Diamond Transmission Partners BBE Ltd Decommissioning Programme

Document History

Issue	Date	Summary of Changes / Reasons	Author(s)	Approved By (Inc. Job Title)
1	08/06/18	First Issue following BEIS approval	T Gwatinyanya	G Thornton

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1 Introduction

This document presents the proposed OFTO decommissioning programme for the Diamond Transmission Burbo Bank Extension Limited ("**DTPBBE**") assets and is based upon the approved decommissioning plan[1] proposed by DONG Energy Burbo Extension (UK) Limited ("**BBW02**"). The decommissioning programme proposed by DTPBBE is informed and supported by the Environmental Impact Assessment ("**EIA**") and the resulting Environmental Statement[2] for the Burbo Bank Extension Offshore Wind Farm ("**BBEOWF**").

The project is a 258MW wind farm developed by BBW02.

The BBEOWF project has been awarded a number of primary consents necessary for its construction and operation. Those consents with provisions relating to decommissioning of the offshore wind farm are shown in Table 1.1.

Table 1.1: Burbo Bank Extension Consents

Regulation	Legislative Context	Achieved Consents	Authority
Secretary of State for the Department for Energy and Climate Change / Planning Inspectorate (PINS)	Infrastructure Planning Regulation 2009(a) or Planning Act 2008	Development Consents Order: The Burbo Bank Extension Offshore Wind Farm Order 2014 - Ref EN010026 and the deemed marine licence the transmission asset - Schedule 3.	Secretary of State for the Department for Energy and Climate Change / Planning Inspectorate (PINS)
Natural Resources Wales	Marine and Coastal Access Act 2009: Part 4 – Marine Licensing	Welsh Marine Licence (13/17/ML) awarded on 19th December 2014 (construction only). BBEW02 is currently applying for the operation marine licence.	Natural Resources Wales

In accordance with Section 105(02) of the Energy Act 2004, BBW02 was required to prepare a draft decommissioning programme for the BBEOWF and to submit the document to DECC (now Department for Business & Industrial Strategy ("**BEIS**")) for approval prior to the construction of the wind farm.

The draft decommissioning programme outlines the methods for decommissioning, and is consistent with the relevant requirements outlined in BEIS's guidance note on decommissioning of offshore renewable energy installations.

BBW02 decommissioning plan was approved by BEIS on the 13th of February 2017. BBW02 in their financial security document state that the OFTO assets will be decommissioned by the appointed OFTO. This will remove any obligations they have under the licence and pass this on to the OFTO.

If possible the generator assets will be decommissioned at the same time as the DTPBBE assets.

[1] 2.7.5.2 BBW02 Decommissioning Plan – Version C, Doc. no. 2192167, 20 January 2016
[2] 2.7.6 BBW02 Environmental Statement, Doc. No. 511, March 2013

The programme will be continuously reviewed and revised throughout the life of the project. These reviews will take into account any changes in legislation, circumstances, technological advancements and regulatory requirements.

DTPBBE will adopt the principles of the BEIS programme process stages and will follow the process as set out below.

Stage 1: DTPBBE discusses draft decommissioning programme with BEIS (including proposed financial security measures), developer and other consultation parties including any additional EIA activities;

Stage 2: DTPBBE formal submission of the decommissioning programme and approval under the Energy Act;

Stage 3: Reviews and modifications of decommissioning programme (and any financial security);

Stage 4: Responsible person ensures decommissioning is carried out in accordance with the programme; and

Stage 5: Responsible person adopts decommissioning monitoring, maintenance and management as specified in the programme.

2 Executive Summary

BBW02 obtained consents and licences necessary for the construction of the wind farm in 2014. The operational lifetime is approximately 25 years. At the end of this time the objective will be to decommission the asset in accordance with the provisions set out in the various licences obtained.

In accordance with section 105(2) of the Energy Act 2004, BBW02 submitted its decommissioning plan for the BBEWOF project to DECC. BBW02 decommissioning plan was approved by BEIS on the 13th of February 2017.

The proposed decommissioning measures set out in this decommissioning plan aim to adhere to the existing UK and international legislation and guidance notes. In addition, decommissioning industry best practice will be applied, taking into account the legislation applying at the time of decommissioning of the DTPBBE assets. DTPBBE will pay full regard to the "waste hierarchy", which suggests that reuse should be considered first, followed by recycling, incineration with energy recovery and, lastly, disposal.

It is difficult to determine the decommissioning schedule, as unforeseen issues can arise during the installation and operation of the assets, which ultimately could affect the decommissioning. At the time of writing, no offshore wind farms (including offshore transmission assets) worldwide have been decommissioned[3], so direct experience of the potential challenges are limited. Once other projects start to be decommissioned, it will provide valuable insight into the timing, costs and operational challenges to be faced.

The proposed decommissioning measures for the offshore components of the DTPBBE assets can be summarised as:

- complete removal of the offshore substation;
- offshore substation foundations cut off at or below seabed and removed; and
- offshore export cable will remain in situ but will be removed where required.

[3] Danish Vindeby (1.8km from shore 4.95MW) decommissioned in 2017. Swedish Yttre Stengrund (2km from shore, 10MW) decommissioned in 2016. Both projects are small scale and do not include transmission assets and as such do not provide a benchmark for large offshore transmission systems.

In accordance with the Polluter Pays Principle, DTPBBE in conjunction with BBW02 proposes to clear the seabed in accordance with the provisions made in this decommissioning programme and in the Marine and Coastal Access Act 2009 (Marine Licence), and to collect and provide evidence to reflect this.

DTPBBE in conjunction with BBW02 is committed to restoring the site and cable corridors to the condition it was in prior to construction, as far as it is reasonably practicable. The key restoration work will relate to ensuring that all cut foundations are made safe and adequately covered, and ensuring that cable ends are adequately buried.

DTPBBE in conjunction with BBW02 proposes that, following post decommissioning, a full geophysical survey (swath, side scan sonar and magnetometer) is carried out. The survey will be carried out by an independent survey contractor and all results issued to BEIS for review and comment. It is proposed that geophysical surveys are carried out one, two and five years after decommissioning has been completed, with an optional survey after ten years (depending on any risks highlighted by the year 5 survey).

A cost estimate for the plan has been derived, based on the equipment, personnel requirements and the duration of works. Financial security provisions have been carefully considered to ensure that this liability will be met.

In advance of decommissioning, the EIA will be reviewed to assess the potential impacts that may arise and to identify any additional impacts that were not covered in the initial EIA process and subsequent reviews.

Once the assets are nearing the end of their agreed operational life, DTPBBE will initiate a final review of this document and the proposed programme of works. Once this review is complete, a "Decommissioning Programme of Works" will be developed, in conjunction with the wind farm owner, and the schedule of works will be determined in agreement with the statutory authorities.

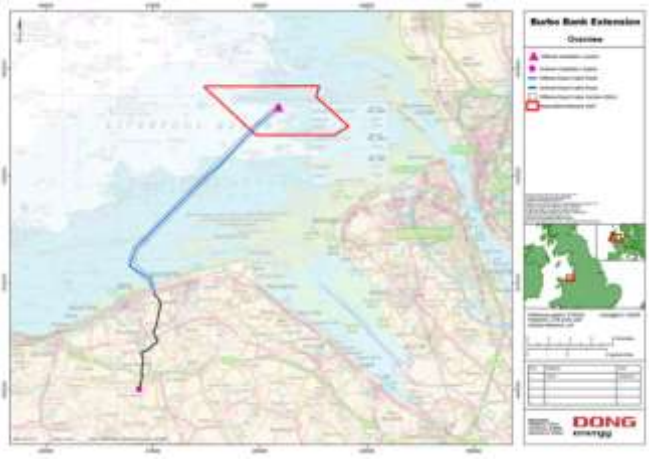
3 Background Information

This section describes the project and gives a brief overview of the biological, physical and human environment in the area.

3.1 Location

The project is located approximately 7km off the north Wirral coast, North West of the Mersey Estuary and immediately west of the existing operational Burbo Offshore Wind Farm. The offshore site occupies an area of 40km^2.

Figure 3.1: Burbo Bank Extension Offshore Wind Farm



3.2 Design and Background

Burbo Bank Extension Wind Farm will have an installed capacity of 258MW fed from 32 turbines rated 8MW each. Power generated by the turbines will be transmitted through a network of inter array cables.

The array cables will transmit power to a single offshore substation.

Using a combination of subsea and land cable with an approximate length of 35km, power will be transmitted to an onshore substation at St Asaph's called Bodelwyddan Substation for connection onto the National Grid, see Figure 3.1.

DTPBBE is being formed to operate and maintain the Offshore Transmission Assets associated with the BBEOWF.

3.3 As Built Information

DTPBBE anticipate that the Construction Design and Management ("**CDM**") Regulations 2015 will apply and will require accurate as-built data as amended during the lifetime of the project to be used as a basis for the decommissioning methodologies. The Developer is responsible at the time of purchase for providing the purchaser with this information. DTPBBE will expect that such information is supplied and will include as a minimum:

i. as-built position for all structures;
ii. details of the construction of all structures; and
iii. position depths of burial and other forms of cable protection for all subsea cables (both export cables and inter-array cables).

If at any time during the lifetime of the project the as-built details change, for example, after a repair to a subsea cable, amended details will be prepared for the on-going live status of as-built data.

3.4 Site Characteristics

The site characteristics are described by a comprehensive data set and information collated for the EIA process of the BBEOWF. A full summary of this information is described in the offshore, onshore cable and onshore substation and cable spur Environmental Statements prepared for the BBEOWF[4].

3.4.1 **Physical Characteristics:** Geology, Bathymetry and Seabed Features.

A brief summary of the key physical characteristics for the offshore locations of the BBEOWF site is provided below.

The bathymetry at the project site is rather flat, and dominated by two large sandbanks stretching from east to west; one in the north and one in the south. A relatively flat channel deepening towards the west separates the two sand banks.

The sea depth in the offshore site area ranges from 3.5m to 17m below Lowest Astronomical Tide ("**LAT**"), where it is most shallow at the peak of the two sand banks, and deepest towards the west. Seabed gradients are in general <1°.

The cable route connecting the southwest corner of the wind farm with the shore running from southeast-northwest, shows seabed levels lying close to 0.0 m LAT and the seabed dipping gently northwards at an average gradient of <0.3°, to 5.0mm below LAT at kilometre point ("**KP**") 2.443.

