A review of national and local sectoral trends and developments to inform the C-SCOPE Marine Spatial Plan

Contents

1. Introduction

Marine Spatial Planning is a future-oriented activity, and this document is an attempt to predict future sectoral development within the C-SCOPE Marine Management Area (MMA) (Figure 1). It draws on national and local trends to help inform policy development, and enables some cumulative effects to be considered. In addition to this document, planners are advised to consult Charting Progress 2, plus the C-SCOPE MMA and Socio-economic Reports which provide more in-depth information on national and local trends.

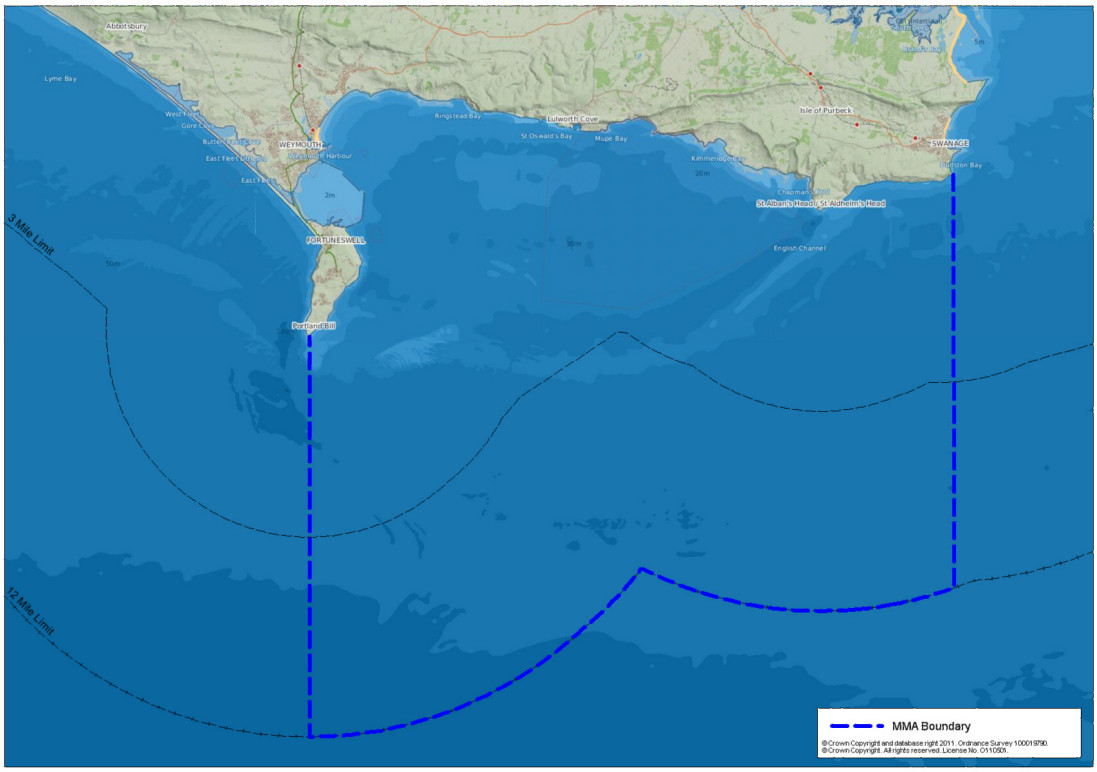

Figure 1: C-SCOPE Marine Management Area. Source: C-SCOPE

2. Sector Assessments

2. 1 Dredging and Disposal

2.1.1 National Overview

There are approximately 215 marine disposal sites for dredged material in the UK, but only half of these are in use at any one time. Since the 1980s there has been increasing legislation to prohibit the disposal of radioactive and industrial wastes, colliery minestone and sewage sludge. The disposal of material dredged from ports and harbours which cannot be used beneficially for other purposes is still permitted in licensed marine disposal sites.

Effluents have also traditionally been disposed of at sea, but again there has been increasing legislative control. Cefas reports that between 1985 and 2005, 78% of total dredged material disposal at sea was related to maintenance dredging.

Licenses to dredge declined from 2001-2007 from 123 to 76 in England and Wales, but this was due to the introduction of longer-term licenses. Wet tonnage of disposed dredged material has remained relatively constant, although there is more fluctuation with capital dredge material (Figure 2). There may be some overall increase associated with port expansion schemes.

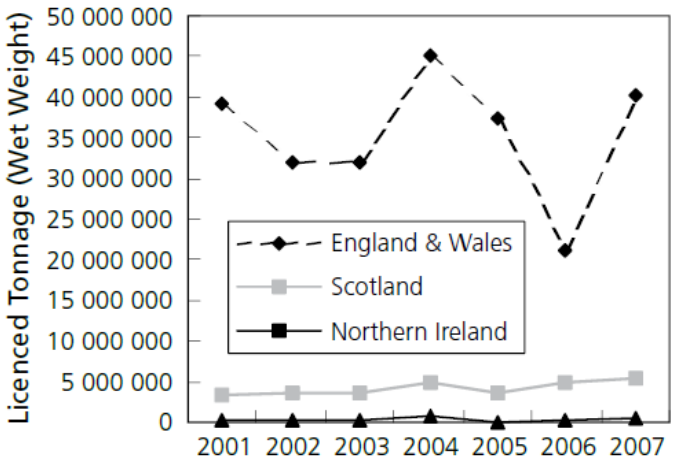

Figure 2: Tonnage of dredged material licensed for disposal from 2001 to 2007. Source: Charting Progress 2.

2.1.2 Future

Nationally, demand for disposal sites is unlikely to decrease and there are a number of future proposed schemes requiring the disposal of increased amounts of dredged material. Concentrations of contaminants discharged at point source have reduced significantly over the past 30 years, and this is likely to be sustained. Some further reductions are likely to occur through implementation of the EC Water Framework Directive and revised Bathing Waters Directive and in line with ongoing reductions in the UK manufacturing base.

2.1.3 Climate Change

Climate change is predicted to result in more severe weather, including storms and consequent flooding. Effluent discharge increases in times of peak rainfall and, where drainage and sewage water are processed at the same location, it is possible that increased water volume could lead to untreated sewage being discharged into the marine environment through a combined sewer overflow. Diffuse runoff from agricultural and urban areas can also be a problem during heavy rain.

Possible disruptions to current flow caused by climate change could lead to ineffective and unexpected directional disposal of sewage by longfall pipelines. Similarly, changes to flow regimes in estuaries and rivers could result in reduced dilution of pollutants and consequently more pollution of the marine environment. The release of contaminants from seabed sediments could be affected by changes in salinity, wave regimes or currents.

Disposal grounds for dredged material further offshore could be disrupted by current changes, rendering them unsuitable.

2.1.4 C-SCOPE MMA

There is one closed dredging disposal site to the east of Portland, and an active one outside the MMA to the east of Swanage (Figure 3)

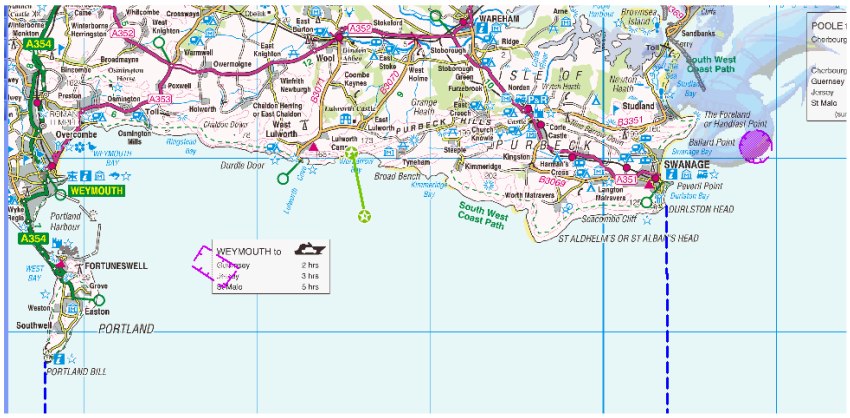

Figure 3: Licensed disposal sites within and close to the MMA.

The urban area of Weymouth immediately behind the beach is served by a combined (surface and sewer) system. Surface water can flow into the streams from urban areas and highway drains. This can affect stream water quality, particularly after periods of rainfall. Sewage from the Weymouth and Portland area is treated at Weymouth Sewage Treatment Works and discharges to the sea one kilometre offshore, west of Portland Harbour (Figure 4).

There are emergency/storm overflows from (Figure 4):

- West Lulworth Beach and West Lulworth Hanbury Farm pumping stations, discharging into the sea west of Lulworth Cove.
- Castle Cove pumping station, discharging into Portland Harbour
- Hillcrest pumping station, discharging into Portland Harbour
- Ringstead Sewage Treatment Works, discharging into the Ringstead Stream 280m from the beach.

- Melcombe Avenue and Cranford Avenue Combined Sewer Overflows (CSOs) share an outfall, discharging into Weymouth Bay just south of the Sea Life Centre.

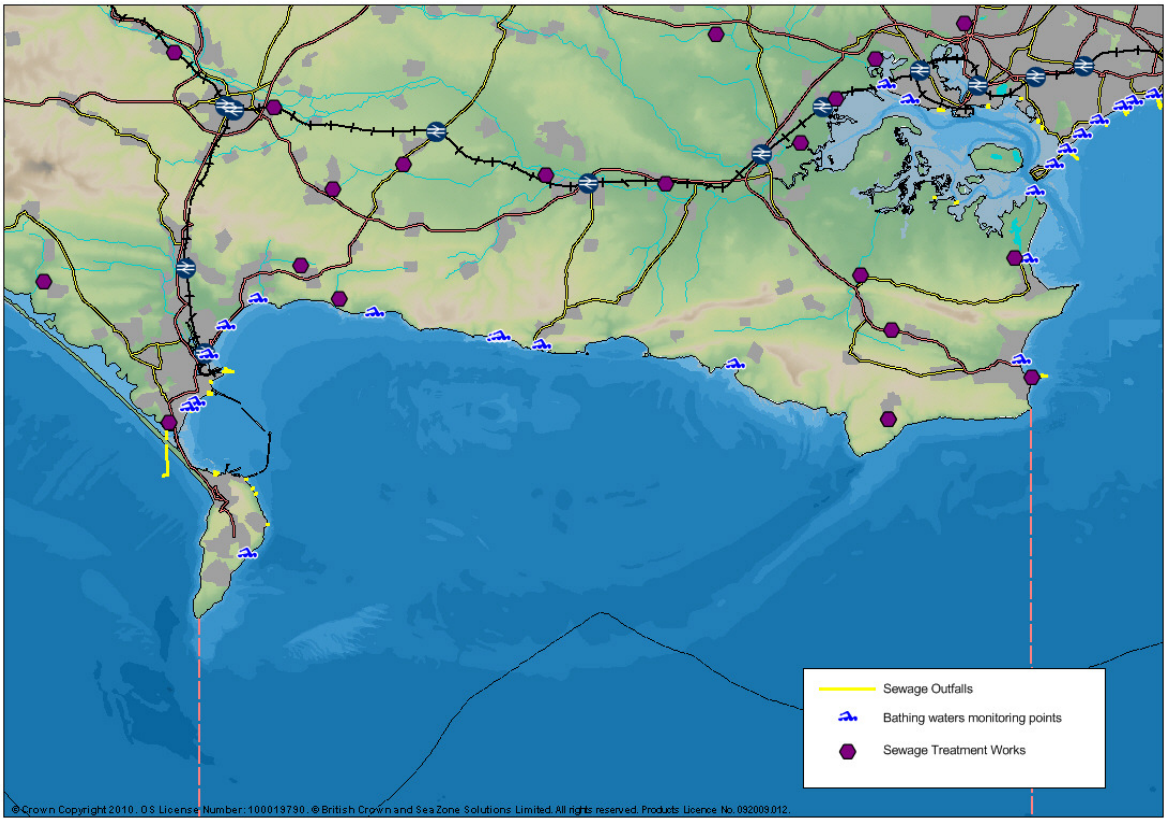

Figure 4: Sewage Outfalls within the MMA

The Winfrith nuclear facility is in the process of being decommissioned, but the discharge pipelines are still in use. The two inner pipelines discharge approximately 4km from Arish Mell into Weymouth Bay and carry the main radioactive liquid wastes. In 2008, the discharges were assessed to result in doses to the critical group of people (a group or representative individual who receive the largest dose from artificially produced radionuclides due to their habits, diet and where they spend their time) of less than 0.005 mSv/y or less than 0.5% of the public dose limit.

There is no regular maintenance dredging activity within the MMA. The Outer Harbour at Weymouth is dredged occasionally but, with catamarans replacing more traditional cross channel ferry boats, there has been less need for it and it was last dredged 15-20 years ago. Within Portland Harbour a flushing current enters through the north entrance, rotates anti-clockwise and exits via the south and east entrances, which keeps the harbour self scouring and reduces the need for maintenance dredging.

