountered may be required. It should be noted that this is an extreme example and would only be undertaken following discussion with advisors and in those rare cases where preservation *in situ* was not a feasible option.	
Submerged prehistoric landscapes	Potential across characterisation area with enhanced potential in areas close to geomorphological features such as the palaeochannels being worked by the marine aggregate industry to the West of the Isle of Wight, and other such channels, deposits and features, or areas closer to the coast.	During periods of lower sea level during the three major glaciations of the Pleistocene the characterisation area would have been continually exposed. There is potential for recovery of cultural material associated with the utilisation of the land surfaces during times of suitable climatic conditions and prior to the inundation of the channel in the Holocene. Any remains would be expected to be associated with geomorphological features such as palaeochannels and valleys, and the geological deposits from these periods. The valleys and terraces associated with the palaeochannels are thought to be the most likely sites where prehistoric artefacts and objects might survive with potential for the survival of sediments, and primary and secondary context artefactual material. Sites dating to the Pleistocene and early Holocene are known from the wider areas to the north of the characterisation area. Evidence of Mesolithic occupation and potential settlement, in the form of flint artefacts, deposits and wooden structures have been recorded during excavations of a now submerged site at Bouldner Cliff to the northeast of the characterisation area. Significant deposits and possible finds may therefore be anticipated in association with Pleistocene and early Holocene channel systems and geomorphological features that were present and exposed prior to marine transgression in the Mesolithic. As such there is potential for remains from this period to be present and impacted by offshore wind development in the characterisation area. Established procedures exist to ensure that any submerged prehistoric landscapes, associated geographical and geomorphological features, and associated deposits, features and finds are identified as part of any proposed offshore wind development, ensuring impacts are mitigated and minimised.	
Area Commentary			Area rating
There are extensive heritage assets and potential for recovery of further remains across the area, with particular potential for significant historic wreck, and aviation archaeological material. The application of standard mitigation measures on a strategic and project-specific basis will minimise the risk to underwater cultural heritage in this area.			

Glossary of acronyms and abbreviations

ADR	Air Defence Radar
AONB	Area of Outstanding Natural Beauty
ATC	Air Traffic Control
CCS	Carbon Capture Storage
cSAC	Candidate Special Area of Conservation
FAME	Future of the Atlantic Marine Environment
HRA	Habitat Regulations Assessment
JNCC	Joint Nature Conservation Committee
km	Kilometre
KRA	Key Resource Area
m	Metre
MCZ	Marine Conservation Zone
MERP	Marine Ecosystems Research Programme
MoD	Ministry of Defence
MPA	Marine Protected Area
MW	Mega watt
NATS	National Air Traffic Services
NM	Nautical Mile
OESEA3	Offshore Energy Strategic Environmental Assessment 3
OFTO	Offshore Transmission Owners
OWF	Offshore Wind Farm
PTEC	Perpetuus Tidal Energy Centre
PSR	Primary Surveillance Radar
Ramsar	Ramsar Convention on wetlands of international Importance especially as waterfowl habitat, also known as the ‘Convention on Wetlands’.
RNAS	Royal Navy Air Service
RSPB	Royal Society for the Protection of Birds
RYA AIS	Royal Yachting Association (RYA) Automatic Identification System (AIS)
SAC	Special Area of Conservation
SCI	Site of Community Interest
SNCB	Statutory Nature Conservation Body
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
STAR	Seabird Tracking and Research
UXO	Unexploded Ordnance
WFD	Water Framework Directive

Offshore Wind **Leasing Round 4**

THE CROWN ESTATE

Resource and Constraints Assessment for Offshore Wind

Characterisation Area Report **South West**

11

38255-TCE-REP-016

Characterisation Area Report: 11 - South West

38255-TCE-REP-016 Characterisation Area Report: 11 - South West		
Version	Status	Issue date
1.1	Draft	July 2018
1.2	Draft	November 2018
1.3	Final	September 2019

The information included in this report should be read in conjunction with the *Resource and Constraints Assessment for Offshore Wind: Methodology Report* and the *Summary Stakeholder Feedback Report*. The trigger distance for constraints to be included in the constraints analysis section of this report is 1 nautical mile (NM).

The Crown Estate has undertaken the analysis in this report using the evidence available to it, internal expertise and support from external advisers where appropriate. The analysis does not obviate any potential need for any Habitat Regulations Assessment (HRA) or any project level consideration of the potential impact of development. The analysis does not supersede any statutory policies or marine plans. The analysis, including the data and information contained in this document, presents a point in time assessment with changes likely to both the presence and nature of constraints.

This report is provided for information purposes only and no party may rely on the accuracy, completeness or fitness of its content for any particular purpose. The Crown Estate makes no representation, assurance, undertaking or warranty in respect of the analysis in the report including all data and information contained in it.

Receptor rating		Area rating	
Receptor assessed but no interaction noted		Receptor assessed but no interaction noted	
Interaction acceptable with best practice/accepted mitigation		The constraint will present the need to implement best practice/accepted mitigation measures to enable acceptable development within the whole area	
Interaction acceptable with moderate mitigation		The constraint will present the need to implement moderate mitigation measures to enable acceptable development within the whole area	
Interaction acceptable with significant mitigation		The constraint will present the need to implement significant and/or strategic level mitigation measures to enable acceptable development within the whole area	
Significant/insurmountable issue that would be challenging to mitigate within the area of influence of a receptor		Significant/insurmountable issue that would be challenging to mitigate for any development within the whole area	
No data coverage across the area		No data coverage across the area	

Constraints analysis

Note that in addition to The Crown Estate leases/licences within this table, The Crown Estate has also identified key resource areas (KRAs) which may be suitable for the future development of different marine sectors. Information about overlapping KRAs that overlap this characterisation area is described in a latter section of this document.

Exclusions model — hard constraints			Receptor rating	Area rating
	Present	Commentary		
The Crown Estate agreements	Cables: there are numerous active and inactive cables adjacent to this characterisation area, particularly in the south-west of the characterisation area.	Only a small amount of cables intersect the corner of the characterisation area. This is not considered to have any significant impacts on future development of offshore wind here. Since cable crossings require cable protection (which may have adverse environmental effects), crossings should be minimised where practicable.		
	Wave Hub export cable: the cable intersects the south-west corner of the characterisation area on the north coast of Cornwall.	The cable has been removed from the characterisation area and should be avoided where possible by using best practice/accepted mitigation. This is not considered to have any significant impacts on future development of offshore wind within the area. Since cable crossings require cable protection (which may have adverse environmental effects), crossings should be minimised where practicable.		
Other energy infrastructure	None within the trigger distance.	There is no existing oil and gas infrastructure and no new licences under development in this characterisation area.		
Navigation	There is navigational dredging at Fowey and at Marazion beach access which are situated within 600 m of the area.	There is sufficient other opportunity in the characterisation area for interactions to be minimised/avoided.		
Social	There is one protected wreck (Loe Bar near Porthleven) that intersects the area and nine others within 1.8 km.	There is sufficient other opportunity in the characterisation area for interactions to be minimised/avoided.		
Restrictions model — soft constraints			Receptor rating	Area rating
Economic tier				
Navigation	There are anchorage areas in estuaries and sheltered areas around the area.	There is no intersection with the characterisation area so no constraint in anticipated.		
	The area intersects with three harbour authority areas (Plymouth, Padstow and Hayle Harbours). It is also within 800 m of three other harbour authority areas (Salcombe, Dartmouth and Fowey).	There is sufficient other opportunity in the characterisation area for interactions to be minimised/avoided.		
	There is significant traffic into and out of Falmouth, Plymouth and Brixham harbours into channel routes. There is also significant activity around Newlyn Harbour.	This poses a significant constraint to the south coast section of the characterisation area, with displacement and safety potentially difficult to minimise due to lack of alternative opportunity. The north coast looks unconstrained.		
	Five disposal sites intersect the characterisation area generally on the outer boundaries of the area.	There is sufficient other opportunity in the characterisation areas for interactions to be minimised/avoided.		
Subsurface	There are none within the trigger distance.			
Fishing	*See fisheries commentary below.*		N/A	

Environmental Tier							
The assessment of the sensitivity of Marine Protected Areas (MPAs) to pressures caused by offshore wind development and operation is assessed in a separate spreadsheet which will be made available as part of the Round 4 evidence base. Commentary has been noted in the relevant characterisation document where MPAs either overlap or are within 1 NM of the characterisation area and have been assessed as a yellow rating or above. For more information on the methodology for this assessment, please refer to the methodology report. Assessments of Annex II species have not been made as part of the characterisation process. Such assessments will need to be undertaken at project level for individual developments within the characterisation area.							
Type of designation		Name of designation	Designated features/species	Conservation objectives	Commentary	Receptor rating	Area rating
European marine designations	Special Area of Conservation (SACs)	Start Point to Plymouth Sound and Eddystone, Blackstone Point, Polruan to Polperro, Penhale Dunes (20 m); Lyme Bay and Torbay, Tintagel-Marsland-Clovelly Coast (300 m); South Devon Shore Dock (150 m); The Lizard (750 m); Lizard Point, Godrevy Head to St Agnes (800 m).					
	SAC	Plymouth Sound and Estuaries	Subtidal sandbanks Estuaries Intertidal mudflats and sandflats Shallow inlets and bays Reefs Atlantic salt meadows Allis shad Shore dock	The majority of conservation objectives for habitat features are to maintain them in their current condition. A few areas have 'restore' conservation objectives, and the shad population has conservation objectives to restore the population size and reproduction.	It is noted that the majority of the site has been excluded from the characterisation area which should substantially reduce impacts on all features - including shad, which as a species tend to stay close to shore and are likely to be present. The potential for acoustic impacts on shad would need to be considered at project level if array development was proposed close to the SAC. Features at the site are likely to be sensitive to export cabling through the estuary and landfall within it, but impacts are likely to be avoidable/mitigable. Areas of saltmarsh and shore dock populations are likely to be particularly sensitive.		
	Harbour porpoise Special Area of Conservation (SAC)	Bristol Channel Approaches	harbour porpoise	The conservation objectives for the SAC are: To ensure that the integrity of the site is maintained and that it makes the best possible contribution to maintaining Favourable Conservation Status (FCS) for harbour porpoise in UK waters. In the context of natural change, this will be achieved by ensuring that: 1. Harbour porpoise is a viable component of the site;	Harbour porpoise could be affected by offshore wind development in the area, mainly through acoustic impacts (disturbance and hearing damage) from pile driving, UXO clearance and possibly some geotechnical surveys. Disturbance and barrier effects arising from vessel movements and presence of turbines may also occur. The noise disturbance during wind farm construction is likely to be significant if using pile-driving to install the turbine foundations, and there is also a risk from UXO clearance. There will be a need to consider population level effects of disturbance (mainly during construction), and there may be some additional requirements to investigate potential impacts on prey species. The designation of harbour porpoise SACs will undoubtedly have consequences as to how some activities operate, and measures may need to be put in place to reduce disturbance. Implementation of any disturbance management is likely to be challenging given the complexity of marine activities, regulatory arrangements and scientific uncertainty surrounding the significance of noise impacts on		

				2. There is no significant disturbance of the species; and 3. The condition of supporting habitats and processes, and the availability of prey is maintained. This is similar to the protection afforded to harbour porpoise throughout their range by the European Protected Species (EPS) regulations in the UK. However, the Natura 2000 principles and HRA tests set the bar higher than EPS protection for impacts on the site as the protection is no longer solely considering effects on the population as a whole but making sure that the site is contributing positively to the species' Favourable Conservation Status	harbour porpoise. The approach recommended by SNCBs is that developers should ensure that there is sufficient time between the assessment and the start of construction for them to effectively implement mitigation/management, which could include: 1. Careful spatial planning and phasing of noisy activities. 2. Use of alternative foundations that do not require pile driving (e.g. suction buckets, gravity bases), noting that these may have other impacts. 3. Use of alternative methods of installation (e.g. vibropiling) to reduce the noise footprint. 4. Use of technology to reduce the sound levels at source or to minimise sound propagation and reduce the noise footprint. The SNCBs and The Wildlife Trusts have concerns over the potential cumulative impacts on harbour porpoise within this SAC, and note that currently there is no mechanism to ensure that a strategic approach to the management of impacts is taken. They consider that this could be a significant consenting risk for offshore wind development. In parallel to new offshore wind leasing, The Crown Estate has committed to fund a collaborative programme of strategic enabling actions to increase the evidence base and support sustainable and coordinated expansion of offshore wind. Underwater noise and its management, assessment of impacts on sensitive receptors, and approaches to modelling and assessment, are all likely to form a key priority area for further work, and we anticipate collaborating with stakeholders on new work streams.		
	Sites of Community Interest (SCIs)	None within the trigger distance.					
	Ramsar	None within the trigger distance.					
	Special Protection Areas (SPAs)	Tamar Estuaries Complex (1.7 km) Marazion Marsh (1 km).			Assessed as low risk; details available in separate spreadsheet.		
	SPA	Falmouth Bay to St Austell Bay.	black-throated diver (wintering) great northern diver (wintering) Slavonian grebe (wintering)	Maintain/restore features as appropriate.	The bird species at this site would be sensitive to offshore wind development, but since the majority of this SPA has been excluded from the characterisation area it is likely that this will be sufficient to mitigate impacts on the birds within the SPA. It should be noted that slavonian grebe is on the Birds of Conservation Concern (BoCC) Red List.		
	Potential Special Protection Area (pSPA)	None within the trigger distance.					
Marine Conservation	Whitsand and Looe Bay		High energy intertidal rock Intertidal coarse	The general management approach for the site is to recover pink sea-fan and	Much of the MCZ lies within the characterisation area, and it contains some features which are likely to be very sensitive to offshore wind development – especially ocean quahog		

Zones (MCZs)		sediment Intertidal sand and muddy sand Low energy intertidal rock Moderate energy intertidal rock ocean quahog (Arctica islandica) pink sea-fan (Eunicella verrucosa) sea-fan anemone (Amphianthus dohrnii) Seagrass beds stalked jellyfish (Haliclystus spp) Subtidal coarse sediment Subtidal sand Moderate energy circalittoral rock giant goby (Gobius cobitis) stalked jellyfish (Calvadosia campanulata) stalked jellyfish (Calvodosia cruxmelitensis)	sea-fan anemone features to favourable condition, and to maintain all other features in favourable condition.	(which has a high vulnerability) and the pink sea fan (which has a low recoverability), and the sea-fan anemone (which is very rare). Intertidal/shallow subtidal features such as the stalked jellyfish and seagrass features are also likely to be sensitive to cabling impacts. Mitigation of impacts on sea fan/sea-fan anemone features will be difficult to mitigate.		
	Hartland Point to Tintagel Newquay and The Gannel Padstow Bay and Surrounds Skerries Bank and Surrounds Tamar Estuary Sites (1.6 km) Upper Fowey and Pont Pill (1.3 km) Mounts Bay Erme Estuary Devon Avon Estuary			Assessed as low risk; details available in separate spreadsheet.		

Sites of Special Scientific Interest (SSSIs)	Aire Point to Carrick Du (250 m), Froward Point (1.5 km), Lynher Estuary (1.7 km), Loe (300 m), Marazion Marsh (1 km), Nance Wood (1.2 km), Porthleven Cliffs (300 m), Rame Head & Whitsand Bay, Polruan to Polperro, South Milton Ley (1.3 km), Talland Barton Farm (300 m), Tremearne Par (350 m), Porthleven Cliffs East (300 m), Slapton Ley, Blackstone Point, Bolt Head to Bolt Tail, Cameron Quarry (1 km), Folly Rocks (700 m), Wheal Penrose (850 m), Cudden Point to Prussia Cove (300 m), Loggans Moor (1.5 km), St Michael's Mount, Porthcew, Gwithian to Mexico Towans (50 m), St Agnes Beacon Pits (800 m), Eglarooze Cliff, Kelsey Head, Penhale Dunes (20 m), Trevaunance Cove (1.2 km), Tintagel Cliffs (300 m), Bedruthan Steps and Park Head (500 m), Cligga Head (400 m), Baulk Head to Mullion (750 m), Yealm Estuary (300 m), Wembury Point (50 m), Harbour Cove (1.8 km), Trevone Bay (1.5 km), Prawle Point and Start Point (900 m), Trevose Head and Constantine Bay (200 m), Stepper Point (1.7 km), Salcombe to Kingsbridge Estuary (850 m), Erme Estuary (200 m).			Assessed as low risk; details available in separate spreadsheet.		
SSSI	Hayle Estuary & Carrack Gladden (1 km)	Aggregations of wintering birds Estuaries Fixed dune grassland Hard maritime cliff and slope Sand dune; strandline, embryo and mobile dunes Saltmarsh Vascular plant assemblage	Majority of features are in favourable condition with some in unfavourable (recovering) condition.	Birds using the area are generally wintering wildfowl and waders, and the site is of strategic importance for important bird migration routes across the Land's End Peninsula. This migration route would need to be taken into consideration when deciding on suitable project locations within the characterisation area, but effects on the birds at this site would be limited to when they are migrating since wildfowl and waders do not forage extensively offshore. Other features at this site would only be exposed to impacts from cabling since the site is at some distance from the characterisation area. Saltmarsh is patchy within the site and impacts are considered to be avoidable (or mitigable). The dune area is likely to be sensitive (including the changes in coastal processes) but impacts are likewise mitigable/avoidable.		
SSSI	Godrevy Head to St Agnes	Kittiwake (breeding) Assemblage of breeding birds - Mixed Geological/Earth Heritage Fixed dune	Majority of features are in favourable condition with some in unfavourable (recovering) condition.	Seabirds breed on the cliffs and offshore rocks within the site. The colony of kittiwake was the largest in Cornwall at the time of designation. Guillemot, razorbill and cormorant also use the site, and the intertidal rocky shore has a rich fauna including star coral species which are rare in Cornwall. Impacts on the breeding birds at the site would need to be taken into consideration at project level, but are likely to be mitigable with sensible project placement/turbine design.		

		grassland Wet heaths Dry heaths Hard maritime cliff and slope Lowland dry heath Early gentian, Gentianella anglica Vascular plant assemblage		Intertidal communities and dune systems are likely to be sensitive to impacts from cable landfall, but impacts are likely to be avoidable/mitigable.		
SSSI	Pentire Peninsula	fulmar (breeding) guillemot (breeding) puffin (breeding) razorbill (breeding) Assemblages of breeding birds - Mixed Geological/Earth Heritage Vascular plant assemblage	All features are in favourable condition.	The site is mainly designated for its geological interest -cliff and foreshore rocky outcrops which are likely to make the site unsuitable as a cable landfall location. Seabirds breed on the cliffs, but there is no indication that the colonies are particularly large, and the site has not been designated as a SPA. It is likely that impacts on the site are mitigable/avoidable both in terms of birds offshore and cable landfall through the site.		
Spawning and nursery grounds		There's an important spawning and nursery ground on the north coast of Cornwall with six species utilising the characterisation area; in particular cod spawns off Trevose Head. There are also spawning grounds on the south coast of Cornwall around Whitsand Bay and St Austell Bay.	Noise disturbance has the potential to be an issue with the potential for seasonal restrictions on piling during breeding. It will depend on whether the spawning grounds are still active and their precise locations (which may need to be determined by surveys). Cod are particularly sensitive to noise impacts.			
Social Tier						
Royal Yachting Association (RYA) Automatic Identification System (AIS) Intensity		There is a significant level of recreational sailing activity all along the south coast of Cornwall including traffic into Padstow.	This constraint will be difficult to mitigate due to the volume of traffic and limited options for alternative siting locations to avoid interactions.			
Marinas		There are five marinas around the characterisation area at Fowey, Plymouth and Looe. Marinas at River Yealm Harbour and Salcombe Harbour are in close proximity as well.	There is sufficient other opportunity in the characterisation areas for interactions to be minimised/avoided.			
Bathing beaches		There are 81 bathing beaches in and around this characterisation area.	This presents a significant constraint due to the number of beaches and the close proximity of the characterisation to the coast minimising the potential for siting to avoid impacts.			
Visibility from sensitive receptors		*See visual analysis below.*				

Review Layers

Visibility from landscape designations and from the coast

The bands of significant visual impact are taken from the OSEA3[1] environmental report. It should be noted that these bands were challenged through the statutory stakeholder engagement by the Statutory Nature Conservation Bodies (SNCBs) so further analysis and engagement should be conducted to understand the visual constraint in potential development areas more fully.

The visibility from landscape designations analysis has been conducted using designations which include protections for landscapes and settings namely: National Parks, Areas of Outstanding Natural Beauty (AONBs), Heritage Coasts and World Heritage sites. For more information on these, please consult the methodology report. The analysis draws on visibility from these designations but not the sensitivity of them to offshore wind developments. Proposals should draw on the relevant management plans or local policies to fully understand the level of constraint that exists in the vicinity of these landscape designations. As such, more analysis is required to fully understand the potential constraint.

	Band of significant visual impact	% of overlap with the characterisation area	Commentary	Area rating
Medium sensitivity receptors	0-13 km (3.6 MW turbines)	99%	Almost all of this characterisation area sits within 13 km of the coast. This means that developments will be greatly constrained due to visual impacts.	
	13-20 km (4-8 MW turbines)	1%		
	20-30 km (10-15 MW turbines)	0%		
High sensitivity receptors	0-30 km	100%		

Visibility of sea surface from landscape designations		Receptor rating	Area rating
The characterisation area is visible from numerous landscape designations: • Dartmoor National Park • South Devon AONB • Tamar AONB • Cornwall AONB • South Devon Heritage Coast • The Cornish Heritage Coasts • Devon and Cornwall mining landscape World Heritage Site	The significant number of landscape designations and the close proximity to the shore of the characterisation area means that visual impact will be a material constraint. There are some opportunities to avoid sensitive areas, but these are very limited and generally close to shore.		

Ornithology outside of Special Protection Areas (SPAs) for high-risk species

Joint Nature Conservation Committee (JNCC), Natural England and Royal Society for the Protection of Birds (RSPB) advise that there are a number of information sources which should be taken into consideration in the assessment of potential impacts from offshore wind development in this characterisation area. These are:

- Site Information Centres on the JNCC website (http://jncc.defra.gov.uk/page-6895) which provide up-to-date information on protected areas, their features and status.

[1] BEIS (2016), OESEA3 Environmental Report. Crown copyright 2016, p 291. URN 16D/033.