The proposed route veers northwards at KP 3.262 and then north-eastwards at KP 4.717, with seabed levels initially deepening to close to 6.5m below LAT at KP 4.894, before it shoals again to reach 5.0m below LAT at KP 5.215.

[4] BBW02 Environmental Statement, Doc. No. 511, March 2013

Seabed level from here towards approximately KP 17.250, range from less than 1.5m below LAT to approximately 13.0 m below LAT, with rapid undulations occurring across a number of sand waves and associated large mega ripple bed forms.

A broad irregular channel is evident between KP 13.86 and KP 15.3, where seabed levels lie between 8.5 m below LAT and 11.5 m below LAT. Seabed level then shoal temporarily to reach 8.5 m below LAT at KP 16.335, before deepening to a maximum depth of approximately 17.0 m below LAT within a broader and deeper channel feature, which crosses the proposed route between KP 17.5 and KP 19.00. From here the seabed is rather flat, shallowing to 14.5 m LAT at the wind farm border, KP 20.35.

The geology is rather complex and laterally discontinuous, especially in the shallow areas of the site.

In large areas in the south-eastern part of the site, seismic blanking is observed and rules out any seismic interpretations where present. This area covers approximately 15% of the site. From the side scan sonar data two areas of disturbed seabed have been located in the north western part of the site. These are considered to be extensive anchor scars. Mega ripples are visible at the north-western of the area oriented north-south, up to 0.3m in height and spaced between 6-10m. Smaller ripples are observed in the south-eastern area. At the site numerous contacts from the Side Scan Sonar (**"SSS"**) and magnetic anomalies have been identified.

In the south-eastern part of the site a cluster of both magnetic and SSS targets are observed. Many of these targets are contained within the Marine Archaeology and Cultural Heritage assessment, see document 2.7.6.19 BBW02 5.1.2.19 Marine Archaeology DOK2060932, summary in Section 3.4.8. Along the cable route from KP 3.4 and out, the sandy sediments exhibit various bed forms, from low order sand waves to large mega ripples. Again, several contacts have been registered on both the SSS data and magnetometer data.

3.4.2 MetOcean and Coastal Processes

Regional water depth information is based on bathymetric charts and an enhanced description within the project site area is provided by the geophysical survey.

Water depths vary between 3.5 and 17m below LAT within the project site. Depths are greatest in the north-west (14.8m) and shallowest around the eastern margin (4.3m).

The project is on the edge of the Burbo Bank, a sand bank approximately 9km in length and 1 to 2km wide, with water depths typically only a few metres below LAT or shallower. The bank acts as an ebb tidal delta in terms of the processes maintaining and shaping it, although its present configuration is heavily influenced by the training walls (sheet piling) at the edges of the Mersey River navigation channel to the east.

Shallow water depths mean that locally, the sandbank is frequently subject to the action of waves and tides and may vary in profile locally on a range of time-scales from hours to years. Historical chart analysis demonstrates that the overall position and shape of the bank is stable on at least decadal time-scales, following the installation of the Mersey Estuary training walls.

Tidal variation in water levels are defined by the long term Liverpool "class A" tide gauge and measurements collected at the existing wind farm. Tidal behaviour in the area is characterised as semi-diurnal and macro-tidal. The mean neap and spring tidal ranges are 4 m and 7.8 m respectively. The largest astronomical

range is 9.8 m. Storm surges of 1 to 2 m have been observed, but are not necessarily coincident with astronomical high water periods. Flood tide peak current speeds (between ~0.9 and 1.0 m/s to the east-south-east) are relatively faster (around 10%) than the adjacent ebb phases (between ~0.8 and 0.9 m/s to the west-north.

Differences in water depth may lead to slight differences in flow speed in the deeper parts of the project, but only of the order of a few per cent. Such differences would likely be most evident around the turn of the tide, immediately before and after slack water periods, so are unlikely to be relevant to other dependant processes (e.g. sediment transport).

Residual current information (the average drift of water on time scales of days to weeks) shows asymmetry observed in relation to peak current speed is balanced by a slight difference in the duration of the half tidal window so that residual current speeds and directions are found to be highly variable, varying instead in response to the meteorological or fresh water discharge conditions at the time of the survey, and do not follow a clear spatial pattern.

Winds are most commonly (25% of the time) and strongest from the west to north-west (255 to 315°N). The longest open fetches for wind (up to 200km) are also from these directions.

Waves most commonly come from (around 50% of the time), and are largest from, the west or west north-west and are relatively small (less than 1m wave height). Typical wave heights during large storms are 3 to 6.5m (1:1 to 1:10 year return periods), although wave heights of up to 7m may be experienced during a 1:50 year event.

Surficial sediments at the site are characterised by marine sediments (slightly gravelly sands and gravelly sands, and a small area of sandy muds of variable thickness (10 to 15 m) overlying a glacial till (consolidated boulder clay) that extends to at least the base of any expected installation activities. This is consistent with muddy sediments transiting along the North Wales coast (following the regional sediment transport pathways described below). The presence of some fine material is likely a normal feature of the surficial sediment in the project area but the proportion and distribution is likely to vary with time.

Sediment transport is predominantly onshore (towards the Burbo Bank and Mersey) from west to east in offshore areas, and mainly driven by tidal asymmetry / residuals with higher rates associated with stronger tidal currents. Sediment transport rates will also be enhanced by wind driven surge and wave action during storm events.

Near-shore sediment transport is also predominantly from west to east in adjacent onshore (coastal) areas due to the relative orientation of the coastline to the dominant wave regime (west and west-north-west).

Aside from localised and small scale patterns of accretion and erosion, the function of the Burbo Bank is a net pathway for sediment being transported to the east. Within the project site suspended sediment concentration (**"SSC"**) levels are locally controlled by a combination of tidal, wave, fluvial and anthropogenic factors. Naturally occurring background levels of 5 to 20 mg/l are present in surface waters in offshore areas, increasing to, approximately, and 150mg/l near the bed. Background levels are higher (order of hundreds of mg/l) in offshore areas during storm events. Background levels are higher (30 to 450 mg/l near surface and 70 to 1500 mg/l near bed) in the Mersey Estuary.

The coastal process receptors considered in relation to the project site include:

i. Liverpool Bay;
ii. Wirral and Formby coastlines ("**SAC**");

iii. Dee Estuary (Special Protection Area (**SPA**), Special Area of Conservation (SAC) and Ramsar);
iv. the form and function of the Burbo Bank;
v. coastal morphology (beaches, cliffs, dunes), in particular:
    - Dunes at Formby (Sefton Coast);
    - Heswall (Dee Estuary); and
vi. Mersey Estuary navigation channels and training walls.

As noted above, the Burbo Bank is also separately considered as a local morphological feature with a particular physical form and function. Burbo Bank is constrained to the east by the Mersey Estuary navigation channel training walls, which are also specifically considered. Coastal dunes at Formby and Heswall cliffs in the Dee Estuary are also considered based on previous stakeholder comments received during EIA consultation.

3.4.3 **Biological Environment:** Subtidal and Intertidal Benthic Ecology

Benthic surveys were carried out on the littoral and sub-littoral area to inform the EIA. Subtidally, sediments were dominated by slightly gravely sands. This was observed throughout the project area. No unexpected species or habitats were recorded within the project area. Benthic infaunal invertebrates were dominated by polychaete worms and bivalve molluscs, with echinoderms and crustaceans (crabs and amphipods) also well presented.

The coarser sand to gravel areas are dominated by polychaete worms. In slightly deeper, more gravelly locations, veneered bivalves and other robust molluscs occurred. In the shallower, fine sandy areas fauna tended to be sparse and included impoverished examples with fewer organisms than normally expected.

Areas built up with silt are often heavily dominated by one or few characterising species, including bivalves, polychaete worms or brittlestars. Historical data from Burbo Bank 1 offshore wind farm supports suggestions that infaunal communities are generally variable in this area.

The intertidal characterisation survey of the export cable route landfall are identified as generally sandy, sparsely populated foreshore dominated by polychaete worms, with occasional burrowing amphipods.

The communities and habitats in the project area are typical of the local subtidal and intertidal environments. The only rare or unusual species recorded was the nationally scarce thumbnail crab, which was recorded in very low numbers predominantly to the north of the array area. No protected invertebrate species were recorded during any of the surveys. A few commercially targeted species known to occur in the area such as edible crabs, common spider crab and commons whelk. There was also no indication of Habitats Directive Annex 1 habitat within the survey area.

3.4.4 Fish and Shellfish Ecology

Within the International Council for the Exploration of the Sea (ICES) blocks in which the project area consists, shellfish comprise the majority of the landings by weight from the study area, representing 73.5% of total landings (shellfish, teleost's and elasmobranchs combined). Queen scallop is the principle shellfish species landed by weight, accounting for 66.9% of total shellfish landings, followed by cockles (12.6%), kind scallops (9.1%), whelks (5.9%) and mussels (3.8%).

Teleost landings account for 20.8% of total landings in the study area. Demersal flatfish species, in particular plaice and sole, constitute the majority of teleost landings at 37.3% and 32.0% respectively.

Within the project boundary, there is a small, discrete, seasonal fishery for sole, plaice and cod; species generally targeted by vessels operating beam trawls during the spring. There is also occasional otter trawling for plaice and sole throughout the site.

The cable route transects seasonal gillnet fisheries for seabass and flatfish. Spawning grounds for sole, plaice, cod, whiting, sand eels, sprat and mackerel have all been defined within the project area and its export cable. Nursery grounds for all the aforementioned spawning species (with the exception of sprat) as well as for herring, thornback ray, tope, spotted ray and anglerfish have also been identified in the area of the Project and its export cable. In addition, nursery grounds of spur dog are located in the vicinity of the project approximately 8 km to the northwest.

The timings of Atlantic salmon smolt runs in the Clwyd, Conwy and Dee have been identified through meetings with fisheries stakeholders and statutory bodies. Runs occur throughout late March to June. Salmon could be expected to be in the vicinity of the project between March to October. The number of fish potentially transiting the area is not possible to determine, although is likely to increase through spring and summer as the peak of river entry (August and September) is approached. The majority of salmon enter the rivers between June and October, with the peak occurring in late summer to early autumn.