2.1.5 C-SCOPE MMA Future

The Portland Harbour Revision Order 2010 authorises Portland Harbour Authority Limited (PHAL) to construct works at the harbour including quay walls, reclamation of land and facilitates, and permanent mooring of a floating dry-dock (Figure 5).

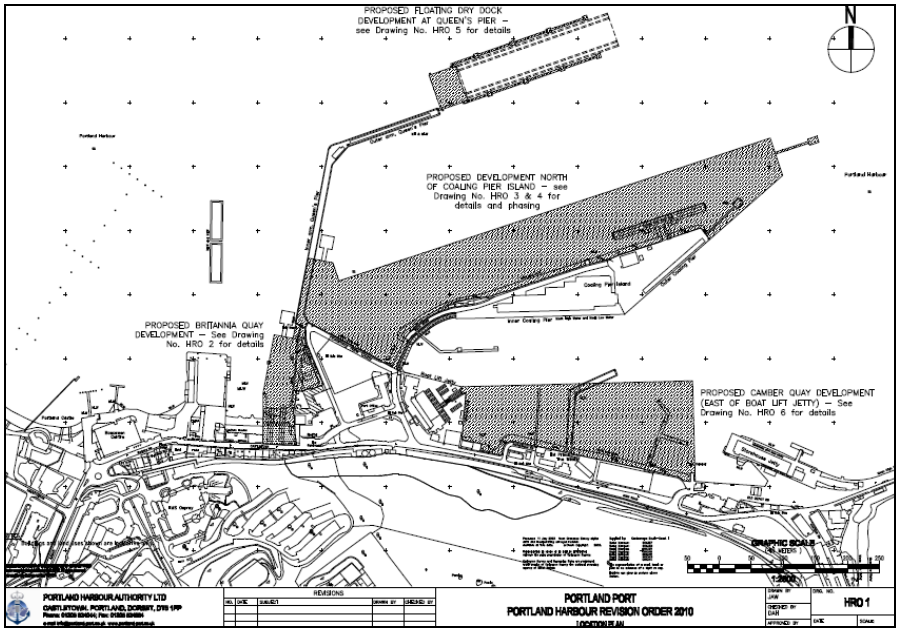

Figure 5: Portland Harbour Revision Order 2010, proposed developments. Source: PHAL.

Under the Order, there includes a power to dredge, *'for the purposes of constructing and maintaining the authorised works and to afford uninterrupted means of access to the authorised works and enabling their use at all states of the tide, from time to time deepen, dredge, scour, cleanse, alter and improve the bed, shores and channels of the harbour within an area not exceeding 35 metres in width adjacent to all berthing faces created as part of the authorised works to a depth of not more than 14 metres below Chart Datum (unless the Secretary of State shall otherwise approve in writing).'*

The order also allows PHAL to *'appropriate or dispose of any materials… from time to time dredged, taken or collected by it in the course of any such operations.'* This is subject to national acts relating to the disposal of waste, and any waste must be deposited below the level of high water, unless permissions are granted by the Secretary of State.

The PHAL Marine Spatial Plan, adopted in 2008, also sets out designated dredging areas (Figure 6). This also includes *'dredging in any access channels through the Harbour entrances or Inner and Outer Harbour areas necessary to safely navigate vessels to or from the marine terminals to the deeper waters in Weymouth Bay. Maintenance dredging will also be permitted within New Channel and its approaches.'*

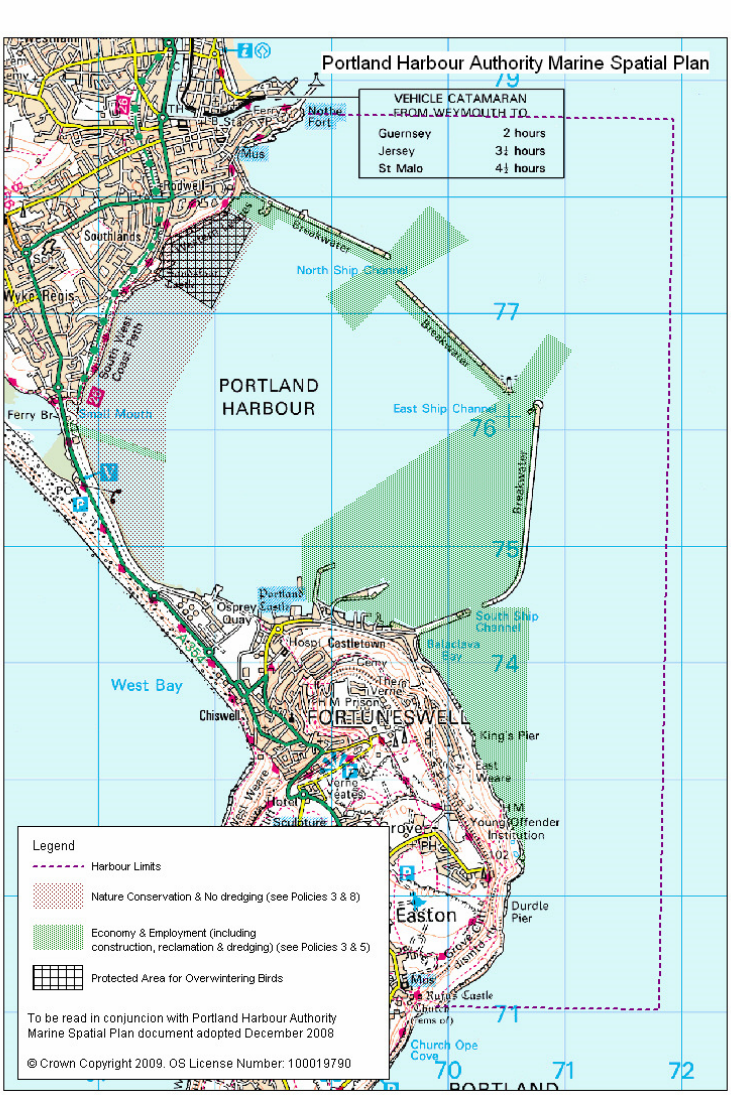

Figure 6: Portland Harbour Authority Marine Spatial Plan, showing designated dredging zones. Source: PHAL.

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4. The Portland Harbour Authority Marine Spatial Plan 2008
5. The Portland Harbour Revision Order 2010

2.3. Cables & Pipelines

2.3.1 Marine Power Cables

2.3.1.1 National Overview

There has been steadily increasing demand for marine power cables within the UK, particularly for improved security and stability of electricity supply. With development of Round 3 offshore renewable power installations, there are likely to be significant increases in power cable deployment. Currently power cable installations cover approximately 0.16 km^2 (0.00002%) of the UK Continental Shelf (UKCS). Consequently, pressures from electromagnetic fields associated with these cables are spatially minor, and impact on sensitive species is not significant if cables are buried more than 1m.

2.3.1.2 Future

The largest growth in this sector is likely to be a result of the Round 3 wind farm developments, and significant investment will be needed in the transmission network. There is a clear need for more interconnection capacity between the UK and Europe; again the main driver is the projected growth in wind energy production throughout the continent. Figure 7 shows current, and potential future interconnections between the UK and Europe.

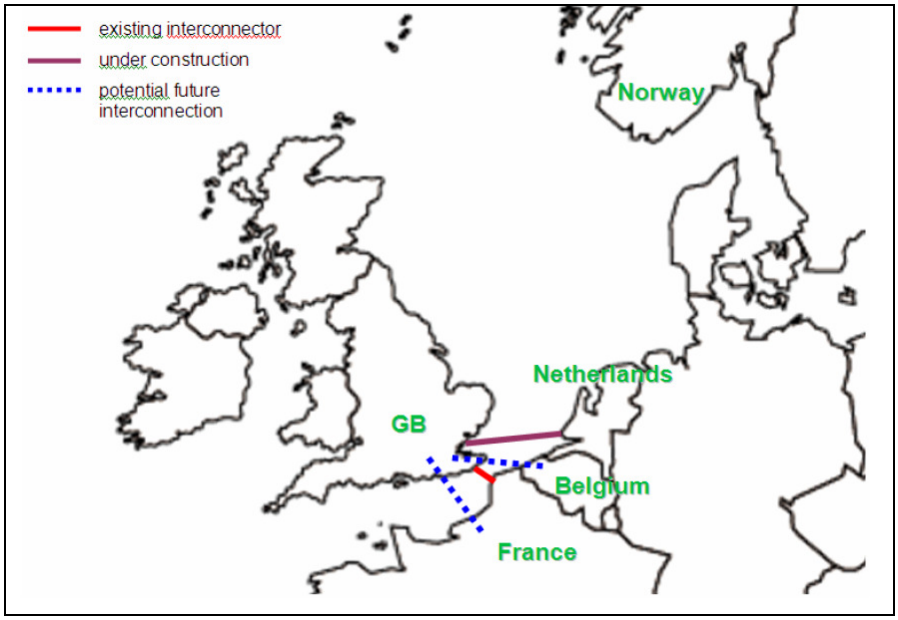

Figure 7: Current and potential future power cable interconnections between the UK and Europe. Source: http://www.nationalgrid.com/uk/Interconnectors/France/consultations/

2.3.1.3 Climate Change

There could potentially be smaller weather windows to install transmission cables if there is an increase in the frequency and severity of storms. Changes in current regime could also lead to increased scour, resulting in cables becoming uncovered.

2.3.1.4 C-SCOPE MMA

There is currently one active power cable which runs from the beach at Grove Point, Portland, out to the Noise Range (Figure 8).

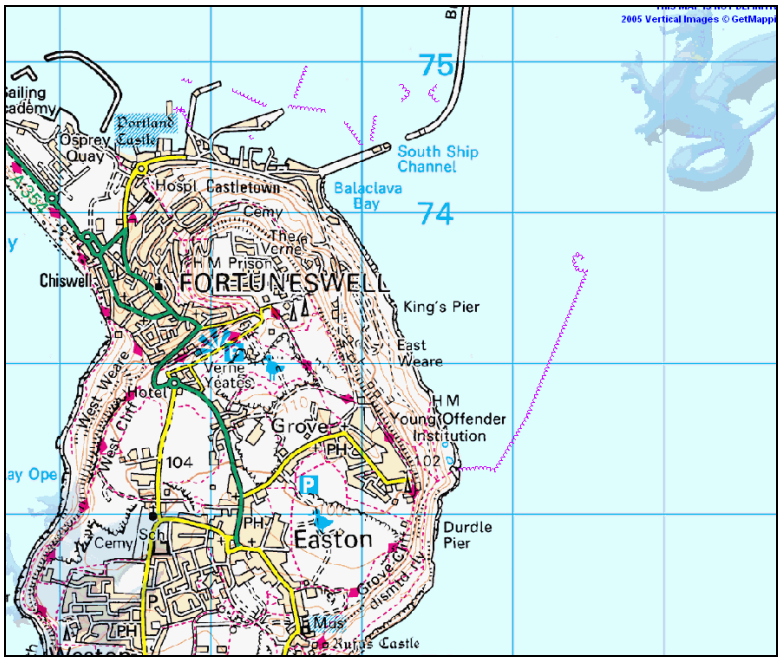

Figure 8: Portland Noise Range Power Cable. Source: C-SCOPE

2.3.1.5 C-SCOPE MMA Future

It is anticipated that the Noise Range power cable will continue to be used for defence research.

Eneco, who are developing the 'Navitus Bay' wind farm (known more formally as Zone 7, West of Wight) have identified the area they wish to develop (Figure 9a) There are currently three potential landfall sites and cable search corridors for the associated power transmission cables (Figure 9b).

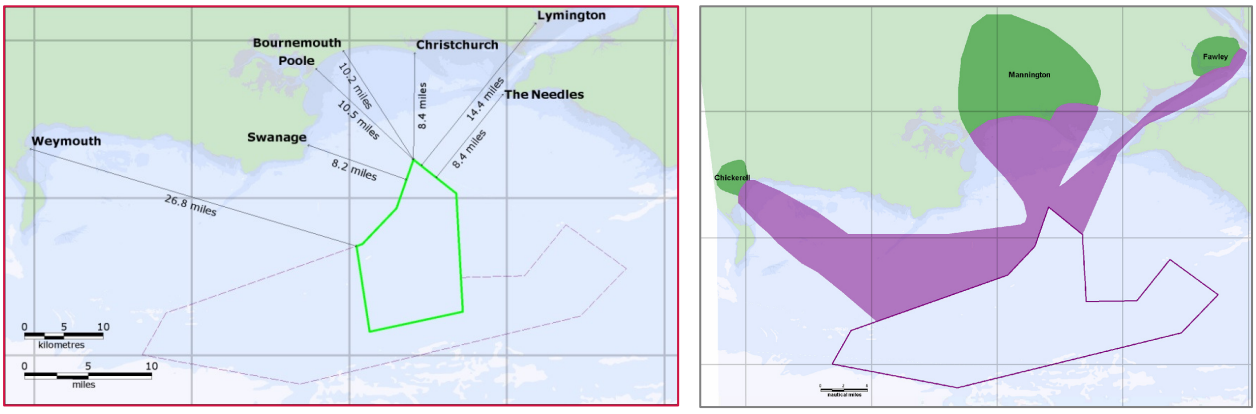

Figure 9: a) Area to be developed and b) Cable Search Corridor for 'Navitus Bay' wind farm. Source: Eneco.