- Marine Ecosystems Research Programme (MERP) seabird distribution maps (https://marine-ecosystems.org.uk/Research_outcomes/Top_predators).
- Future of the Atlantic Marine Environment (FAME) and Seabird Tracking and Research (STAR) tracking data from the RSBP (https://rspb.maps.arcgis.com/apps/Cascade/index.html?appid=d6c3aa1ec7184a2895a01cebf451c7b3) .
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Species	Site	Commentary on coverage	Area rating
Lesser black-backed gull	Isles of Scilly SPA	The lesser black-backed gull mean maximum seaward foraging range extends 141 km from the Isles of Scilly SPA, with over half the South West characterisation area overlapping this foraging range. Given the absence of existing offshore wind development within this foraging range, cumulative impacts of development in the South West area with other offshore wind development are unlikely to be a key consent constraint as with other areas within reach of lesser black-backed gull colonies. Summer density of lesser black-backed gull tends to be highest in the west of its foraging range, with densities in the South West characterisation area relatively low in comparison. Locating any development within the South West characterisation area towards in the south and east of the characterisation area and beyond the mean maximum foraging range (i.e. 141 km) would help minimise any impacts on the Isles of Scilly lesser black-backed gull colony.	
Lesser black-backed gull	Skomer, Skokholm and the seas off Pembrokeshire SPA	The lesser black-backed gull mean maximum seaward foraging range extends 141 km from the Skomer, Skokholm and the seas off Pembrokeshire SPA, overlapping the most northern part of the South West characterisation area. Three other characterisation areas lie within this foraging range, therefore cumulative collision risk effects should be considered if development is taken forward in more than one. Given the absence of existing offshore wind development within this foraging range, cumulative impacts will most likely focus on the cumulative effects of new development in the characterisation areas. Summer density of lesser black-backed gull is concentrated around the SPA colony, with the density of lesser black-backed gull in the South West characterisation area fairly uniformly distributed. Locating any development in this characterisation area further south and beyond the Skomer foraging ranging (i.e. > 141 km), would help minimise any impacts on this SPA colony; however, this would need to be balanced with any siting and mitigation for effects on the Isles of Scilly SPA.	
Gannet	Grassholm SPA	The gannet mean maximum seaward foraging range extends 229 km from the source colony at Grassholm SPA. This range overlaps six other characterisation areas in addition to encompassing the South West characterisation area, which lies in the south of the foraging radius. Cumulative collision risk effects should therefore be considered if development is taken forward in more than one of these characterisation areas. Given the limited existing offshore wind development in Grassholm foraging range, cumulative impacts will most likely focus on the cumulative effects of new development in the characterisation areas. Summer density tends to be concentrated around the coastline, with the South West characterisation area overlapping areas of increased gannet density. An area of high gannet density to the north of the Cornish coast should be avoided, in order to minimise impacts on the species.	
Great black-backed gull	Isles of Scilly SPA	The great black-backed gull mean maximum foraging range extends 60 km from the Isles of Scilly SPA, overlapping the western edge of the South West characterisation area. Given the limited foraging range and absence of existing offshore wind developments, cumulative effects on the SPA colony are unlikely to be a key consent consideration. It should be noted that the great black-backed gull 60 km foraging range could be an overestimate as it has been derived from herring gull data due to a limited great black-backed gull dataset.	

Ministry of Defence (MoD) activity

	Issues when using 250 m tip heights	Issues when using 350 m tip heights	Receptor rating
Air traffic control (ATC)	Royal Navy Air Service (RNAS) Culdrose Primary Surveillance Radar (PSR) concerns on the North Cornish Coast and around Mounts Bay sections of the characterisation area. RNAS Culdrose Precision Approach Radar (PAR) concerns within area Mounts Bay section of the characterisation area. RNAS Culdrose Secondary Surveillance Radar (SSR) concerns within area Mounts Bay section of the characterisation area. Hartland Point PSR concerns within the North Cornish Coast section of the characterisation area. Wembury PSR concerns within area south-eastern sections of the characterisation area and a small part of the area around Mounts Bay. Wembury SSR concerns within area south-eastern sections of the characterisation area. Portland PSR concerns within the eastern part of area and south-eastern sections of the characterisation area. Portreath SSR concerns on the North Cornish Coast section of the characterisation area.	RNAS Culdrose PSR concerns on the North Cornish Coast and around Mounts Bay sections of the characterisation area. RNAS Culdrose PAR concerns within area Mounts Bay section of the characterisation area. RNAS Culdrose SSR concerns within area Mounts Bay section of the characterisation area. Hartland Point PSR concerns within the North Cornish Coast section of the characterisation area. Wembury PSR concerns within area south-eastern sections of the characterisation area and a small part of the area around Mounts Bay. Wembury SSR concerns within area south-eastern sections of the characterisation area. Portland PSR concerns within the eastern part of area and south-eastern sections of the characterisation area. Portreath SSR concerns on the North Cornish Coast section of the characterisation area.	
Air defence radar (ADR)	Portreath ADR concerns with 250 m high turbines within the North Cornish coast section of the characterisation area. This type of radar system installed at this facility does not have an accepted mitigation method currently. Statutory safeguarding zone surrounding Portreath ADR extends over the North Cornish Coast; 250 m high turbines along the coast between Newquay and St Ives would cause a physical obstruction to the radar.	Portreath ADR concerns with 350 m high turbines within area the North Cornish Coast section of the characterisation area. This type of radar system installed at this facility does not have an accepted mitigation method currently. Statutory safeguarding zone surrounding Portreath ADR extends over the North Cornish Coast; 350 m high turbines along the coast between Newquay and St Ives would cause a physical obstruction to the radar.	
Threat radar	No threat radar concerns.	No threat radar concerns.	
Low flying	No low flying concerns, however, there will be a lighting requirement.	No low flying concerns, however, there will be a lighting requirement.	
Ranges, danger and exercise areas	D007, D007A and D007B Fowey and D009A Wembury danger area concerns. These are situated in the south-eastern section of the characterisation area only. Rotary and fixed wing Royal Navy aircraft operate down to sea level in these danger areas practising live firing, para dropping and high energy manoeuvres. Turbines within these danger areas would present a significant physical obstruction to aircraft. UXO should be taken into account. The MoD would need to review cable routes to ensure highly surveyed routes were not obstructed by new cables or turbines.	D007, D007A and D007B Fowey and D009A Wembury danger area concerns. These are situated in the south-eastern section of the characterisation area only. Rotary and fixed wing Royal Navy aircraft operate down to sea level in these danger areas practising live firing, para dropping and high energy manoeuvres. Turbines within these danger areas would present a significant physical obstruction to aircraft. UXO should be taken into account. The MoD would need to review cable routes to ensure highly surveyed routes were not obstructed by new cables or turbines.	
Statutory safeguarding	Statutory safeguarding zones surrounding RNAS Culdrose and Predannack airfield extend over the sea and cover the Cornish coast areas. 250 m high turbines within the area around Mounts Bay would be of concern to the MoD, as they would cause an infringement of the obstacle limitation surface (OLS) surrounding these airfields.	Statutory safeguarding zones surrounding RNAS Culdrose and Predannack airfield extend over the sea and cover the Cornish coast areas of interest. 350 m high turbines within the area around Mounts Bay would be of concern to the MoD, as they would cause an infringement of the OLS surrounding these airfields.	

Area commentary	Area rating
Numerous ATC, ADR, statutory safeguarding and danger area concerns across the characterisation area. Radar issues cover the majority of the area and will require mitigation solutions. There will be a lighting requirement and consideration of UXO as per standard industry practice.	

Fishing activity

Gear type	Location and comments
Static gear	▪ Significant fishery. There is static fishing on the offshore side of Bude with a shift towards mobile gear around Hartland Point. ▪ The characterisation area hosts a large fleet of netters, potters and hand liners. ▪ The north coast is very exposed and has no good harbours. The fishing methods change with a greater emphasis on static gear fishing for crabs, lobsters and whelks. There is also a handline fishery in this part of the characterisation area. ▪ Newlyn has the largest gillnet and wreck net fleet in the UK and it also has a large fleet of beam trawlers plus twin rig and single rig trawlers.
Mobile	▪ The main mobile fisheries are demersal trawling, scalloping, ring netting (for pilchards) and a cuttlefish fishery. ▪ There is French and Belgian presence in the characterisation area. Most of the effort is focussed inside 12 NM.
General	▪ The fishing vessels from Looe, Mevagissey and Falmouth share the inshore grounds. ▪ Newlyn at the western end of Mounts Bay is England's second top port and it's an important fishing area.

Area commentary	Area rating
It would be very difficult to co-locate fishing and wind farm infrastructure in this characterisation area due to the amount of fishing activity and potential economic impact.	

Marine plans

South West (inshore) Marine Plan (in progress)	Spatially explicit policies	Issues	Area rating
	The policies for the South West Marine Plan have not yet been produced. The Marine Policy Statement is the default position which does not provide any spatial prescription for marine activities.	There are currently no spatial restrictions on where any future offshore wind developments could be located.	

The Crown Estate key resource areas (KRAs) for other sectors

KRA category	Where?	Commentary	Receptor rating	Area rating
Cables	Intersects all of the area.	This KRA is significant in size. It does not give a strong enough signal to be seen as a significant constraint development in this characterisation area.		
Carbon Capture Storage (CCS) stores	No interaction.			
CCS infrastructure	No interaction.			
Minerals	Some prime resources in St Austell Bay on the south coast and dotted along the north coast.	Their proximity to shore and the exposed nature of this coastline means that these resources are unlikely to be commercially attractive in the short to medium term. Therefore, this is deemed as a low constraint.		
Pipelines	No interaction.			

Sandscaping	Interaction around the south-western tip of Cornwall.	This KRA is significant in size due to the knowledge of potential sites and resources for sandscaping schemes not being well known currently. Significant conclusions cannot therefore be drawn from this KRA.		
Tidal range	No interaction.			
Tidal stream	No interaction.			
Wave	Some slightly intersecting the west of the characterisation area around Land's End.	Not a significant interest in this characterisation area and therefore does not present a significant constraint to development.		

National Air Traffic Services (NATs) radar overlap

% Overlap with Primary Surveillance Radar (PSR) assessment buffer (200 m turbines)	Commentary	Area rating
3.05%	Very little overlap with this characterisation area. Further assessment is unlikely to be required.	

Water Framework Directive (WFD)

Water bodies triggered	Water body details					
	Type	Is it heavily modified?	Overall status	Ecological status	Chemical status	Target date to achieve good status
Penzance	Coastal	No	Good	Good	Good	2015
Gannel	Transitional	No	High	High	Good	2015
Cornwall North	Coastal	No	High	High	Good	2015
St Austell	Coastal	No	Good	Good	Good	2027
Devon South	Coastal	No	Good	Good	Good	2015
Plymouth Coast	Coastal	No	Good	Good	Good	2015
Cornwall South	Coastal	No	Good	Good	Good	2015
Land's End to Trevose Head	Coastal	No	Good	Good	Good	2015
Salcombe Harbour	Coastal	No	Moderate	Moderate	Good	2015
Dart	Transitional	Yes	Moderate	Moderate	Good	2027

% of the area covered	Spatial overlap with the area	Commentary	Area rating
23%	The characterisation area intersects with water bodies all around the south-west coastline.	This characterisation area intersects with mainly unmodified water bodies which are in good to moderate condition with some high. There is also a moderate overlap between the characterisation area and these water bodies. This has potential to pose some level of constraint to development in parts of this area.	

Marine cultural heritage

Heritage asset type	Where	Commentary on sensitivity from offshore wind development	Receptor rating
Maritime archaeology and wrecks	Significant potential throughout characterisation area, with concentrations in those areas closer to the coast and near to Salcombe, Plymouth, Falmouth, Land's End and off the coast of Padstow. There are a number of protected wrecks in this area concentrated closer to the south coast, mainly owing to their discovery through sports diving.	Maritime archaeology including known wrecks, historic losses and isolated finds, all have potential to be affected by offshore wind farm development in the South West characterisation area. The area contains a high number of wrecks and obstructions, with concentrations in areas close to the coast and near Salcombe, Plymouth, Falmouth, Land's End and off the coast of Padstow. There is a dominance of steel and metal vessels from the 19th and 20th Centuries in the known records, particularly those associated with trade and the fishing industry. The presence of several protected wrecks across the area also indicates the potential for recovery of significant wrecks, material from the medieval period and the great age of sailing, up to the present day. The area played a significant role in the development of trade across England, and with the New World. Remains may also be associated with trade and military activity along the coast (e.g. Plymouth). There is potential for the recovery of remains from the earliest seafaring in the prehistoric period to the present day. Established procedures exist to ensure that any historic wrecks, both known and unknown, and associated remains are identified as part of any proposed offshore wind farm development, ensuring impacts are mitigated and minimised.	
Aviation archaeology	Potential for recovery of aviation archaeology remains throughout characterisation area.	There is potential within the characterisation area for the discovery of remains from crashed aircraft and associated cultural material from the birth of aviation at the start of the 20th Century to present day. The greatest potential is associated with losses from the Second World War, owing to locations of defence along the Cornish coast, and shipping routes along the English Channel and the Atlantic. Several Royal Air Force (RAF) bases were located in Cornwall from where sorties and defensive operations were launched, including RAF Cleave, RAF Perranporth, originally built as an RAF supermarine Spitfire station in 1941, and RAF Portreath. Historic records indicate a significant number of aircraft losses from the Second World War across the area. Known sites of crashed aircraft on the seabed remain rare, however the characterisation area has potential for discovery of more material of this type. Any remains if present may be identified or impacted on by wind farm development. While existing standard mitigation measures may be utilised for specific projects in the area, further site-specific mitigation including excavation and recovery of significant remains that are encountered and where impacts are unavoidable may be required, although it should be noted that this is an extreme example and would only be undertaken following discussion with advisors and, in rare cases, where preservation *in situ* was not a feasible option.	
Submerged prehistoric landscapes	Potential across characterisation area with enhanced potential in areas close to geomorphological features such as palaeochannels, and where such geomorphological features are closer to the coast e.g. North Cornish coast off Perranporth.	During periods of lower sea level caused by three major glaciations (the Anglian, Wolstonian and Devensian) the characterisation area would have been continually exposed, except for during the height of the Anglian glaciation when the ice sheet is believed to have reached the North Cornwall coast. There is potential for recovery of cultural material associated with the utilisation of the prehistoric land surfaces during times of lower sea level, and prior to the inundation of the English Channel in the Holocene. Any remains would be expected to be associated with geomorphological features such as palaeochannels and valleys, and the geological deposits from these periods. There is potential for the survival of sediments and primary and secondary context artefactual material where these have not been removed or reworked by the later Devensian glaciation. Evidence of Mesolithic occupation and activity may be anticipated where significant deposits have survived the Holocene sea level rise. Such remains may therefore be anticipated in association with the early Holocene channel systems and geomorphological features that were present and exposed prior to marine transgression in the Mesolithic, particularly in the North Cornwall area. There is potential for remains from this period to be present and impacted by offshore wind farm development in the characterisation area. Established procedures exist to ensure that any submerged prehistoric landscapes, associated geographical and geomorphological features, and associated deposits, features and finds are identified as part of any proposed offshore wind farm development, and impacts are mitigated and minimised.	
Area commentary			Area rating
There are extensive heritage assets and potential for recovery of further remains across the characterisation area, with particular potential for significant historic wreck, and aviation archaeological material. The application of standard mitigation measures on a strategic and project specific basis will minimise the risk to underwater cultural heritage in this characterisation area.			

Glossary of acronyms and abbreviations

ADR	Air Defence Radar
AONB	Area of Outstanding Natural Beauty
ATC	Air Traffic Control
BoCC	Birds of Conservation Concern
CCS	Carbon Capture Storage
cSAC	Candidate Special Area of Conservation
EPS	European Protected Species
FAME	Future of the Atlantic Marine Environment
HRA	Habitat Regulations Assessment
JNCC	Joint Nature Conservation Committee
km	Kilometre
KRA	Key Resource Area
m	Metre
MCZ	Marine Conservation Zone
MERP	Marine Ecosystems Research Programme
MoD	Ministry of Defence
MPA	Marine Protected Area
MW	Mega watt
NATS	National Air Traffic Services
NM	Nautical Mile
OESEA3	Offshore Energy Strategic Environmental Assessment 3
OFTO	Offshore Transmission Owners
OLS	Obstacle Limitation Surface
OWF	Offshore Wind Farm
PAR	Precision Approach Radar
pSPA	Potential Special Protection Area
PSR	Primary Surveillance Radar
Ramsar	Ramsar Convention on wetlands of international Importance especially as waterfowl habitat, also known as the ‘Convention on Wetlands’.
RAF	Royal Air Force
RNAS	Royal Navy Air Service
RSPB	Royal Society for the Protection of Birds
RYA AIS	Royal Yachting Association (RYA) Automatic Identification System (AIS)
SAC	Special Area of Conservation
SCI	Site of Community Importance
SNCB	Statutory Nature Conservation Body
SPA	Special Protection Area
SSR	Secondary Surveillance Radar
SSSI	Site of Special Scientific Interest
STAR	Seabird Tracking and Research
UXO	Unexploded Ordnance
WFD	Water Framework Directive

Offshore Wind **Leasing Round 4**

THE CROWN ESTATE

Resource and Constraints Assessment for Offshore Wind

Characterisation Area Report
Bristol Channel (English)

12

38255-TCE-REP-017

Characterisation Area Report: 12 — Bristol Channel (English)

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Version	Status	Issue date
1.1	Draft	July 2018
1.2	Draft	November 2018
1.3	Final	September 2019

The information included in this report should be read in conjunction with the *Resource and Constraints Assessment for Offshore Wind: Methodology Report* and the *Summary Stakeholder Feedback Report*. The trigger distance for constraints to be included in the constraints analysis section of this report is 1 nautical mile (NM).

The Crown Estate has undertaken the analysis in this report using the evidence available to it, internal expertise and support from external advisers where appropriate. The analysis does not obviate any potential need for any Habitat Regulations Assessment (HRA) or any project level consideration of the potential impact of development. The analysis does not supersede any statutory policies or marine plans. The analysis, including the data and information contained in this document, presents a point in time assessment with changes likely to both the presence and nature of constraints.

This report is provided for information purposes only and no party may rely on the accuracy, completeness or fitness of its content for any particular purpose. The Crown Estate makes no representation, assurance, undertaking or warranty in respect of the analysis in the report including all data and information contained in it.

Receptor rating		Area rating	
Receptor assessed but no interaction noted		Receptor assessed but no interaction noted	
Interaction acceptable with best practice/accepted mitigation		The constraint will present the need to implement best practice/accepted mitigation measures to enable acceptable development within the whole area	
Interaction acceptable with moderate mitigation		The constraint will present the need to implement moderate mitigation measures to enable acceptable development within the whole area	
Interaction acceptable with significant mitigation		The constraint will present the need to implement significant and/or strategic level mitigation measures to enable acceptable development within the whole area	
Significant/insurmountable issue that would be challenging to mitigate within the area of influence of a receptor		Significant/insurmountable issue that would be challenging to mitigate for any development within the whole area	
No data coverage across the area		No data coverage across the area	

Constraints analysis

Note that in addition to The Crown Estate leases/licences within this table, The Crown Estate has also identified key resource areas (KRAs) which may be suitable for the future development of different marine sectors. Information about overlapping KRAs that overlap this characterisation area is described in a latter section of this document.

Exclusions model — hard constraints			Receptor rating	Area rating
	Present	Commentary		
The Crown Estate agreements	Numerous telecoms cables come into Croyde, Bude and Berrow intersect the characterisation area, particularly across the northern part.	The cables have been removed from the characterisation area and should be avoided where possible by using best practice/accepted mitigation. However, the large number of cables transecting the area may be a constraint on the area available for new arrays. Since cable crossings require cable protection (which may have adverse environmental effects), crossings should be minimised where practicable.		
	Aggregate area 472: active dredge site within the eastern part of the characterisation area.	Would require a 2 km buffer around it and negotiations with the customer.		
	Aggregate area 526: active dredge site within the eastern part of the characterisation area.	Would require a 2 km buffer around it and negotiations with the customer.		
Other energy infrastructure	There is dredging around the Hinkley C nuclear plant to allow access during construction. There will also be exclusions around the outfalls and intakes when the plant is commissioned.	The Hinkley C nuclear plant is situated up the Bristol Channel with sufficient potential elsewhere in the area. Any interaction with Hinkley C should be avoidable through appropriate siting.		
	Oil and gas infrastructure.	There is no existing oil and gas infrastructure in this area, and there are no new licences under development.		
Navigation	There is navigational dredging within 1.2 km of the area to support Royal National Lifeboat Institution (RNLI) Clovelly.	The dredge denotes a significant investment in maintaining access to the facilities; impacts on access should therefore be avoided. There is sufficient potential area available to allow mitigation/avoidance of interaction through appropriate siting.		
Social	There are two protected wrecks within 1.8 km.	There is sufficient other opportunity in the areas for interactions to be minimised/avoided.		

Restrictions model — soft constraints			Receptor rating	Area rating
Economic Tier				
Navigation	One active disposal site related to Watchet Harbour which is 1.8 km from the area.	No anticipated interaction.		
	Significant shipping traffic traverses the area along a deep-water channel to Cardiff, Newport and Bristol ports.	This will have to be carefully managed to avoid health and safety and displacement concerns.		
	The area intersects with the harbour authority areas for ports of Bridgewater and Bristol.	There is sufficient potential area available to allow mitigation/avoidance of interaction through appropriate siting, however development within these jurisdictions will present a significant constraint.		
Subsurface	None within the trigger distance.			
Fishing	*See fisheries commentary below.*		N/A	

Environmental tier							
The assessment of the sensitivity of Marine Protected Areas (MPAs) to pressures caused by offshore wind development and operation is assessed in a separate spreadsheet which will be made available as part of the Round 4 evidence base. Commentary has been noted in the relevant characterisation document where MPAs either overlap or are within 1 NM of the characterisation area and have been assessed as a yellow rating or above. For more information on the methodology for this assessment, please refer to the methodology report. Assessments of Annex II species have not been made as part of the characterisation process. Such assessments will need to be undertaken at project level for individual developments within the characterisation area.							
Type of designation		Name of designation	Designated features/species	Conservation objectives	Commentary	Receptor rating	Area rating
European marine designations	Special Areas of Conservation (SACs)	Exmoor Heaths, Braunton Burrows (900 m), Tintagel-Marsland-Clovelly Coast (130 m), Exmoor and Quantock Oakwoods (700 m), Mendip Limestone Grasslands (1.3 km)					
	SAC	Lundy	Subtidal sandbanks. Reefs Sea caves grey seal	Maintain grey seal population Maintain subtidal sandbanks Maintain/recover reefs Maintain/recover sea caves	The Lundy SAC completely surrounds Lundy with the intersection with the characterisation area being minimal. Cable landfalls are unlikely to go through the site since grid connections will be to the mainland and given the distance from the characterisation area, it is unlikely that there will be significant impacts on habitat features within the site. Grey seal are likely to forage within the characterisation area and may be an important consideration at project level, but impacts on this species are likely to be mitigable through project location and construction methodology. Note that the Lundy SAC has harbour porpoise and bottlenose dolphin as non-qualifying features – their presence is likely to feature in consenting processes for nearby wind farms.		
	SAC	Severn Estuary/ Môr Hafren	Subtidal sandbanks Estuaries Intertidal mudflats and sandflats Reefs Atlantic salt meadows Sea lamprey River lamprey Twaite shad	Maintain/restore as appropriate.	Given the large size of the SAC and the significant intersection with the characterisation area it is likely that many of the features within the SAC will need to be considered as part of a project level HRA within the characterisation area. The impacts are likely to be linked to coastal processes and Sabellaria reefs may be of concern. Impacts on these are likely to be manageable. Impacts on migratory fish will also need to be considered, but these are also likely to be manageable. It is noted that HRA issues were not a major consenting concern for the round 3 Bristol Channel Zone/Atlantic Array Project.		
	Harbour porpoise SAC	Bristol Channel Approaches	Harbour porpoise	The conservation objectives for the SAC are: to ensure that the integrity of the site is maintained and that it makes the best possible contribution to maintaining Favourable Conservation Status (FCS) for harbour porpoise in UK waters. In the context of natural change, this will be achieved by ensuring that:	Harbour porpoise could be affected by offshore wind development in the area, mainly through acoustic impacts (disturbance and hearing damage) from pile driving, UXO clearance and possibly some geotechnical surveys. Disturbance and barrier effects arising from vessel movements and presence of turbines may also occur. The noise disturbance during wind farm construction is likely to be significant if using pile-driving to install the turbine foundations, and there is also a risk from UXO clearance. There will be a need to consider population level effects of disturbance (mainly during construction), and there may be some additional requirements to investigate potential impacts on prey species.		