The environmental parameters initiating migration in sea trout are similar to those of Atlantic salmon, where the seasonal timing of sea trout smolt runs in the study area are broadly similar, although the run may be initiated up to two weeks earlier. Adult sea trout runs in the studied rivers are broadly similar to adult salmon. However, as with smolts, the peak of the adult sea trout return migration tends to occur earlier than for salmon, typically during June and July.

3.4.5 Marine Mammals

The area of the offshore windfarm is not known for high presence of marine mammals. Evans and Shepherd (2001), updated by Evans and Anderwald (2006), reported that:

Liverpool Bay and the waters adjacent to the northern Irish Sea are not rich areas for cetaceans compared with other parts of the United Kingdom. The total number of species of cetaceans recorded since 1975 in near-shore waters remains at fifteen (Evans, 1996b; Reid et al., 2003; Evans et al., 2003). These include six species which are either present at any time of the year or recorded annually as seasonal visitors: mink whale, long finned pilot whale, Risso's dolphin, bottlenose dolphin, common dolphin (now called short-beaked common dolphin), and harbour porpoise. Other cetacean species that have been recorded only casually in the region include: fin whale, sei whale, sperm whale, northern bottlenose whale, Sowerby's beaked whale, white-beaked dolphin, Atlantic white-sided dolphin, striped dolphin, and killer whale.

A relatively small proportion of the above are resident or regular visitors to the Liverpool Bay area. Harbour porpoise, bottlenose dolphin and the short-beaked common dolphin are the most likely cetaceans to be recorded. Larger species such as minke whale, long-finned pilot whale and sei whale have been regularly sighted in the north western Irish Sea (west of the Isle of Man) but rarely in the shallower coastal waters to the east.

The most commonly recorded cetaceans close to the Lancashire coast have been reported as harbour porpoise followed by short-beaked common dolphin and bottlenose dolphins.

3.4.6 Offshore Ornithology

Thirty-seven bird taxa were recorded during boat-based surveys at the site as part of the EIA, of which twenty-eight were identified to species level. The majority of species involved were true seabirds including Manx shearwater, gannet, three species of auk, eight species of gull, three species of tern and two species of skua.

In contrast, aerial surveys for the EIA recorded a total of fourteen bird species and six taxonomic groups were identified from the images. Gulls and guillemot/razorbill were the two species groups that were recorded most frequently in the analysis of all six surveys. Other frequently recorded species were red-throated/black-throated divers, cormorant, shag and puffin.

Of principal relevance to the assessment of the project are the interest features of Liverpool Bay Special Protection Area ("**SPA**") (wintering red-throated diver and common scoter), within which much of the project site is situated. A suite of European sites exists on the adjacent Wirral, Merseyside and North Wales coasts, and the interest features of these sites are of high relevance to the assessment. Features from the Dee Estuary, Mersey Estuary, Ribble and Alt Estuaries and Mersey Narrows Aberdaron Coast and Skokholm & Skomer **SPA**/Ramsar sites include both breeding seabird colonies and wintering/passage waterfowl. Breeding seabird interest features of these European sites include lesser black-backed and black-headed gulls, common, little and sandwich terns.

3.4.7 Nature Conservation

There are a few designated areas (areas protected under nature protection legislation) along the coast in the vicinity of the project area, the site and cable route corridor only interfere with one of these - Liverpool Bay **SPA**, which has wintering red-throated diver and common scoter listed, and other features of concern such as little gull, cormorant, tern and little tern.

The Project site also lies within the area of numerous other sites of conservation status and their attributed feature that have been considered under the EIA such as:

- Aberdaron Coast and Bardsey Island - *Manx shearwater (breeding);*
- Skokholm and Skomer - *Manx shearwater (breeding);*
- Copeland Islands - *Manx shearwater (breeding);*
- Bowland Fells - *Lesser black-backed gull (breeding);*
- Ribble and Alt Estuaries **SPA** and Ramsar - *Common scoter (assemblage feature), Cormorant (wintering), Common tern (breeding), Lesser-black backed gull (breeding) **SPA** and Ramsar feature;*
- Dee Estuary - *Common tern (breeding), Cormorant (wintering assemblage), Sandwich tern (passage);*
- Mersey Narrows and north Wirral foreshore **SPA** and Ramsar - *Cormorant (assemblage feature), Common tern (breeding), Common tern (passage) **SPA** and Ramsar feature, Little gull (passage);*
- Morecambe Bay **SPA** and Ramsar - *Herring gull (breeding) both **SPA** and Ramsar features, Lesser-black backed gull (breeding) both **SPA** and Ramsar features;*
- Dee Estuary SAC - *River Lamprey, and Sea Lamprey; and*
- River Dee and Bala Lake SAC - *River Lamprey, Sea Lamprey, and Atlantic salmon.*

3.4.8 Offshore Human Environment

Shipping and Navigation

A Navigation Risk Assessment ("**NRA**") has been performed to assess the baseline vessel activity and navigational features in the area and potential impacts of the development, as well as consultations with a number of stakeholders and regulators such as the Maritime and Coastguard Agency ("**MCA**"), the Trinity House ("**TH**"), Chamber of Shipping, Royal Yachting Association ("**RYA**"), Port of Liverpool ("**PoL**"), Port of Mostyn ("**PoM**"), Cruising Association ("**CA**") and local stakeholders.

Vessels were tracked using Automatic Identification System ("**AIS**") and radar for a period of 14 days during summer and winter respectively. During this period there were 76 vessels per day on average within 10 nautical miles ("**nm**") of the offshore windfarm during summer and 79 per day during winter. To the north of the site in the Queens Channel, there were 38 in the summer and 33 in winter.

The Project site is within the limits of the Port of Liverpool. The port itself is located approximately 7nm to the southeast of the project site. The Mersey Docks and Harbour Company Limited ("**MDHC**") is the Statutory Harbour Authority for the Port of Liverpool and Birkenhead Docks, and is responsible for the management of navigational safety and protection of the Marine Environment on the River Mersey between Warrington Bridge and the outer port limits. MDHC provides Conservancy, Pilotage and Vessel Traffic Services ("**VTS**") for ships and craft using the port. Port Operations Control is situated in the Maritime Centre at Royal Seaforth Dock, which provides a continuous traffic information service 24 hours a day, year round, with radar and AIS coverage of Liverpool Bay. Pilotage is compulsory within the Port of Liverpool for all vessels of more than 82 m in length and for all other vessels carrying hazardous cargoes, with defective equipment affecting their safe navigation or carrying fare-paying passengers.

Several surface oil and gas installations are situated in the vicinity of the project site, including Hamilton (4.7 nm northwest), Douglas (7.5nm west-northwest), Lennox (7.8 nm north), Hamilton north (9.5nm north-northwest) and Conwy (13 nm northwest). There are also a number of subsurface structures in the vicinity. The project site is encompassed by Oil & Gas Licence Blocks 110/19 and 110/14.

The Project site lies immediately west of the existing Burbo Bank offshore wind farm. Other Round 1 offshore wind farms in the vicinity are North Hoyle, approximately 5nm southwest, and Rhyl Flats, approximately 12nm southwest. Gwynt y Môr Round 2 offshore wind farm is approximately 4nm west of the project site. Further to the north are a number of other Round 1 and 2 wind farms.

There are two licenced aggregate dredge areas located to the west and northwest of the project site, both of which are actively dredged. There is also an area which has been identified by the Crown Estate as a potential Aggregate Resource Block, located to the west of the project site.

Subsea cables, spanning between the west coast of England and the Isle of Man / Ireland, and submarine pipelines associated with surface / subsurface installations are present near the project site.

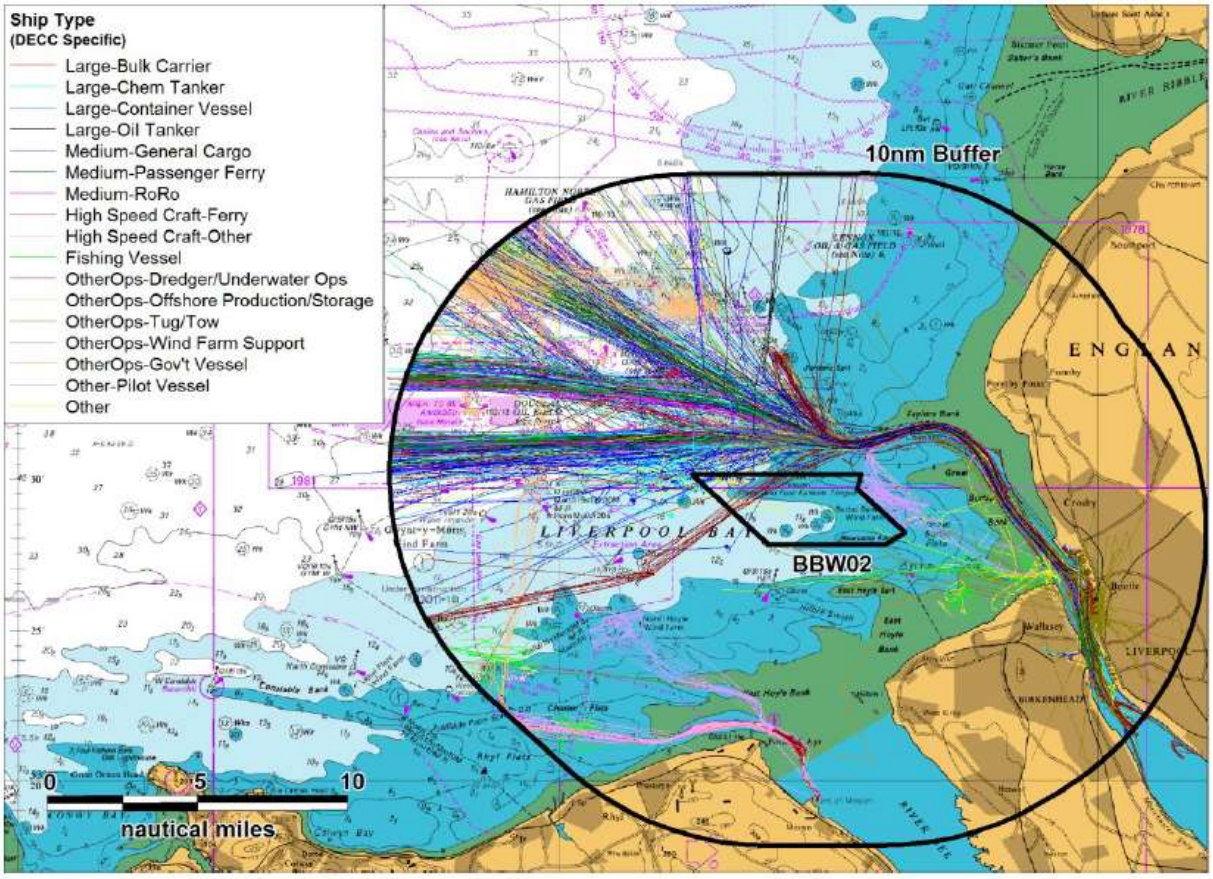
The EirGrid east west Interconnector is located approximately 8 nm southwest of the project, is an electricity link between Rush north Beach in County Dublin and Barkby Beach in north Wales.