Inter-array cabling will be used to connect individual turbines to offshore substations or transformer platforms, where the voltage is stepped up and the multiple inter-array cables marshalled to a single or reduced numbers of cables to shore. Commonly, cables between wind turbines in large offshore arrays are 33kV, and are stepped up to 132kV for transmission to shore, where it will feed into a transition pit, before feeding into the national grid.

Given the size of the development, it is likely that a High Voltage Alternating Current (HVAC) cable design will be used. Cable burial or protection can take place either in-situ during installation, using burial ploughs, or post-lay using an ROV with a cable jetting tool. In environmentally sensitive or high abrasion areas, cables are fitted with articulated pipe.

At present it is unclear whether the Chickerell option will be selected, although a report by Senergy Econnect and National Grid for the Crown Estate to identify optimised transmission connections focuses on Chickerell. Several factors require consideration for the specific location to minimise adverse interaction with the built and natural environment. These include the ease of access for construction, operation and maintenance, along with hard constraints including subsea obstacles such as existing oil or gas pipelines, excessive depth change or mineral extraction areas and other existing developments.

Further considerations for the site of landfall and onshore cable routing include nature conservation interests, cultural heritage, hydrology, landscape and visual assessment, commercial fisheries, Ministry of Defence (MoD) activities and local communities including the impacts on noise, air quality, recreation, port, harbour, traffic and access receptors.

2.3.2 Telecoms Cables

2.3.2.1 National Overview

Currently, telecoms cables are estimated to occupy 1.6 km^2 (or 0.0002%) of the UK Continental Shelf (based on a nominal cable diameter of 0.09 m including rock armour or double armour); the majority of these make land in the south west and east (Figure 10).

Most international communication transmissions are through fibre optic submarine cables which carry telephony, internet and data transmissions which service many other industries such as finance, commerce and media. Due to increasing demands in these sectors, major domestic and international installations of telecoms cables are now taking place.

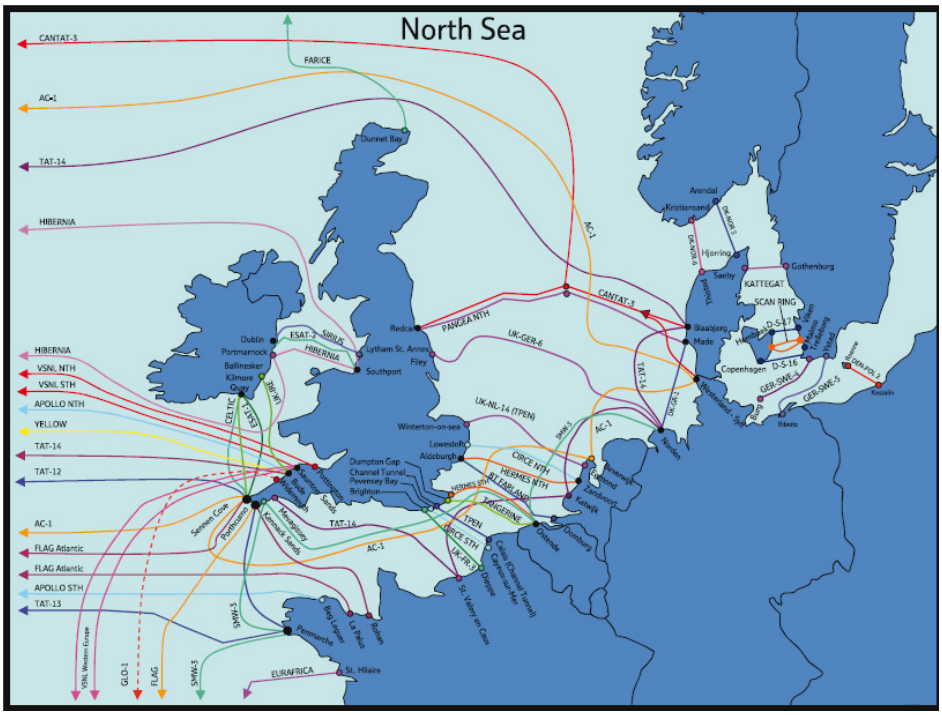

Figure 10: Major telecoms cables on the UK Continental Shelf. Source: UKCPC.

2.3.2.2 Future

Changes in bandwidth and the development of high speed internet as well as continued growth in the sector are using up spare capacity, leading to the installation of major domestic and international systems. To increase resilience of the networks, there will most likely be a reliance on a number of submarine cable routes rather than a few. It is also highly probable that the global reach of the submarine networks will continue to expand, with more investment in higher capacity circuits.

2.3.2.3 Climate Change

Telecoms cables are prone to similar issues as power transmission cables. Those laid in water shallower than 1500 m are thicker, and tend to be buried - giving them some protection from the influences of climate change. They are therefore less prone to scour, but may become exposed in areas of high sediment mobility – making them more prone to damage by anchors and trawling. Increases in the current regime could increase the frequency of this occurrence.

2.3.2.4 C-SCOPE MMA

There are currently no telecoms cables within the C-SCOPE MMA (Figure 11).

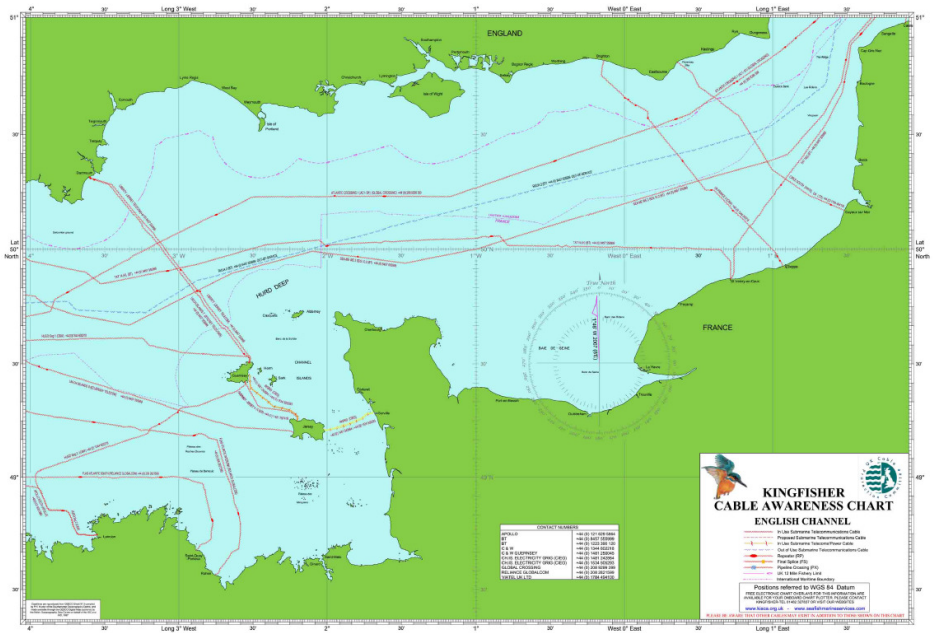

Figure 11: Telecoms cables in the English Channel. Source: UKCPC.

2.3.2.5 C-SCOPE MMA Future

With an increasing reliance on diversifying the network, and the relatively close proximity of Normandy to the Dorset coast, there is a remote possibility that telecoms cables could be laid within the MMA in the future.

2.3.3 Pipelines

2.3.3.1 National Overview

There is currently 21 000 km of pipelines on the UK seabed, estimated to cover approximately 5.5 km^2 (less than 0.0006% of the UKCS). The vast majority are in the east of England and Scotland (Figure 12). These pipelines carry a range of liquids including gas, oil, mixed hydrocarbons and a range of chemicals. With the opening of its North Sea gas fields, the UK was self-sufficient from 1995 to 2004, but it became a net importer of gas again in 2005. This is likely to have driven the increasing number of pipeline installations over the past ten years. However installation is expensive and requires specialised equipment, so the majority of oil and gas is still brought in by ship.

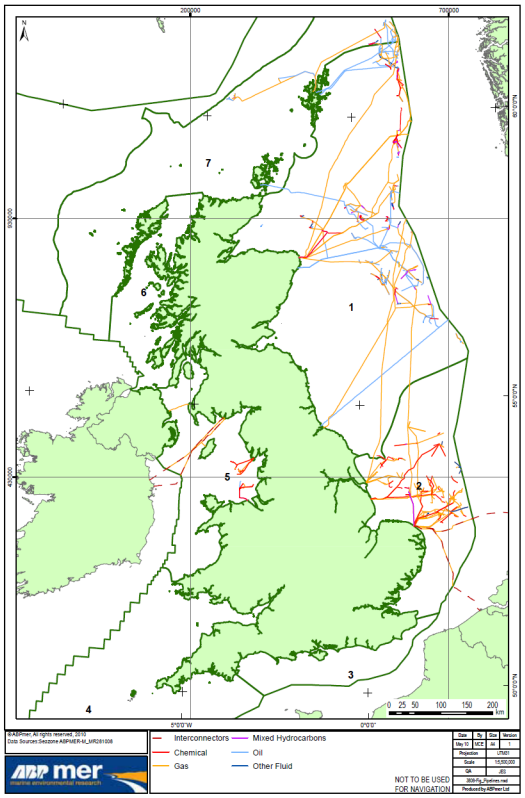

Figure 12: Pipeline network in 2008. Source: Charting Progress 2.

2.3.3.2 Future

The amount of oil and gas imported into the UK has increased steadily since 1997 as national reserves diminish. Currently around 25% of the UK's annual gas demand is served by imports, and on the basis of current policy this could rise to 50-80% by 2020. Given these predictions, the number of related supply chain projects is likely to increase.

2.3.3.3 Climate Change

An increase in storminess at sea may reduce the windows of opportunity to lay pipelines. Currently 66% of the main trunk pipelines, including interconnectors, are trenched and buried, but changes in patterns of erosion and ocean currents could lead to increased scour on the seabed, uncovering them and leading to the risk of breakage. Climate change is also currently driving government policy on renewable energy which may, in the future, lead to less reliance on fossil fuels.

2.3.3.4 C-SCOPE MMA

Figure 12 shows there is currently no pipelines within the MMA.

2.3.3.5 C-SCOPE MMA Future

Crude oil from the Wytch Farm and Wareham oil fields is exported via terrestrial pipeline to the BP Oil terminal at Hamble for oil storage and export by sea. The Sherwood reservoir within Wytch Farm is the 6th largest in the UK with reserves rising to 480 million barrels, but BP view Wytch Farm as a mature asset and has recently sold it to Perenco UK Ltd for up to $610m, with the sale due to be completed by the end of 2011. Unless economically viable

new fields are discovered, it seems unlikely that undersea pipelines will be installed either within the MMA or just outside it.

The Portland Gas Project is a 1000 million cubic metres salt cavern natural gas storage facility, to be built at Upper Osprey, which could satisfy 1% of the UK annual demand for gas. On a typical midwinter day, it should be able to export gas to the market at 20 million cubic metres a day, providing 5% of the UK's daily gas supply. The project was granted planning approval by Weymouth & Portland Borough Council in May 2008 and is scheduled to take approximately seven years to become fully operational. Drilling is due to commence in 2011, although no exact dates have been given. Assuming this timetable is maintained, first gas operations will be in 2014 with full storage volume available in 2018.

Natural gas will be piped from the National Grid at Mappowder (18 kilometres north east of Dorchester, to the caverns located 2,400m under Portland. A nine-kilometre section will cross Weymouth Bay from a point east of Redcliff Point to the Upper Osprey site south of Portland Harbour (Figure 13), which is proposed to be buried to a target depth of one metre. A section of the pipeline across Balaclava Bay will be lying on the sea-bed and will be protected by either concrete and/or rock armour. Alongside the gas pipeline, there will be two brine pipelines, with an intake and outfall located on the eastern side of Portland to the south of Portland Harbour (Figure 13). A full Environmental Impact Assessment has been conducted.