				1. Harbour porpoise is a viable component of the site; 2. There is no significant disturbance of the species; and 3. The condition of supporting habitats and processes, and the availability of prey is maintained. This is similar to the protection afforded to harbour porpoise throughout their range by the European Protected Species (EPS) regulations in the UK. However, the Natura 2000 principles and HRA tests set the bar higher than EPS protection for impacts on the site as the protection is no longer solely considering effects on the population as a whole but making sure that the site is contributing positively to the species' Favourable Conservation Status.	The designation of harbour porpoise SACs will undoubtedly have consequences as to how some activities operate, and measures may need to be put in place to reduce disturbance. Implementation of any disturbance management is likely to be challenging given the complexity of marine activities, regulatory arrangements and scientific uncertainty surrounding the significance of noise impacts on harbour porpoise. The approach recommended by SNCBs is that developers should ensure that there is sufficient time between the assessment and the start of construction for them to effectively implement mitigation/management, which could include: 1. Careful spatial planning and phasing of noisy activities. 2. Use of alternative foundations that do not require pile driving (e.g. suction buckets, gravity bases), noting that these may have other impacts. 3. Use of alternative methods of installation (e.g. vibropiling) to reduce the noise footprint. 4. Use of technology to reduce the sound levels at source or to minimise sound propagation and reduce the noise footprint. The SNCBs and The Wildlife Trusts have concerns over the potential cumulative impacts on harbour porpoise within this SAC, and note that currently there is no mechanism to ensure that a strategic approach to the management of impacts is taken. They consider that this could be a significant consenting risk for offshore wind development. In parallel to new offshore wind leasing, The Crown Estate has committed to fund a collaborative programme of strategic enabling actions to increase the evidence base and support sustainable and coordinated expansion of offshore wind. Underwater noise and its management, assessment of impacts on sensitive receptors, and approaches to modelling and assessment, are all likely to form a key priority area for further work, and we anticipate collaborating with stakeholders on new work streams.		
	Sites of Community Importance (SCIs)	None within the trigger distance.					
	Ramsar	Severn Estuary	Estuaries Bird species Migratory fish species ic: Sea Lamprey River Lamprey Twaite Shad Allis Shad salmon sea trout eel	Maintain/restore as appropriate.	Site essentially has the same features (and the same level of protection) as the Severn Estuary Special Protection Area (SPA) and SAC. The impacts are likely to be linked to coastal processes and sabellaria reefs may be of concern. Impacts on these are likely to be manageable. Impacts on migratory fish and hearing sensitive fish will also need to be considered, but these are also likely to be manageable. It is noted that HRA issues were not a major consenting concern for the Round 3 Bristol Channel Zone/Atlantic Array Project.		
	Special Protection Areas (SPAs)	Severn Estuary (300 m)	Bewick's swan (Wintering) ringed plover (Migratory) curlew (Wintering) dunlin (Wintering) pintail (Wintering) redshank (Wintering) shelduck (Wintering) Wetlands	Maintain/restore as appropriate.	Important habitats are intertidal sandflats/mudflats, subtidal sandbanks, Atlantic salt meadow and reef features. These features could all be affected by cabling/landfall through the site. Advice on operations focuses on maintenance of the coastal habitat, the avoidance of disturbance and the 'absence of obstruction to bird sight lines'. Impacts on habitats within the SPA are likely to be mitigable/avoidable (although saltmarsh habitats are likely to be sensitive). Impacts on the birds offshore (e.g. whilst foraging) are likely to be of more concern. These impacts are likely to be mitigable through site design.		

	Potential Special Protection Area (pSPA)	None within the trigger distance.					
Marine Conservation Zones (MCZs)		Bideford to Foreland Point	Fragile sponge and anthozoan communities on subtidal rocky habitats High energy circalittoral rock High energy infralittoral rock High energy intertidal rock Honeycomb worm (Sabellaria alveolata) reefs Intertidal coarse sediment Intertidal mixed sediments Intertidal sand and muddy sand Intertidal under boulder communities Littoral chalk communities Low energy infralittoral rock Low energy intertidal rock Moderate energy circalittoral rock Moderate energy infralittoral rock Moderate energy intertidal rock Pink sea-fan (Eunicella verrucosa) Spiny lobster (Palinurus elephas) Subtidal coarse sediment Subtidal mixed sediments Subtidal sand	The general management approach for this site is to recover subtidal sand and spiny lobster features to favourable condition, and to maintain all other features in favourable condition.	Several of the features are likely to be very sensitive to offshore wind development - these are communities on subtidal rock and coarse sediments, and pink sea fan (Eunicella verrucosa). Other features are also likely to be sensitive, especially the sponge/anthozoa communities, subtidal sediment communities, sabellaria alveolata reefs and spiny lobster (Palinurus elephas). The MCZ stretches far along the coastline but does not extend far offshore. This means that impacts on features within the MCZ are likely to be avoidable for the most part. However, the southern section of the site (where the softer sediments are located) is likely to be suitable as a cable landfall location and features could be exposed in this area. The soft sediment communities are generally likely to be less sensitive to impacts from offshore wind, and therefore it is probably possible to mitigate impacts from landfall in this location.		
MCZ		Hartland Point to Tintagel	Coastal saltmarshes and saline reedbeds Fragile sponge and anthozoan	The general management approach for this site is to recover moderate/high energy circalittoral rock, subtidal sand/coarse sediment and fragile sponge and anthozoan	The most sensitive features at the site are subtidal rock communities, sponge/anthozoan communities and pink sea fan (Eunicella verrucosa). Sabellaria alveolata reefs are also likely to be sensitive to sediment resuspension. Intertidal features are less sensitive. Much of the MCZ appears to have been excluded from the characterisation area, including the south-western block which contains the high energy infralittoral rock		

		communities on subtidal rocky habitats High energy circalittoral rock High energy infralittoral rock High energy intertidal rock Honeycomb worm (Sabellaria alveolata) reefs Intertidal coarse sediment Intertidal sand and muddy sand Low energy intertidal rock Moderate energy circalittoral rock Moderate energy infralittoral rock Moderate energy intertidal rock Pink sea-fan (Eunicella verrucosa) Subtidal coarse sediment Subtidal sand	communities to favourable condition, and to maintain all other features in favourable condition.	features and much of the pink sea fan and sponge/anthozoan communities. This means that impacts on these features are likely to be limited. Much of the site has soft sediments nearshore and may be suitable for landfall. Impacts on intertidal features are generally lower, and impacts are likely to be mitigable with standard mitigation measures.		
MCZ	Lundy	spiny lobster (Palinurus elephas) (Since Lundy was originally designated as a Marine Nature Reserve for its marine habitats there are other sensitive features in the MCZ, but these features are not a formal part of the MCZ designation - they are protected through the Lundy SAC)	Recover population size, distribution & reproduction of spiny lobster within site. Maintain habitat size, food availability, water quality and water turbidity.	The Lundy MCZ completely surrounds Lundy with the intersection with the characterisation area being minimal. Cable landfalls are unlikely to go through the site since grid connections will be to the mainland and given the distance from the characterisation area, it is unlikely that there will be significant impacts on spiny lobster in Lundy MCZ.		
MCZ	Morte Platform	Subtidal coarse sediment High energy circalittoral rock Moderate energy circalittoral rock	Conservation objectives for all features are to recover the features to favourable condition.	This MCZ was designated in May 2019. The overlap between the MCZ and the characterisation area is very small and direct effects from turbine construction are likely to be mitigable, particularly given the high energy nature of the Bristol Channel. Some of the features within the site could be sensitive to cable installation.		

Sites of Special Scientific Interest (SSSIs)	West Exmoor Coast and Woods (50 m)	Woodland and wet woodland with associated plants/lichens; Heath; Breeding (terrestrial) birds; Geological/earth heritage; guillemot (breeding); razorbill (breeding).	Site units are a mixture of favourable and unfavourable (recovering). It is worth noting that the razorbill population was assessed as unfavourable (recovering) in 2010.	Terrestrial parts of site are unlikely to be affected unless cables cross it (this is probably avoidable/mitigable). Guillemot and razorbill could be affected by offshore developments - they are breeding populations and are very close to the potential development area.		
	Boscastle to Widemouth (130 m)	grey seal Hard maritime cliff & slope Vegetated sea cliffs Heath & associated invertebrates Woodland Geological/earth science features	Grey seal is in favourable status.	Terrestrial features of the site are unlikely to be exposed to offshore wind activity (since landfall unlikely to be made over cliffs). Grey seal breed in the SSSI. Impacts to the haul out sites are unlikely, but seals are likely to travel through and forage within the characterisation area since it is relatively close to the SSSI. Impacts on seals could be significant during construction, but are mitigable through (e.g.) piling restrictions, use of non-piled foundations or acoustic deterrent devices.		
	Blue Anchor to Lilstock Coast (1 km), Hobby to Peppercombe (700 m), River Lyn (1.1 km), Watersmeet (1.3 km), Porlock Ridge and Saltmarsh (550 m), Napp's Cave (550 m), Glenthorne (200 m), Mermaid's Pool to Rowden Gut (100 m), Northam Burrows (1 km), Westward Ho! Cliffs (500 m), Steeple Point to Marsland Mouth (750 m), Barricane Beach (650 m), Braunton Burrows (900 m), Exmoor Coastal Heaths, Hele; Samson's and Combe Martin Bays (550 m), Mill Rock (1.4 km), Morte Point (100 m), Saunton to Baggy Point Coast, Taw-Torridge Estuary (1.8 km), Bude Coast (300 m), Duckpool to			Assessed as low risk; details available in separate spreadsheet.		

	Furzey Cove (400 m), Marsland to Clovelly Coast (250 m), Tintagel Cliffs (500 m), Brean Down (1.3 km), Bridgwater Bay (1.1 km), Steep Holm (300 m)					
Spawning and nursery grounds	There is an area of significant usage as spawning and nursery grounds by five species to the north-west of the characterisation area.			There is a sufficient potential elsewhere in the area to be able to mitigate impacts of high usage.		
Social tier						
Royal Yachting Association (RYA) Automatic Identification System (AIS) intensity	There is a moderate amount of recreational boating activity in the area.			There is significant potential in the area to minimise/avoid interactions with these designations.		
Marinas	None within the trigger distance.					
Bathing beaches	There are 30 designated bathing beaches intersecting and situated close to the area.			There is significant other potential in the area to minimise/avoid interactions with these designations.		
Visibility from sensitive receptors	See visual analysis below.					

Review layers

Visibility from landscape designations and from the coast

The bands of significant visual impact are taken from the OSEA3[1] environmental report. It should be noted that these bands were challenged through the statutory stakeholder engagement by the Statutory Nature Conservation Bodies (SNCBs) so further analysis and engagement should be conducted to understand the visual constraint in potential development areas more fully.

The visibility from landscape designations analysis has been conducted using designations which include protections for landscapes and settings namely: National Parks, Areas of Outstanding Natural Beauty (AONBs), Heritage Coasts and World Heritage sites. For more information on these, please consult the methodology report. The analysis draws on visibility from these designations but not the sensitivity of them to offshore wind developments. Proposals should draw on the relevant management plans or local policies to fully understand the level of constraint that exists in the vicinity of these landscape designations. As such, more analysis is required to fully understand the potential constraint.

	Band of significant visual impact	% of overlap with the characterisation area	Commentary	Area rating
Medium sensitivity receptors	0-13 km (3.6 MW turbines)	76%	This area is all contained within 30 km of the coast with the majority being within 13 km. This will pose a significant constraint.	
	13-20 km (4-8 MW turbines)	21%		
	20-30 km (10-15 MW turbines)	3%		
High sensitivity receptors	0-30 km	100%		

Visibility of sea surface from landscape designations		Receptor rating	Area rating
The area is very visible from sensitive receptors on both the English and Welsh coasts. Designations are: • Gower Heritage Coast • Glamorgan Heritage Coast and • Gower AONB on the Welsh side • the Cornish Heritage Coasts • Hartland (Devon) Heritage Coast • North Devon Heritage Coast • Exmoor National Park • Mendip Hills AONB • Quantock Hills AONB • North Devon AONB • Cornwall AONB	The visibility of the area to a number of different landscape designations makes it likely that visual impact will pose a significant constraint to development in the area.		

[1] BEIS (2016), OESEA3 Environmental Report. Crown copyright 2016, p 291. URN 16D/033.

Ornithology outside of Special Protection Areas (SPAs) for high-risk species

Joint Nature Conservation Committee (JNCC), Natural England and Royal Society for the Protection of Birds (RSPB) advise that there are a number of information sources which should be taken into consideration in the assessment of potential impacts from offshore wind development in this characterisation area. These are:

- Site Information Centres on the JNCC website (http://jncc.defra.gov.uk/page-6895) which provide up-to-date information on protected areas, their features and status.
- Marine Ecosystems Research Programme (MERP) seabird distribution maps (https://marine-ecosystems.org.uk/Research_outcomes/Top_predators).
- Future of the Atlantic Marine Environment (FAME) and Seabird Tracking and Research (STAR) tracking data from the RSBP (https://rspb.maps.arcgis.com/apps/Cascade/index.html?appid=d6c3aa1ec7184a2895a01cebf451c7b3).
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- Thaxter, C.B., Ross-Smith, V., Bouten, W., Clark, N., Conway, G., Rehfisch, M. & Burton, N. (2015) Seabird–wind farm interactions during the breeding season vary within and between years: A case study of lesser black-backed gull Larus fuscus in the UK. Biological Conservation 186: 347-358.

Species	Site	Commentary on coverage	Area Rating
Gannet	Grassholm SPA	The gannet mean maximum seaward foraging range extends 229 km from the source colony at Grassholm SPA. This range overlaps six other characterisation areas in addition to wholly encompassing the Bristol Channel (English) area, which lies in the east of the foraging radius. Cumulative collision risk effects should be considered if development is taken forward in more than one of these characterisation areas. Given the limited existing offshore wind development in the Grassholm foraging range, cumulative impacts will most likely focus on the cumulative effects of new development in the characterisation areas. Summer density of gannet tends to be more concentrated around the coastline, with the Bristol Channel (English) area overlapping an area of slightly increased gannet density. However, the characterisation area is sited away from the highest densities of gannet, north of the Cornish coast and around the Grassholm SPA itself.	
Lesser black-backed gull	Skomer, Skokholm and the seas off Pembrokeshire SPA	The lesser black-backed gull mean max seaward foraging range extends 141 km from the Skomer, Skokholm and the seas off Pembrokeshire SPA, encompassing the Bristol Channel (English) characterisation area. Three other characterisation areas lie within this foraging range, therefore cumulative collision risk effects should be considered if development is taken forward in more than one of these characterisation areas. Given the absence of existing offshore wind development within this foraging range, cumulative impacts will most likely focus on the cumulative effects of new development in the characterisation areas. Summer density of lesser black-backed gull is concentrated around the SPA colony, with the density of lesser black-backed gull in the Bristol Channel (English) area fairly uniformly distributed and relatively low. Given the entire area is encompassed within the foraging range, siting of developments within the characterisation area is unlikely to materially affect collision risk.	
Kittiwake	Skomer, Skokholm and the seas off Pembrokeshire SPA	The kittiwake mean max seaward foraging range extends 60 km from the source colony at Skomer, Skokholm and the seas off Pembrokeshire SPA. There is a small overlap with the northern part of the Bristol Channel (English) characterisation area; the majority of which lies beyond this foraging radius. Two other characterisation areas lie within this foraging range, and cumulative collision risk effects should be considered if development is taken forward in more than one of these areas. Given the absence of existing offshore wind development within this foraging range, cumulative impacts will most likely focus on the cumulative effects of new development in the characterisation areas. Summer density of kittiwake is slightly increased along the north Devon coast and around the Pembrokeshire coast. Much of the overlap between the kittiwake foraging range and the characterisation area is in an area of relatively low kittiwake density. Locating any development south and east of the kittiwake mean maximum foraging range (i.e. > 60 km), would help reduce impacts on this Skomer, Skokholm and the seas off Pembrokeshire SPA colony.	

Ministry of Defence (MoD) activity

	Issues when using 250 m tip heights	Issues when using 350 m tip heights	Receptor rating
Air traffic control (ATC)	Hartland Point Primary Surveillance Radar (PSR) and Secondary Surveillance Radar (SSR) concerns although there are mitigation options available. Royal Navy Air Service (RNAS) Yeovilton PSR concerns in a small area close to the coast at Bridgwater Bay between Burnham-on-Sea and Minehead.	Hartland Point PSR and SSR concerns although there are mitigation options available. RNAS Yeovilton PSR concerns in a small area close to the coast at Bridgwater Bay between Burnham-on-Sea and Minehead.	
Air defence radar (ADR)	Portreath ADR concerns with 250 m high turbines off the coast at Bude. This type of radar system installed at this facility does not have an accepted mitigation method currently.	Portreath ADR concerns with 350 m high turbines off the coast at Bude. This type of radar system installed at this facility does not have an accepted mitigation method currently.	
Threat radar	No threat radar concerns.	No threat radar concerns.	
Low flying	No low flying concerns, however, there will be a lighting requirement.	No low flying concerns, however, there will be a lighting requirement.	
Ranges, danger and exercise areas	Concerns relating to the D119 Lilstock Range within Bridgwater Bay. Navy aircraft practise live firing within this danger area and turbines within this area would constrain the movement of aircraft. There are however opportunities in the rest of the characterisation area. UXO should be taken into account. The MoD would need to review cable routes to ensure highly surveyed routes are not obstructed by cables or turbines. Cable routes which pass through the Castlemartin, Manorbier and Pendine live firing ranges or through the D119 Bridgwater Bay bombing range would be a concern.	Concerns relating to the D119 Lilstock Range within Bridgwater Bay. Navy aircraft practise live firing within this danger area and turbines within this area would constrain the movement of aircraft. There are however opportunities in the rest of the characterisation area. UXO should be taken into account. The MoD would need to review cable routes to ensure highly surveyed routes are not obstructed by cables or turbines. Cable routes which pass through the Castlemartin, Manorbier and Pendine live firing ranges or through the D119 Bridgwater Bay bombing range would be a concern.	
Statutory safeguarding	Turbines south of the coast at Barry will occupy the Obstacle Limitation Surface (OLS) safeguarding zone surrounding MoD St Athan aerodrome. To maintain an assured piece of airspace there can be no infringements of the OLS, 250 m high turbines would cause an infringement. There are however opportunities in the rest of the characterisation area.	Turbines south of the coast at Barry will occupy the OLS safeguarding zone surrounding MoD St Athan aerodrome. To maintain an assured piece of airspace there can be no infringements of the OLS, 350 m high turbines would cause an infringement. There are however opportunities in the rest of the characterisation area.	

Area commentary	Area rating
ATC, aerodrome safeguarding and danger area radar concerns. Radar issues cover the majority of the area and will require mitigation solutions. Also note that Government Communications Headquarters (GCHQ) may have concerns with development proposals off the coast of Bude as they have a separate Radar in operation. There will be a lighting requirement and consideration of UXO as per standard industry practice.	

Fishing activity

Gear type	Location and comments
Static gear	▪ There are some vessels potting for crabs, lobsters and whelks and netting in the area.
Mobile gear	▪ The fleet at Bideford and some Belgian interests fish the inshore area mainly targeting rays. ▪ The further north activity is mainly Single and Twin Rig Trawling with vessels from Biddeford and Ilfracombe. ▪ There is also seasonal Beam trawling activity. ▪ The trawling fleet relies heavily on the squid fisheries, which are seasonal, and the ray fisheries which are regulated by quota.
	▪ There is big investment in the fleets at Ilfracombe in both vessels and production facilities.

Area commentary	Area rating
Opportunity down the middle of the channel. Also, information is available from the Atlantic Array Wind Farm that could inform engagement.	

Marine plans

South West (inshore) Marine Plan (in progress)	Spatially explicit policies	Issues	Area rating
	The policies for the South West Marine Plan have not yet been produced. The Marine Policy Statement is therefore the default position however, this does not provide any spatial prescription for marine activities.	There are currently no spatial restrictions on where any future offshore wind developments could be located.	

The Crown Estate key resource areas (KRAs) for other sectors

KRA category	Where	Commentary	Receptor rating	Area rating
Cables	Intersect all of the area.	This KRA is significant in size and does not give a strong enough signal to be a significant constraint development in this area.		
Carbon Capture Storage (CCS) stores	No interaction.			
CCS infrastructure	No interaction.			
Minerals	Resources covering the outer channel.	Strategically important for aggregates in the long term. There is however some opportunity elsewhere in the characterisation area.		
Pipelines	No interaction.			
Sandscaping	Slight coverage on the northern side of the characterisation area.	This KRA is significant in size and does not give a strong enough signal to be a significant constraint development in this area.		

Tidal range	Coverage to the east of the area.	There are projects proposed in this area and long-standing interest in development of tidal range. There is significant development potential elsewhere in the characterisation area to avoid interactions.		
Tidal stream	Significant overlap in the inner Bristol Channel.	There is some interest in tidal stream resource but there is significant opportunity elsewhere in the area.		
Wave	No intersection.			

National Air Traffic Services (NATs) radar overlap

% Overlap with Primary Surveillance Radar (PSR) assessment buffer (200 m turbines)	Commentary	Area rating
46.11%	Some significant overlap with the further assessment buffer to the western edge of the characterisation area. This is in an area that may be appropriate for development meaning that further assessment will probably be required.	