There is a HDVC cable close to the project. The Western High Voltage Direct Current (**"HVDC"**) Link runs along the south and western boundaries of the project and comprises a subsea cable running between converter stations at Hunterston, north Ayrshire in Scotland and Connah's Quay, Flintshire in north Wales.

The Emerald Express Cable System, to run approximately 12 nm north of the project, is a subsea fibre optic cable linking North America, Iceland and the UK.

The Liverpool Bay Traffic Separation Scheme ("**TSS**"), adopted by the International Maritime Organisation ("**IMO**") is located approximately 5.5nm northwest of the project site. One objective of the TSS was to separate opposing streams of traffic passing north of the Gwynt y Môr wind farm. There is also a TSS off the Skerries for vessels rounding Anglesey.

Figure 3.2: Ship Tracks Relative to Burbo Bank Extension Site



Commercial Fisheries

The Burbo Bank Extension Offshore Wind Farm is located within ICES rectangle 35E6, where the MMO data identifies cockles, queen scallops, king scallops and sole as the principal target species. Consultation suggests that dredging for king and queen scallops occurs to the west of the local study area, some distance from the project. The main method for harvesting cockles is handpicking and charts provided by the NW-IFCA indicated that this only occurred in intertidal and near shore areas well to the south of the project and not in areas which would be transacted by the export cable route.

Within the project boundary, there is a small, discrete, seasonal fishery for sole, plaice and cod, generally targeted by vessels operating beam trawls during the spring. Consultation has also identified a small thornback ray gillnet fishery in the north-west of the project site and occasional otter trawling for plaice, sole and thornback ray throughout the site. The cable route transects seasonal gillnet fisheries for bass, tope, smoothound and flatfish. Occasional whelk boat activity has been logged in the project area however this is sporadic.

The project records low levels of activity compared to grounds elsewhere in the Irish Sea, and very low levels on a national context.

The receptors considered are therefore as outlined below:

- Otter and beam trawlers targeting mixed demersal species; and
- Gillnetters targeting mixed demersal species.

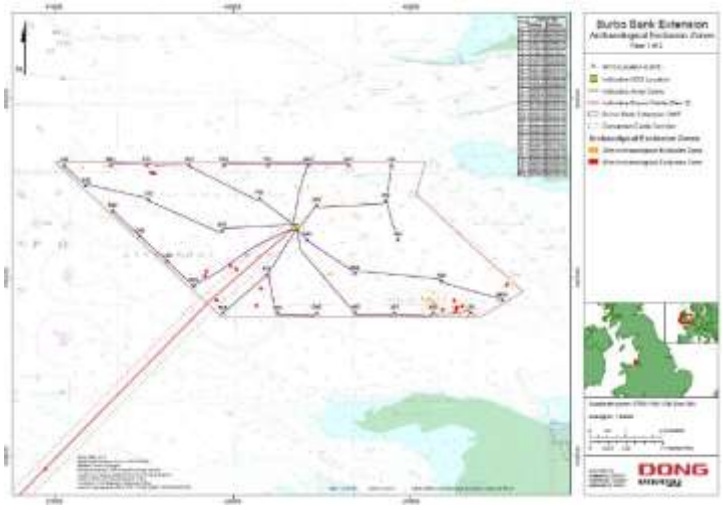
Existing legislation does not currently prohibit fishing from within operational wind farm sites subject to any safety zones applied. It is considered that otter and beam trawling and gillnetting activity potentially could resume within the project providing inter-array cables are buried to a sufficient depth. In light of this and where appropriate, the impacts upon the above receptors are considered on an individual basis.

Marine Archaeology and Cultural Heritage

A data search and several geophysical surveys aimed at identifying possible impacts of the development to archaeological subjects were conducted. Results showed that a combination of wrecks, structures, buried anomalies, anthropogenic material, seabed disturbance and debris (archaeological anomalies) are present within the site (Burbo Bank Extension Offshore Wind Farm, Revised Archaeological Written Scheme of Investigation, January 2014, Maritime Archaeology).

Archaeological exclusions zones were agreed and have been applied to ensure identified and potential archaeological objects are protected from potential impacts from any activity. No decommissioning works will be conducted within the identified archaeological exclusion zones as shown in Figure 3.3 below.

Figure 3.3: Map of Archaeological Exclusion Zones (AEZs) at Burbo Bank Extension OWF within Order Limits



The information on existing archaeological knowledge in the study area indicates a significant potential for maritime archaeological remains from all periods to be present in the windfarm area. There is some potential for submerged prehistoric landscapes and terrestrial structures to survive in the study area. However as with much of the wider Irish Sea region, material from the earliest periods is likely to be deeply buried by subsequent marine sedimentation.

The mitigation measures that will be employed include the establishment of Archaeological Exclusion Zones ("**AEZ**"), which have a 50m radius around anomalies that have been assigned high archaeological potential and a 25 m around anomalies that have been assigned medium archaeological potential.

15 High risk AEZs and 115 Medium risk AEZs were found and defined within the windfarm area (see Figure 3.1, High risk marked in red and medium risk in

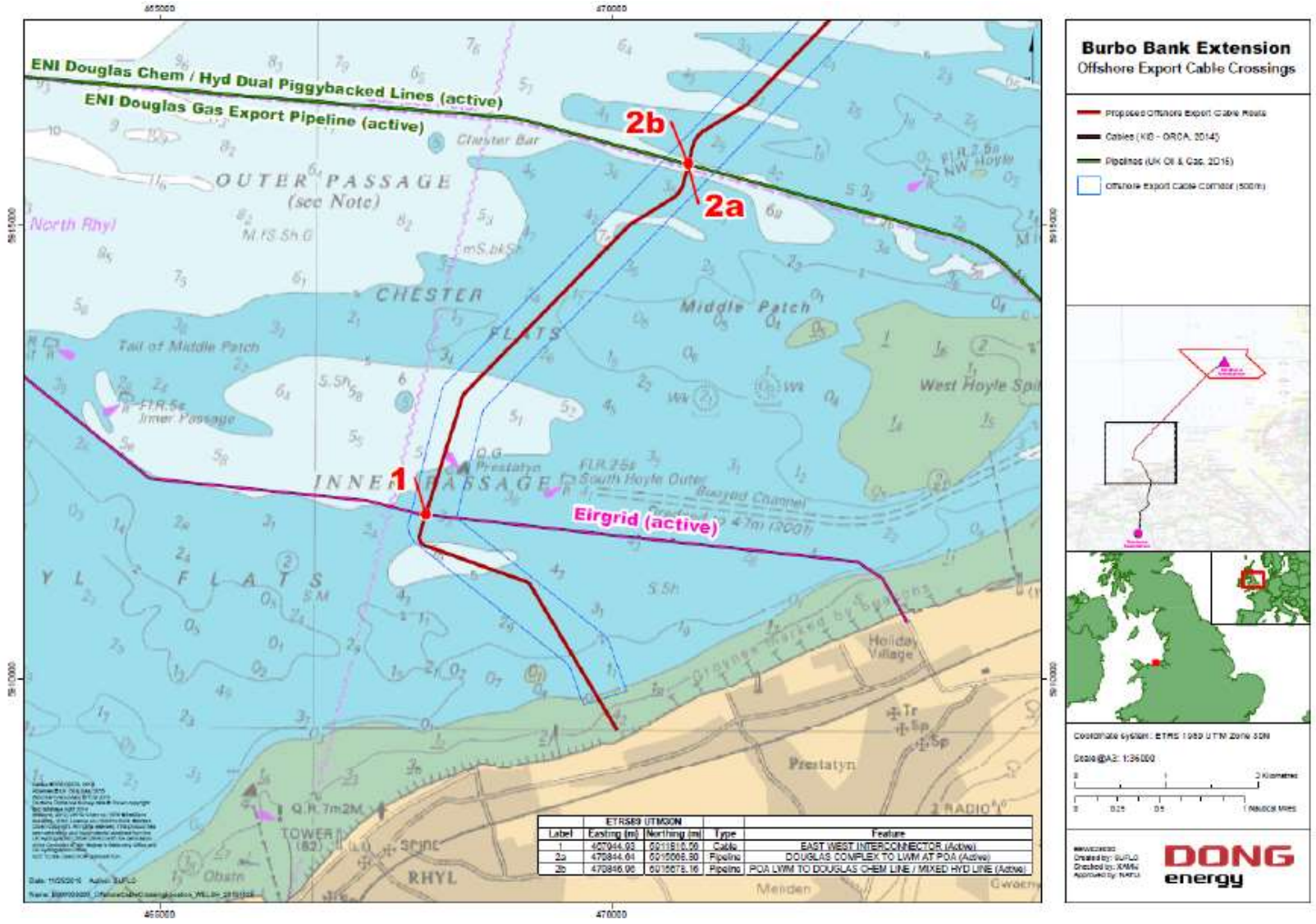
yellow). These AEZs will be avoided during operational and decommissioning activities.