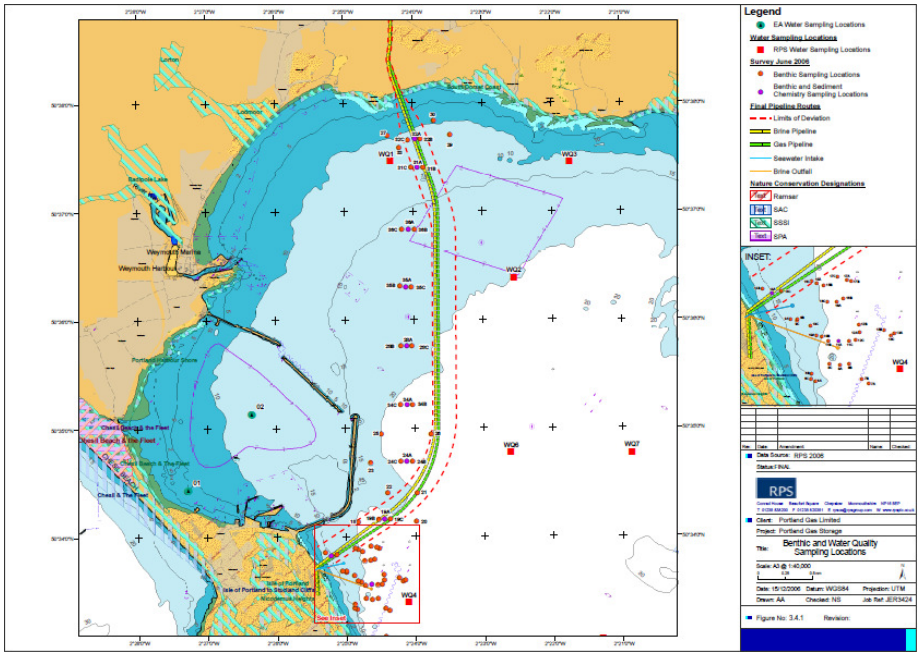

Figure 13: Proposed gas, brine and intake/outfall for Portland Gas Storage Project. Source: Portland Gas Project Environmental Statement.

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2.4. Oil and Gas

2.4.1 National Overview

The majority of oil and gas fields on the UKCS are located in the Northern and Southern regions of the North Sea. In 2009, the UK was the 16th largest oil and gas producer in the world (15th largest gas producer and 19th largest oil producer), satisfying almost all (94%) of domestic oil consumption and approximately 66% of UK gas demand. However, reserves of both oil and gas are declining; production peaked in 1999 and has been declining ever since (Figure 14). Over the next three decades, approximately 500 individual structures (including platforms and tie backs) will be decommissioned.

There are currently 160 companies licensed to explore for and/or produce oil and gas from the UKCS; around 70 companies are involved with production, whilst the remaining companies concentrate on exploration. At the end of 2008, there were 383 producing fields offshore, including 17 new fields which started production in 2008.

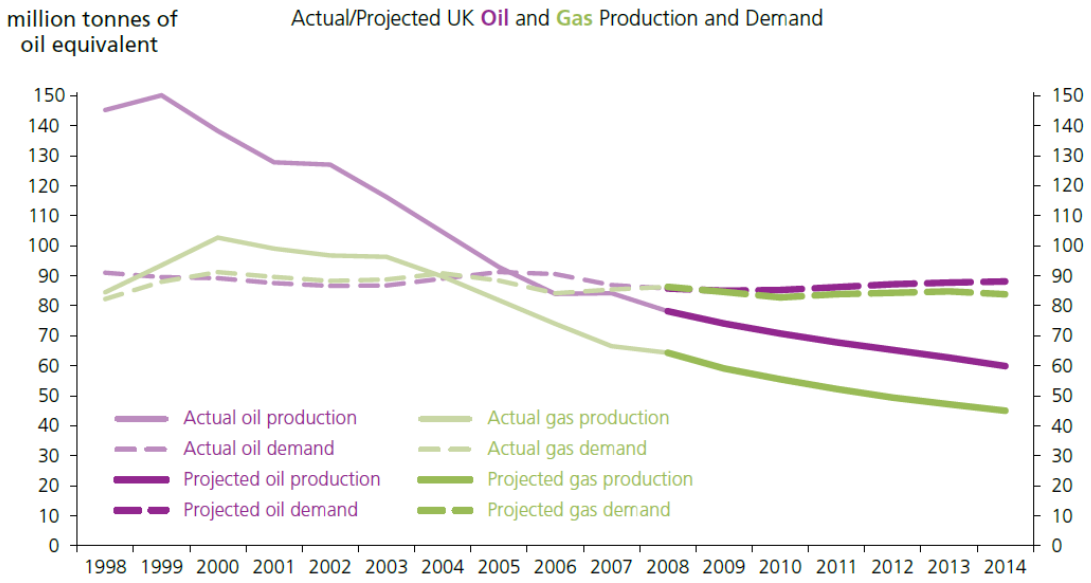

Figure 14: Actual and projected UK oil and gas production and demand. Source: Charting Progress 2 (DECC 2009)

2.4.2 Future

In 2020 it is forecast that the proportion of UK energy supplied by oil and gas, whether produced by the UK or not, will have declined to around 70%. If current investment plans continue, overall oil and gas production is expected to decline at an average rate of 5% over the next five years as several larger fields reach the end of their life span. In the long term, production of both oil and gas will fall heavily by 2025, and the recovery of remaining reserves will require significant additional investment. As a result of increasing dependence on imported fuels the UK will have a growing need for gas storage. The use of geological structures in the sub-sea marine environment for the storage of gas is therefore receiving increasing focus.

2.4.3 Climate Change

Changes to currents could result in different scouring regimes around the legs and supports of offshore installations. Sea level rise and increases in waves and winds could lead to greater stresses on offshore oil and gas structures, whilst increased storminess could also affect air and sea access to offshore installations and pose operational issues in terms of health and safety.

2.4.4 C-SCOPE MMA

The eastern coast of Dorset has four significant oil fields; Wareham, Wytch Farm, Beacon and Kimmeridge (Figure 15). Wareham produces 300-400 barrels of oil a day which is taken by small diameter pipeline to the main gathering station about 10 kilometres away and processed with oil from the Wytch Farm well sites.

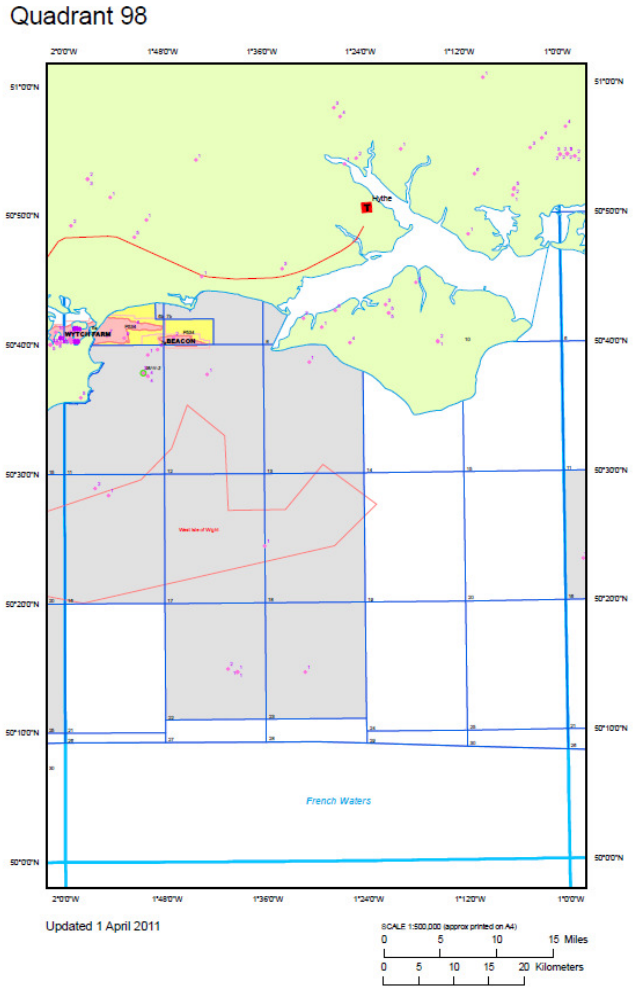

Figure 15: Oil fields in Quadrant 98, showing the Wytch Farm field. Source: DECC

Wytch Farm itself is Western Europe's largest onshore oilfield, and comprises of three separate oil reservoirs that lie under Poole Harbour and Poole Bay. Oil is extracted using extended reach drilling techniques, reaching over 10km out and 1638m under Poole Bay. The total estimated recoverable reserves of these fields are 480 million barrels, of which over 90% lie in the Sherwood reservoir, making it the sixth largest in the UK.

Small quantities of oil (about 65 barrels a day) are still being produced from a well site on the cliffs at Kimmeridge a few miles west of Swanage. The oil is taken by road tanker to the gathering station at Wytch Farm. Crude oil from the gathering station is exported via pipeline to the BP Oil terminal at Hamble into oil storage and for export by sea. These rates are currently low, but there are options to expand the existing facilities to handle a greater volume of tankers. There is also some spare gas processing capacity, but this is likely to be removed in 2015 due to HCFC (refrigerant) legislation.

2.4.5 C-SCOPE MMA Future

The Wytch Farm complex has recently been sold by BP to Perenco UK Ltd for up to $610m, with the sale due to be completed by the end of 2011. One of the drivers for the sale of Wytch Farm was that BP considered it to be a 'mature asset'. The site was also closed down in November 2010 for two months due to corrosion of pipes. The majority of planning permissions for the oilfield are time limited to 2016 by condition and are subject to a planning condition making them 'personal' to BP. The oilfield facilities are considered to have actual and potential adverse impacts on the designated interests, including the potential for significant pollution incidents. The presence of the facilities and the tree screening around them has the effect of delaying the restoration and management of parts of European sites to 'favourable condition'. Conditions require that the oilfield facilities are removed and the sites restored at the end of the development, and this will itself have environmental impacts. With the sale in progress, BP intends to make s73 'variation of condition' applications to remove the 'personal to BP' conditions and extend the life of the permissions for a further 25 years. An EIA will be required as part of the process.

The marine elements of the Portland Gas Project are covered in section 2.3.3.5. The gas storage facility on the Isle of Portland will be located on a five-hectare brownfield site, known as Upper Osprey (Figure 16). The area is in close proximity to the Isle of Portland SSSI. At the peak it is anticipated that there will be 300 working on site, with 24 permanent jobs once the build is complete.

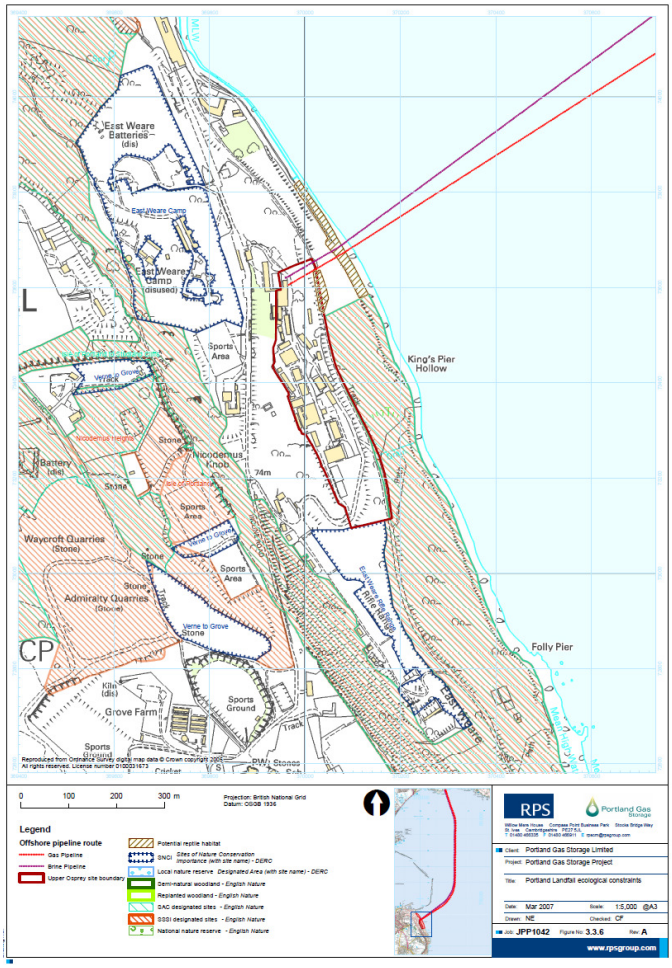

Figure 16: Upper Osprey site for Portland Gas Storage Facility. Source: Portland Gas Project Environmental Statement.

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2.5. Offshore Renewables and Carbon Capture & Storage

2.5.1 Offshore Renewables

2.5.1.1 National Overview

The UK has among the highest levels of exploitable renewable energy resources in the world, including wind, wave, tidal stream and tidal range. Through new legislation, including the Climate Change Act (2008) and Energy Act (2008), the UK Government is aiming to achieve 15% renewable energy use by 2020 and it is looking to offshore renewables to help fulfil a major part of this target. The Government's Renewable Obligations (RO) scheme places an obligation on UK suppliers of electricity to source an increasing proportion of their electricity from renewable sources, and this has recently been extended from 2027 to 2037 to ensure greater long term investment and increase offshore wind farms.