Water Framework Directive (WFD)

Water bodies triggered	Water body details					
	Type	Is it heavily modified?	Overall status	Ecological status	Chemical status	Target date to achieve good status
Cornwall North	Coastal	No	High	High	Good	2015
Barnstaple Bay	Coastal	No	Good	Good	Good	2015
Bristol Channel Outer South	Coastal	No	Good	Good	Good	2015
Lundy	Coastal	No	Good	Good	Good	2015
Bridgwater Bay	Coastal	No	Moderate	Moderate	Good	2027
Bristol Channel Inner South	Coastal	No	Moderate	Moderate	Good	2015
Bristol Channel Inner North	Coastal	No	Moderate	Moderate	Good	2027
Bristol Channel Inner South	Coastal	No	Moderate	Moderate	Good	2015
Bristol Channel Inner North	Coastal	No	Moderate	Moderate	Good	2027

% of the area covered	Spatial overlap with the area		Area rating
46%	The characterisation area intersects with water bodies all around the adjacent coastline. The Bristol Channel Outer South waterbody extends out to the median line.	This area intersects only unmodified water bodies which are in good to moderate overall condition with one being high. There is also a significant overlap between the characterisation area and these water bodies. This has potential to pose some level of constraint to development in this area.	

Marine Cultural Heritage

Heritage asset type	Where	Commentary on sensitivity from offshore wind development	Receptor rating
Maritime archaeology and wrecks	Significant potential throughout the characterisation area, with concentrations of known wrecks and obstructions in the areas closer to the coast off the North Devon near Bideford and Ilfracombe and associated with the main navigation channels into the estuary. There are several protected wrecks located off the coast of Lundy to the west of the characterisation area. High potential for recovery of remains from the sandbanks present in the area.	There is potential for the recovery of a wide variety of maritime archaeological material from the Palaeolithic to the present day to be present and affected by offshore wind farm (OWF) development in the Bristol Channel English characterisation area. The area has a long history of maritime activity, with the Bristol Channel utilised by ships accessing a number of key ports along the English and Welsh coasts since at least the early medieval period. The area contains a number of wrecks and obstructions, with concentrations in the areas closer to the coast off North Devon near Bideford and Ilfracombe. There are several protected wrecks located off the coast of Lundy to the west of the characterisation area. There is a dominance of steel and metal vessels from the 19th and 20th Centuries in the known records, with significant potential for recovery of wooden wrecks of older date from the navigational hazards and sandbanks in the channel (e.g. Culver Sands). There is potential for the recovery of remains from the earliest seafaring vessels dating from the prehistoric period to the present day - it is likely that early forms of watercraft were utilised to traverse the rivers, lakes and lagoons present within the coastal waters of the characterisation area, with some evidence of craft being capable of seafaring journeys. Surviving maritime archaeological evidence from the late Upper Palaeolithic, and Mesolithic may be present. Evidence of Bronze Age watercraft has been discovered in the Bristol Channel. Established procedures exist to ensure that any historic wrecks, both known and unknown, and associated remains, are identified as part of any proposed OWF development and impacts are mitigated and minimised.	
Aviation archaeology	Potential for recovery of remains throughout the characterisation area, particularly in the Inner Channel.	The Bristol Channel English characterisation area has high potential for the recovery of crashed aircraft and material from the birth of aviation at the start of the 20th Century to the present, but in particular from airborne military conflict during two World Wars. The skies above the area saw substantial airborne conflict, including organised and pre-planned attacks on military convoys and strategic locations, airborne defence and numerous other battles and skirmishes. The area is located on important routes to strategic locations and targets located all along the Bristol Channel. Royal Air Force (RAF) bases were located along the South Wales coast, and Bristol suffered from a number of bombing raids by the Luftwaffe due to the presence of the docks and military infrastructure in the city. Very few known aircraft wrecks have been identified in the area due to difficulty in identifying these sites on the seabed, however the historic records attest to a high number of losses in the area which indicate the potential for remains. Any remains that are present may be identified or impacted upon by wind farm development. While existing standard mitigation measures may be utilised for specific projects in the area, further site-specific mitigaton including excavation and recovery of significant remains that are encountered where impacts are unavoidable may be required. It should be noted that this is, however, an extreme example and would only be undertaken following significant discussion with advisors, and in those rare cases where preservation *in situ* is not a feasible option.	
Submerged prehistoric landscapes	Potential across characterisation area with enhanced potential in areas close to geomorphological features such as palaeochannels, in particular those coastal locations where remains from the early Mesolithic can be anticipated.	During periods of lower sea level caused by three major glaciations (the Anglian, Wolstonian and Devensian) the Bristol Channel (English) characterisation area would have been exposed beyond the limits of the Welsh Ice Cap, potentially forming an attractive and abundant habitat for prehistoric populations. The exception to this is at the height of the Anglian glaciation when the contemporary ice sheet is believed to have reached the North Cornwall coast. There is potential for the recovery of prehistoric archaeological materials from the characterisation area spanning the Lower Palaeolithic to the final inundation of the Bristol Channel in the late Mesolithic (c. 7,500 years BP) period. Finds recovered from the foreshore in the Severn Estuary include Palaeolithic hand axes, Mesolithic footprints and stone tool scatters which indicate the significant prehistoric archaeological potential of the characterisation area. Established procedures exist to ensure that any submerged prehistoric landscapes, associated geographical and geomorphological features, and associated deposits, features and finds are identified as part of any proposed OWF development and impacts are mitigated and minimised.	
Area Commentary			Area Rating
There are extensive heritage assets and potential for recovery of further remains across the characterisation area; with notable potential for significant historic wreck, and prehistoric archaeology from the Palaeolithic and Mesolithic. The application of standard mitigation measures on a strategic and project-specific basis would minimise the risk to underwater cultural heritage in this area.			

Glossary of acronyms and abbreviations

ADR	Air Defence Radar
AONB	Area of Outstanding Natural Beauty
ATC	Air Traffic Control
CCS	Carbon Capture Storage
EPS	European Protected Species
FAME	Future of the Atlantic Marine Environment
GCHQ	Government Communications Headquarters
HRA	Habitat Regulations Assessment
JNCC	Joint Nature Conservation Committee
km	Kilometre
KRA	Key Resource Area
m	Metre
MCZ	Marine Conservation Zone
MERP	Marine Ecosystems Research Programme
MoD	Ministry of Defence
MPA	Marine Protected Area
MW	Mega watt
NATS	National Air Traffic Services
NM	Nautical Mile
OESEA3	Offshore Energy Strategic Environmental Assessment 3
OFTO	Offshore Transmission Owners
OLS	Obstacle Limitation Surface
OWF	Offshore Wind Farm
pSPA	Potential Special Protection Area
PSR	Primary Surveillance Radar
Ramsar	Ramsar Convention on wetlands of international Importance especially as waterfowl habitat, also known as the ‘Convention on Wetlands’.
RAF	Royal Air Force
RNAS	Royal Navy Air Service
RNLI	Royal National Lifeboat Institution
RSPB	Royal Society for the Protection of Birds
RYA AIS	Royal Yachting Association (RYA) Automatic Identification System (AIS)
SAC	Special Area of Conservation
SCI	Site of Community Importance
SNCB	Statutory Nature Conservation Body
SPA	Special Protection Area
SSR	Secondary Surveillance Radar
SSSI	Site of Special Scientific Interest
STAR	Seabird Tracking and Research
UXO	Unexploded Ordnance
WFD	Water Framework Directive

Offshore Wind **Leasing Round 4**

THE CROWN ESTATE

Resource and Constraints Assessment for Offshore Wind

Characterisation Area Report
Bristol Channel (Welsh)

13

38255-TCE-REP-018

Characterisation Area Report: 13 – Bristol Channel (Welsh)

38255-TCE-REP-018 Characterisation Area Report: 13 – Bristol Channel (Welsh)		
Version	Status	Issue date
1.1	Draft	July 2018
1.2	Draft	November 2018
1.3	Final	September 2019

The information included in this report should be read in conjunction with the *Resource and Constraints Assessment for Offshore Wind: Methodology Report* and the *Summary Stakeholder Feedback Report*. The trigger distance for constraints to be included in the constraints analysis section of this report is 1 nautical mile (NM).

The Crown Estate has undertaken the analysis in this report using the evidence available to it, internal expertise and support from external advisers where appropriate. The analysis does not obviate any potential need for any Habitat Regulations Assessment (HRA) or any project level consideration of the potential impact of development. The analysis does not supersede any statutory policies or marine plans. The analysis, including the data and information contained in this document, presents a point in time assessment with changes likely to both the presence and nature of constraints.

This report is provided for information purposes only and no party may rely on the accuracy, completeness or fitness of its content for any particular purpose. The Crown Estate makes no representation, assurance, undertaking or warranty in respect of the analysis in the report including all data and information contained in it.

Receptor rating		Area rating	
Receptor assessed but no interaction noted		Receptor assessed but no interaction noted	
Interaction acceptable with best practice/accepted mitigation		The constraint will present the need to implement best practice/accepted mitigation measures to enable acceptable development within the whole area	
Interaction acceptable with moderate mitigation		The constraint will present the need to implement moderate mitigation measures to enable acceptable development within the whole area	
Interaction acceptable with significant mitigation		The constraint will present the need to implement significant and/or strategic level mitigation measures to enable acceptable development within the whole area	
Significant/insurmountable issue that would be challenging to mitigate within the area of influence of a receptor		Significant/insurmountable issue that would be challenging to mitigate for any development within the whole area	
No data coverage across the area		No data coverage across the area	

Constraints analysis

Note that in addition to The Crown Estate leases/licences within this table, The Crown Estate has also identified key resource areas (KRAs) which may be suitable for the future development of different marine sectors. Information about overlapping KRAs that overlap this characterisation area is described in a latter section of this document.

Exclusions model — Hard constraints			Receptor rating	Area rating
	Present	Commentary		
The Crown Estate agreements	Numerous telecoms cables: active telecoms cables which land around Swansea Bay intersect the central part of the characterisation area.	The cables have been removed from the characterisation area and should be avoided where possible by using best practice/accepted mitigation. However, the relatively large number of cables in close proximity may be a constraint on available area for new arrays. Since cable crossings require cable protection (which may have adverse environmental effects), crossings should be minimised where practicable.		
	Aggregate Area 472: active dredge site within the western part of the characterisation area.	Would require a 2 km buffer around it and negotiations with the customer.		
	Aggregate Area 476: active dredge site within the western part of the characterisation area.	Would require a 2 km buffer around it and negotiations with the customer.		
	Aggregate Area 526: active dredge site within the western part of the characterisation area.	Would require a 2 km buffer around it and negotiations with the customer.		
Other energy infrastructure	None within the trigger distance.	No existing oil and gas infrastructure and no new licences under development in this area.		
Navigation	None within the trigger distance.			
Social	None within the trigger distance.			

Restrictions model — Soft constraints			Receptor rating	Area rating
Economic tier				
Navigation	There are three anchorage areas situated around Swansea Bay which service the Port Talbot, Swansea and Port of Neath.	There is sufficient potential available in the area to allow mitigation/avoidance of interaction through appropriate siting, however, development within these jurisdictions will potentially be a significant constraint.		
	Four harbour authority areas intersect or are within 1.2 km of the area including Port Talbot, Port of Barry, Swansea and Port of Neath.	There is sufficient potential available in the area to allow mitigation/avoidance of interaction through appropriate siting, however, development within these jurisdictions may present a significant constraint.		
	There is one active disposal site in Swansea Bay that intersects with the area.	With sufficient potential elsewhere in the area, any interaction should be avoidable through appropriate siting.		
	There is some traffic traversing the area providing access to Cardiff, Newport and Bristol ports.	This will have to be carefully managed to avoid health and safety and displacement concerns, however, there is sufficient opportunity around the rest of the area.		
Subsurface	None within the trigger distance.			
Fishing	See assessment below.		N/A	

Environmental tier							
The assessment of the sensitivity of Marine Protected Areas (MPAs) to pressures caused by offshore wind development and operation is assessed in a separate spreadsheet which will be made available as part of the Round 4 evidence base. Commentary has been noted in the relevant characterisation document where MPAs either overlap or are within 1 NM of the characterisation area and have been assessed as a yellow rating or above. For more information on the methodology for this assessment, please refer to the methodology report. Assessments of Annex II species have not been made as part of the characterisation process. Such assessments will need to be undertaken at project level for individual developments within the characterisation area.							
Type of designation		Name of designation	Designated features/species	Conservation objectives	Commentary	Receptor rating	Area rating
European marine designations	Special Areas of Conservation (SACs)	Gower Ash Woods/ Coedydd Ynn Gwyr, Dunraven Bay (1 km); Gower Commons/ Tiroedd Comin Gwyr (1.4 km).			Assessed as low risk; details available in separate spreadsheet.		
	SAC	Pembrokeshire Marine/Sir Benfro Forol	Subtidal sandbanks Estuaries Intertidal mudflats and sandflats Lagoons Shallow inlets and bays Reefs Atlantic salt meadows Sea caves Sea lamprey River lamprey Allis shad Twaite shad Otter Grey seal Shore dock	Advice on operations indicates that offshore wind development has the potential to affect all features of the site.	Some of the features would be exposed to offshore activities (particularly lamprey, shad and seal). This would need to be managed through the HRA process but is considered to be mitigable. Impacts to shore-based features are also likely to be mitigable through careful project design and construction. Consideration of coastal processes and landfall location will be important.		
	SAC	Carmarthen Bay and Estuaries/ Bae Caerfyrddin ac Aberoedd	Subtidal sandbanks Estuaries Intertidal mudflats and sandflats Shallow inlets and bays Glasswort and other annuals colonising mud and sand Atlantic salt meadows Sea lamprey River lamprey Allis shad Twaite shad Otter	Advice on operations indicates that offshore wind development has the potential to affect inlet/bay, estuary, and subtidal sandbank features	Some of the features would be exposed to offshore activities (particularly lamprey and shad). This would need to be managed through the HRA process but is considered to be mitigable. Impacts to intertidal features are also likely to be mitigable through careful project design and construction. Consideration of coastal processes and landfall location will be important.		
	SAC	Limestone Coast of South West Wales/ Arfordir Calchfaen de Orllewin Cymru	Vegetated sea cliffs Dune grassland Dry heaths Dry grasslands and scrublands on chalk or limestone Caves not open to the public Sea caves Greater horseshoe bat	In 2008 the sea caves were in favourable condition and are important sites for bats and seals. In 2008 the bat population was in favourable condition	The terrestrial features of the sites are not exposed to offshore wind development, although could be impacted by cable landfall. These impacts would be largely mitigable although some of the habitats may be rather sensitive. The sea caves are not likely to be affected by offshore wind development, nor are they likely to be exposed to cabling impacts.		

			Petalwort Early gentian		Impacts on the greater horseshoe bat may need to be investigated at a project level, since bats have been observed around offshore turbines. However, greater horseshoe bats are not a migratory species and this is unlikely to be a major consenting issue.		
	SAC	Kenfig/ Cynffig (500 m)	Atlantic salt meadows Dune grassland Dunes with creeping willow Humid dune slacks Calcium-rich nutrient-poor lakes, lochs and pools Petalwort Fen orchid	Some features are favourable, others are unfavourable - refer to management plan	Terrestrial features not exposed to impacts from offshore wind unless they lie on the cable path. It is considered that impacts can be mitigated (or avoided) although some of the habitats may be quite sensitive (especially vegetated dunes).		
	Harbour Porpoise SAC	Bristol Channel Approaches.		The conservation objectives for the SAC are: To ensure that the integrity of the site is maintained and that it makes the best possible contribution to maintaining Favourable Conservation Status (FCS) for harbour porpoise in UK waters. In the context of natural change, this will be achieved by ensuring that: 1. Harbour porpoise is a viable component of the site; 2. There is no significant disturbance of the species; and 3. The condition of supporting habitats and processes, and the availability of prey is maintained. This is similar to the protection afforded to harbour porpoise throughout their range by the European Protected Species (EPS) regulations in the UK. However, the Natura 2000 principles and HRA tests set the bar higher than EPS protection for impacts on the site as the protection is no longer solely considering effects on the population as a whole but making sure that the site is contributing positively to the species' Favourable Conservation Status.	Harbour porpoise could be affected by offshore wind development in the area, mainly through acoustic impacts (disturbance and hearing damage) from pile driving, UXO clearance and possibly some geotechnical surveys. Disturbance and barrier effects arising from vessel movements and presence of turbines may also occur. The noise disturbance during wind farm construction is likely to be significant if using pile-driving to install the turbine foundations, and there is also a risk from UXO clearance. There will be a need to consider population level effects of disturbance (mainly during construction), and there may be some additional requirements to investigate potential impacts on prey species. The designation of harbour porpoise SACs will undoubtedly have consequences as to how some activities operate, and measures may need to be put in place to reduce disturbance. Implementation of any disturbance management is likely to be challenging given the complexity of marine activities, regulatory arrangements and scientific uncertainty surrounding the significance of noise impacts on harbour porpoise. The approach recommended by SNCBs is that developers should ensure that there is sufficient time between the assessment and the start of construction for them to effectively implement mitigation/management, which could include: 1. Careful spatial planning and phasing of noisy activities. 2. Use of alternative foundations that do not require pile driving (e.g. suction buckets, gravity bases), noting that these may have other impacts. 3. Use of alternative methods of installation (e.g. vibropiling) to reduce the noise footprint. 4. Use of technology to reduce the sound levels at source or to minimise sound propagation and reduce the noise footprint. The SNCBs and The Wildlife Trusts have concerns over the potential cumulative impacts on harbour porpoise within this SAC, and note that currently there is no mechanism to ensure that a strategic approach to the		

					management of impacts is taken. They consider that this could be a significant consenting risk for offshore wind development. In parallel to new offshore wind leasing, The Crown Estate has committed to fund a collaborative programme of strategic enabling actions to increase the evidence base and support sustainable and coordinated expansion of offshore wind. Underwater noise and its management, assessment of impacts on sensitive receptors, and approaches to modelling and assessment, are all likely to form a key priority area for further work, and we anticipate collaborating with stakeholders on new work streams .		
	Sites of Community Importance (SCIs)	None within the trigger distance.					
	Ramsar	None within the trigger distance.					
	Special Protection Areas (SPAs)	Castlemartin Coast (1.6 km).			Assessed as low risk; details available in separate spreadsheet.		
	SPA	Bae Caerfyrddin/ Carmarthen Bay	Black (Common) scoter (wintering)	Advice on operations for the SPA indicates that offshore wind has the potential to impact scoter.	Common scoter are considered to be displaced from offshore wind array areas and this is one of the factors which led to the re-siting of the (subsequently abandoned) Shell Flats offshore wind project. The intersection of this characterisation area and the SPA is minimal, however, impacts should be considered in site selection. Impacts of cabling through the SPA are likely to be minimal.		
	SPA	Skomer; Skokholm and the Seas off Pembrokeshire	European storm petrel (breeding) Red-billed chough (breeding) Short-eared owl (breeding) Manx Shearwater (breeding) Atlantic puffin (breeding) Lesser black-backed gull (breeding) Seabird assemblage	Overarching conservation objective is to maintain/enhance bird populations, including the population size and distribution. Supporting habitat should be maintained and factors affecting the populations/habitats should be under control.	The site overlaps the characterisation area, and the seabird species for which it is designated will be exposed to collision/displacement impacts by developments within the characterisation area. However, the characterisation area largely excludes the footprint of the SPA, and since the SPA area includes the sea areas considered most important for the bird populations this is likely to go a long way towards mitigaing impacts on the SPA. It is likely that the SPA will feature in an Appropriate Assessment (AA) for developments within the characterisation area.		
	Potential Special Protection Area (pSPA)	None within the trigger distance.					
Marine Conservation Zones (MCZs)		None within the trigger distance.					
Sites of Special Scientific Interest (SSSIs)		Bishop's Wood (600 m), Bracelet Bay (250 m), Caswell Bay, Cliff Wood - Golden Stairs (550 m), Coedydd Parkmill A Cwm			Assessed as low risk; details available in separate spreadsheet.		

	Llethrid/Parkmill Woodlands And Llethrid Valley (1.6 km), Cynffig/Kenfig (500 m), East Aberthaw Coast (300 m), Freshwater East Cliffs To Skrinkle Haven, Great Tor (Three Cliff Bay) (1km), Horton; Eastern And Western Slade (250 m), Langland Bay (Rotherslade), Lydstep Head To Tenby Burrows (350 m), Margam Moors (1.7 km), Minchin Hole, Monknash Coast, Nash Lighthouse Meadow, Oxwich Bay, Oystermouth Old Quarry (1.1 km), Penard Valley (700 m), Southerndown Coast (850 m), Barry Island, Hayes Point To Bendrick Rock (1.2 km), Merthyr Mawr (1.5 km), Rhossili Down (1.4 km), Stackpole (1.6 km), Stackpole Quay - Trewent Point					
SSSI	Blackpill; Swansea	Sanderling Common ringed plover Muddy gravel		The muddy gravel feature is not considered sensitive to offshore wind development. There may be concerns about sanderling/plover interaction with offshore arrays; oystercatcher, grey plover, bar-tailed godwit, knot and dunlin also use the site. Impacts are likely to be manageable/mitigable with site location within the characterisation area.		
SSSI	Pwll-Du Head And Bishopston Valley	Wooded valley Maritime grassland Freshwater marsh Sand influenced biogenic reefs (*Sabellaria alveolata*)		Potential for reefs to be affected by offshore wind activity (both array and cable, depending on location). However, this is likely to be mitigable and is not considered a significant constraint on development within the characterisation area. Terrestrial features would only be affected by onshore cabling, and impacts are considered to be mitigable.		
SSSI	St. Margaret's Island	Caves and overhangs Soft piddock bored substrata Under-boulders Cormorant (breeding) Kittiwake (breeding) Razorbill (breeding) Puffin (breeding) Shag (breeding) Great black-backed gull (breeding) Herring gull (breeding) Lesser black-backed gull		Given the distance between the site and the characterisation area, none of the intertidal features are considered to be sensitive to offshore wind impacts unless the site is chosen as a landfall point. Cabling impacts are likely to be mitigable. Bird features could be affected by offshore array development, and this would need to be considered at project level. A Royal Society for the Protection of Birds (RSPB) report indicates that cormorant are the main reason for site citation and that there are approximately 238 breeding pairs (2012).		

		(breeding) Guillemot (breeding)				
SSSI	Gower Coast: Rhossili To Porteynon	Geological/Earth Heritage Vegetated cliff slopes Maritime grassland Terrestrial invertebrate assemblage Kittiwake (breeding) Guillemot (breeding) Razorbill (breeding) Puffin (breeding) Fulmar (breeding) Greater black-backed gull (breeding) Chough (breeding)		The SSSI covers a very long section of the coastline bordering the characterisation area and has extensive high cliffs which make it unsuitable as a landfall location. Impacts on terrestrial habitats/species are therefore unlikely, but impacts on the breeding seabird species should be considered possible. The north-western tip of the SSSI is within the Carmarthen Bay SPA which may be an additional level of protection for some of the seabirds within the SSSI. Impacts on the birds are likely to factor in the consenting process for developments within the characterisation area, but at this stage it is considered likely that impacts can be mitigated or avoided through choice of site location and design.		
Spawning and nursery grounds	There is an area of significant usage as spawning and nursery grounds by five species to the north-west of the area The Centre for environment, fisheries and aquaculture science (Cefas) fish spawning maps show small discreet areas of herring spawning off Pembrokeshire and in Swansea Bay.		There is a sufficient potential elsewhere in the characterisation area to be able to mitigate impacts on areas of high usage. Project level mitigation should deal with impacts as well.			
Social tier						
Royal Yachting Association (RYA) Automatic Identification System (AIS) intensity	There is a moderate amount of recreational boating activity in the characterisation area.		There is significant potential in the area to minimise/avoid interactions with these designations.			
Marinas	There is one marina 1.8 km to the north-east at Porthcawl.		An interaction with this constraint should be mitigatable through appropriate siting within the area.			
Bathing beaches	There are 42 designated bathing beaches intersecting and situated close to the area.		There is significant other potential in the area to minimise/avoid interactions with these designations.			
Visibility from sensitive receptors	See visual analysis below.					