Existing Infrastructure

Along the export cable route, there is existing infrastructure that will need to be taken into account during decommissioning. These are as follows:

- Cable Crossing: Interconnector: E-W interconnector (EIgrid)
- Pipeline Crossing: Oil & Gas Pipeline (BHP Biliton)(x2 located at inter-distance of approximately 11m); and
- Cable Crossing: HVDC western link (Scottish Power and National Grid)

Figure 3.4: Existing Offshore Export Cable Crossings at Burbo Bank Extension



	ETRS89 UTM30N			
Label	Easting (m)	Northing (m)	Type	Feature
1	427944.93	5915810.50	Cable	EAST WEST INTERCONNECTOR (Active)
2a	470844.64	5915666.80	Pipeline	DOUGLAS COMPLEX TO LWM AT POA (Active)
2b	470846.96	5915678.16	Pipeline	POA LWM TO DOUGLAS CHEM LINE / MIXED HYD LINE (Active)

4 Description of Items to be Decommissioned

As part of the windfarm construction the OFTO assets are also constructed in a way that it is possible to decommission them at the end of its operational life (approximately 25 years), in order to fulfil regulatory requirements at construction consenting stage.

The items covered in this section for decommissioning by DTPBBE are:

- Offshore Platform Substation ("**OSP**") (including jacket and ALL components on the platform); and
- Offshore export cables.

Scour protection materials have a potential to become inhabited by marine organisms over the lifetime of the project. It is understood that no scour protection at the OSP foundations is identified by BBW02. Therefore no decommissioning measures associated with scour protection at the OSP foundation are required.

It is planned that the structure for the offshore substation will be removed in its entirety including the foundations. There however are some structures that may be left under the seabed i.e. cables and foundation bottom pieces whereby removal may result in greater impact on the environment than leaving them in place.

Components left in situ following decommissioning will be aligned with standards set out by the IMO that specify that, an installation or structure need not be entirely removed if:

- it would not involve extreme cost;
- it is not technically feasible (however, the design and construction should be such that entire removal would be feasible);
- it would involve an unacceptable risk to personnel ;and
- It would involve an unacceptable risk to the environment.

In addition DTPBBE will also apply the following principles:

Table 4.1: Guiding Principles

Guiding Principles	Comments
Minimise environmental impact	In considering decommissioning measures, the Best Practicable Environmental Option ("**BPEO**") will be chosen in order to minimise impact on the environment at an acceptable cost.
Safety at all times for all	The highest levels of health and safety will be followed throughout the project lifecycle. Safe practices will be followed in implementing decommissioning solutions.
Maximise reuse of materials	DTPBBE will aim to maximise the reuse of waste material from the decommissioning phase and will pay full regard to the 'waste hierarchy', see Table 4.2.
Consideration of the rights and needs of legitimate users of the sea	The rights and needs of other users are respected by DTPBBE. Decommissioning activities will seek to minimise the impact on stakeholders and emphasis will be placed on clear and open communication.

Guiding Principles	Comments
Follow Polluter Pays Principle	DTPBBE decommissioning and waste management provisions acknowledge our responsibility to incur the costs associated with our impact on the environment.

At the time of decommissioning, where assets have remaining technical asset life and a second hand market exists DTPBBE will look to sell assets. If this is not possible then DTPBBE will recycle or disposal as detailed in Table 4.2.

Table 4.2: Re-use, Recycle and Disposal Options

Asset	Waste Type	Re-Use	Recycle	Disposal
Jacket and foundations from OSP	Steel from topside and Foundations		**X**	
Main power transformers	Steel, iron laminate, copper, transformer oil	**X**	**X**	
Gas insulated switchgear	Copper, electronics	**X**	**X**	
OSP power cables	Copper		**X**	
Diesel generators	Steel, copper, electronics	**X**	**X**	
Reactors	Steel, iron laminate, copper, reactor oil	**X**	**X**	
Auxiliary transformers	Steel, iron laminate, copper, transformer oil	**X**	**X**	
SCADA, protection panels	Steel, electronics		**X**	
Neutral earthing resistor	Steel, copper	**X**	**X**	
LV switchboard	Steel, electronics	**X**	**X**	
Subsea cables	Aluminium, steel		**X**	
Onshore cables	Aluminium, steel		**X**	
	Non-recyclable materials and fluids			**X**

4.1 Offshore Substation

The project has an installed capacity of 258MW. The offshore element of the project consists of a single 34/220kV OSP. The purpose of the OSP is to transform the voltages of the electricity generated by the turbines from 34kV up to 220kV for transmission of generated power to the onshore transmission grid system.

The dimensions of the Burbo Bank Extension OSP are as follows:

- topside weight: 2150 tonnes;
- foundation and support structure weight: 2000 tonnes incl. piles;

- area of topside: 37m by 25m and approximately 17.5m high, everything included.

Located on the platform are the following items:

- two 200MVA power transformers with oil spillage facility;
- two auxiliary transformers;
- one 220kV Gas Insulated Switchgear ("**GIS**");
- two 34kV GIS;
- two Low Voltage ("**LV**") switchgear rooms;
- Protection, control and instrumentation systems;
- two diesel generators;
- four uninterruptible power supply systems ("**UPS**");
- 220kV High Voltage ("**HV**") internal platform cables;
- 34kV Medium Voltage ("**MV**") internal platform cables.

The items to be decommissioned are:

- All of the topside equipment and transformers. As the transformers are oil filled they, and the various other components including generators and fuel storage, will be transported to an onshore facility for dismantling, with constituent parts processed for reuse, recycling and disposal. This will be performed in conjunction with the generator;
- The topside's support structure;
- The jacket structure, including all appurtenances such as J-Tubes and boat access system; and
- The piles, which will be cut below the seabed level to allow the cable to remain buried. Following the cutting operation the foundations and the jacket structure may be removed as a single structure after the removal of the topside.

The turbine interconnecting cables adjacent to the substructure will be cut at a point below the surface of the seabed to allow the cable to remain buried. The cut sections will be removed with minimal disruption to the seabed.

Figure 4.1: Burbo Bank Extension Topside

Figure 5.2: Burbo Bank Jacket and Foundation

4.2 Offshore Export Cable

The total length of the offshore export cable is 24.3 km from the OSP to landfall. The subsea cable is required to connect the wind farm to the onshore electricity transmission system. As part of their design the cable will also have an internal fibre optic for data transfer and control purposes.

The subsea export cable is buried to a nominal depth of 1.20 to 3.00 m.

As removal of cables from the seabed poses a significant environmental impact risk, it will be prudent to leave the cables in situ, removed where required, buried but cut low down at a position that restores the natural features of the seabed.

This proposal will be reviewed prior to decommissioning and if new evidence has come to light that will affect this proposal then these will be assessed and taken into account in formulating a new programme for the decommissioning of the export cable.

The mattressing crossing protection will remain in situ, as this material is also benign. It is also possible that artificial reefs may have formed and as such it may be better left in place and undisturbed. However this will be subject to the crossing owners, ENI, EIgrid and Westernlink and dependent upon the crossing agreements.

5 Description of Proposed Decommissioning Measures

This section gives an overview of legislation and guidance relevant to decommissioning activities and further outlines in more detail how decommissioning of individual parts of the development will be carried out i.e. the OSP and the export cables.

At the time of writing this document, the decommissioning phase is not expected to commence before a timeframe of at least 20 years. Therefore, it is not possible to describe the precise technology and methods of decommissioning works. These will develop over the operational lifetime of the wind farm, and should therefore be reviewed and a detailed decommissioning works schedule

finalised before the decommissioning phase starts. DTPBBE will also review the plan upon request by BEIS.

However as mentioned in Section 3, certain principles are projected to be followed:

- health and safety considerations;
- Best Practicable Environmental Option ("**BPEO**");
- safety of surface and subsurface navigation; and
- other uses of the sea.

5.1 Adherence to relevant legislation and guidance

The decommissioning measures are based on known techniques of today and have been proposed taking into consideration the following key UK and international legislation and guidance notes:

- Decommissioning of Offshore Renewable Energy Installations under the Energy Act 2004: Guidance notes for Industry, DECC, January 2011;
- Guidelines and Standards for the Removal of Offshore Installations and Structures on the Continental Shelf and in the Exclusive Economic Zone, International Maritime Organisation (IMO), 19th October 1989;
- Guidance Notes for Industry: Decommissioning of Offshore Installations and Pipelines under the Petroleum Act 1998, DECC;
- OSPAR guidance documents on offshore wind farms;
- Guidelines for Environmental Risk Assessment and Management, Defra, September 2002; and
- United Nations Convention on the Law of the Sea (UNCLOS), 1982.

Other relevant legislation includes:

- Hazardous Waste Regulations 2005;
- Marine and Coastal Access Act 2009;
- The Water Resources Act 1991;
- The Conservation of Habitats and Species Regulations 2010;
- The disposal or recovery of waste on land, principally under Part II of the Environmental Protection Act 1990, other legislation relating to the carriage and transfer of waste and, where appropriate, the Hazardous Waste Regulations 2005; and relevant health and safety legislation;
- London Convention 1972 and the 1996 Protocol, relating to the prevention of marine pollution by dumping of wastes;
- Construction (Design and Management) Regulations (CDM) 2015; and
- Appropriate H&S Regulations.

5.2 Phasing and Co-ordination of Decommissioning

Due to the close proximity of Burbo Bank Extension Offshore Wind Farm to other wind farms which exist, it is conceivable that Burbo Bank Extension together with other wind farms will enter the decommissioning phase at similar times. This could bring benefits of minimising environmental impacts, costs for vessel transport, staff and equipment, and make greatest utilisation of onshore handling facilities. This will be therefore taken into account at the planning stages of decommissioning, seeking to develop a potential partnership with other wind farms in the proximity and to harmonise the decommissioning process.

5.3 Plan of Works and Integration

A detailed final decommissioning plan will be prepared two years ahead of the proposed decommissioning date and will incorporate the results of a detailed recent EIA, thus allowing sufficient time to implement any measures arising into the final decommissioning plan. The process supporting the EIA will include pre-decommissioning surveys. The plan of work will include detailed method statements together with project specific hazard and risk assessments. DTPBBE will also liaise with other developers in the North Wales region to ensure potential synergies for decommissioning facilities are investigated.

5.4 Decommissioning of Offshore Substation

It is expected that the offshore substation will be decommissioned in two main stages, comprising the complete removal firstly of the topside, followed by removal also of the jacket foundation.

Prior to removal of the topside, a number of preparatory activities will be conducted including:

- de-energise and isolate required electrical control and power cables from National Grid and SCADA system;
- it is proposed that the oil filled transformers are braced for sea transportation, transformer oil levels can be reduced in components like the conservator tank and cooler fins to deal with a liquid load;
- dismantle terminations for export and array cables; removal of all cables back to cable deck, or seabed;
- removal of all unsecured loose items from the topside;
- containment and/or removal of potentially hazardous/polluting fluids. A special agreement will be made with the GIS supplier to ensure the safe removal of the SF_6 Gas; and
- cutting welded stab-in connections between topside and foundation.