There are currently ten offshore wind farms with an installed capacity of 0.7 GW of electricity but there are targets to increase the total installed capacity to 33 GW by 2020. This increase will partly be delivered by twelve offshore wind farm projects which are either in the process of being constructed or have been consented. A further 17 wind farm projects are in the planning process and, if all these projects are realised, the total installed capacity will increase to over 14 GW. Round 3 wind farms, which are in the early scoping stages of the planning process, may add more than 30 GW of additional generating capacity (Figure 17).

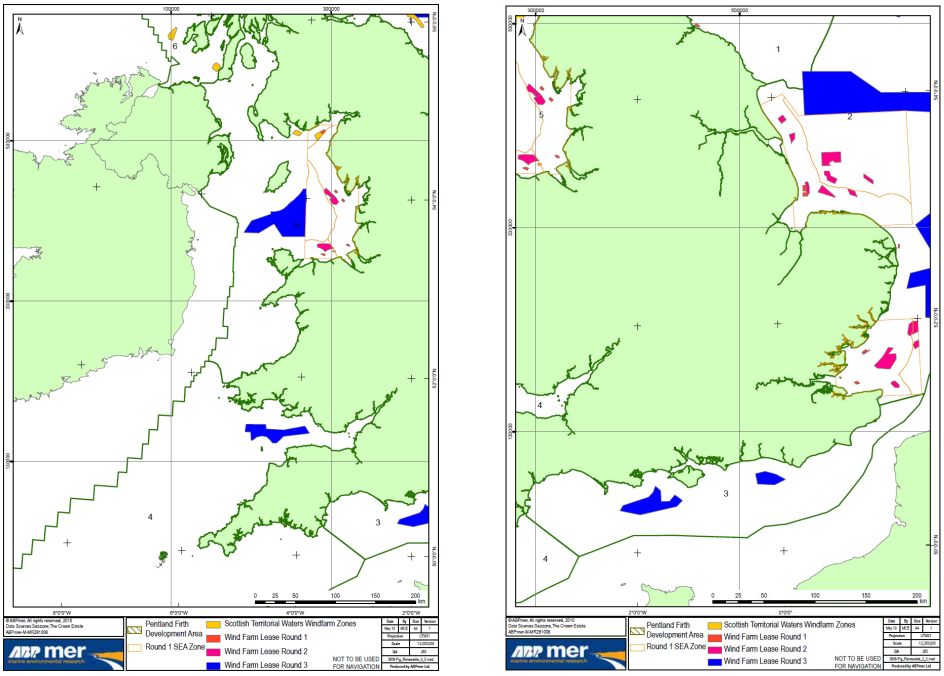

Figure 17: Existing wind farms and possible areas for Round 3 development in England and Wales. Source: Charting Progress 2.

The Carbon Trust has stated that wave and tidal technologies are ten years behind wind technology. Only a few devices are currently in the water, and these are largely demonstration devices. The main UK test sites are the European Marine Energy Center (EMEC) in Orkney and the New and Renewable Energy Center (NaREC) in North East

England. Wave Hub, 16 kilometres off the north coast of Cornwall, provides shared offshore infrastructure for the demonstration and proving of arrays of wave energy generation devices over a sustained period of time.

2.5.1.2 Future

The UK is forecast to be the biggest international market in renewables due to its excellent wind, wave and tidal resources, the market mechanisms and funding it has in place, and the large number of wave and tidal device developers working here.

Looking beyond Round 3 it is likely that wind farm exploration will extend out into even deeper waters but much of the technology is still in its infancy. For this to develop there needs to be further advances in offshore wind technology. A number of European organisations are already experimenting with floating foundation concepts (such as Hywind in Norway and BlueH in the Mediterranean) that will enable access to deeper water areas without the financial constraints posed by seabed based foundations. Hywind are currently testing floating turbines off the Norwegian coast, this is a two year project and initial findings are positive.

Many innovative tidal stream devices have been developed over recent years; the majority of the devices currently in the market place comprise horizontal axis, with typically either a two or three blade rotor system; the 1.2MW SeaGen tidal energy convertor, installed in Strangford Lough in April 2008, is a successful example. The funnel like 'Venturi effect' design has also proved a success for OpenHydro. A number of other design types are in the market place within the UK (either through UK based design or overseas interest in UK deployment).

Wave energy development is further behind and the limited devices tested to date comprise a mix of technological solutions. One of the key factors that has restricted the rate of progress to date, is the ability to construct a device that is capable of not only operating (and therefore, generating power) in, but also surviving the harsh conditions within which the devices will operate. Shoreline devices, such as the Limpet and Sidar, have fewer technological challenges, but their potential is limited due to their highly specific location requirements and likely increased consenting risks (due to visual and physical impacts of the development on the associated coastline).

The private sector is currently financing and funding most renewable energy exploration, however, more government funding is being introduced. The Marine Renewable Deployment Fund (MRDF), effective since 2004, has a budget of £50 million and Government recently (28th June 2011) announced that up to £20 million from DECC's budget of over £200 million to fund low carbon technologies will help progress the development of marine devices from the current large scale prototypes to bigger formations in the sea.

Government plans also include delivery of an offshore electricity grid in order to support the development of a new generation of offshore wind power. This should enable the UK to utilise its renewable energy sources more efficiently.

2.5.1.3 Climate Change

Increased storminess may impact on offshore wind and wave farms if structures are unable to cope with the increase in wave size and also storm surges. Changes to currents could result in changes to scour around the legs and supports of offshore installations and array and export cables, whilst increases in the occurrence of bad weather could also result in operation and maintenance issues. Predicted changes to waves, wind and tides could provide an increased source of energy for the renewables industry resulting in an increased potential for electrical generation from both waves and wind; however these predictions come with a low confidence assessment.

2.5.1.4 C-SCOPE MMA

There are currently no offshore renewable sites within the MMA.

2.5.1.5 C-SCOPE Future

i) Offshore Wind

At the beginning of 2010, The Crown Estate awarded Eneco the lease to develop Zone 7 (West of Wight) of the Round 3 offshore wind sites. The total zone area equates to 723.7km^2, but only 197km^2 of this will be developed (Figure 18a). This area is just outside the C-SCOPE MMA; however, amongst other implications, Chickerell substation is identified as a possible site to connect to the national grid (Figure 18b). At its closest turbines will be sited 8.2 miles from Peveril Point, Swanage and its Northern most boundary will be located 10.2 miles from Bournemouth and 8.4 miles South West of the Needles. The type (and therefore height) of turbines will be determined following further research and consultation and this in turn will dictate the number of turbines within the development. Eneco currently state there will be approximately 180-300 turbines spaced 1.5km apart with a total power capacity of 0.9GW, powering between 615,000 and 820,000 homes.

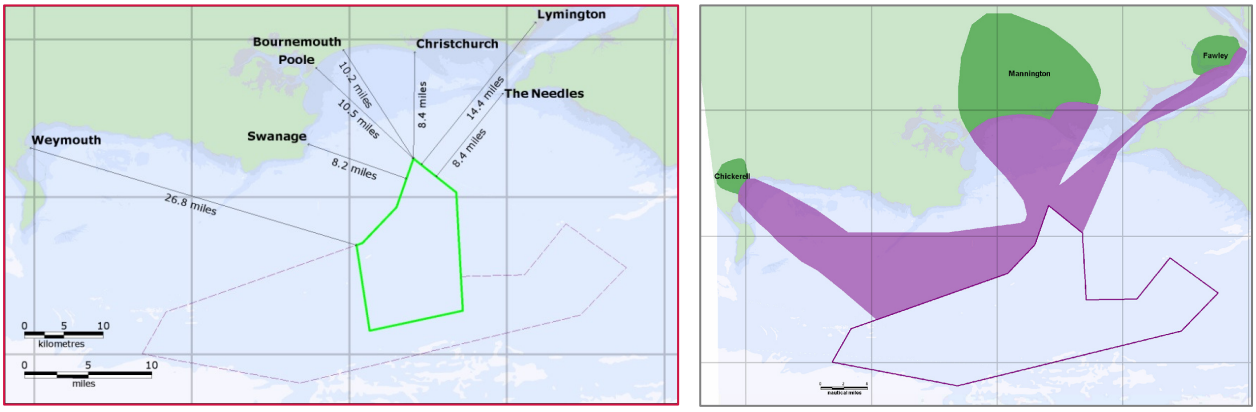

Figure 18: a) Area to be developed and b) Cable Search Corridor for 'Navitus Bay' wind farm. Source: Eneco.

Project scoping will continue through to 2012, and a consents application will be placed on its completion. Eneco hope to be awarded permissions in 2013, and this will be followed by construction contract bids and port selection in 2014. Construction will commence in 2016, completing in 2018-19 to a 50 year design standard. Foundation design is yet to be decided, (key determinates being depth, seabed geology and sediment type) but this in turn will dictate construction techniques. Power transmission cabling associated with the Navitus Bay

development are discussed in section 2.3.1.5, but on landfall, Eneco intend to use underground cabling, linking to a transmission pit and onwards to existing electricity sub-stations. Any onshore infrastructure is expected to be approximately 150m^2 and would require road access.

Neither The South West Regional Development Agency (SWRDA) Offshore Renewables Resource Assessment and Development Technical Report (2010), nor The Offshore Valuation Group Report (2010) identified further practical fixed offshore wind resource (what is available after consideration of external physical constraints) in Dorset waters. The Dorset Offshore Renewable Energy Capacity Study identified two Potential Development Areas, but this study imposed fewer hard constraints and listed development considerations (i.e. parameters that may influence the complexity of development within these areas but do not restrict it out right). Both areas lie within 12nm of the coast (Figure 19).

Care must be taken when interpreting these conclusions as both future technologies and government policy could radically alter the potential for future development. Resolution and manipulation of data must also be considered.

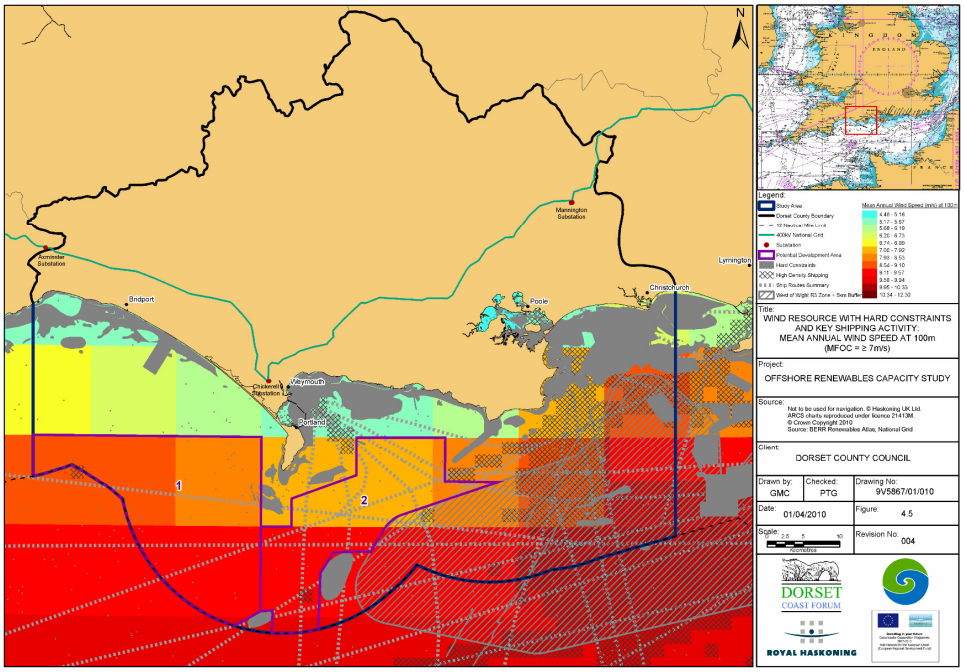

Figure 19: Potential offshore wind resource within Dorset. Source: C-SCOPE.

ii) Tidal Stream

There are several recent studies exploring future offshore renewable capacity, and all identify the area south of Portland Bill as a tidal stream resource (Figure 20 a) and b). This area is not considered one of the UK's best tidal resource locations due to relatively shallow water depths, which may be insufficient to allow the installation of high capacity devices, and inconsistent tidal flows - where flow reversals of up to 35% have been recorded. Further areas around St Albans ledge may also be suitable in the future should technology progress to enable commercialisation in slightly lower resource areas.