Review layers

Visibility from landscape designations and from the coast

The bands of significant visual impact are taken from the OSEA3[1] environmental report. It should be noted that these bands were challenged through the statutory stakeholder engagement by the Statutory Nature Conservation Bodies (SNCBs) so further analysis and engagement should be conducted to understand the visual constraint in potential development areas more fully.

The visibility from landscape designations analysis has been conducted using designations which include protections for landscapes and settings namely: National Parks, Areas of Outstanding Natural Beauty (AONBs), Heritage Coasts and World Heritage sites. For more information on these, please consult the methodology report. The analysis draws on visibility from these designations but not the sensitivity of them to offshore wind developments. Proposals should draw on the relevant management plans or local policies to fully understand the level of constraint that exists in the vicinity of these landscape designations. As such, more analysis is required to fully understand the potential constraint.

	Band of significant visual impact	% of overlap with the characterisation area	Commentary	Area rating
Medium sensitivity receptors	0-13 km (3.6 MW turbines)	74%	This area is all contained within 30 km of the coast, with the majority being within 13 km. This will pose a significant constraint.	
	13-20 km (4-8 MW turbines)	19%		
	20-30 km (10-15 MW turbines)	7%		
High sensitivity receptors	0-30 km	100%		

Visibility of sea surface from landscape designations		Receptor rating	Area rating
The area is very visible from sensitive receptors on both the English and Welsh coasts. Designations are: • South Pembrokeshire Heritage Coasts • Gower Heritage Coasts • Glamorgan Heritage Coasts and **T**he Gower AONB on the Welsh side • Exmoor National Park • Mendips Hills AONB • North Devon AONB • Quantock Hills AONB • Hartland (Devon) Heritage Coast • North Devon Heritage Coast • Lundy Heritage Coast on the English side	The visibility of the area to a number of different landscape designations makes it likely that visual impact will pose a significant constraint to development in the area. Feedback from Natural Resources Wales has highlighted that the Gower AONB and Glamorgan Heritage Coast are particularly sensitive to visual pressures in this area.		

Ornithology outside of Special Protection Areas (SPAs) for high-risk species

Joint Nature Conservation Committee (JNCC), Natural England and Royal Society for the Protection of Birds (RSPB) advise that there are a number of information sources which should be taken into consideration in the assessment of potential impacts from offshore wind development in this characterisation area. These are:

- Site Information Centres on the JNCC website (http://jncc.defra.gov.uk/page-6895) which provide up-to-date information on protected areas, their features and status.

[1] BEIS (2016), OESEA3 Environmental Report. Crown copyright 2016, p 291. URN 16D/033.

- Marine Ecosystems Research Programme (MERP) seabird distribution maps (https://marine-ecosystems.org.uk/Research_outcomes/Top_predators)
- Future of the Atlantic Marine Environment (FAME) and Seabird Tracking and Research (STAR) tracking data from the RSBP (https://rspb.maps.arcgis.com/apps/Cascade/index.html?appid=d6c3aa1ec7184a2895a01cebf451c7b3)
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Species	Site	Commentary on coverage	Area rating
Gannet	Grassholm SPA	The gannet mean maximum seaward foraging range extends 229 km from the source colony at Grassholm SPA. This range overlaps six other characterisation areas in addition to wholly encompassing the Bristol Channel (Welsh) characterisation area, which lies in the east of the foraging radius. Cumulative collision risk effects should be considered if development is taken forward in more than one of these characterisation areas. Given that there is limited existing offshore wind development in the Grassholm foraging range, cumulative impacts will most likely focus on the cumulative effects of new development in the characterisation areas. Summer density of gannet tends to be more concentrated around the Grassholm SPA. The Bristol Channel (Welsh) characterisation area overlaps an area of relatively low gannet density, however there are some small patches of slightly increased density in the western part of the characterisation area. Locating any development towards the east of the characterisation area, away from these slightly increased densities, would help minimise any impacts on the Grassholm SPA colony.	
Lesser black-backed gull	Skomer, Skokholm and the seas off Pembrokeshire SPA	The lesser black-backed gull mean maximum seaward foraging range extends 141 km from the Skomer, Skokholm and the seas off Pembrokeshire SPA, encompassing the Bristol Channel (Welsh) characterisation area. Three other characterisation areas lie within this foraging range. Cumulative collision risk effects should be considered if development is taken forward in more than one of these characterisation areas. The absence of existing offshore wind development within this foraging range means that cumulative impacts will most likely focus on the cumulative effects of new development in the characterisation areas. Summer density of the lesser black-backed gull is concentrated around the SPA colony. The density of lesser black-backed gull in the Bristol Channel (Welsh) characterisation area is relatively low, however, there are some patches of increasing density towards the west of the characterisation area, closer to the SPA. Locating any development towards the central and eastern parts of the characterisation area would help minimise any impacts on this SPA colony.	
Kittiwake	Skomer, Skokholm and the seas off Pembrokeshire SPA	The kittiwake mean maximum seaward foraging range extends 60 km from the source colony at Skomer, Skokholm and the seas off Pembrokeshire SPA, and overlaps the western half of the Bristol Channel (Welsh) characterisation area. Two other characterisation areas lie within this range, and cumulative collision risk effects should be considered if development is taken forward in more than one of these areas. The absence of existing offshore wind development within this foraging range means that cumulative impacts will most likely focus on the cumulative effects of new development in the characterisation areas and will be less of a consent risk than with other kittiwake SPA colonies. Summer density of kittiwake is highest around the Skomer, Skokholm and the seas off Pembrokeshire SPA, with some patchy density recordings in the western part of the characterisation area. Locating any development east of the kittiwake mean maximum foraging range (i.e. > 60 km), would help minimise impacts on this SPA colony.	

Ministry of Defence (MoD) activity

	Issues when using 250 m tip heights	Issues when using 350 m tip heights	Receptor rating
Air traffic control (ATC)	Hartland Point Primary Surveillance Radar (PSR) and Secondary Surveillance Radar (SSR) concerns.	Hartland Point PSR and SSR concerns.	

	RNAS Yeovilton PSR concerns in a small area close to the coast at Bridgwater Bay between Burnham-on-Sea and Minehead.	RNAS Yeovilton PSR concerns in a small area close to the coast at Bridgwater Bay between Burnham-on-Sea and Minehead.	
Air defence radar (ADR)	No ADR concerns.	No ADR concerns.	
Threat radar	No threat radar concerns.	No threat radar concerns.	
Low flying	No low flying concerns, however, there will be a lighting requirement.	No low flying concerns, however, there will be a lighting requirement.	
Ranges, danger and exercise areas	Concerns relating to the Castlemartin (D113B) and Manorbier (D115B) danger areas on the south Pembrokeshire Coast. Any turbines within these danger areas would be a concern as live firing occurs within these areas which could damage the turbines and would constrain the types of munitions fired from the range. Turbines within the north-western part of the Bristol Channel area would also impact upon the Manorbier range danger area radar. UXO should be taken into account. The MoD would need to review cable routes to ensure highly surveyed routes are not obstructed by cables or turbines. Cable routes which pass through the Castlemartin, Manorbier and Pendine live firing ranges or through the D119 Bridgwater Bay bombing range would be a concern.	Concerns relating to the Castlemartin (D113B) and Manorbier (D115B) danger areas on the south Pembrokeshire Coast. Any turbines within these danger areas would be a concern as live firing occurs within these areas which could damage the turbines and would constrain the types of munitions fired from the range. Turbines within the north-western part of the Bristol Channel area would also impact upon the Manorbier range danger area radar. UXO should be taken into account. The MoD would need to review cable routes to ensure highly surveyed routes are not obstructed by cables or turbines. Cable routes which pass through the Castlemartin, Manorbier and Pendine live firing ranges or through the D119 Bridgwater Bay bombing range would be a concern.	
Statutory safeguarding	Turbines south of the coast at Barry will occupy the obstacle limitation surface (OLS) safeguarding zone surrounding MoD St Athan aerodrome. To maintain an assured piece of airspace there can be no infringements of the OLS, 250 m high turbines would cause an infringement.	Turbines south of the coast at Barry will occupy the OLS safeguarding zone surrounding MoD St Athan aerodrome. To maintain an assured piece of airspace there can be no infringements of the OLS, 350 m high turbines would cause an infringement.	
Area commentary			Area rating
ATC, Aerodrome safeguarding and danger area concerns. Radar issues cover the majority of the area and will require mitigation solutions. There will be a lighting requirement and consideration of UXO as per standard industry practice.			

Fishing activity

Gear type	Location and comments
Static gear	▪ Activity in this area is mainly potting and gillnetting with a limited amount of trawling.
Area commentary	Area rating
Opportunity down the middle of the channel. There is information available from the Atlantic Array Wind Farm that could inform engagement. There is also potentially data of use from Succorfish iVMS units that is available on request from Natural Resources Wales.	

Marine plans

Please note there is one marine plan area in Wales, encompassing Welsh inshore and offshore waters. The Welsh Government is responsible for preparing a Marine Plan for Wales. The Welsh National Marine Plan was consulted on, between December 2017 and March 2018. Welsh Government have been working with stakeholders to address issues raised through the consultation and it is now being finalised. The Welsh Government are aiming for adoption of the plan in Autumn 2019, subject to seeking approval of the plan from the UK Government. The analysis below is based on the published draft Welsh National Marine Plan.

Welsh National Marine Plan (Draft)	Spatially explicit policies	Issues	Area rating
Aggregates	AGG04: proposals potentially affecting strategic resource areas for aggregate extraction should demonstrate how, in order of preference, they: a) avoid adverse impacts on future potential aggregate extraction in those areas; b) minimise impacts where they cannot be avoided; c) mitigate impacts where they cannot be minimised; and d) should present the case for proceeding where (a-c) are not possible.	The characterisation area overlaps with the aggregate strategic resource area identified in the draft Welsh National Marine Plan. Any new offshore wind development would need to consider impacts to the aggregates industry and negotiation with the sector would be required. Whilst The Crown Estate leases/licences seabed for offshore wind and aggregate extraction it should be noted that aggregates tendering rounds currently run every two years, and so the requirement for liaison between industries will be ongoing.	
Aquaculture	AQU03: proposals potentially affecting strategic resource areas for aquaculture should demonstrate how, in order of preference, they: a) avoid adverse impacts on future potential aquaculture activity in those areas; b) minimise impacts where they cannot be avoided; c) mitigate impacts where they cannot be minimised; and d) should present the case for proceeding where (a-c) are not possible.	The characterisation area overlaps with the seabed strategic resource area and water column strategic resource area for aquaculture identified in the draft Welsh National Marine Plan. However, the overlap is relatively small and is not considered to be a significant concern for future offshore wind development, however, negotiation with the aquaculture sector would be required.	
Ports and shipping	P&S03: proposals potentially affecting strategic resource area for: a) established commercial navigation routes; b) pilot boarding areas and commercial anchorages; or c) Existing port, harbour and marina activities and their potential for future expansion; Including where a consent or authorisation has been granted or formally applied for, should not be authorised except where compatibility with the existing, authorised or proposed activity can be satisfactorily demonstrated or there are exceptional circumstances. In order of preference, compatibility should be achieved through: a) avoiding adverse impacts on those activities; b) minimising impacts where they cannot be avoided; and/or c) mitigating impacts where they cannot be minimised. If adequate compatibility cannot be achieved, proposals should present the case for proceeding.	The southern part of the characterisation area intersects with the strategic resource area for shipping as identified in the draft Welsh National Marine Plan. Where there is an intersect it is unlikely that static infrastructure would gain consent, but the overlap is relatively small, and much of the characterisation area would be unaffected.	
Tidal range energy	ELC04: proposals potentially affecting strategic resource areas for renewable energy (including those within the UK Offshore Energy SEA process) should demonstrate how, in order of preference, they: a) avoid adverse impacts on future potential renewable energy activities in those areas; b) minimise impacts where they cannot be avoided; and/or c) mitigate impacts where they cannot be minimised; and, d) should present the case for proceeding where (a-c) are not possible.	There is some overlap in the eastern part of the characterisation area with the tidal range energy strategic resource area identified in the draft Welsh National Marine Plan. Any new offshore wind development would need to consider impacts to the tidal range industry and negotiation with the sector would be required.	
Tidal stream energy		There is a small overlap of the south-east corner of the characterisation area with the tidal stream energy strategic resource area identified in the draft Welsh National Marine Plan. Any new offshore wind development would need to consider impacts to the tidal stream industry and negotiation with the sector would be required.	
Wave energy		There is a very small overlap of the south-west corner of the characterisation area with the wave energy strategic resource area identified in the draft Welsh National Marine Plan. It is not considered that this would cause significant concern for future offshore wind development.	

The Crown Estate key resource areas (KRAs) for other sectors

KRA category	Where?	Commentary	Receptor rating	Area rating
Cables	Intersects all of the area.	This KRA is significant in size and does not give a strong enough signal to be a significant constraint to development in this area.		
Carbon Capture Storage (CCS) stores	No interaction.			
CCS infrastructure	No interaction.			
Minerals	Resources covering the outer channel.	Strategically important for aggregates in the longer term. However, there is some opportunity elsewhere in the area.		
Pipelines	No interaction.			
Sandscaping	Coverage around the Mumbles area.	This KRA is significant in size and does not give a strong enough signal to be a significant constraint to development in this area.		
Tidal range	Coverage to the east of the area.	There are projects proposed in this area and long-standing interest in development of tidal range. There is significant development potential elsewhere in the area to avoid interactions.		
Tidal stream	Slight overlap in the inner Bristol Channel.	There is some interest in this tidal stream resource but there is significant opportunity elsewhere in the area. The Marine Planning strategic resource areas will take precedence over the KRA assessment, hence a green rating.		
Wave	No interaction.			

National Air Traffic Services (NATs) radar overlap

% Overlap with Primary Surveillance Radar (PSR) assessment buffer (200 m turbines)	Commentary	Area rating
29.22%	Some overlap the west of the area meaning further assessment may be required. There is significant other opportunity in the area to site potential projects outside of the consultation area.	

Water Framework Directive (WFD)

Water bodies triggered	Water body details					
	Type	Is it heavily modified	Overall status	Ecological status	Chemical status	Target date to achieve good status
Bristol Channel Outer North	Coastal	No	Moderate	Moderate	Good	2021
Swansea Bay	Coastal	Yes	Moderate	Moderate	Fail	2027

Pembrokeshire South	Coastal	No	Good	Good	Good	2015
Carmarthen Bay	Coastal	No	Moderate	Moderate	Fail	2021
Bristol Channel Inner North	Coastal	No	Moderate	Moderate	Good	2027

% of the area covered	Spatial overlap with the area	Commentary	Area rating
57%	The Bristol Channel Outer North waterbody extends out to the median line and covers a large proportion of the inshore portion of the characterisation area	This area intersects mainly unmodified water bodies which are in good to moderate overall condition. There is also significant overlap between the characterisation area and these water bodies. This has potential to pose some level of constraint to development in some of this area.	

Marine cultural heritage

Heritage asset type	Where?	Commentary on sensitivity from offshore wind development	Receptor rating
Maritime archaeology and wrecks	Potential throughout characterisation area, but in particular where there are concentrations of known wrecks in the east of the characterisation area off Barry in proximity to Cardiff and in the offshore areas near Swansea.	There is potential for the recovery of a wide variety of maritime archaeological material from the Palaeolithic to be present and affected by offshore wind farm (OWF) development in the Bristol Channel (Welsh) characterisation area. The area has a long history of maritime activity, with the channel being utilised by ships navigating the Bristol Channel to utilise key ports along the English and Welsh coasts since at least the early medieval period. The area contains a number of wrecks and obstructions associated with trade, with concentrations of known wrecks located to the east of the characterisation area off Barry in proximity to Cardiff, and in the offshore areas near Swansea. There is potential for the recovery of remains from the earliest seafaring in the prehistoric period to the present day in the characterisation area, particularly those areas close to known navigational hazards (e.g. Nobel Banks, coastal locations). Early forms of watercraft are likely to have been utilised to traverse the rivers, lakes and lagoons present within the coastal waters of the characterisation area in the Palaeolithic and Mesolithic; therefore there may be present surviving maritime archaeological evidence from the late Upper Palaeolithic and Mesolithic. Several examples of evidence of Bronze Age watercraft have been discovered in the Bristol Channel, including two pieces of a sewn plank boat dating to around 1000 BC recovered from excavations at Goldcliff. The area is also particularly significant for the role it played in the establishment of trade to the New World in the 16th and 17th Centuries. Established procedures exist to ensure that any historic wrecks, both known and unknown, and associated remains, are identified as part of any proposed OWF development so any impacts can be mitigated and minimised.	
Aviation archaeology	Potential for recovery of remains throughout characterisation area, and particularly in the parts of the characterisation area along the South Wales coast.	The Bristol Channel (Welsh) characterisation area has high potential for the recovery of crashed aircraft and material from the birth of aviation at the start of the 20th Century to the present, but in particular from airborne military conflict during the First and Second World Wars. The skies above the area saw substantial airborne conflict in defence of important routes to strategic locations and targets located all along the Bristol Channel. Royal Air Force (RAF) bases were located along the south Wales coast, including at Angle (Pembrokeshire), Manorbier, Pembrey, Carew Cheriton, Fairwood Common (now Swansea airport), Llandow and Caerau (Cardiff). Bombing raids frequently occurred on Swansea and Cardiff in the early years of the war. Very few known aircraft wrecks have been identified in the area due to difficulty in identifying these sites on the seabed, however, there have been a high number of losses in the area which indicate the potential. Any remains present, may be identified or impacted upon by wind farm development. While existing standard mitigation measures may be utilised for specific projects in the area, further site-specific mitigation including excavation and recovery of remains that are encountered where impacts are unavoidable may be required, although it should be noted that this is an extreme example and would only be undertaken following significant discussion with advisors and in rare cases where preservation *in situ* was not a feasible option.	
Submerged prehistoric landscapes	Potential across characterisation area; with enhanced potential in those areas close to the coast where evidence of human activity prior to inundation in the early Holocene may survive in	During periods of lower sea level caused by three major glaciations (the Anglian, Wolstonian and Devensian) the Bristol Channel (Welsh) characterisation area would have been exposed, potentially forming an attractive and abundant habitat for prehistoric populations. The exception to this is at the height of the Anglian glaciation when the ice sheet is believed to have reached the North Cornwall coast. There is potential for the recovery of prehistoric archaeological materials from the characterisation area spanning the period from the Lower Palaeolithic to the final inundation of the Bristol Channel in the late Mesolithic (c. 7,500 years BP). One of the most important finds from the Welsh Upper Palaeolithic, the remains of a human male skeleton known as the 'Red Lady of Paviland', was identified in Goat's Hole Cave on the Gower Peninsular in 1823. Dated to c.33,000 years BP. This find is one of the oldest ceremonial burials from Western Europe, and also provides	

	association with contemporary geomorphological features and deposits.	important evidence of a human presence close to the characterisation area. Other finds recovered from the foreshore in the Severn Estuary include Palaeolithic hand axes, Mesolithic footprints and stone tool scatters - the distribution of known Mesolithic sites in Wales shows a clear concentration in coastal areas. A number of established procedures exist to ensure that any submerged prehistoric landscapes, associated geographical and geomorphological features, and associated deposits, features and finds are identified as part of any proposed OWF development and impacts are mitigated and minimised.	
Area commentary			Area rating
Across the characterisation area there are extensive heritage assets and potential for recovery of further remains notably significant historic wreck, and prehistoric archaeology from the Palaeolithic and Mesolithic. The application of standard mitigation measures on a strategic and project-specific basis will minimise the risk to underwater cultural heritage in this area.			

Glossary of acronyms and abbreviations

AA	Appropriate Assessment
ADR	Air Defence Radar
AONB	Area of Outstanding Natural Beauty
ATC	Air Traffic Control
CCS	Carbon Capture Storage
Cefas	Centre for environment, fisheries and aquaculture science
EPS	European Protected Species
FAME	Future of the Atlantic Marine Environment
GCHQ	Government Communications Headquarters
HRA	Habitat Regulations Assessment
JNCC	Joint Nature Conservation Committee
km	Kilometre
KRA	Key Resource Area
m	Metre
MCZ	Marine Conservation Zone
MERP	Marine Ecosystems Research Programme
MoD	Ministry of Defence
MPA	Marine Protected Area
MW	Mega watt
NATS	National Air Traffic Services
NM	Nautical Mile
OESEA3	Offshore Energy Strategic Environmental Assessment 3
OFTO	Offshore Transmission Owners
OLS	Obstacle Limitation Surface
OWF	Offshore Wind Farm
pSPA	Potential Special Protection Area
PSR	Primary Surveillance Radar
Ramsar	Ramsar Convention on wetlands of international Importance especially as waterfowl habitat, also known as the ‘Convention on Wetlands’.
RAF	Royal Air Force
RNAS	Royal Navy Air Service
RSPB	Royal Society for the Protection of Birds
RYA AIS	Royal Yachting Association (RYA) Automatic Identification System (AIS)
SAC	Special Area of Conservation
SCI	Site of Community Importance
SNCB	Statutory Nature Conservation Body
SPA	Special Protection Area
SSR	Secondary Surveillance Radar
SSSI	Site of Special Scientific Interest
STAR	Seabird Tracking and Research
Succorfish	Under 12m vessel tracking equipment
UXO	Unexploded Ordnance
WFD	Water Framework Directive

Offshore Wind **Leasing Round 4**

THE CROWN ESTATE

Resource and Constraints Assessment for Offshore Wind

Characterisation Area Report **Cardigan Bay**

14

38255-TCE-REP-019

Characterisation Area Report: 14 - Cardigan Bay

38255-TCE-REP-019 Characterisation Area Report: 14 - Cardigan Bay		
Version	Status	Issue date
1.1	Draft	July 2018
1.2	Draft	November 2018
1.3	Final	September 2019

The information included in this report should be read in conjunction with the *Resource and Constraints Assessment for Offshore Wind: Methodology Report* and the *Summary Stakeholder Feedback Report*. The trigger distance for constraints to be included in the constraints analysis section of this report is 1 nautical mile (NM).