A Heavy Lift Vessel ("**HLV**") will be used to dismantle the topside and transport the structure ashore for further dismantling.

The process of decommissioning of the OSP is likely to involve the following second stage sequence:

- a HLV lifts the topside module onto an adjacent barge;
- topside is transported back to port where the topside is transferred to the quayside;
- topside will be processed for recycling and or disposal as appropriate; and
- jacket piles will be cut will be cut below the natural level of the seabed, as appropriate. Method used could be either water cutting or remote thermal cutting.

Complete removal of the pile below the seabed is considered neither practical nor environmentally desirable. The appropriate depth for removal would depend upon the sea-bed conditions and site characteristics at the time of decommissioning. This is in line with the IMO standards as complete removal of the foundations would involve an unacceptable risk to the marine environment and is likely to involve extreme cost. If an obstruction exists above the sea bed or an obstruction appears following decommissioning which is attributable to the wind farm, this obstruction will be marked by the owner so as not to present a hazard to other sea users. The marking will remain in place until such time as

the obstruction is removed or is no longer considered to be a hazard to other sea users. The monitoring of this obstruction will be built into the decommissioning monitoring and maintenance programme.

The general target for cutting of the jacket piles will be one metre below the seabed, though this is likely to be varied due to individual localised factors such as ground condition etc. at each site. When assessing the possibility of cutting below the seabed, it is important to consider the need to overcome frictional forces acting on the pile. Considerable excavation will have to take place, approximately two meters diameter for every meter in depth below the seabed.

Once cut the jacket will then be lifted onto a barge and transported back to port for recycling or sold off as scrap metal.

Items contained within the topside will be processed for recycling accordingly or disposed as appropriate.

All hazardous waste will be handled accordingly and disposed of in accordance with its classification.

5.5 Decommissioning of Export Cables

Relevant stakeholders and regulators will be consulted to determine which sections of the offshore cable will remain in-situ or be removed. If left in-situ, the ends of the export cable leading from the offshore substation to the landfall would be cut off at the substation Cable Protection System (28 m from J-tube) and the ends weighted down and buried, again with the remainder of the export cable left buried at the current depth. This will ensure that no navigational risk arises in the sense that fishing gear or anchor would interface with the as left cables. Only export cables which are buried to a depth which is considered safe would be left in situ. At cable or pipeline crossings the cables may remain in place to avoid unnecessary risk to the integrity of the cable or pipeline.

If the export cables are removed on request, the sequence for removal is anticipated to be:

- Identify the location of the export cables that need to be removed;
- Seabed material may need to be removed to locate the cable, likely to be carried out using a water jetting tool similar to that used during cable installation. Buried cables will be located using a grapnel to lift them from the seabed. Alternatively, or in addition, it may be necessary to use an Remote operated Vehicle ("**ROV**") to cut and/or attach a lifting attachment to the cable so that it can be recovered to the vessel;
- The recovery vessel will either 'peel out' the cable as it moves backwards along the cable route whilst picking it up on the winch or cable engines, or, if the seabed is very stiff/hard it may first under-run the cable with a suspended sheave block to lift the cable from the seabed. The use of a suspended sheave block could be carried out by a separate vessel such as a tug prior to the recovery vessel 'peeling out' the cable;
- The recovery vessel will either spool the recovered cable into a carousel or chop it into lengths as it is brought on-board before transport to shore;
- Parts will be processed for reuse, recycle or disposal.

5.6 Summary of Proposed Decommissioning Measures

A summary of the proposed decommissioning measures for the offshore components of the DTPBBE are outlined in Table 5.1.

Table 5.1: Summary of Proposed Decommissioning Measures for DTPBBE

Component		Proposed decommissioning measures
Offshore substation	Topside	Complete removal
	Jacket	Cut off (target 1 m) below seabed level and removed
Offshore export cable		Cut off at the base of the platform, the remaining cable will be weighted down and left in situ. Cable crossing mattresses left in situ.

5.7 Proposed Waste Management Solutions

DTPBBE is committed to maximising the reuse of waste materials and pays full regard to the 'waste hierarchy' which suggest that reuse should be considered first, followed by recycling, incineration with energy recovery and lastly, disposal. In any event waste management will be carried out in accordance with all relevant legislation and it would be intended that any disposal takes place on land.

A waste management plan will be drawn up prior to the commencement of decommissioning to ensure that adequate time remains for the proper provisions to be made.

An overview of expected types of wastes and their expected re-use, recycling or disposal is given in Table 5.2. In any event, waste management will be carried out in accordance with all relevant legislation at the time of decommissioning and it is intended that any disposal will take place on land.

Table 5.2: Decommissioning Programme Technical and Environmental Summary

Activity	Description	Approach
Dis-connection	Transmission assets disconnected from NGET and wind turbine generators, isolated and earthed.	Undertaken in accordance with the safety rules in place at the time.
Topside structure housing the offshore substation ("**OSP**")	Houses transmission assets including oil-filled transformers, gas-insulated switchgear, diesel generators and termination of the OFTO export cables and wind farm array cables. Total lift of the substation topside is approximately 2,131 tonnes.	Oil filled transformers are braced for sea transportation, transformer oil levels reduced in the conservator tank and cooler fins to deal with a liquid load. Cables will be removed or cut at the hang-off. Any loose items will be removed. The topside is then cut from

Activity	Description	Approach
		the jacket and removed in one piece. Parts will be processed for reuse, recycling and disposal.
OSP platform structure and piles	Jacket structure and supporting foundations and piles.	Critical joints and members of the structure will be inspected. Foundations will be inspected using ROV. Jacket piles will be cut off at a level (with an appropriate safety margin) that would not interfere with subsequent activity on the site. Following the cutting operation the foundations and the jacket structure will be removed as a single structure after the removal of the topside.
Inter array cables	Inter array cables are owned by Ørsted (previously DONG Energy) and connect the wind turbine generators to equipment on the OSP.	In conjunction with Ørsted's inter array cables will be cut or dismantled at the hang-off to enable removal of the platform.
Offshore export cables	OSP is connected to land by a 24.3 km subsea export cable buried to a target depth of between 1.2 metre and 3 metres. The subsea export cable consists of one XLPE insulated; three core 1200 mm^2 aluminium conductor cables.	As per the current industry standard to minimise environmental disturbance to the seabed cable will be left in situ and removed where required. Only offshore cables that are exposed at the time of decommissioning will be removed. Cable requiring removal will be cut as close to the platform foundation, or sea bed, as is possible, with the ends weighted down and buried to a secure depth below seabed level. Recovered cable will be stripped and recycled. Contingency plans will be put in place to ensure appropriate actions are in place if the cables become exposed post decommissioning.

Activity	Description	Approach
Onshore cables	The onshore cables run for approximately 10.4 km from the transition joint bay, via ducts through local land, under roads and via further joint bays to the onshore substation located at Cefn Estate, to the west of Coed yr Escob, St Asaph, Denbighshire. The onshore cable consists of three 1000 mm^2 aluminium conductors; single core XLPE insulated cables, installed in a cross-bonded system.	Onshore cables will where reasonably practicable be drawn and recovered where in ducts. The cable ducts will be sealed and manholes and draw pits back filled, ground will be reinstated to an acceptable appearance.
Onshore substation	The onshore substation is on leased land which will be assigned to DTPBBE for 55 years from grant of the lease. Prior to the end of the Term (or DTPBBE giving written notice of permanent abandonment to the landlord if earlier) DTPBBE is required to decommission the onshore substation site and any ancillary equipment and make them safe in accordance with all statutory requirements and consents and will reinstate the premises so that they can be used for agricultural purposes, which shall include the removal of all plant and equipment which is at a depth of less than 1 metre from the surface.	Components have varying technical life expectancies (usually >=40 years). Decommissioning will be reviewed with Ofgem and NGET in the light of any existing or proposed use of the substation. If decommissioning is required, transformers, switchgear and reactors will be removed and sold / recycled where appropriate. Following removal of equipment and any above ground structures, all pavements, slabs and piles will be demolished to 1 metre below ground level and the area refinished to its original condition.

5.8 Details of Any Item Let in-situ Offshore Following Decommissioning

As described in the previous sections, it is proposed to leave a major section of offshore cable and the embedded piles of the OSP in the seabed. The basis of this decision is that the items in question meet at least one of the four situations in which (based on the IMO standards) non-removal or partial removal may be considered.

The four situations are where:

1. the installation or structure will serve a new use, whether for renewable energy generation or for another purpose, such as enhancement of a living resource (provided it would not be detrimental to other aims, such as conservation);
2. entire removal would involve an unacceptable risk to personnel;
3. entire removal would involve an unacceptable risk to the marine environment; and
4. entire removal would involve extreme costs.

The primary reason for leaving cables buried and embedded piles in the seabed is that their removal is likely to cause a major impact to the environment and may require significant and dangerous diver involvement. The complete recovery of all of the pile structures would entail a major excavation of the seabed that would be very costly and hugely damaging to the environment in the area.

5.9 Lighting and marking

During the decommissioning of the DTPBBE, appropriate aviation and nautical marking and illumination will be applied.

In accordance with the Burbo Bank Extension consent under Section 36 of the Electricity Act 1989, DTPBBE is committed to exhibiting the appropriate marks and lights during the decommissioning of the project.

In relation to aviation safety, the shape, colour and character of the lighting will be compliant with the Air Navigation Order 2005, or as otherwise directed by the Civil Aviation Authority or the relevant legislation at the time.

In relation to navigational safety, lights and marks will be agreed with Trinity House, in consultation with the Maritime and Coastguard Agency prior to decommissioning to specify any obstruction marking that may be required during the removal operations. In the event that any obstruction is left on site, which may be considered to present a hazard to navigation, the necessary and specified marking will be provided.

6 Environmental Impact Assessment

An EIA was completed by BBW02 for Burbo bank Extension wind farm in 2013. Table 6.1 summarizes the impacts from the decommissioning phase.