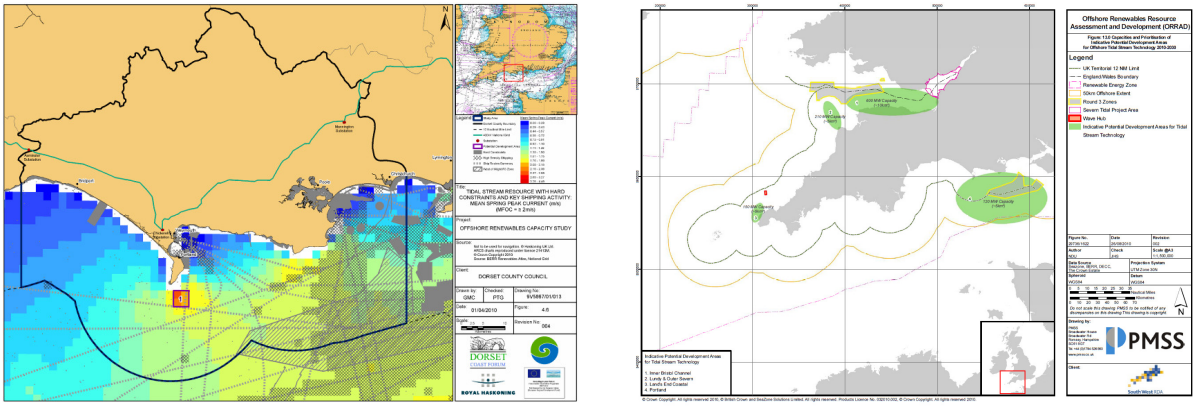

Figure 20: Tidal Resources within the C-SCOPE MMA a) C-SCOPE Offshore Renewables Capacity Report and b) Offshore Renewables Resource Assessment and Development (ORRAD) Project – Technical Report

iii) Wave Energy

Using the industry standard Minimum Feasible Operating Standards for wave technologies, the Dorset Offshore Renewables Capacity Report did not identify any offshore wave potential However, ¼ scale wave demonstration devices were considered feasible within three areas (Figure 21).

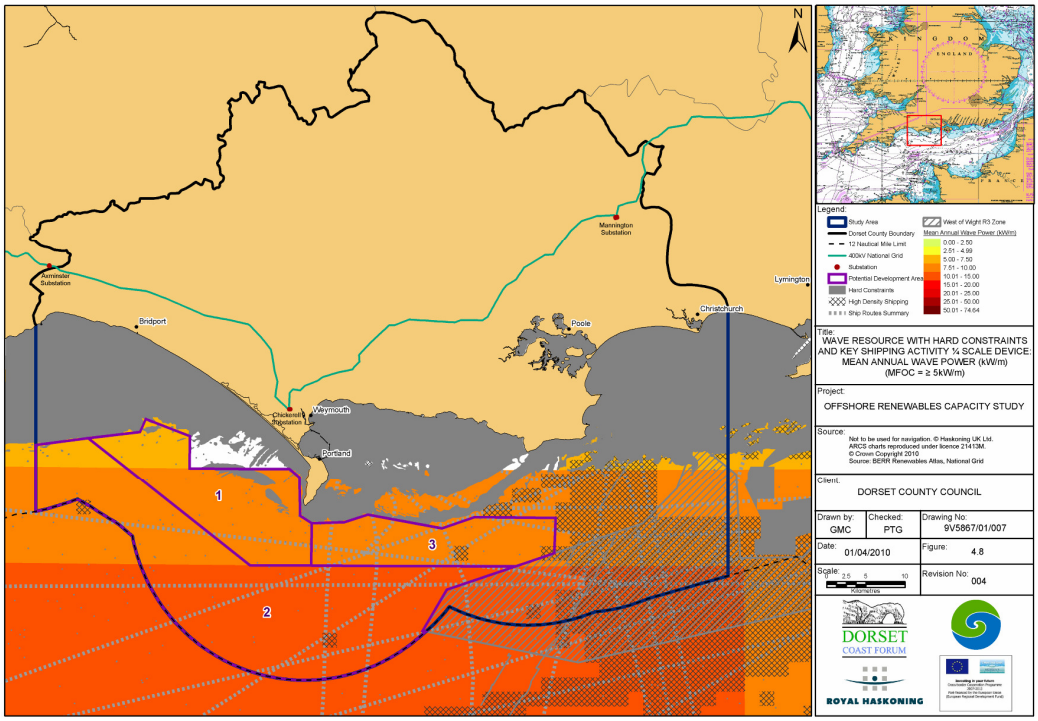

Figure 21: ¼ scale wave device potential areas within Dorset

The SWRDA Technical Report identifies a 58km section of coastline from near Overcombe, to the Dorset/Hampshire border (excluding Poole Harbour inside of the Sandbanks ferry route) as suitable for shoreline wave device deployment (Figure 22). Shoreline wave technologies are assumed to be land based and fixed or embedded into structures such as breakwaters; they operate at low tidal ranges of less than 2m. Not all of this area will be available for deployment due to existing coastal constraints, including MoD, the Poole Bay and Lyme Bay Reef dSAC and the Jurassic Coast World Heritage Site.

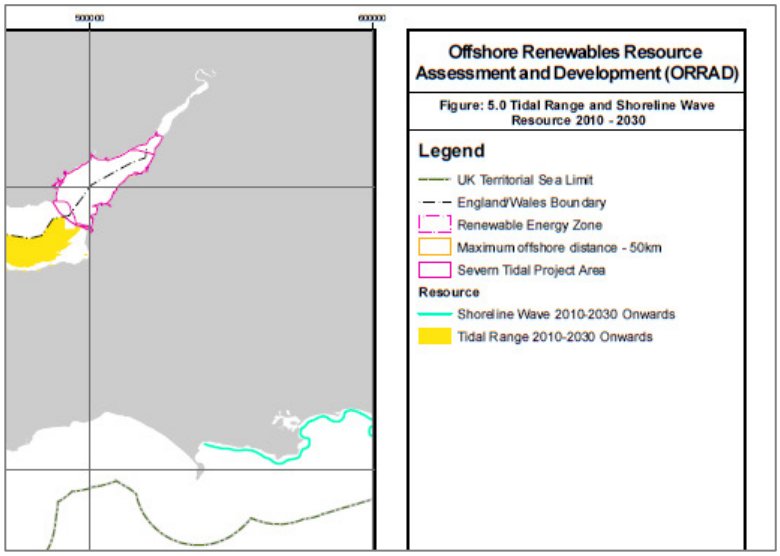

Figure 22: Shoreline wave resource 2010-2030. Source: Offshore Renewables Resource Assessment and Development (ORRAD) Project – Technical Report

2.5.2 Carbon Capture and Storage

2.5.2.1 National Overview

Development of Carbon Capture and Storage (CCS) has the potential to reduce CO_2 emissions from power stations by around 90% and should make significant contributions towards both the UK and global climate change goals. Carbon Capture and Storage could potentially help to enhance oil recovery from some reservoirs which would have a significant and permanent effect on the recovery and efficiency of available UK reserves Carbon Capture and Storage is a 3 step process:

- Capturing the CO_2 from power plants and other industrial sources.
- Transporting it, via pipelines, to storage points.
- Storing it safely in geological sites. Most likely deep under sea or in disused oil fields.

One CCS site (Sleipner West gas field) has been operational since 1996 in the Norwegian North Sea and there is an offshore gas storage facility in operation in the UKCS: The Rough 47/8 Alpha facility which lies 26 miles off the Humber Estuary. Total subsea gas storage capacity within the UKCS is estimated to be between 31,000 and 22,000 million tonnes.

2.5.2.2 Future

CCS is forecast to reach full potential in the next 30-40 years which could reduce energy-related global CO_2 emissions by up to half by 2050. There are currently no commercial-scale CCS power stations in the UK; the government has, however, committed that any new coal power station constructed in the future must demonstrate a 25% or 400mw capacity for CCS to gain planning approval. There is also a commitment from the government to build 4 CCS projects by 2020. There are several planned CCS sites in the UK, mainly in the North of England (Yorkshire) and Scotland.

Areas suitable for CCS tend to coincide with areas of offshore oil and gas extraction but a lack of demonstration projects has been identified as a barrier to full scale commercial CCS

deployment (Charting Progress 2 2010). The government has announced that there will be a £1billion capital expenditure for the first commercial scale CCS demonstration project. The aim is to have the scheme fully operational by 2014. There are many questions still to be answered with CCS and concerns have been raised about storage under sea and deep ocean seismic activity. However, all CCS projects require an Environmental Impact Assessment before planning approval.

2.5.2.3 C-SCOPE MMA

There are currently no CCS sites in the MMA.

2.5.2.4 C-SCOPE Future

The Portland Gas Storage development is primarily land based, however there will be undersea gas and brine pipelines as well as coastal infrastructure. This is discussed in sections 2.3.3.5 and 2.4.5.

With the Wytch Oil fields and other smaller or abandoned test wells, there are suitable geological locations for CCS within or close to the MMA. However, there is a low density of power stations within the south west and, due to costs of building transport pipelines and storage facilities, it seems unlikely that the area will be a prime location for offshore CCS within the timescale of the marine plan.

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2.6. Environmental Designations

2.6.1 National Overview

Until very recently only a small fraction of one percent of UK waters were designated as MPAs. International, European and national legislation has led to an increasing number of statutory MPA designations, from early Ramsar protected wetlands through to ongoing identification of Marine Conservation Zones. These are summarised in Table x.

Table 1: Summary of statutory MPA designations.

Marine Protected Area	Description	Year of legislation
Ramsar Site	Wetland sites of international importance, which includes marshes, freshwater and coastal zones adjacent to wetlands.	1971 (International Convention)
Special Protection Area	Areas of international importance for the feeding, breeding, over-wintering and migratory birds which are considered either rare or vulnerable. The sites are designated under the European Birds Directive 1979	1979
Sites of Special Scientific Interest	Designation is down to low water with legal protection under the Wildlife and Countryside Act and subsequent acts.	1981
Special Area of Conservation	Protected areas designated under the European Habitats Directive. Gives protection to a specific range of species and habitats.	1992
Marine Conservation Zone	Areas protected under the Marine and Coastal Access Act 2009 to protect a full range of habitats or specific species as part of an ecologically coherent network.	2009

There are currently 168 Ramsar sites designated in the UK. In the marine environment SACs and SPAs are only designated to protect a relatively small range of specific species and habitats. A large number of SACs and SPAs have already been designated; there are 73 SPAs with 83 (45 in England) coastal and inshore SACs, and nine offshore SACs. Natural England is responsible for this process in UK inshore water and the Joint Nature Conservation Committee has responsibility offshore, sites are chosen purely on a scientific basis with some stakeholder consultation on management.

Most recently the Marine and Coastal Access Act (2009) established the statutory basis for the creation of an ecologically coherent network of MPAs, to include existing sites and Marine Conservation Zones (MCZs), a new type of MPA involving stakeholders in their selection. In England four regional MCZ projects were created to progress the designation of the MPA network. The regional projects are due to submit final proposals to the statutory nature conservation bodies, (NE and JNCC) towards the end of 2011. After review and further work the proposed network will go to DEFRA and then on to Parliament to be in place by the end of 2012.

Voluntary MPAs are agreed at a local level after consultation with stakeholders in the local community. They have two big advantages; the first is that they have wide community

support and are therefore restrictions are likely to be observed; the second is the low cost of creating them. The disadvantage however is that legal enforcement is not carried out.

2.6.2 Future

In the short term the suggested MPA networks from the four regional MCZ projects will be completed and submitted together with the conservation objectives, proposed management and impact assessment for each MCZ. The four suggested networks will be combined into one and will be reviewed by the statutory nature conservation bodies in their role as advisors to government. Defra will consult publicly and the resulting final suggestion will go to Parliament with the network in place by the end of 2012. Networks for the waters of the Devolved Governments should follow.

Natural England has submitted 15 inshore SAC sites to Europe for approval with a few more likely to follow shortly, and JNCC have proposed eleven and are working to propose five more. The final say as to whether there are sufficient Natura 2000 sites in the UK will be based on discussions with the European Commission and between other Member States.

In order to ensure this progress it is required that every six years starting from 2012, the Secretary of State will report on how well the networks of MCZs and MPAs are achieving their written objectives. It may be necessary to amend or review existing MCZs or even designate new conservation areas. This adaptive management will allow for any new data on conditions of habitats and species and also for change, whether it is due to natural causes, climate change or other human activities.

2.6.3 Climate Change

Evidence suggests that high biodiversity enables habitats and species to survive and adapt to climate change, and one of the main drivers of creating the MPA network is to provide a full range of healthy and diverse habitats.

The 2009-2010 Marine Climate Change Impacts Partnership report states with medium confidence that biodiversity is already increasing in southern areas as warm water species extend their distributions faster than cold water species are retreating.

Changes in crustacean abundance in some locations and the occurrence of previously undocumented species in others suggest some degree of climate-influence in Shallow and Shelf Subtidal Habitats whilst increased seawater temperatures have been linked with disease outbreaks in seafans, changes in algae distribution and abundance, and the appearance and increased occurrence of a previously unrecorded warm-water barnacle in southern and south-western areas (all low confidence).