The Crown Estate has undertaken the analysis in this report using the evidence available to it, internal expertise and support from external advisers where appropriate. The analysis does not obviate any potential need for any Habitat Regulations Assessment (HRA) or any project level consideration of the potential impact of development. The analysis does not supersede any statutory policies or marine plans. The analysis, including the data and information contained in this document, presents a point in time assessment with changes likely to both the presence and nature of constraints.

This report is provided for information purposes only and no party may rely on the accuracy, completeness or fitness of its content for any particular purpose. The Crown Estate makes no representation, assurance, undertaking or warranty in respect of the analysis in the report including all data and information contained in it.

Receptor rating		Area rating	
Receptor assessed but no interaction noted		Receptor assessed but no interaction noted	
Interaction acceptable with best practice/accepted mitigation		The constraint will present the need to implement best practice/accepted mitigation measures to enable acceptable development within the whole area	
Interaction acceptable with moderate mitigation		The constraint will present the need to implement moderate mitigation measures to enable acceptable development within the whole area	
Interaction acceptable with significant mitigation		The constraint will present the need to implement significant and/or strategic level mitigation measures to enable acceptable development within the whole area	
Significant/insurmountable issue that would be challenging to mitigate within the area of influence of a receptor		Significant/insurmountable issue that would be challenging to mitigate for any development within the whole area	
No data coverage across the area		No data coverage across the area	

Constraints analysis

Note that in addition to The Crown Estate leases/licences within this table, The Crown Estate has also identified key resource areas (KRAs) which may be suitable for the future development of different marine sectors. Information about overlapping KRAs that overlap this characterisation area is described in a latter section of this document.

Exclusions model – Hard constraints			Receptor rating	Area rating
	Present	Commentary		
The Crown Estate agreements	Telecoms cables: there is one telecoms cable intersecting the southern part of the characterisation area.	Not considered to be a concern for any future offshore wind development.		
Other energy infrastructure	No existing infrastructure triggered in the area.	No existing oil and gas infrastructure.		
Navigation	None within the trigger distance.			
Social	None within the trigger distance.			

Restrictions model – Soft constraints			Receptor rating	Area rating
Economic tier				
Navigation	There are five anchorage areas within 1.8 km of the area.	This is far enough away so as not to cause a constraint.		
	Fishguard Harbour Authority Area intersects with the very south of this area.	There is sufficient potential available in the area to allow mitigation/avoidance of interaction through appropriate siting; however, development within these jurisdictions may present a significant constraint.		
	The only significant traffic that could interact with the area is into Fishguard Harbour.	This impact should be easily mitigatable through appropriate siting; however, access to the harbour should be maintained.		
Subsurface	None within the trigger distance.			
Fishing	*See fisheries commentary below.*		N/A	

Environmental tier							
The assessment of the sensitivity of Marine Protected Areas (MPAs) to pressures caused by offshore wind development and operation is assessed in a separate spreadsheet which will be made available as part of the Round 4 evidence base. Commentary has been noted in the relevant characterisation document where MPAs either overlap or are within 1 NM of the characterisation area and have been assessed as a yellow rating or above. For more information on the methodology for this assessment, please refer to the methodology report. Assessments of Annex II species have not been made as part of the characterisation process. Such assessments will need to be undertaken at project level for individual developments within the characterisation area.							
Type of designation		Name of designation	Designated features/species	Conservation objectives	Commentary	Receptor rating	Area rating
European marine designations	Special Area of Conservation (SACs)	Pen Llŷn a'r Sarnau/ Llŷn Peninsula and the Sarnau.	Subtidal sandbanks; Estuaries; Intertidal mudflats and sandflats; Lagoons;	Conservation objectives (set in 2009) were mainly to maintain features, with the requirement to restore some of the habitat areas which had been affected by human activity.	Most of the features of the site are unlikely to be significantly affected by offshore wind activity unless the site is chosen as a landfall location. Even in this case, it would be possible to mitigate the impacts		

			Shallow inlets and bays; Reefs; Glasswort and other annual colonising mud and sand; Atlantic salt meadows; Sea caves; Bottlenose dolphin; Otter; and, Grey seal.	For dolphin, seal and otter, conservation objectives include the requirement that their range (within the SAC and adjacent to it) should not be constrained.	(although some features such as saltmarsh may be sensitive). It should be noted that The Wildlife Trusts (TWT) consider that cabling through this site should be avoided, and that impacts to coastal features (especially saltmarsh) could be significant. However, impacts to the grey seal and bottlenose dolphin populations may be harder to avoid, since these species range far offshore and are sensitive to impacts from offshore wind (especially piling noise, although there are other impacts). It may be possible to mitigate impacts with project location/installation methods, but impacts on these features of the SAC may feature heavily in HRA/Appropriate Assessment (AA) for projects in this area. However, it is noted that much of the SAC area has been excluded from the characterisation area, and this may help in managing impacts to seal/dolphin populations.		
	SACs	Cardigan Bay/ Bae Ceredigion.	Subtidal sandbanks; Reefs; Sea caves; Sea lamprey; River lamprey; Bottlenose dolphin; and, Grey seal.	For bottlenose dolphin and seal the conservation objectives include a requirement that their range, food resources and supporting habitat are not significantly affected.	It is noted that the majority of the SAC has been excluded from the characterisation area. Impacts on the habitat features of the site are likely to be mitigable or avoidable. Impacts on species features are likely to be of more concern. The advice on operations for the site focuses more on the impacts of offshore wind on lamprey than on seal and bottlenose dolphin, but all four species are likely to be part of the HRA/AA for the site. Impacts on lamprey and seal are considered to be mitigable, especially since the overlap with the site has been reduced. The site contains one of the UK's two resident populations of bottlenose dolphin - the other is in the Moray Firth. For offshore wind developments in the Moray Firth, management of impacts on bottlenose dolphin was a significant issue during the HRA/AA but is was manageable in the end. The avoidance of most of the Cardigan Bay SAC area should go a long way to mitigate the impacts on this species.		
		Pembrokeshire Marine/Sir Benfro Forol	Subtidal sandbanks Estuaries Intertidal mudflats and sandflats Lagoons Shallow inlets and bays Reefs Atlantic salt meadows Sea caves Sea lamprey River lamprey Allis shad Twaite shad Otter Grey seal Shore dock	Advice on operations indicates that offshore wind development has the potential to affect all features of the site.	Some of the features would be exposed to offshore activities (particularly lamprey, shad and seal). This would need to be managed through the HRA process but is considered to be mitigable. Impacts to shore-based features are also likely to be mitigable through careful project design and construction. Consideration of coastal processes and landfall location will be important.		
		St David's / Ty Ddewi.			Assessed as low risk; details available in separate spreadsheet.		

	Harbour porpoise SAC	West Wales Marine	Harbour porpoise	The conservation objectives for the SAC are: To ensure that the integrity of the site is maintained and that it makes the best possible contribution to maintaining Favourable Conservation Status (FCS) for harbour porpoise in UK waters. In the context of natural change, this will be achieved by ensuring that: 1. Harbour porpoise is a viable component of the site; 2. There is no significant disturbance of the species; and 3. The condition of supporting habitats and processes, and the availability of prey is maintained. This is similar to the protection afforded to harbour porpoise throughout their range by the European Protected Species (EPS) regulations in the UK. However, the Natura 2000 principles and HRA tests set the bar higher than EPS protection for impacts on the site as the protection is no longer solely considering effects on the population as a whole but making sure that the site is contributing positively to the species' Favourable Conservation Status	Harbour porpoise could be affected by offshore wind development in the area, mainly through acoustic impacts (disturbance and hearing damage) from pile driving, UXO clearance and possibly some geotechnical surveys. Disturbance and barrier effects arising from vessel movements and presence of turbines may also occur. The noise disturbance during wind farm construction is likely to be significant if using pile-driving to install the turbine foundations, and there is also a risk from UXO clearance. There will be a need to consider population level effects of disturbance (mainly during construction), and there may be some additional requirements to investigate potential impacts on prey species. The designation of harbour porpoise SACs will undoubtedly have consequences as to how some activities operate, and measures may need to be put in place to reduce disturbance. Implementation of any disturbance management is likely to be challenging given the complexity of marine activities, regulatory arrangements and scientific uncertainty surrounding the significance of noise impacts on harbour porpoise. The approach recommended by SNCBs is that developers should ensure that there is sufficient time between the assessment and the start of construction for them to effectively implement mitigation/management, which could include: 1. Careful spatial planning and phasing of noisy activities. 2. Use of alternative foundations that do not require pile driving (e.g. suction buckets, gravity bases), noting that these may have other impacts. 3. Use of alternative methods of installation (e.g. vibropiling) to reduce the noise footprint. 4. Use of technology to reduce the sound levels at source or to minimise sound propagation and reduce the noise footprint. The SNCBs and The Wildlife Trusts have concerns over the potential cumulative impacts on harbour porpoise within this SAC, and note that currently there is no mechanism to ensure that a strategic approach to the management of impacts is taken. They consider that this could be a significant consenting risk for offshore wind development. In parallel to new offshore wind leasing, The Crown Estate has committed to fund a collaborative programme of strategic enabling actions to increase the evidence base and support sustainable and coordinated expansion of offshore wind. Underwater		

					noise and its management, assessment of impacts on sensitive receptors, and approaches to modelling and assessment, are all likely to form a key priority area for further work, and we anticipate collaborating with stakeholders on new work streams.		
	Sites of Community Importance (SCIs)	None within the trigger distance.					
	Ramsar	None within the trigger distance.					
	Special Protection Areas (SPAs)	Glannau Aberdaron ac Ynys Enlli/ Aberdaron Coast and Bardsey Island.	Red-billed chough (breeding/wintering) Manx shearwater (breeding/wintering)	In 2008 the conservation status of both the chough and manx shearwater was favourable (maintained).	Impacts on chough are likely to be limited since they do not travel/forage far offshore. However, impacts on manx shearwater have the potential to be significant. This species is on the Amber list of Birds of Conservation Concern. The UK has the majority of the world's population of manx shearwater, and this site contains around 2% of the British breeding population. It is noted that much of the SPA area has been excluded from the characterisation area, and this should go some way to managing impacts on manx shearwater populations (although they are a highly mobile species).		
		Northern Cardigan Bay / Gogledd Bae Ceredigion.	Red-throated diver (wintering)	The site was designated in January 2017 – no conservation objectives available.	This site supports 7% of the wintering red-throated diver population. The intersection of this site with the characterisation area is of some concern because red-throated diver are known to be displaced by offshore wind activity, and the HRA/AA issued with red-throated diver populations were the main reason for the abandonment of London Array II. However, it is noted that much of the SPA area has been excluded from the characterisation area, and this should go a long way to managing impacts on red-throated diver populations.		
	Potential Special Protection Area (pSPA)	None within the trigger distance.					
Marine Conservation Zones (MCZs)		None within the trigger distance.					
Sites of Special Scientific Interest (SSSIs)		Allt Wen A Traeth Tanybwlch (650 m), Creigiau Aberarth-Morfa (400 m), Creigiau Abergwaun (Fishguard Cliffs) (700 m), Creigiau Cwm-Ceriw A Ffos-Las (Morfa Bychan) (250 m), Portheiddy Moor (1.2 km), Traeth Llanon (1 km),			Assessed as low risk; details available in separate spreadsheet.		

	Glanllynnau A Glannau Pen-Ychain I Gricieth (250 m), Morfa Abererch (100 m), Mynydd Tir Y Cwmwd A'r Glannau At Garreg Yr Imbill (850 m)					
SSSI	Aberarth - Carreg Wylan	Grey seal Bottlenose dolphin Caves and overhangs Exposed rock Moderately exposed rock Rockpools Sand influenced biogenic reefs Pectenogammarus planicrurus (An amphipod) Vegetated cliffs Maritime grassland Coastal heath (and associated invertebrates) Roosting and breeding (sea) birds Geological/Earth Heritage		Given the distance between the site and the characterisation area, the majority of features are not considered sensitive to offshore wind activity unless landfall is made through the site. Cabling impacts are likely to be mitigable/avoidable. Impacts on seal, bottlenose dolphin and birds may need to be considered, but it is likely that these impacts will be mitigable (and insignificant in comparison with impacts on European sites).		
SSSI	Arfordir Abereiddi	Grey seal Caves and overhangs Exposed rock Rockpools Silled saline lagoon Geological/Earth Heritage		Some of the intertidal features are likely to be sensitive to offshore wind development, especially if landfall is made through the site (although the presence of cliffs makes this unlikely). Impacts are probably mitigable/avoidable. Grey seal breed in the sea caves and impacts on this species will need to be considered in the event of offshore wind activity nearby, however, it is likely that impacts can be mitigated.		
SSSI	Creigiau Pen Y Graig	Sand influenced biogenic reefs Woodland Grey seal Cormorant		Given the distance between the site and the characterisation area, the majority of features are not considered sensitive to offshore wind activity unless landfall is made through the site (which is unlikely owing to the presence of steep sea cliffs). Cabling impacts are likely to be mitigable/avoidable. Impacts on seal and cormorant may need to be considered, but it is likely that these impacts will be mitigable (and insignificant in comparison with impacts on European sites).		
SSSI	Newport Cliffs	Caves and overhangs Rockpools Sand influenced biogenic reefs Vegetated sea cliffs Vegetated scree Small numbers of breeding (sea)birds Maritime heath and scrub Grey seal		Some of the intertidal features are likely to be sensitive to offshore wind development, especially if landfall is made through the site (although the presence of cliffs makes this unlikely). Impacts are probably mitigable/avoidable. Grey seal breed in the sea caves and impacts on this species may need to be considered in the event of offshore wind activity nearby - however, it is likely that impacts can be mitigated. Impacts on seabirds are likely to be negligible since they are not a major part of the site designation.		
SSSI	Strumble Head - Llechdafad Cliffs	Caves and overhangs Exposed rock Surge gullies		Features are likely to be sensitive to offshore wind activity, especially cabling. However, the sea-cliffs on this part of the coastline mean it is unlikely that landfall		

		Vegetated seacliffs Geological/Earth Heritage Heathland Small colonies of breeding (sea)birds Grey seal Reptiles		would be made through the site, and impacts are probably mitigable/avoidable. The breeding seabird populations are small and unlikely to be of significant concern. Impacts on grey seal are likely to be mitigable.		
Spawning and nursery grounds	There are few overlaps of high-intensity nursery and spawning grounds in the area (the maximum is three).		This data does not show this area to be of significant sensitivity, so should be viewed as minimal constraint.			
Social tier						
Royal Yachting Association (RYA) Automatic Identification System (AIS) intensity	Sailing activity in the Cardigan Bay area is minimal, with some increased activity to the south of the areas.		Not a significant constraint in this area.			
Marinas	One marina to the north of the area.		Not a significant constraint in this area.			
Bathing beaches	There are 26 bathing beaches within 1.5 km of the area.		The area extends close to shore. The impact on these beaches should be mitigatable with appropriate siting of the development.			
Visibility from sensitive receptors	*See visual analysis below.*					

Review layers

Visibility from landscape designations and from the coast

The bands of significant visual impact are taken from the OSEA3[1] environmental report. It should be noted that these bands were challenged through the statutory stakeholder engagement by the SNCBs so further analysis and engagement should be conducted to understand the visual constraint in potential development areas more fully.

The visibility from landscape designations analysis has been conducted using designations which include protections for landscapes and settings namely: National Parks, Areas of Outstanding Natural Beauty (AONBs), Heritage Coasts and World Heritage sites. For more information on these, please consult the methodology report. The analysis draws on visibility from these designations but not the sensitivity of them to offshore wind developments. Proposals should draw on the relevant management plans or local policies to fully understand the level of constraint that exists in the vicinity of these landscape designations. As such, more analysis is required to fully understand the potential constraint.

	Band of significant visual impact	% of overlap with the characterisation area	Commentary	Area rating
Medium sensitivity receptors	0-13 km (3.6 MW turbines)	26%	This shows a large proportion of the area being within 30 km of the coast. There are opportunities further from shore in the central section of the area however the area has been highlighted as particularly sensitive from a visibility perspective by Natural Resources Wales during the statutory engagement.	
	13-20 km (4-8 MW turbines)	11%		
	20-30 km (10-15 MW turbines)	27%		
High sensitivity receptors	0-30 km	64%		

Visibility of sea surface from landscape designations		Receptor rating	Area rating
The southern section of the area is visible from: • Pembrokeshire Coast National Park The northern section is visible from: • Snowdonia National Park The area is also visible from: • Ceredigion, Dinas Head and St David's Peninsula Heritage Coasts	The shape of the characterisation area avoids the most visible areas of sea, but it is anticipated that there will be significant constraint of the area due to visual impacts due to the current undeveloped wilderness characteristics of this area. This assumption was reiterated through the statutory stakeholder engagement.		

Ornithology outside of Special Protection Areas (SPAs) for high-risk species

Joint Nature Conservation Committee (JNCC), Natural England and Royal Society for the Protection of Birds (RSPB) advise that there are a number of information sources which should be taken into consideration in the assessment of potential impacts from offshore wind development in this characterisation area. These are:

- Site Information Centres on the JNCC website (http://jncc.defra.gov.uk/page-6895) which provide up-to-date information on protected areas, their features and status.
- Marine Ecosystems Research Programme (MERP) seabird distribution maps (https://marine-ecosystems.org.uk/Research_outcomes/Top_predators)
- Future of the Atlantic Marine Environment (FAME) and Seabird Tracking and Research (STAR) tracking data from the RSBP (https://rspb.maps.arcgis.com/apps/Cascade/index.html?appid=d6c3aa1ec7184a2895a01cebf451c7b3)

[1] BEIS (2016), OESEA3 Environmental Report. Crown copyright 2016, p 291. URN 16D/033.

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Species	Site	Commentary on coverage	Area rating
Gannet	Grassholm SPA	The gannet's mean maximum seaward foraging range extends 229 km from the source colony at Grassholm SPA. This range overlaps six other characterisation areas in addition to encompassing the Cardigan Bay characterisation area, which lies in the north of the foraging radius. Cumulative collision risk effects should be considered if development is taken forward in more than one of these characterisation areas. Given the limited existing offshore wind development in the Grassholm foraging range, cumulative impacts will most likely focus on the cumulative effects of new development in the characterisation areas. Summer density of gannet tends to be more concentrated around the Grassholm SPA; gannet density in the Cardigan Bay area is patchy. However, locating any development towards the north of the characterisation area, where gannet density is generally relatively low, would help to minimise any impacts on the Grassholm SPA colony.	
Lesser black-backed gull	Skomer, Skokholm and the seas off Pembrokeshire SPA	The lesser black-backed gull's mean maximum seaward foraging range extends 141 km from the Skomer, Skokholm and the seas off Pembrokeshire SPA, encompassing the Cardigan Bay characterisation area. Three other characterisation areas lie within this foraging range, and so cumulative collision risk effects should be considered if development is taken forward in more than one of these characterisation areas. Given the absence of existing offshore wind development within this foraging range, cumulative impacts will most likely focus on the cumulative effects of new development in the characterisation areas. The summer density of lesser black-backed gulls is concentrated around the SPA colony, with high density extending northwards to overlap with the southern part of the Cardigan Bay characterisation area. Locating any development toward the north of the characterisation area, to avoid these higher densities, would help to minimise any impacts on this SPA colony.	
Kittiwake	Skomer, Skokholm and the seas off Pembrokeshire SPA	The kittiwake's mean maximum seaward foraging range extends 60 km from the source colony at Skomer, Skokholm and the seas off Pembrokeshire SPA, and overlaps the southern part of the Cardigan Bay characterisation area. Two other characterisation areas overlap this range, so cumulative collision risk effects should be considered if development is taken forward in more than one of these areas. Given the absence of existing offshore wind development within this foraging range, cumulative impacts will most likely focus on the cumulative effects of new development in the characterisation areas and will be less of a consent risk than with other kittiwake SPA colonies. Summer density of kittiwake is highest around the Skomer, Skokholm and the seas off Pembrokeshire SPA, with some patchy density recordings to the north of the area and overlapping the southern part of the Cardigan Bay characterisation area. Locating any development north of the kittiwakes mean maximum foraging range (i.e. more than 60 km) would help to minimise impacts on this SPA colony.	

Ministry of Defence (MoD) activity

	Issues when using 250 m tip heights	Issues when using 350 m tip heights	Receptor rating
Air traffic control (ATC)	Aberporth Range Primary Surveillance Radar (PSR) poses concerns within central and northern sections of the area. Turbines within the statutory lines of shot across Cardigan Bay between Aberdaron, Aberporth and Aberystwyth will cause a physical obstruction to the radars. Hartland Point PSR concerns within a small part of the southern section of the area.	Aberporth Range PSR poses concerns within central and northern sections of the area. Turbines within the statutory lines of shot across Cardigan Bay between Aberdaron, Aberporth and Aberystwyth will cause a physical obstruction to the radars. Hartland Point PSR concerns within a small part of the southern section of the area. Turbines within the line of statutory lines of shot across Cardigan Bay between Aberdaron, Aberporth and Aberystwyth will cause a physical obstruction to the radar.	

Air defence radar (ADR)	No ADR concerns.	No ADR concerns.	
Threat radar	No threat radar concerns.	No threat radar concerns.	
Low flying	No low flying concerns, however, there will be a lighting requirement.	No low flying concerns, however, there will be a lighting requirement.	
Ranges, danger and exercise areas	MoD Aberporth D201 danger area concerns which covers most the characterisation area. This danger area is a test facility within which Unmanned Air Vehicles (UAV's) are operated and undertake high energy manoeuvres and where living firing, torpedo dropping and bombing takes place. Turbines within Cardigan Bay itself will constrain test activities and cause physical obstructions to UAVs. UXO should be taken into account. The MoD would need to review cable routes to ensure highly surveyed routes are not obstructed by cables or turbines. We would have concerns if the cable route passed through the D201 Aberporth danger area.	MoD Aberporth D201 danger area concerns, which cover the majority of the characterisation area. This danger area is a test facility within which UAVs are operated and undertake high energy manoeuvres, and where live firing, torpedo dropping and bombing takes place. Turbines within Cardigan Bay itself will constrain test activities and cause physical obstructions to UAVs. UXO should be taken into account. The MoD would need to review cable routes to ensure highly surveyed routes are not obstructed by cables or turbines. We would have concerns if the cable route passed through the D201 Aberporth danger area.	
Statutory safeguarding	Statutory lines of shot cross Cardigan Bay between Aberporth, Aberdaron, Aberporth and Aberystwyth, turbines within the line of shot will cause a physical obstruction to the Aberporth radars.	Statutory lines of shot across Cardigan Bay between Aberdaron, Aberporth and Aberystwyth; turbines within the line of shot will cause a physical obstruction to the Aberporth radars.	

Area commentary	Area rating
There are several ATC and danger area concerns, especially in relation to D201 which may inhibit any development in the area. There will be a lighting requirement and consideration of UXO as per standard industry practice.	