Table 6.1: Summary of Decommissioning Impact Assessment

Topic	Impact Description	Decommissioning Impact
MetOcean	Short term impacts on current and wave patterns from decommissioning vessels.	Negligible
Morphology and coastal processes	Short term impacts on sediment disturbance through removal of infrastructure.	Negligible
Bottom fauna	Loss of habitable area and direct impact on species inhabiting the surface of wind farm infrastructure through the removal of infrastructure. Temporary loss of seabed area and seabed disturbance from decommissioning vessels jacked up on seabed and removal of infrastructure. Increased level of suspended sediment and smothering from the above activities.	Minor
Fish and Shellfish	Short term noise and vibration from decommissioning activities. Short term increased sediment	Minor

	concentration from decommissioning activities. Short term habitat disturbance. (*Note if blasting is required to remove foundations then salmonid migrations and Dover sole Spawning periods would need to be considered re: seasonal sensitivity*)	
Birds	Short term disturbance / displacement as a result of noise and vibrations from decommissioning vessels and activities.	Minor
Marine mammals	Short term noise impacts from decommissioning vessels and activities. No piling works will be undertaken during decommissioning, however should blasting be required then impact would increase and an agreed Marine Mammal Mitigation Plan would need to be submitted to the relevant authority (currently the MMO).	Minor
Shipping and navigation	Construction vessel collision on-site or with structure, underwater obstruction during jack up or anchoring or over unexploded ordnance, man overboard during personnel transfer operations or dropped object during major lifting operations.	Minor
Commercial fishery	Short term impacts on commercially exploited species, increased steaming times to fishing grounds, seabed obstacles, loss / restriction of access to fishing grounds/fish marks (for anglers), interference to fishing/angling activities.	Moderate
Cultural heritage	Direct damage to wreck structure, disturbance to artefacts and surroundings, destabilisation of sites, erosion leading to damage and instability.	Negligible
Contamination	Release of grouting cement during removal of Foundations.	Minor
Airborne noise	Short term noise as a result of decommissioning activities.	Negligible
Underwater noise	Short term noise as a result of decommissioning activities. No piling	Negligible

	activities will be undertaken, however should blasting be required this impact would increase.	
Seascape and visual	Short term impact from increased number of vessels.	Minor

Consistent with the commitment to undertake reviews of the decommissioning provisions contained within this document, DTPBBE will review and update existing EIA is throughout the lifetime of the project. A final review will be undertaken towards the end of the installation when final details of the decommissioning measures are known in order to address the impacts at the time. At this point a decision will be made as to whether a more detailed assessment is required. Key criteria that will inform the decision will include:

- An updated review, identification and assessment of potential impacts on both the physical, biological and human environment. Planned surveys in and around the transmission assets which could inform this process could include:
    - geophysical surveys (side scan sonar ("SSS") and Multibeam Echo Sounder ("MBES");
    - geotechnical surveys;
    - benthic grab/camera surveys;
    - ornithological surveys; and
    - Marine mammal monitoring.
- An updated review, identification and assessment of activities of other legitimate users of the sea with the potential to be affected by decommissioning. This is because the nature and/or intensity of human activities taking place on/around the transmission assets, such as navigation in and out of the Mersey Estuary, could have changed over the lifetime of the project.
- An updated review, identification and assessment of the potential impacts of decommissioning on the local community, e.g. potential socio-economic impacts.
- An updated review, identification and assessment of potential impacts on historic environment interests, in particular marine archaeological features.

If upon these additional reviews it is concluded that gaps exist in any of the topics above, a specific EIA covering the decommissioning process will be prepared in consultation with the relevant authorities. The EIA will list measures to avoid or otherwise reduce or remedy adverse impacts where possible.

7 Consultation with Key Stakeholders and General Public

DTPBBE regards open and effective communication and consultation as an essential element of owning and operating the asset. Carrying on with the good work and relationships established by BBW02 during the development and construction phase, we will ensure that this is applied during the operational life of the asset through to decommissioning.

DTPBBE proposes to seek the advice and opinions on the draft decommissioning programme form a range of stakeholders including but not limited to:

- BEIS;
- Historic England;

- Environment Agency;
- Marine Management Organisation;
- Centre for Environment, Fisheries and Aquaculture Science;
- Maritime and Coastguard Agency;
- Natural Resources Wales;
- Natural England;
- National Federation of Fishermen's Organisations;
- British Marine Aggregate Producers Association;
- Trinity House Lighthouse Service;
- Royal Yachting Association; and
- Chamber of Shipping.

In accordance with the relevant clauses under Section 36 of the Electricity Act 1989 and relevant conditions of the Marine Licence, DTPBBE will issue timely and efficient Notice to Mariners and other navigational warnings of the position and nature of the decommissioning activities that will be taking place. Efforts will be made to ensure that this information reaches mariners of the shipping and fishing industry as well as recreational mariners. A Notice will also be placed in the Kingfisher bulletin ahead of the decommissioning works. The UK Hydrographic Office will be notified as appropriate on the progress and completion of works.

8 Costs and Financial Security

Cost and financial security information is confidential and therefore not included in Decommissioning Plan. Cost and financial security information is provided separately to BEIS.

9 Proposed Decommissioning Schedule

It is proposed that decommissioning commences in year 20, coinciding with the end of life of the asset based on its design life and the mid-life of the Crown Estate lease.

As no offshore windfarm has been decommissioned to date worldwide, it is difficult to anticipate the operational challenges, costs and precise timings of works. Once other farms start to be decommissioned, it will provide valuable information to DTPBBE on timings, costs and operational challenges to be faced. Currently we anticipate Burbo Bank Extension offshore wind farm will be decommissioned at the same time as the transmission assets and will take 12 months to complete.

It is proposed that the lifetime of the wind farm is approximately 25 years. However, the possibility of BBW02 repowering the site could extend the lifetime of wind farm for approximately an additional 25 years.

In line with project management guidelines and DTPBBE experience, we acknowledge that the most important step in the decommissioning process is advance planning and having an option of decommissioning methods. Applying the principles mentioned in earlier parts of this document, DTPBBE will carry out regular reviews throughout the project lifecycle.

DTPBBE intends to undertake internal reviews of the Decommissioning Programme throughout the life of the project and proposes that a formal review exercise is undertaken with BEIS at the following times:

- 9 years following commencement of generation;
- 15 years following commencement of generation; and

- 20 years following commencement of generation (Final Review).

Note: the offshore transmission owner's revenue stream is 20 years after which the transmission assets are to be decommissioned unless otherwise directed by Ofgem.

The final review after 20 years of commencement of generation will provide an opportunity to scrutinise the detail of the decommissioning provisions in consultation with BEIS and key stakeholders, ensuring the impacts of the decommissioning works have been adequately assessed and the schedule of works and the costs associated are fully understood and agreed. At this stage consideration will also be given as to whether a revised EIA and Appropriate Assessment are deemed necessary.

10 Project Management and Verification

The final Decommissioning Programme will provide information on how DTPBBE will manage the implementation of the decommissioning works and also provide assurance to the BEIS concerning progress and compliance. The final review of this document and the proposed schedule of decommissioning works will be undertaken towards the end of the operational lifetime (depending on repowering taking place or not). This review will produce a Decommissioning Plan of Works, including current knowledge of decommissioning methods, measures and timing. The Decommissioning Plan will be made available to the public for comment.

The project management of the decommissioning works will be undertaken with the right level of rigor expected of such a project. DTPBBE envisages a single main contractor for the decommissioning work and will also appoint an experienced and highly qualified project management team to ensure the decommissioning work proceeds on schedule and in accordance with the requirements of the Decommissioning Plan.

A Decommissioning Report will be issued for the approval from the appropriate regulatory authorities after the decommissioning phase is finished, in compliance with the BEIS Guidance, summarizing how the Programme has been carried out.

As a minimum, this report will include:

- confirmation that the approved decommissioning programme has been adhered to during the decommissioning works; otherwise, an explanation of any major variances from the programme; this includes information of actual costs of the works and an explanation of any major variances from the forecast costs;
- information on the outcome of the decommissioning phase, including sea-bed clearance;
- confirmation that relevant authorities have been notified, in case any elements of the development remain protruding from the seabed, of existence of such remains; and
- information of any appropriate aids to navigation have been installed, where required, to overcome risks posed by such remains.

Upon completion, not more than four months after the decommissioning works, the report will be provided to BEIS.

11 Sea-bed Clearance

In accordance with the Polluter Pays Principle ("**PPP**"), DTPBBE proposes to clear the seabed in accordance with the provisions made in this decommissioning programme and to collect and provide evidence of this.

Following the completion of decommissioning works, surveys will be carried out to show that the site has been cleared. These surveys will enable identification and subsequent recovery of any debris located on the sea-bed which may have arisen from activities related to the project and which may pose a risk to navigation, other users of the sea or the marine environment. It is currently intended that side scan sonar will be used to identify debris, with an ROV deployed to investigate and recover any potential identified.

The area to be covered will be determined prior to decommissioning but DTPBBE is aware of the guidance for oil and gas installations which specifies a 500 m radius around any installation.

References will be made to 'Archaeological No Build Areas' in order that these are not inadvertently cleared in the process of removing any debris. Analysis of the survey data will also ensure that items for removal and disposal relate only to the project. The appropriate competent authority will be approached regarding the identification of other anomalies that may be of archaeological interest.

It is important that this process of collecting and presenting evidence that the site is cleared is independent. DTPBBE proposes that an independent survey company complete the surveys and that they report in parallel to both DTPBBE and BEIS.

12 Restoration of the Site

Following the successful completion of the decommissioning works, the DTPBBE site will be restored, as far as reasonably practicable, to the condition it was in pre-construction. This will apply to the area of the platform installation and the export cable corridor within the Welsh waters.

The key restoration works will include the following:

- securing and adequately covering all cut foundations; and
- ensuring that cable ends are adequately buried.

Active restoration relying on intervention with equipment is not proposed as it is considered that such works present unnecessary and unacceptable risk to personnel. For the export cable, it should be noted that the currently envisaged option is to leave the cable buried in the seabed. Allowing the seabed to 'self-settle' is considered sufficient and in proportion to the limited environmental impact of the proposed decommissioning. Should post decommissioning surveys indicate that previously buried cables have become exposed such that they pose a navigational risk, the exposed parts of the cable would be cut away and removed from the seabed.