Shifting species range boundaries will have implications for MPAs, as designated boundaries in the past have tended to be static. The MCZ Project Ecological Network Guidance states *"Where features protected by MCZs have altered due to natural processes or climate change, it will be possible to revise the features listed for a site, de-designate MCZs , amend the MCZ conservation objectives, or modify the boundaries if such actions are deemed appropriate by Defra and the SNCBs."*

2.6.4 C-SCOPE MMA

Dorset has a very rich and diverse range of marine and coastal habitats, including chalk cliffs, the ridged sand dune system at Studland and the Jurassic coastline to mention just a few. The diversity and importance of these habitats is reflected in the number of MPAs along the coast. Dorset has coastal Ramsar sites such as Poole Harbour which is the best and largest example of a bar built estuary with lagoon characteristics in the UK, composed of salt marshes, peatland mires, swamps and fens, the site has nationally rare plant and algal species and three red data book invertebrate species. The Chesil and Fleet is another Ramsar site famous for the shingle storm beach of international geomorphological importance, it also has a shallow lagoon with strong tidal and salinity gradients and a number of rare species. Both of these are also SPAs and the Chesil Fleet site is also an SAC. SACs also extend along most of the Dorset coast from the cliffs at Studland to Lyme Regis.

Within the MMA, the Studland to Portland draft SAC consists of two blocks (Figure 23) which have been selected for its Annex I Reef Habitat. All documentation for the dSAC has gone to Defra prior to formal consultation which should commence in summer 2011. Following consultation, and if approved, it will be submitted to the European Union as a candidate SAC, when it will then become legally protected. This is likely to occur in 2012.

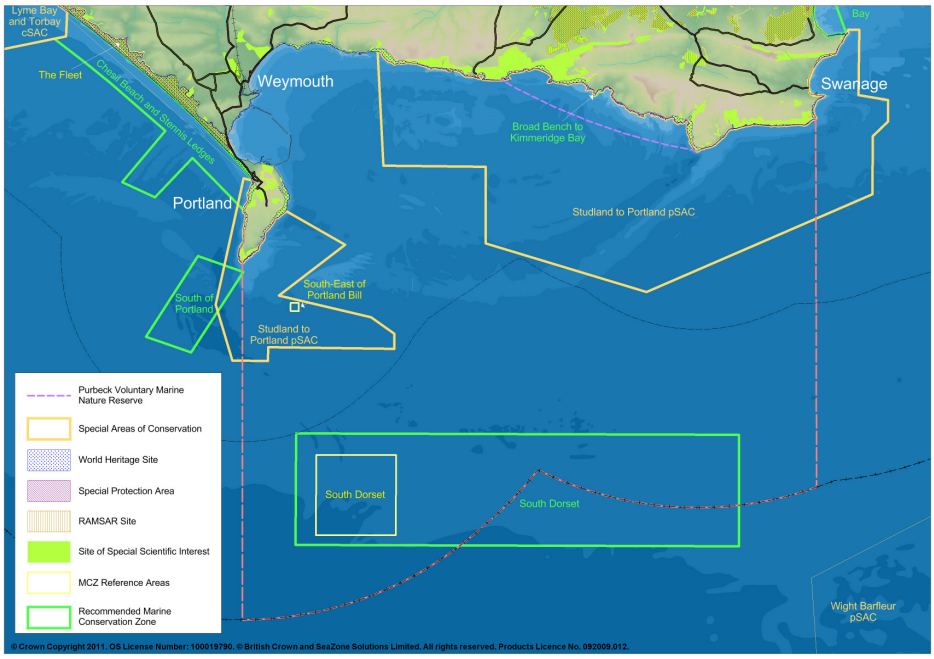

Figure 23: Existing and potential Marine Protected Areas.

Finding Sanctuary, the south west regional MCZ project, has recently released its Draft Final Recommendations, which include a number of MCZs within and close to the MMA. To the South East of Portland Bill is the South Dorset pMCZ containing the smaller South Dorset reference area; this site contains one of very few areas of sub-tidal chalk in the South West. A second pMCZ runs along the coast from Broad Bench to Kimmeridge Bay to protect inter-tidal rock habitats, whilst the proposed 'South of Portland' MCZ based around the geological feature of Portland Deep is on the western most edge of the MMA. (Figure 23).

The Purbeck Marine Wildlife Reserve, which includes Kimmeridge bay, was created in 1978 and is the longest established Voluntary Marine Nature Reserve in the UK.

2.6.5 C-SCOPE MMA Future

The Studland to Portland dSAC was created following consultation on the much larger Poole Bay to Lyme Bay dSAC; blocks within Lyme Bay went forward as cSACs, while the boundaries of the two blocks within Weymouth Bay/Purbeck were redrawn. It seems unlikely therefore that these new boundaries will be contested and it is probable that the dSAC will be designated sometime towards the end of 2012.

Although it is unlikely, there is still a possibility that the pMCZ boundaries may change before final submission to Government for final approval. To comply with European directives, the network must be in place by the end of 2012.

2.6.6 Bibliography

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2.7. Fisheries

2.7.1 National Overview

The Department for Environment, Food and Rural Affairs (Defra) is responsible for the management of fisheries at a national level, but is highly restricted by the Total Allowable Catch (TAC) quota system which exists under the European Union Common Fisheries Policy (CFP). Inshore Fisheries and Conservation Authorities (IFCAs) are responsible for areas from 0-6nm and the MMO from 6-12nm. Fishing activity presents the most widespread human pressure in UK waters. The large majority of scientifically assessed stocks in the UK continue to be fished at rates well above the levels expected to provide the highest long-term yield; currently, 88% of fish stocks are over-fished and 30% are 'outside safe biological limits'.

The Fishing industry is a small and slowly declining part of the UK economy; in 2005 the fishing fleet was about 3.4% of the larger 'agriculture, forestry and fishing' sector, which in turn was about 1% of the total UK economy. In 2007, the first sale value (turnover) of fish and shellfish taken by UK vessels in UK waters was £510 million with an estimated Gross Value Added (GVA) of £204 million, whilst ship building and fish processing are important ancillary services. Of the total market value of catch, shellfish and demersal fish species currently contribute around 40% each, with the remaining 20% comprising pelagic species. Around 50% of UK catches are exported.

In 2010 the UK had 6,477 registered fishing vessels; just over three quarters of the UK fleet is made up of vessels of 10 metres and under in length, but they only account for 8% of the fleet's capacity and a third of the fleet's power. The number of days spent at sea by vessels over 10 metres in length has fallen by 37% since 2001. In contrast, vessels over 18 metres in length account for just 8% of the total number but for 79% of total capacity and 49% of total power. The UK fleet is ageing, with 63% (whose age is known) having been built prior to 1991; however, while the number of vessels being built since 1990 has decreased, their average capacity and power have increased.

Since 2001 the number of fishermen on UK registered vessels has fallen by almost 2,300 to 12,700 (Figure 24). Although fishermen represent a small percentage of the national workforce, they are regionally concentrated and make a significant contribution to local economies around the coast.

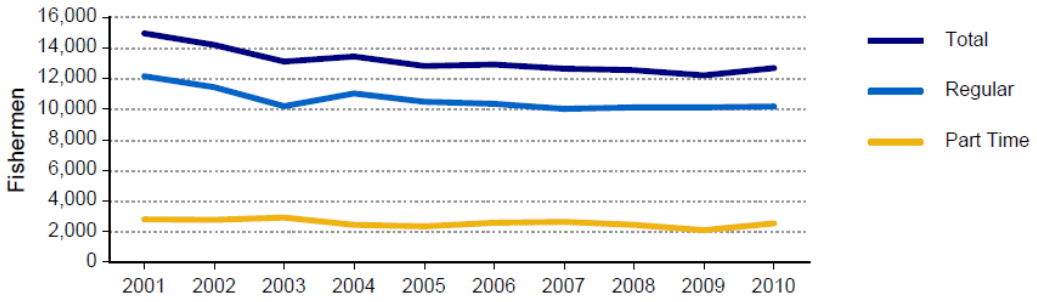

Figure 24: Number of fishermen on UK registered vessels: 2001 to 2010. Source: MMO.

The wider economic, social and environmental benefits of small-scale fishing make a significant contribution to the lives of individuals and coastal communities; providing jobs, attracting tourists, providing high-quality fresh fish and maintaining the character and cultural identity of small ports throughout England.

2.7.2 Future

Fisheries management is currently in a period of transition, with a review of the Common Fisheries Policy (CFP) underway in preparation for its renewal in 2012. Revisions to the CFP are placing increasing focus on the ecosystem approach to management, and it is expected that decisions will increasingly consider the broader impacts of fishing and the inter-relatedness of species being harvested. This is reflected in the additional conservation responsibilities of the new Fisheries and Conservation Authorities (IFCAs) vested in April 2011.

IFCAs are in the process of reviewing and evaluating existing byelaws and this should be completed by 2015. With an increasing number of Marine Protected Areas, fisheries enforcement will be a key issue in the future; IFCAs will be responsible for areas from 0-6nm and the MMO will have responsibility for 6-12nm. From 6nm, Common Fisheries Policy enforcement policies will also apply. With the current economic climate, funding for enforcement could be an issue.

Evidence indicates that increases in fishing pressure on important UK fish stocks that occurred during the 1980s and 1990s have been largely halted and in some cases reversed, and a progressively increasing number of stocks are being harvested sustainably; although the proportion remains relatively low at around 40%. There is an indication that declines in fish landings, fleet size and employment which occurred up to 2003 or 2004 have lessened in subsequent years, indicating greater stability in the fishing industry.

Climate change will continue to cause longer term changes to the mix of species available to marine fisheries in the different Regional Seas around the UK. Management measures will need to adapt to ensure that the fisheries remain sustainable and profitable.

2.7.3 Climate Change

Climate change has already started to alter the abundance and distribution of fish stocks in EU waters, and populations at the edge of species distribution are especially vulnerable. Predictions indicate that many of the UK commercially important fish species will decline and possibly disappear if Sea Surface Temperature (SST) continues to increase.

It has been estimated that if there is a sustained rise in sea temperature of just 1°C, (below predictions for 2100) several of the southern cod stocks will become stressed; stocks in the Celtic and Irish Sea may disappear altogether by 2100, while those in the North Sea will continue to decline. Studies have also shown that demersal fish assemblages have gone deeper as sea temperature rises. Changes to currents may have an impact on the dispersal of fish eggs and larvae. It is anticipated that winter and early spring spawners (such as cod and plaice) will experience poor larval survival, whereas warmer-water species (such as sprat) may benefit.

Warmer temperatures could expand ranges for warm-water species; analysis of Scottish trawl data found that since 1995, when SST began to rise, catches of warm-water species such as anchovy, sardine and striped red mullet all increased in the North Sea. Research has also identified northward movement of other warm-water fish, John Dory and rosy dory, through Portuguese waters and up to the southwest coast of Ireland since the 1960s.

Whilst some species may disappear from local waters, opportunities may also open up to fishermen as new, warmer-water species arrive. However increased storminess could lead to fewer days at sea for fishermen, and greater risks of getting into difficulties.

2.7.4 C-SCOPE MMA

Dorset's fishing fleet is primarily composed of inshore multi-purpose vessels which can use several methods of fishing to take advantage of seasonal fisheries. Fishers target a mix of species depending on the season, using whichever method and location best suits the prevailing conditions and enable them to earn a reasonable wage. Most fish catches landed in Dorset are exported to mainland Europe, as there is only a small demand from local retailers.

Approximately 90% of boats registered within the MMA are skipper-owned, and because of this it is difficult to estimate the number of people dependent on fishing within the area. Poole is the administration port with the largest number of fishermen in England (983). This is in part due to the large number of vessels of 10 metres and under overall length which are shared by multiple part-time fishermen (Table 3). Most of these boats are, with one or 2 exceptions, day boats, leaving in the morning to return and land their catch later that day; they are generally home-based but may also travel between local ports.

Table 3: Number of registered and licensed fishing vessels within the MMA, 1st July 2011 (Source MMO):

Home Port/Harbour	10 metres and under overall length	Over 10 metres overall length
Weymouth	53	5
Portland	25	1
Kimmeridge	1	0
Lulworth Cove	3	1
Swanage*	10	1
Poole*	88	5

*outside MMA but many boats operate within it

Inshore vessels are controlled by the Southern Inshore Fisheries Conservation Authority (S IFCA), with a remit of not only sustainable management of inshore fisheries, but also to support the conservation objectives of designated sites, such as SSSIs and Ramsar sites and Marine Conservation Zones within the IFCA district. Their jurisdiction is from the high water mark out to 6 nautical miles, and all fishing vessels operating within their district must be registered with them. Under S IFCA byelaws, vessels must be less than 12m; although a few skippers have 'grandfather rights' which exempt vessels over the permitted size prior to the introduction of the byelaw to continue until ownership of the vessel changes.

The fishing fleet is dominated by static gear operators, and a large number use pots to target crabs and lobsters along the rocky inshore ledges. The potting fleet is increasing, and is mainly operated by full time fishermen. Vessels sometimes stake and operate within boundaries, with a degree of local cooperation and respect of each other's boundaries. Boats set between 400 and 1000 pots each, in fleets of 20-100 pots from a couple of metres from the shoreline, sometimes out to 30 miles offshore. It is currently estimated that there are 6000 crab and lobster pots around the Weymouth and Portland areas alone. Portland Harbour is also potted for prawns and whelks, caught in purpose-built pots, are targeted for the rapidly growing far-east market. Cuttlefish are also targeted using cuttlefish pots at certain times of the year.