Fishing activity

Gear type	Location and comments
Static gear	▪ There is a large amount of static gear fishing all along the coast of this area. This moves further off the coast in the winter to protect gear.
Mobile gear	▪ There is a minimal amount of mobile gear but some nomadic scallop dredging. The Welsh Government requires all vessels that fish for scallops inside Welsh waters to have Succorfish iVMS units on board. This data is available on request from Natural Resources Wales on request.

Area commentary	Area rating
There could be good opportunities further from the coast.	

Future oil and gas

Licensing round	Commentary	Receptor rating	Area rating
28th and 29th rounds – western edge of the area	Blocks 106/29, 107/16 and 107/11 were awarded via the 28th licensing round and overlap with the western edge of the characterisation area. Helicopter buffers around platforms could be a constraint if these blocks are developed in future, but the likelihood of development is unknown and the spatial extent of overlap is relatively limited.		

Marine plans

Please note there is one marine plan area in Wales, encompassing Welsh inshore and offshore waters. The Welsh Government is responsible for preparing a Marine Plan for Wales. The Welsh National Marine Plan was consulted on, between December 2017 and March 2018. Welsh Government have been working with stakeholders to address issues raised through the consultation and it is now being finalised. The Welsh Government are aiming for adoption of the plan in Autumn 2019, subject to seeking approval of the plan from the UK Government. The analysis below is based on the published draft Welsh National Marine Plan.

Welsh National Marine Plan (Draft)	Spatially explicit policies	Issues	Area rating
Aggregates	AGG4: proposals potentially affecting the strategic resource areas for aggregate extraction should demonstrate how they, in order of preference: a) avoid adverse impacts on future potential aggregate extraction in those areas; b) minimise impacts where they cannot be avoided; c) Mitigate impacts where they cannot be minimised; and, d) should present the case for proceeding where (a-c) are not possible.	There is no overlap of the characterisation area with the aggregate strategic resource area identified in the draft Welsh National Marine Plan.	
Aquaculture	AQU03: proposals potentially affecting the strategic resource areas for aquaculture should demonstrate how they, in order of preference: a) avoid adverse impacts on future potential aquaculture activity in those areas; b) Minimise impacts where they cannot be avoided; c) Mitigate impacts where they cannot be minimised; and, d) should present the case for proceeding where (a-c) are not possible.	The characterisation area overlaps with some seabed strategic resource area and water column strategic resource area for aquaculture identified in the draft Welsh National Marine Plan. However, the overlap is relatively small and is not considered to be a significant concern for future offshore wind development. However, negotiation with the aquaculture sector would be required.	
Ports and shipping	P&S3: proposals potentially affecting the strategic resource area for: a) established commercial navigation routes; b) pilot boarding areas and commercial anchorages; or c) existing port, harbour and marina activities and their potential for future expansion. Including where a consent or authorisation has been granted or formally applied for, should not be authorised except where compatibility with the existing, authorised or proposed activity can be satisfactorily demonstrated or there are exceptional circumstances. Compatibility should be achieved, in order of preference, through: a) avoiding adverse impacts on those activities; b) minimising impacts where they cannot be avoided; c) Mitigating impacts where they cannot be minimised. If adequate compatibility cannot be achieved, proposals should present the case for proceeding.	There is a small overlap of the southern part of the characterisation area around Fishguard with the strategic resource area for shipping as identified in the draft Welsh National Marine Plan. Where there is an intersect, it is unlikely that static infrastructure would gain consent. However, the overlap is small and most of the characterisation area would be unaffected.	
Tidal range energy	a) ELC04: proposals potentially affecting strategic resource areas for renewable energy (including those within the UK Offshore Energy SEA process) should demonstrate how, in order of preference, they: avoid adverse impacts on future potential renewable energy activities in those areas; b) minimise impacts where they cannot be avoided; and/or c) mitigate impacts where they cannot be minimised; and, d) should present the case for proceeding where (a-c) are not possible.	There is no overlap of the characterisation area with the tidal range energy strategic resource area identified in the draft Welsh National Marine Plan.	
Tidal stream energy		There is a small overlap of the south-west corner of the characterisation area with the tidal stream energy strategic resource area identified in the draft Welsh National Marine Plan. It is not considered that this would cause significant concern for future offshore wind development.	

Wave energy		There is no overlap of the characterisation area with the wave energy strategic resource area identified in the draft Welsh National Marine Plan.	

The Crown Estate key resource areas (KRAs) for other sectors

KRA category	Where	Commentary	Receptor rating	Area rating
Cables	No interaction.			
Carbon Capture Storage (CCS) stores	No interaction.			
CCS infrastructure	No interaction.			
Minerals	No interaction.			
Pipelines	No interaction.			
Sandscaping	Coverage to the north of the areas.	This KRA is significant in size and does not give a strong enough signal to pose a significant constraint on development in this area.		
Tidal range	No interaction.			
Tidal stream	Very slight overlap to the south.	There is some interest in this tidal stream resource but there is significant opportunity elsewhere in the area.		
Wave	No interaction.			

National Air Traffic Services (NATs) radar overlap

% Overlap with Primary Surveillance Radar (PSR) assessment buffer (200 m turbines)	Commentary	Area rating
0%	No overlap, not an issue.	

Water Framework Directive (WFD)

Water bodies triggered	Water body details					
	Type	Is it heavily modified?	Overall status	Ecological status	Chemical status	Target date to achieve good status
Cardigan Bay central	Coastal	No	Good	Good	Good	2015
Tremadog Bay	Coastal	No	Good	Good	Good	2015
Cardigan Bay south	Coastal	No	Good	Good	Good	2015
Cardigan Bay north	Coastal	No	Moderate	Good	Fail	2021

% of the area covered	Spatial overlap with the area		Area rating
6%	There are three areas of intersect with this characterisation area: around Fishguard, around Aberystwyth and Pwllheli.	This area intersects only unmodified water bodies which are in good to moderate overall condition. The overall overlap with the characterisation area is minimal and should not present a significant constraint.	

Marine Cultural Heritage

Heritage asset type	Where	Commentary on sensitivity from offshore wind development	Receptor rating
Maritime archaeology and wrecks	Moderate potential throughout the characterisation area, with the greatest potential and concentration of known wrecks in the south part of the area off the coast of Fishguard.	There is potential for maritime archaeological material from the Palaeolithic period to the present day to be present and affected by offshore wind farm (OWF) development in the Cardigan Bay characterisation area. The area contains wrecks and obstructions associated with trade and the fishing industry, with a concentration of known wrecks close to Fishguard, likely owing to the role of the town as a fishing centre and port in the 18th Century. There is a notable lack of wrecks and obstructions in the known records in the northern part of the characterisation area and in the waters off Aberystwyth. There is a dominance of steel and metal vessels from the 19th and 20th Centuries in the known records, with potential for the recovery of wrecks associated with trade and 20th Century military conflict, including vessels engaged in the defence and maintenance of important strategic supply routes and shipping channels across the Irish Sea to the Atlantic from Liverpool, Ireland and the west coast of Scotland. Early forms of watercraft are likely to have been utilised to traverse the coastal waters of the characterisation area in the Palaeolithic and Mesolithic periods. Surviving maritime archaeological evidence from the late Upper Palaeolithic and Mesolithic periods may therefore be present in shallower locations. Established procedures exist to ensure that any historic wrecks, both known and unknown, and associated remains, are identified as part of any proposed OWF development so any impacts can be mitigated and minimised.	
Aviation archaeology	Moderate potential for the recovery of aviation archaeological remains throughout characterisation area.	The Cardigan Bay characterisation area has potential for the recovery of crashed aircraft and material from airborne military conflict in the First and Second World Wars. The skies above the area saw substantial airborne conflict, including the protection of merchant shipping and passenger vessels in the Irish sea. The area is located on important routes between the Atlantic, Wales and Ireland, and to ports and other important strategic locations and targets located on the north-west coast of England (Liverpool), and Scotland. A Royal Air Force (RAF) base was located at Fishguard in 1918, (and at Aberporth, Towyn and Llanbedr) from which seaplanes would provide anti-submarine and maritime protection patrols over the Irish Sea and St George's Channel. Very few known aircraft wrecks have been identified in the area due to the difficulty of identifying these sites on the seabed; however, the historic records attest to the high number of losses in the area, indicating the potential for aircraft wrecks. If present, any remains may be identified or impacted upon by wind farm development. While existing standard mitigation measures may be utilised for specific projects in the area, further site-specific mitigation may be required, including excavation and recovery of significant remains that are encountered and where impacts are unavoidable. However, it should be noted that this is an extreme example and would only be undertaken following significant discussion with advisors and in rare cases where preservation *in sit*u was not a feasible option.	
Submerged prehistoric landscapes	Potential across the characterisation area, with enhanced potential in the areas close to the coast and	During periods of lower sea level caused by three major glaciations (the Anglian, Wolstonian and Devensian) the Cardigan Bay characterisation area would have been covered by the Welsh Ice Cap, so there is limited potential for the recovery of prehistoric archaeological material from these periods. Any remains would be expected to be associated with geomorphological features such as palaeochannels and valleys, and the geological deposits from these periods.	

	geomorphological features such as palaeochannels.	There is some potential for the survival of sediments and secondary context artefactual material in areas where glacial activity has not eroded earlier sedimentary deposits. There is potential for the recovery of material associated with the late Upper Palaeolithic and Mesolithic periods in the Cardigan Bay characterisation area. Following the retreat of the Devensian ice sheet, much of the area would have provided an accessible and attractive habitat in the late Upper Palaeolithic and Mesolithic. Significant deposits and possible finds may therefore be anticipated in association with the early Mesolithic channel systems and other geomorphological features that were present and exposed prior to marine transgression. There is potential for remains from this period to be present and impacted by OWF development in the characterisation area. Established procedures exist to ensure that any submerged prehistoric landscapes, associated geographical and geomorphological features, and associated deposits, features and finds are identified as part of any proposed OWF development so that any impacts can be mitigated and minimised.	
Area commentary			Area rating
There is a range of known heritage assets and potential for the recovery of further remains across the characterisation area. There is potential for the recovery of significant historic wrecks associated with trade and military functions, aviation archaeological remains, and prehistoric archaeological remains from the late Palaeolithic and Mesolithic periods. The application of standard mitigation measures on a strategic and project-specific basis will reduce the risk to underwater cultural heritage in this area.			

Glossary of acronyms and abbreviations

AA	Appropriate Assessment
ADR	Air Defence Radar
AONB	Area of Outstanding Natural Beauty
ATC	Air Traffic Control
CCS	Carbon Capture Storage
EPS	European Protected Species
FAME	Future of the Atlantic Marine Environment
HRA	Habitat Regulations Assessment
JNCC	Joint Nature Conservation Committee
km	Kilometre
KRA	Key Resource Area
m	Metre
MCZ	Marine Conservation Zone
MERP	Marine Ecosystems Research Programme
MoD	Ministry of Defence
MPA	Marine Protected Area
MW	Mega watt
NATS	National Air Traffic Services
NM	Nautical Mile
OESEA3	Offshore Energy Strategic Environmental Assessment 3
OFTO	Offshore Transmission Owners
OWF	Offshore Wind Farm
pSPA	Potential Special Protection Area
PSR	Primary Surveillance Radar
Ramsar	Ramsar Convention on wetlands of international Importance especially as waterfowl habitat, also known as the ‘Convention on Wetlands’.
RAF	Royal Air Force
RSPB	Royal Society for the Protection of Birds
RYA AIS	Royal Yachting Association (RYA) Automatic Identification System (AIS)
SAC	Special Area of Conservation
SCI	Site of Community Importance
SNCB	Statutory Nature Conservation Body
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
STAR	Seabird Tracking and Research
Succorfish	Under 12m vessel tracking equipment
TWT	The Wildlife Trusts
UAVs	Unmanned Air Vehicles
UXO	Unexploded Ordnance
WFD	Water Framework Directive

Offshore Wind **Leasing Round 4**

THE CROWN ESTATE

Resource and Constraints Assessment for Offshore Wind

Characterisation Area Report **Northern Ireland**

18

38255-TCE-REP-023

Characterisation Area Report: 18 – Northern Ireland

38255-TCE-REP-023 Characterisation Area Report: 18 – Northern Ireland		
Version	Status	Issue date
1.1	Draft	July 2018
1.2	Draft	November 2018
1.3	Final	September 2019

The information included in this report should be read in conjunction with the *Resource and Constraints Assessment for Offshore Wind: Methodology Report* and the *Summary Stakeholder Feedback Report*. The trigger distance for constraints to be included in the constraints analysis section of this report is 1 nautical mile (NM).

The Crown Estate has undertaken the analysis in this report using the evidence available to it, internal expertise and support from external advisers where appropriate. The analysis does not obviate any potential need for any Habitat Regulations Assessment (HRA) or any project level consideration of the potential impact of development. The analysis does not supersede any statutory policies or marine plans. The analysis, including the data and information contained in this document, presents a point in time assessment with changes likely to both the presence and nature of constraints.

This report is provided for information purposes only and no party may rely on the accuracy, completeness or fitness of its content for any particular purpose. The Crown Estate makes no representation, assurance, undertaking or warranty in respect of the analysis in the report including all data and information contained in it.

Receptor rating		Area rating	
Receptor assessed but no interaction noted		Receptor assessed but no interaction noted	
Interaction acceptable with best practice/accepted mitigation		The constraint will present the need to implement best practice/accepted mitigation measures to enable acceptable development within the whole area	
Interaction acceptable with moderate mitigation		The constraint will present the need to implement moderate mitigation measures to enable acceptable development within the whole area	
Interaction acceptable with significant mitigation		The constraint will present the need to implement significant and/or strategic level mitigation measures to enable acceptable development within the whole area	
Significant/insurmountable issue that would be challenging to mitigate within the area of influence of a receptor		Significant/insurmountable issue that would be challenging to mitigate for any development within the whole area	
No data coverage across the area		No data coverage across the area	

Constraints analysis

Note that in addition to The Crown Estate leases/licences within this table, The Crown Estate has also identified key resource areas (KRAs) which may be suitable for the future development of different marine sectors. Information about overlapping KRAs that overlap this characterisation area is described in a latter section of this document.

Exclusions model – hard constraints			Receptor rating	Area rating
	Present	Commentary		
The Crown Estate agreements	Telecoms and interconnector cables: there are a few active and inactive cables intersecting the northern and central parts of the characterisation area landing at various points on the coast.	The cables have been removed from the characterisation area and will need to be avoided; this should be possible with best practice/accepted mitigation. However, the number of cables is relatively low and therefore they are not considered to be a significant concern for future offshore wind development. Since cable crossings require cable protection (which may have adverse environmental effects), crossings should be minimised where practicable.		
Other energy infrastructure	None within the trigger distance.	No existing oil and gas infrastructure and no new licences under development in this area.		
Navigation	None within the trigger distance.			
Social	None within the trigger distance.			

Restrictions model – soft constraints			Receptor rating	Area rating
Economic tier				
Navigation	Belfast Harbour and Donaghadee Harbour Authority areas are respectively within 320 m and 700 m of the characterisation area; vessel density shows the majority of tracks focused on Belfast Harbour with routes south overlap the full width of the characterisation area. There is also Warrenpoint Harbour to the south of the area that should be considered.	The proximity of this characterisation area to the coast and the access channels' proximity to the jurisdictions of Belfast Harbour and Donaghadee Harbour Authorities may be significant factors in development. Displacement could be a big risk across most of the characterisation area, with the small exception of the south-west of the area which is close to shore.		
Subsurface	None within the trigger distance.			
Fishing	See assessment below.		N/A	
Environmental tier				

The assessment of the sensitivity of Marine Protected Areas (MPAs) to pressures caused by offshore wind development and operation is assessed in a separate spreadsheet which will be made available as part of the Round 4 evidence base. Commentary has been noted in the relevant characterisation document where MPAs either overlap or are within 1 NM of the characterisation area and have been assessed as a yellow rating or above. For more information on the methodology for this assessment, please refer to the methodology report.

Assessments of Annex II species have not been made as part of the characterisation process. Such assessments will need to be undertaken at project level for individual developments within the characterisation area.

Type of designation		Name of designation	Designated features/species	Conservation objectives	Commentary	Receptor rating	Area rating
European marine designations	Special Area of Conservation (SACs)	Strangford Lough	Intertidal mudflats and sandflats Lagoons Shallow inlets and bays Reefs Annual vegetation of drift lines Coastal shingle vegetation outside the reach of waves Glasswort and other annuals	A mixture of maintain and restore for different features. Reefs and shoreline vegetation features generally have 'restore' conservation objectives, indicating a particular sensitivity for these features.	There are a number of sensitive habitats within Strangford Lough which could be affected by offshore wind activity. The characterisation area avoids the Lough itself but impacts from cabling through the Lough could be significant. They could be avoided by making landfall elsewhere. The common seal population in the Lough is the most important in Northern Ireland. Impacts on this population will need to be considered as part of project-level HRA but may be mitigable.		

			colonising mud and sand Atlantic salt meadows common seal				
		Murlough	Subtidal sandbanks Intertidal mudflats and sandflats Atlantic salt meadows Shifting dunes Shifting dunes with marram Dune grassland Coastal dune heathland Dunes with creeping willow Marsh fritillary butterfly common seal	Conservation objectives for all features are to maintain (and enhance where possible)	The majority of this site has not been included within the characterisation areas, which means that impacts from offshore wind development on habitats within the site would be limited to impacts of cable landfall through the site. These impacts are likely to be mitigable/avoidable (although fixed dune systems are likely to be sensitive). Impacts on common seal within the site are likely to be mitigable.		
		Lecale Fens (1.3 km), Eastern Mournes (1.4 km)			Assessed as low risk; details available in separate spreadsheet.		
	Harbour porpoise SAC	North Channel SAC	harbour porpoise	The conservation objectives for the SAC are: To ensure that the integrity of the site is maintained and that it makes the best possible contribution to maintaining Favourable Conservation Status (FCS) for harbour porpoise in UK waters. In the context of natural change, this will be achieved by ensuring that: 1. Harbour porpoise is a viable component of the site; 2. There is no significant disturbance of the species; and, 3. The condition of supporting habitats and processes, and the availability of prey is maintained. This is similar to the protection afforded to harbour porpoise throughout their range by the European Protected Species (EPS) regulations in the UK. However, the Natura 2000 principles and HRA tests set the bar	Harbour porpoise could be affected by offshore wind development in the area, mainly through acoustic impacts (disturbance and hearing damage) from pile driving, UXO clearance and possibly some geotechnical surveys. Disturbance and barrier effects arising from vessel movements and presence of turbines may also occur. The noise disturbance during wind farm construction is likely to be significant if using pile-driving to install the turbine foundations, and there is also a risk from UXO clearance. There will be a need to consider population level effects of disturbance (mainly during construction), and there may be some additional requirements to investigate potential impacts on prey species. The designation of harbour porpoise SACs will undoubtedly have consequences as to how some activities operate, and measures may need to be put in place to reduce disturbance. Implementation of any disturbance management is likely to be challenging given the complexity of marine activities, regulatory arrangements and scientific uncertainty surrounding the significance of noise impacts on harbour porpoise. The approach recommended by SNCBs is that developers should ensure that there is sufficient time between the assessment and the start of construction for them to effectively implement mitigation/management, which could include: 1. Careful spatial planning and phasing of noisy activities. 2. Use of alternative foundations that do not require pile driving (e.g. suction buckets, gravity bases), noting that these may have other impacts. 3. Use of alternative methods of installation (e.g. vibropiling) to reduce the noise footprint. 4. Use of technology to reduce the sound levels at source or to minimise sound propagation and reduce the noise footprint. The SNCBs and The Wildlife Trusts have concerns over the potential cumulative impacts on harbour porpoise within this SAC, and note that currently there is no mechanism to ensure that a strategic approach to the management of impacts is taken. They consider that this could be a significant consenting risk for offshore wind development.		