13 Post-decommissioning Monitoring, Maintenance and Management of the Site

DTPBBE proposes to use an independent contractor to carry out surveys post decommissioning. The scope will include identification and mitigation of any unexpected risks to navigation and other users of the sea caused by materials left on the seabed.

DTPBBE proposes to carry out magnetometer and geophysical surveys at the completion of decommissioning, followed by surveys 1 and 2 years post decommissioning with a scope to survey in year 4 and 6 based on findings from the previous years as the project is located in an area with high sea mobility. Surveys will be made available to relevant stakeholders.

Should these surveys identify any residual elements from the project protruding above the sea bed, DTPBBE will ensure that notification is given to the UK Hydrographic Office so that suitable notation of a potential anchoring hazard can be marked on relevant charts and mariners informed accordingly. Appropriate

measures will then be taken to remove or re-bury in order to avoid posing a risk to mariners potentially using the area. The removal or reburial technique and machinery will be decided depending on the type, size and location of the elements, but will more likely mirror that used for the initial decommissioning works.

14 Supporting Studies

Any supporting studies or investigations which are undertaken in support of future decommissioning plans will be included as annexes to the Decommissioning Programme.

The following documents inform and support the decommissioning provisions contained in this document:

- Burbo Bank Extension Offshore Wind farm Decommissioning Plan;
- Decommissioning of offshore renewable installations under the Energy Act 2004: Guidance notes for the industry, DECC, January 2011(revised); and
- Marine and Coastal Access Act 2009.

Appendix 1 - Summary of Consultation and Responses

Organisation	Date of Response	Summary of Issues Raised	Action Taken / Response
The Crown Estate ("**TCE**")	20/09/17 and 24/10/17	1. "The Crown Estate has adopted a general presumption that the whole of all disused infrastructure associated with offshore wind farm installations should be removed, including foundations and cables, this being in accordance with our general international obligations under UNCLOS and OSPAR. The decommissioning plan proposes that the substation foundation will be cut below sea level. The Crown Estate understands the reasons why less than full removal of installed equipment at the time of decommissioning may be appropriate, however the circumstances may have changed by the time the decommissioning takes place, and we reserve our position until the final decommissioning plan is produced whether complete foundation removal would be appropriate based on the latest technological advances in decommissioning, environmental circumstances and other relevant parameters." 2. "We also consider that any references to 'cutting 1m below seabed level' should be changed to *"…be cut at such a depth below the surface of the seabed that the remaining parts do not pose a danger for shipping or fishing vessels, even if sediments should become relocated.""*	1. It is noted and understood that TCE will reserve its position unitl the final decommissioning plan is produced on whether complete foundation removal would be appropriate based on the latest technological advances in decommissioning, environmental circumstances and other relevant parameters. 2. Section 5.4 amended in line with Ørsted's approved decommissioning plan following similar comments from TCE. 3. DTPBBE will always consider complete removal as per standards set out by the IMO and pleased this fact is noted. Executive summary has been updated to state "offshore export cable will remain in situ but will be removed where required". Section 4.2 and Table 5.2 has been updated to state "seabed, cable will be left in situ and removed where required". Section 5.5 has been updated to clarify, if cables are left in-situ, the ends will be weighted down and buried at the current depth to ensure that no navigational risk arises in the sense that fishing gear or anchor would interface with the as left cables. Also, only export cables which are buried to a depth which is considered safe would be left in situ. 4. Table 5.2 has been amended to state "a level

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		"The seabed bathymetry and features, which include sand waves and megaripple bed forms, means there may be mobility and exposure of the cables in the future. Better understanding of the potential for mobility is required to determine the burial depth which ensures the asset will not become exposed in the future. DONG has updated their decommissioning program following similar comments from TCE." 3. "We welcome the fact that a complete removal of the subsea cables has been considered, and while we agree that any decision to leave cables or crossing protections in situ would be made closer to the decommissioning date, based on the EIA and other circumstances, the base assumption should be that the cables and crossing protections be completely removed. The rationale for leaving assets in situ will need to be fully qualified in the final decommissioning plan." "The Energy Act Guidance and the UK's international obligations under UNCLOS and OSPAR mean leaving parts in situ are to be treated as exceptions and the detailed case must be made for them, otherwise the presumption of removal remains." "We agree that a case can be made for leaving the crossing protections in place, based on the potential impact on other crossing owners. Please note that, according to the Energy Act Guidance: "It would not be acceptable for a decommissioning programme to propose leaving an installation in place on the grounds that it	(with an appropriate safety margin) that would not interfere with subsequent activity on the site". 5. The Crown Estate Lease requires the tenant to have an obligation to comply with a number of decommissioning provisions as detailed in the lease document for the transmission assets. Included in these provisions is the obligation to undertake post decommissioning monitoring maintenance and management of the leased areas. As described in Section 13 of this Decommissioning Programme, post-decommissioning monitoring surveys of the site, where required, will be carried out by an independent contractor in appropriate intervals after the decommissioning works completion. The scope of which will be agreed in advance with the relevant authorities. Should these surveys identify any residual elements of the transmission assets protruding above the seabed, appropriate measures will be taken to remove or re-bury them in order to avoid posing risk to mariners potentially using this area. The lease provides for an indemnity after the determination of the term of the lease to cover any works remaining on in or under the leased areas (whether or not in breach of the decommissioning obligations and whether or not the Tenant has been negligent) including

Organisation	Date of Response	Summary of Issues Raised	Action Taken / Response
		may, in the future, provide new surfaces for colonisation and the formation of an artificial reef."" "We agree that removing cables from the seabed may have an impact on the environment, however it might not be sufficient to justify leaving them in situ, since the impact was judged acceptable when the cables were laid." "Additionally, we are not aware of any 'current industry standards' on this issue. In the UK, no offshore wind farm decommissioning has yet taken place to set the pace for standards." 4. "Aside from any consideration of pile cut depths and removal of array and structures in regard to the potential for long term emergence of buried infrastructure, The Crown Estate will want to ensure that any future commercial value of the seabed is not impaired. Specifically, (in accordance with the Marine Policy Statement) identification of, and safeguarding of, any future exploitation of surficial aggregate extraction that overlaps with any proposed residual infrastructure in the decommissioning plan will require complete removal of any cables and removal of piles down to a level (with an appropriate safety margin) that would not interfere with subsequent activity on the site." 5. "We would also wish that the post decommissioning surveys be shared with The Crown Estate as manager of the seabed. Additionally, if the final agreed	any removal or disposal of those works. We refer to the statutory requirements of the Energy Act 2004 ("**The Act**"). The Act requires security in place up mid-life (e.g. after 10 years of operation) in relation to the transmission assets and under the OFTO transmission licence the OFTO is a required to make independent security arrangements at year 16 and provide details of credit rating requirements for security.

Organisation	Date of Response	Summary of Issues Raised	Action Taken / Response
		decommissioning plan provides for less than the complete removal of any installed equipment we will wish to be provided with some form of indemnity, or insurance, underwritten by a suitable and approved entity for the residual risk the landowner may inherit." "According to The Energy Act Guidance, the persons who own an installation at the time of its decommissioning will normally remain the owners of any residues. The Government does not intend to take any action to remove any residual liability for these residues from the owners. Any residual liability is thus expected to remain with the owners in perpetuity. We believe the best way to reduce the risk of liabilities falling on the public purse would be through an insurance policy covering that risk. This is in line with clause 3.11 of the Lease."	
Business, Energy & Industrial Strategy ("**BEIS**")	11/10/2017	1. "Section 2 – reference to no other decommissioning having taken place. Vindeby has been decommissioned, though I'm not aware of any OFTO-only decommissioning." 2. "Reviews – the first in-project review of decommissioning proposals is set out at year 10. This ought to be slightly earlier (year 8 or 9), so that the first financial securities can be amended if there is reason to change the decommissioning proposals."	1. The following footnote has been added to the executive summary "Danish Vindeby (1.8km from shore 4.95MW) decommissioned in 2017. Swedish Yttre Stengrund (2km from shore, 10MW) decommissioned in 2016. Both projects are small scale and do not include transmission assets and as such do not provide a benchmark for large offshore transmission systems". 2. First formal decommissioning programme review exercise changed from year 10 to year 9 in Section 9.

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Marine Management Organisation ("**MMO**")	14/03/2016	Note: The MMO did not send a response to BEIS, however BEIS requested DTPBBE to include the OFTO elements of the MMO comments on the Developer decommisisoing Plan. These are detailed below. 1. The preferred option would be for all structures to be entirely removed from the seabed. Any structure left in/on the seabed has the potential to cause navigation or environmental issues in the future. 2. It is unclear which party will be liable for cables left in-situ. Clarity should be provided as this issue has the potential to effect enforcement should it be required. 3. Engagement with the navigation authorities is recommended to agree safe depths for cables tobe left in-situ. This may be achieved through the production of a cable risk assessment in advance of decommissioning. 4. In addition to the Notice to Mariners prior to the start of the decommissioning phase a Notice should also be placed in the Kingfisher bulletin.	1. Executive summary has been updated to state "offshore export cable will remain in situ but will be removed where required". Section 4.2 and Table 5.2 has been updated to state "seabed, cable will be left in situ and removed where required". Section 5.5 has been updated to clarify, if cables are left in-situ, the ends will be weighted down and buried at the current depth to ensure that no navigational risk arises in the sense that fishing gear or anchor would interface with the as left cables. Also, only export cables which are buried to a depth which is considered safe would be left in situ. 2. Any cables left in-situ will be subject to agreement from The Crown Estate. There is an on-going indemnity in TCE lease to cover any works remaining on in or under the leased areas after the determination of the term (whether or not in breach of the decommissioning obligations and whether or not the Tenant has been negligent) including any removal or disposal of those works. The decommissioning obligations state that the seabed must be returned in a good and safe order and condition. 3. DTPBBE will ensure that navigation authorities are consulted as detailed in Section 7. DTPBBE has post installation as built plans and sediment mobility reports, which show

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			the likely sediment movement and accretion along the cable routes. During the operations & maintenance period DTPBBE will perform regular cable burial surveys, with the final survey before decommissioning being the final known depth of any cables chosen to be left in-situ once the transmission system is decommissioned. 4. DTPBBE will ensure this is done and Section 7 has been modified to include "A Notice will also be placed in the Kingfisher bulletin ahead of the decommissioning works".