				higher than EPS protection for impacts on the site as the protection is no longer solely considering effects on the population as a whole but making sure that the site is contributing positively to the species' Favourable Conservation Status.	In parallel to new offshore wind leasing, The Crown Estate has committed to fund a collaborative programme of strategic enabling actions to increase the evidence base and support sustainable and coordinated expansion of offshore wind. Underwater noise and its management, assessment of impacts on sensitive receptors, and approaches to modelling and assessment, are all likely to form a key priority area for further work, and we anticipate collaborating with stakeholders on new work streams.		
	Sites of Community Importance (SCIs)	None within the trigger distance					
	Ramsar	Strangford Lough	Criterion 1 – saltmarsh and freshwater habitats Criterion 2 – rare marine invertebrates, extensive eelgrass beds Criterion 5 – wintering wildfowl assemblage of international importance Criterion 6 – sandwich tern (breeding), common tern (breeding), light-bellied brent goose (wintering), redshank (wintering), red knot (wintering)		There are a number of sensitive habitats within Strangford Lough which could be affected by offshore wind activity. The characterisation area avoids the Lough itself but impacts from cabling through the Lough could be significant. They could be avoided by making landfall elsewhere. Impacts on breeding tern populations may be significant given that this species is likely to forage offshore and may come into contact with offshore arrays. This may be mitigable with location of array and design of turbines (although much of the coastline adjacent to the Northern Irish characterisation areas is important for tern breeding and there is a risk that the problem is displaced to another Special Area of Protection (SPA)/Ramsar site). The light-bellied brent goose population is likely to be of most concern, since this site supports over half of the International population over winter. Depending on the migration routes of the goose, offshore wind developments may encounter significant HRA issues with this species - which may be mitigable through project location. Light-bellied brent geese migrate down from the north-west (from Arctic Canada) so migratory routes may not overlap the characterisation areas.		
		Killough Bay (100 m)	Criterion 6 - wintering Light-bellied brent goose		The site supports on average 1.8% of the wintering population of light-bellied brent goose. Habitats supporting the geese may be impacted by cabling if landfall is made within this area, but impacts are likely to be mitigable. The geese would be most at risk from offshore development whilst on passage, but this impact may be mitigable by locating projects away from migratory routes or altering turbine heights. Light-bellied brent geese migrate down from the north-west (from Arctic Canada) so migratory routes may not overlap the characterisation areas.		
	Ramsar	Outer Ards	Criterion 6 - wintering light-bellied brent goose, ringed plover, european golden plover and ruddy turnstone		The Ramsar site covers a very large area of the Northern Irish Coast and Intersects the characterisation areas in multiple locations. Birds forming part of the site designation are wintering species which may be vulnerable to offshore wind projects on passage. However, analysis of migration routes may allow mitigation of the worst effects via project placement and design. Light-bellied brent geese migrate down from the north-west (from Arctic Canada) so migratory routes may not overlap the characterisation areas.		
	Special Protection Areas (SPAs)	Strangford Lough	Sandwich tern (breeding), common redshank (wintering), arctic tern (breeding), common tern (breeding), light-bellied brent goose (wintering),	In 2014, all bird populations within the SPA were assessed as favourable. The conservation objectives have been set to maintain this status. This includes maintaining supporting	This SPA is of particular importance for the light-bellied brent goose (supporting almost 53% of the International population of this subspecies over winter) and for terns (supporting 13.5% of the Irish breeding population of sandwich tern and around 8% of the Irish breeding population of Arctic Tern). This is likely to be of significance in any HRA process for wind farms within the characterisation areas. Terns are likely to forage offshore and geese may be vulnerable during migration. Whilst		

			red knot (wintering), waterfowl assemblage	habitat and numbers of birds.	impacts may be mitigable in terms of the location within the characterisation areas, breeding terns are a feature along much of the Northern Irish coast and this may mean displacement of the problem to another SPA population. The light-bellied brent goose population is likely to be of most concern, since this site supports over half of the International population over winter. Depending on the migration routes of the goose, offshore wind developments may encounter significant HRA issues with this species - which may be mitigable through project location. Light-bellied brent geese migrate down from the north-west (from Arctic Canada) so migratory routes may not overlap the characterisation areas. Impacts on the wetland and intertidal habitats supporting birds within the SPA may occur as a result of cabling, but these impacts are more likely to be mitigable or avoidable.		
		Killough Bay (150 m)	light-bellied brent goose (wintering)	In 2014, the goose population was assessed as favourable. The conservation objectives have been set to maintain this favourable status. This includes maintaining supporting habitat and numbers of birds.	The site supports on average 1.8% of the wintering population of light-bellied brent goose. Habitats supporting the geese may be impacted by cabling if landfall is made within this area, but impacts are likely to be mitigable. The geese would be most at risk from offshore development whilst on passage, but this impact may be mitigable by locating projects away from migratory routes or altering turbine heights. Light-bellied brent geese migrate down from the north-west (from Arctic Canada) so migratory routes may not overlap the characterisation areas.		
	SPA	Outer Ards	Arctic tern (breeding) European golden plover (wintering) ringed plover (wintering) light-bellied brent goose (wintering) ruddy turnstone (wintering)	In 2014, Arctic tern, light-bellied brent goose and turnstone populations were classed as favourable, whilst all other species were classed as unfavourable. Conservation objectives reflect the need to enhance some populations and maintain/enhance supporting habitats.	This SPA covers a very large area of the Northern Irish Coast and Intersects the characterisation areas in multiple locations. Impacts on birds from the site may be difficult to mitigate, especially since several populations are of national importance and are sensitive to offshore wind (e.g. light-bellied brent goose, arctic tern). However, analysis of the location of breeding colonies and the migration routes of wintering species may allow mitigation of the worst effects via project placement and design. Light-bellied brent geese migrate down from the north-west (from Arctic Canada) so migratory routes may not overlap the characterisation areas.		
	SPA	Copeland Islands	Manx shearwater (breeding) Arctic tern (breeding)	In 2014, all bird populations within the SPA were assessed as favourable. The conservation objectives have been set to maintain this favourable status. This includes maintaining supporting habitat and numbers of birds.	The SPA supports 1.75% of the world breeding population of Manx shearwater and almost 23% of the Irish breeding population of arctic tern. Since both these species will forage offshore (and sometimes travel long distances) this is likely to be a significant issue in terms of a HRA process. The impacts may be mitigable with project location, depending on the foraging areas, but since must of the Northern Irish coat is important for tern breeding this may simply displace the problem elsewhere.		
	Potential Special Protection Area (pSPA)	None within the trigger distance					
Marine Conservation Zones (MCZs)		Strangford Lough	Sublittoral (subtidal) sand: Seagrass (Zostera) beds Sublittoral (subtidal) muds: Sea-pen and burrowing megafauna communities Sublittoral (subtidal) mixed sediments: Brittlestar beds Sublittoral (subtidal) biogenic	Strangford Lough was a marine nature reserve and became an MCZ on the introduction of the Marine Act (Northern Ireland) 2013. There are no conservation objectives/designation orders for the site yet, but it	There are a number of sensitive habitats within Strangford Lough which could be affected by offshore wind activity. The characterisation area avoids the Lough itself but impacts from cabling through the Lough could be significant. They could be avoided by making landfall elsewhere.		

		reef: Blue mussel beds Intertidal biogenic reef	is also protected by Area of Special Scientific Interest (ASSI), SAC, SPA and Ramsar designations.			
	Outer Belfast Lough (150m)			Assessed as low risk; details available in separate spreadsheet.		
Recommended Marine Conservation Zones (rMCZs)	None within the trigger distance					
Areas of Special Scientific Interest (ASSIs)	Tieveshilly (1.7 km) Ballyquintin Point Strangford Lough Part 2 (800 m) Ballycam (1.3 km) Sheepland Coast Samuel's Port St. John's Point Eastern Mournes (1.3 km)			Assessed as low risk; details available in separate spreadsheet.		
ASSI	Killard	Cliffs Raised beach Dunes (fixed & mobile) Rocky shore Saltmarsh Geology/Earth Heritage Maritime grassland & heath redshank (roosting) oystercatcher (roosting) turnstone (roosting) Small numbers of fulmar (breeding)		Terrestrial and intertidal features would not be exposed to offshore wind activity unless landfall was made through the site; impacts of cabling are likely to be mitigable/avoidable (although saltmarsh and dunes may be sensitive). The main bird features at the site are waders rather than offshore feeders which would limit their exposure to offshore wind turbines, and the breeding fulmar population is small. Impacts are likely to be mitigable with location of wind project.		
ASSI	Killough Bay and Strand Lough (150 m)	Tidal lough Swamp, fen & wet meadows Brackish lake light-Bellied Brent Goose (wintering) Intertidal sand/mud Sabellaria alveolata reef		Impact to features at the site would only occur if cable landfall was made through the site, and impacts are likely to be avoidable or mitigable (although the brackish lake feature is rare and probably sensitive). The light-bellied brent goose population is important and could be exposed to offshore wind projects in the characterisation areas whilst on passage. Impacts are likely to be mitigable with project location and turbine size. Light-bellied brent geese migrate down from the north-west (from Arctic Canada) so migratory routes may not overlap the characterisation areas.		
ASSI	Outer Ards	Geological/Earth Science (including coastal processes) Intertidal rock Mudflats/intertidal gravel Coastal saltmarsh Maritime grassland (including many rare plant species) grey Seal (breeding) common Seal (breeding) Arctic Tern (breeding) Sandwich Tern (breeding) common Tern (breeding) light-Bellied Brent Goose		This ASSI covers a very large area of the Northern Irish Coast and Intersects the characterisation areas in multiple locations. Owing to the size of the ASSI it has a wide range of marine habitats and a wide range of breeding birds. The terrestrial and intertidal features would not be exposed to offshore wind activity unless cable landfall was made through the site – and since the site covers such a large part of the coastal area bordering the characterisation areas there is a high chance that this could happen. However, it is likely that a suitable location could be found to minimise impacts and avoid significant damage to the site. Impacts on grey/common seal at the site are likely to be mitigable through		

		(wintering) turnstone (wintering) ringed Plover (wintering) golden Plover (wintering) cormorant (wintering) great crested grebe eider curlew dunlin purple sandpiper redshank lapwing oystercatcher		project location and using industry standard mitigations. Impacts on birds from the site will be harder to mitigate, especially since several populations are of national importance and are sensitive to offshore wind (e.g. light-bellied brent goose, tern spp). Analysis of the location of breeding colonies and the migration routes of wintering species may allow mitigation of the worst effects via project placement and design. Light-bellied brent geese migrate down from the north-west (from Arctic Canada) so migratory routes may not overlap the characterisation areas. The birds are also protected through the Outer Ards SPA designation and so would be subject to HRA process at the project level.		
ASSI	Copeland Islands	grey seal (breeding) common seal (breeding) Vegetated cliffs Saltmarsh Wet grassland/marsh Intertidal rock Geological/Earth Heritage Manx Shearwater (breeding) Mediterranean gull (breeding) common gull (breeding) eider duck (breeding) Arctic tern (breeding) black guillemot (breeding) water rail (breeding) stock dove (breeding) lapwing (breeding) snipe (breeding) Birds of prey (visiting) - hen harrier, sparrowhawk, buzzard, kestrel, merlin and peregrine		Intertidal and terrestrial features of this ASSI are not likely to be affected by offshore wind activity – since the ASSI is composed of a set of offshore islands there is no likelihood of landfall being made through the site. The breeding bird colonies are likely to cause a consenting issue (and are also protected through the Copeland Islands SPA designation which means that they would be subject to HRA at the project level). Of particular note are the breeding Manx shearwater, the breeding arctic tern and the breeding Mediterranean gull (at the time of designation this was the only location in Northern Ireland where Mediterranean gull were breeding, and this species is on the Birds of Conservation Concern (BoCC) Amber list).		
ASSI	Tyrella and Minerstown	Intertidal sand & rock Sand dunes (mobile & fixed) Vegetated shingle common seal (breeding)		Given the distance between the site and the characterisation areas the risk of impact to habitat features at the site is considered to be low - impacts would only occur if landfall was made through the site, and impacts are likely to be avoidable or mitigable (although the fixed dunes may be sensitive). Impacts on common seal would need to be considered at project level, but are likely to be mitigable.		
ASSI	Mournes Coast (250 m)	Sabellaria alveolata reef Intertidal rick Vegetated shingle Maritime cliff & slope Saltmarsh Maritime & wet grassland black-legged kittiwake (breeding) black guillemot (breeding)		Given the distance between the site and the characterisation areas the risk of impact to habitat features at the site is considered to be low - impacts would only occur if landfall was made through the site, and impacts are likely to be avoidable or mitigable (although the Sabellaria reef may be sensitive – this site supports the best example of Sabellaria in Ireland). Impacts on breeding kittiwake and guillemot would need to be considered at project level since these species would be exposed to offshore wind developments within their foraging areas. Impacts are likely to be mitigable with project location and turbine design.		

Spawning and nursery grounds	High-intensity nursery and spawning area for numerous species (4-6 overlaps); mainly nursery grounds although there is a cod spawning ground in the south of the area.	This data denotes high potential sensitivity, however, there are some confidence issues with this data. As the data mainly shows nursery grounds, risk is potentially lower with spawning presenting the main concern for consent. Constraint will depend on whether the spawning grounds are still active and their precise locations, which may need to be determined by surveys. Cod are particularly sensitive to noise impacts.		
Social Tier				
Royal Yachting Association (RYA) Automatic Identification System (AIS) intensity	Significant traffic from Belfast down to Strangford Lough.	The shape of this characterisation area and its proximity to the coast means that mitigation to account for recreational traffic will be required (especially in the north of the characterisation zone).		
Marinas	Marinas at Copelands Bangor and Ardglass.	The proximity of this characterisation area to the coast and the access channels' proximity to these marinas may need to be a factor in development.		
Bathing beaches	There are two bathing beaches to the north of the characterisation area that have been triggered. There is more information and other bathing waters in Northern Ireland online (https://www.daera-ni.gov.uk/articles/bathing-water-quality).	The proximity of this characterisation area could be a concern, but standard mitigation should reduce the impact of this factor.		
Visibility from sensitive receptors	See visual analysis below.			

Review layers

Visibility from landscape designations and from the coast

The bands of significant visual impact are taken from the OSEA3[1] environmental report. It should be noted that these bands were challenged through the statutory stakeholder engagement by the SNCBs so further analysis and engagement should be conducted to understand the visual constraint in potential development areas more fully.

The visibility from landscape designations analysis has been conducted using designations which include protections for landscapes and settings namely: National Parks, Areas of Outstanding Natural Beauty (AONBs), Heritage Coasts and World Heritage sites. For more information on these, please consult the methodology report. The analysis draws on visibility from these designations but not the sensitivity of them to offshore wind developments. Proposals should draw on the relevant management plans or local policies to fully understand the level of constraint that exists in the vicinity of these landscape designations. As such, more analysis is required to fully understand the potential constraint.

	Band of significant visual impact	% of overlap with the characterisation area	Commentary	Area rating
Medium sensitivity receptors	0-13 km (3.6 MW turbines)	99%	This area is located within 13 km from the coast, so visual impacts will be a significant issue.	
	13-20 km (4-8 MW turbines)	1%		
	20-30 km (10-15 MW turbines)	0%		
High sensitivity receptors	0-30 km	100%		

Visibility of sea surface from landscape designations		Receptor rating	Area rating
The south of this characterisation area is highly visible from sensitive locations including Ring of Gullion, Morne and Strangford, and Lecale AONBs.	The data shows that the area is potentially unfavourable from a visual context. Mitigation options may be limited this close to the coast.		

Ornithology outside of Special Protection Areas (SPAs) for high-risk species

Species	Site	Commentary on coverage	Area rating
		It has not been possible to assess potential cumulative collision risk constraints as The Crown Estate does not have access to at-sea seabird survey data, and has not plotted SPAs designated for key species and their associated foraging ranges. Understanding potential ornithological consent constraints would be best facilitated by liaising with the SNCB in Northern Ireland.	

Ministry of Defence (MoD) activity

	Issues when using 250 m tip heights	Issues when using 350 m tip heights	Receptor rating
Air traffic control (ATC)	No ATC concerns.	No ATC concerns.	

[1] BEIS (2016), OESEA3 Environmental Report. Crown copyright 2016, p 291. URN 16D/033.

Air defence radar (ADR)	No ADR concerns.	No ADR concerns.	
Threat radar	No threat radar concerns.	No threat radar concerns.	
Low flying	No low flying concerns, however, there will be a lighting requirement.	No low flying concerns, however, there will be a lighting requirement.	
Ranges, danger and exercise areas	UXO should be taken into account. The MoD would need to review cable routes to ensure highly surveyed routes are not obstructed by cables or turbines.	UXO should be taken into account. The MoD would need to review cable routes to ensure highly surveyed routes are not obstructed by cables or turbines.	
Statutory safeguarding	No statutory safeguarding.	No statutory safeguarding.	
Area commentary			Area rating
No concerns in the area apart from those that are mitigatable through best practice and industry accepted mitigation.			

Fishing activity

Gear type	Location and comments
Static gear	▪ Species targeted include scallop, lobster and crab. The fleet is based at Poravogie, Kilkeel and Ardglass.
Mobile gear	▪ The mobile fleets' main target fisheries are either nephops or scallops. However, this balance will change in the future due to improving whitefish stocks.
General	▪ Experience through the First Flight wind project shows that the further north in this area, the less interaction there is with the fishing fleet. ▪ Kilkeel also hosts a herring spawning area.

Area commentary	Area rating
There is some appetite for offshore wind energy in the area, but this needs to be sited correctly and with good engagement.	

Marine plans

DAERA Marine Plan for Northern Ireland (draft)	Spatially explicit policies	Issues	Area rating
	There are no spatially explicit policies within the draft Marine Plan for Northern Ireland. The resource zones for tidal, wave and wind energy as outlined in the Offshore Renewable Energy Resource Action Plan (ORESAP) are included in the marine plan. However, there are no policies to support these areas.	There are no spatial restrictions on where future offshore wind developments could be located.	

The Crown Estate key resource areas (KRAs) for other sectors

KRA category	Where	Commentary	Receptor rating	Area rating
Cables	Some slight interaction to the north of the area.	This KRA is significant in size due to the landing resource for cables generally being dictated by the shortest distance between connection points. Due to the		

		significant number of alternative options for landing cables, the risk of sterilising valuable resource is deemed to be minimal.		
Carbon Capture Storage (CCS) stores	No interaction.			
CCS infrastructure	No interaction.			
Minerals	Some interaction to the south of the area.	This resource is not thought to be particularly attractive due to a current lack of market for marine minerals in Northern Ireland. The current plan policy is supportive of marine minerals extraction provided that extraction poses: "no unacceptable adverse impact on marine activities, uses and/or the marine area and any potential adverse impact is, in order of preference, avoided, minimised and/or mitigated." It is considered that this policy and resource will not pose a significant constraint to development.		
Pipelines	Only very slightly covering the northern part of the area within 12 NM.	The size of this KRA is notable and does not give a strong enough signal to significantly constrain development in this area.		
Sandscaping	No interaction.			
Tidal range	No interaction.			
Tidal stream	No interaction.			
Wave	No interaction.			

National Air Traffic Services (NATs) radar overlap

% Overlap with Primary Surveillance Radar (PSR) assessment buffer (200 m turbines)	Commentary	Area rating
8.88%	Some data is available from Scotland on the interaction with primary radar buffer, but this requires further assessment. This percentage does not include data from Northern Irish radar systems.	

Water Framework Directive (WFD)

Water bodies triggered	Water body details					
	Type	Is it heavily modified	Overall status	Ecological status	Chemical status	Target date to achieve good status
Mourne Coast	Coastal	No	Moderate	(no data)	(no data)	2021
Belfast Lough (outer)	Coastal	No	Good	(no data)	(no data)	2021

Dundrum Bay (outer)	Coastal	No	Good	(no data)	(no data)	2021
Ards Peninsula	Coastal	No	Good	(no data)	(no data)	2021

% of the area covered	Spatial overlap with the area		Area rating
26%	There is overlap between the characterisation area running from the north of the area to Killough.	This area only intersects unmodified water bodies which are in good to moderate overall condition. There is a moderate overlap between the characterisation area and these water bodies. This has the potential to constrain development in some parts of the area, although best practice should mitigate this risk.	

Marine Cultural Heritage

Heritage asset type	Where	Commentary on sensitivity from offshore wind development	Receptor rating
Maritime archaeology and wrecks	Significant potential throughout the characterisation area due to treacherous waters; particular potential in the centre of the area near the mouth of Strangford Lough due to the difficulties of entering the Lough's calmer waters.	Maritime archaeological material from the Palaeolithic to the modern era may be present and could be affected by offshore wind farm (OWF) development in the Northern Ireland characterisation area. The area contains a number of wrecks, obstructions and historic losses, with particular concentrations at the mouth of Strangford Lough due to the difficulty of entering the calmer waters of the Lough. The waters of the Northern Irish sea are known to be particularly treacherous, which accounts for the number of wrecks located there. There is significant potential for the recovery of wrecks associated with local fishing, trade and industry from the early medieval period onward. Vikings carried out raids on Strangford in the 9th and 10th Centuries, so material traces of their presence in the archaeological record are possible. The area also played a significant role in 20th Century military conflict; numerous important shipping and supply routes passed southward through the area to Liverpool, Ireland and the Atlantic, and northward to the west coast of Scotland. In addition to military and trade vessels, early forms of watercraft are likely to have been used to traverse the coastal waters of the characterisation area in the late Palaeolithic and early Mesolithic periods. A number of established procedures exist to ensure that any historic wrecks, both known and unknown, and associated remains, are identified as part of any proposed OWF development and the impacts of development are mitigated and minimised.	
Aviation archaeology	Potential for recovery of aviation archaeological remains throughout the characterisation area.	The Northern Ireland characterisation area has significant potential for the recovery of crashed aircraft and associated material from airborne military conflict in the Second World War. The skies above the area saw substantial conflict, with aircraft involved in protecting merchant shipping and passenger vessels in the Irish sea, as well as protecting Belfast and the surrounding areas from raids by the Luftwaffe. RAF bases were located throughout Northern Ireland, including at RAF Ballyhalbert and RAF Aldergrove. These bases were not only involved in the protection of Belfast and the surrounding areas, but also played a vital role in the Battle of the Atlantic. Very few known aircraft wrecks have been identified in the area due to the difficulty of identifying these sites on the seabed. However, historic records attest to the high number of losses in the area which indicate the potential for aircraft wrecks. If present, any remains may be identified or impacted by wind farm development. While standard mitigation measures may be used for specific projects in the area, further site-specific mitigation may be required, including the excavation and recovery of significant remains and areas where impacts are unavoidable. However, it should be noted that this is an extreme example and would only be undertaken following significant discussion with advisors and in rare cases where preservation *in sit*u was not a feasible option.	
Submerged prehistoric landscapes	Potential across the characterisation area, with enhanced potential in parts of the area close to the coast and areas near Strangford Lough where evidence of Mesolithic human activity has been identified.	The Northern Ireland characterisation area would have been covered by ice during all three major glaciations of the Pleistocene period, so there is limited potential for the recovery of prehistoric archaeological material from this period. Surviving *in situ* archaeological material may be preserved but is likely to be buried under glacial sediments, with greater potential for the recovery of derived archaeological material from the period. As such, there is potential for some sediments and secondary context artefactual material to have survived in areas where glacial activity has not eroded earlier sedimentary deposits. There is potential for the recovery of material associated with the Mesolithic period in the areas closest to the coast. Strangford Lough has long been a focus for human settlement, with evidence found including submerged landscapes, prehistoric submerged forests, peat deposits, Mesolithic flints and shell middens. It can be reasonably surmised that the parts of the characterisation area closest to the coast and the mouth of the Lough have significant potential for the recovery of material associated with the Mesolithic period.	

		Significant deposits and possible finds may be anticipated close to the coast, as well as near early Mesolithic channel systems and other geomorphological features that were present and exposed prior to marine transgression. As such, there is potential for remains from this period to be present and impacted by OWF development in the characterisation area. Several established procedures exist to ensure that any proposed OWF development and its impacts on submerged prehistoric landscapes, associated geographical and geomorphological features and their associated deposits, features and finds are identified, mitigated and minimised.	
Area commentary			Area rating
There are a range of known heritage assets and the potential for recovering further remains across the characterisation area. There is particular potential for the recovery of significant historic wrecks associated with trade and military functions, and prehistoric archaeological remains from the early Mesolithic period. The application of standard mitigation measures on a strategic and project-specific basis will minimise the risk to underwater cultural heritage in this area.			

Glossary of acronyms and abbreviations

ADR	Air Defence Radar
AONB	Area of Outstanding Natural Beauty
ASSI	Area of Special Scientific Interest
ATC	Air Traffic Control
BoCC	Birds of Conservation Concern
CCS	Carbon Capture Storage
DAERA	Department of Agriculture, Environment and Rural Affairs (Northern Ireland)
EPS	European Protected Species
HRA	Habitat Regulations Assessment
JNCC	Joint Nature Conservation Committee
km	Kilometre
KRA	Key Resource Area
m	Metre
MCZ	Marine Conservation Zone
MERP	Marine Ecosystems Research Programme
MoD	Ministry of Defence
MPA	Marine Protected Area
MW	Mega watt
NATS	National Air Traffic Services
NM	Nautical Mile
OESEA3	Offshore Energy Strategic Environmental Assessment 3
OFTO	Offshore Transmission Owners
ORESAP	Offshore Renewable Energy Resource Action Plan
OWF	Offshore Wind Farm
pSPA	Potential Special Protection Area
PSR	Primary Surveillance Radar
Ramsar	Ramsar Convention on wetlands of international Importance especially as waterfowl habitat, also known as the ‘Convention on Wetlands’.
rMCZ	Recommended Marine Conservation Zone
RSPB	Royal Society for the Protection of Birds
RYA AIS	Royal Yachting Association (RYA) Automatic Identification System (AIS)
SAC	Special Area of Conservation
SCI	Site of Community Interest
SNCB	Statutory Nature Conservation Body
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
TWT	The Wildlife Trusts
UXO	Unexploded Ordnance
WFD	Water Framework Directive