Bass are an important demersal target species, and provide income for many part time and casual fishermen in the warmer months. Fishermen use gill and trammel nets, but there has been a trend to switch from netting to rod and lining which usually takes place at dusk and dawn. This particularly applies to smaller vessels operating out of Weymouth which fish Portland Race and the Shambles.

Bass are taken further offshore by visiting pair trawlers, which often land their catch in France, and these trawlers also take herring, mackerel and sprat during the colder months. Other fin-fish which are targeted in smaller quantities by the local fleet include bottom dwelling flatfish, such as sole, rays and plaice as well as demersal and pelagic species such as cod, pollack and mackerel

Scallop dredging, by a small number of boats, mainly occurs to the west of the MMA in Lyme Bay, but commercial divers gather scallops from the rough grounds on Lulworth Bank during the summer months.

Weymouth is the main landings port within the MMA, and in 2009 a total catch of 1,952 tonnes worth £2,153,000 was recorded. Shellfish were the dominant catch, primarily made up of mussels, crab, whelks and scallops. Bass dominated the demersal catch and the only other major landings were skates and rays. The only pelagic species landed in 2009 was mackerel. Landings into Weymouth have been decreasing since 2005, although the value of those landings has remained relatively stable.

2.7.5 C-SCOPE MMA Future

Whilst the 2012 CFP reform, and new IFCA conservation obligations, will have implications for fisheries within the MMA, it is the likely designation of new Special Areas of Conservation (SACs) and Marine Conservation Zones (MCZs) (collectively Marine Protected Areas) that will have the biggest future impact. Management measures are uncertain at present, but it is likely that benthic and demersal trawling will be banned from all sites. It is probable that fishermen will still be able to use static gears within both SACs and MCZs except for MCZ reference areas, where all "*extraction, deposition or human-derived disturbance will be removed or prevented".*

Special Areas of Conservation are designated by Natural England to fulfil European obligations, and stakeholders are not involved in identifying sites. However, Dorset fishermen played an active role in identifying pMCZs which should help to improve compliance and minimise impacts on livelihoods in these areas. Despite this, in the future there could be increased pressure on areas outside MPAs caused by displacement fishing. Fishermen who currently use mobile gear could also turn to static methods, causing greater competition and pressure - particularly on rocky reefs.

There is an increasing national and local demand for locally sourced produce and fish that has been caught in a more environmentally responsible way. Following recent national campaigns, people are also more willing to try different types of fish. This could see local fishermen start to deliberately target more diverse species, and encourage more sustainable fishing practices.

Climate change may cause some species to disappear from local waters, opportunities may also open up to fishermen as new, warmer-water species arrive; grey triggerfish, for example, are being found more frequently off Chesil Beach in the summer months. However increased storminess could lead to fewer days at sea for fishermen, and greater risks of getting into difficulties.

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2.8. Aquaculture

2.8.1 National Overview

Aquaculture is the fastest growing area of food production globally and is likely to play an increasingly important role in the future. In the UK, aquaculture increased by 132% between 2000 and 2006 and, despite some recent decreases, the long-term trend is for continued growth, particularly in England and Wales. Fish and shellfish aquaculture make up 99% of all activity.

Scotland is the third largest salmon farming nation in the world and provides 99% of finfish in the UK; water temperature being a key driver in locating fin-fish aquaculture sites. In England shellfish dominate aquaculture production; in 2009, 35.6 thousand tonnes of farmed shellfish, worth £30 million, was produced (Table x). Although this was an 8% decrease from 2008, it was still the second highest annual recorded total. There were 69 authorised shellfish aquaculture production business in England in 2009, employing 135 full time and 63 part time workers.

Table 3: Production (tonnes) of farmed shellfish in the UK in 2009. Source: Cefas

	Scotland	England	Wales	Northern Ireland	UK Total
Pacific oyster	232	811	4	309	1,356
Native (flat) oyster	39	54	0	127	220
Scallops	4	0	-	-	4
Queens	6	-	-	-	6
Mussels	6,302	3,800	13,812	8,015	31,929
Clams	-	13	-	1	14
Cockles	-	2,027	-	-	2,027
Estimated Value (£ million)	7.7	6.2	9.5	6.2	29.6

Mussels are the main species produced in England, and there was a 17% increase in production from 2008-2009. Small quantities of Pacific oyster, native oyster and very small quantities of clam and cockle are also cultured. There are various production methods for shellfish, which can broadly be divided into on-bottom off-bottom and suspended culture (Figure 25 a) and b). Methods used are determined by sea bed composition, depth, wave and current regimes, and economic resources. Inshore aquaculture generally takes place in areas where significant wave heights are between 0.5m (small exposure) and 2.0m (medium exposure) with the majority probably occurring in areas with less than 1m (moderate exposure).

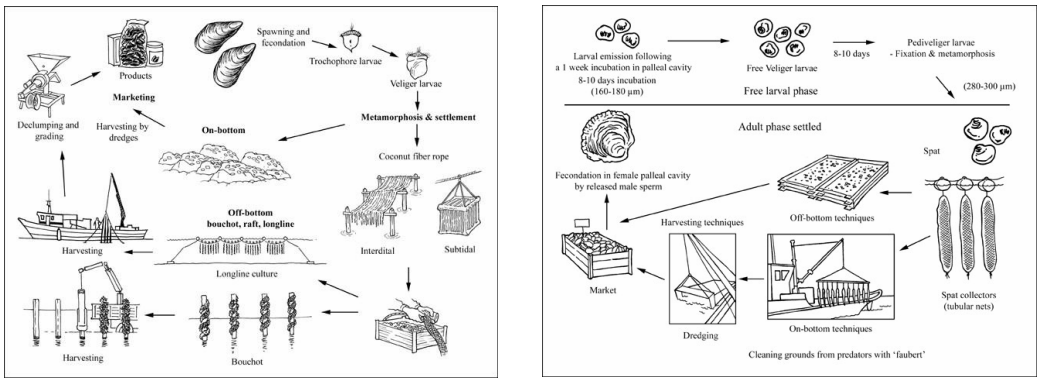

Figure 25: Production methods for a) European mussel and b) European oyster. Source: FAO.

Future

Management of the marine aquaculture industry is currently complex, with a raft of different legislation that has evolved over time. Scotland introduced statutory planning controls over the development of aquaculture installations in 2007 and options are currently being explored through the Marine and Coastal Access Act 2009 and the Marine (Scotland) Act 2010 to simplify licensing procedures. There are currently several schemes operating through the European Fisheries Fund, offering between 40-50% funding to help development and marketing of aquaculture businesses in the UK. The Fund is providing around £38 million between 2007 and 2013.

2.8.2 Future

The UK population is forecast to grow to almost 71 million by 2035. This is forecast to lead to an increased demand of 1.5 seafood meals per week, which would see total seafood requirement grow from 1.1 million tonnes whole fish equivalent (2006) to some 1.9 million tonnes by 2035. To keep up with this demand, aquaculture production in the UK has been projected to increase by 116% compared to current levels in the next decade. A draft English Aquaculture Strategy is shortly to go out to consultation which, amongst other aims, sets out a sustainable growth strategy for the industry.

Defra have identified that aquaculture of cod, halibut, haddock, turbot, lemon sole and arctic char are all realistic within UK waters. Scottish farmers were starting to diversify into cod and halibut farming, but this is now seen as a less attractive option due to recent increases in North Sea cod catch quotas. Other species such as bass, along with the growing organic fin-fish sector may also increase the size of the UK fin-fish aquaculture market. Climate change may have a significant effect on the both the species and location of fin-fish aquaculture developments in the future.

The market for scallops is continually growing and currently the majority of this market is filled by dredging or diving. Scallop ranching occurs in Scotland, using wild-caught spat and juveniles. However scallops require a five year period to reach a suitable size for market, and ranching requires long-term investment. Scallop cultivators are now moving towards hatchery reared seed, where production is more reliable; this may make ranching more economically viable in England.

Aquaculture in the UK is at a critical point as space on land and inshore sites become increasingly limited. If technology continues to advance then offshore sites could become more attractive, especially if co-location with offshore structures becomes viable (Figure 26). Research has been conducted into mussel cultivation within wind-farms in German Bight; shifting production of mussels offshore can decrease the hazards of infection due to dilution of contaminants which would in turn increase the health of mussels. As European sea bass begin to move northwards, a possible result of warming sea temperatures, further possibilities for co-location of cage-based aquaculture may open up.

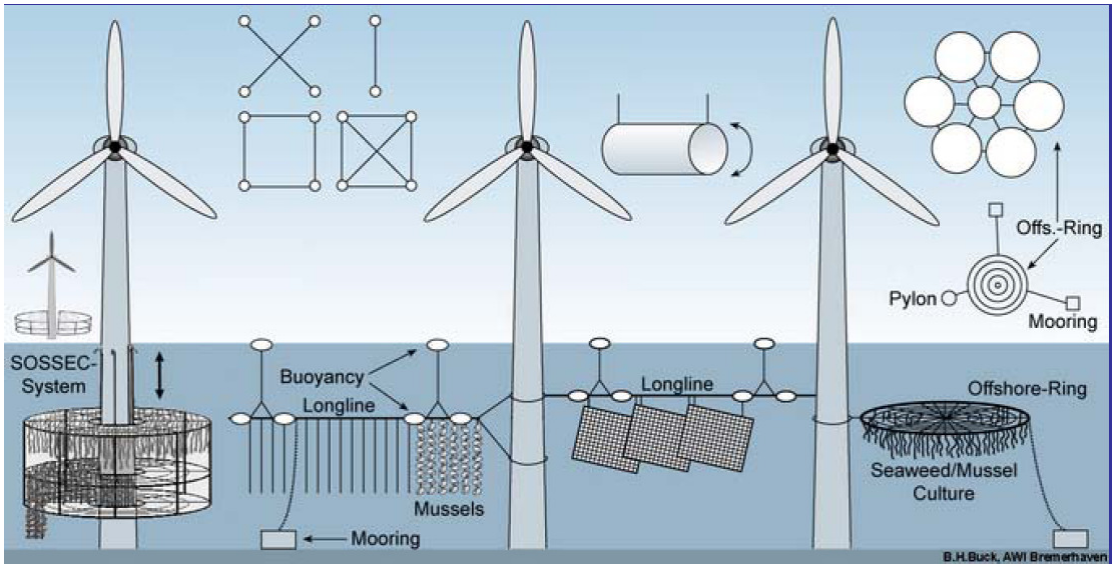

Figure 26: Potential offshore wind and aquaculture co-location attachment/anchoring points. Source: Bela H Buck, Institute for Marine Resources & the University of Applied Sciences

Most of the current or planned offshore sites do not appear suitable, but ongoing dialogue with wind-farm developers may lead to future opportunities. In the long-term some types of wave power generators, which dampen wave energy, may offer a more realistic opportunity to cage-based aquaculture.

Offshore production of salmon and other species around the coast of England remains technically challenging. The economic, technical and biological feasibility of truly offshore aquaculture has yet to be fully demonstrated in the UK. Problems which need to be overcome before this becomes viable include cage and anchor breakages, waste disposal and increases in fish diseases. Offshore mussel farming however has been proven to work in Europe, the US and New Zealand, and pilot schemes in Scotland suggest that there could be significant potential for large scale semi-submerged longline culture of mussels in the UK.

Recent research initiated by the Environment Agency and RSPB at the Wallasea Island managed realignment site has shown the potential for such areas to support the aquaculture of cockles, clams and razorfish.

Seaweed aquaculture is gaining increasing attention; seaweed is used as agricultural and horticultural fertiliser, in animal feeds, in many cosmetics and as a thickener in the food industry. In 2005, Japan began piloting waterborne seaweed farms designed to absorb greenhouse gases before being harvested as biomass. More recently, in 2009, a Norwegian company patented a floating structure to cultivate seaweed on an industrial scale out to sea, calculating that just 0.05 per cent of European coastal regions could yield 75 million tonnes of seaweed a year and 3.2 billion litres of ethanol. Offshore seaweed farming is another candidate for co-location with offshore wind farms.

2.8.3 Climate Change

In the short term, climate change is unlikely to have a significant effect on aquaculture. However, rising sea temperatures could increase growth rates for some important species such as Atlantic salmon, mussels and oysters yet cause cultivation difficulties of other species such as Atlantic halibut. It may also be possible to cultivate new species such as sea

bass and bream. Warmer winters and nights could allow more species to be cultured further north.

As temperatures increase, farmed species may become more susceptible to new exotic diseases and some species may be unable to resist new pathogens; resulting in higher mortality rates. Toxic algal blooms associated with warm water could potentially decrease shellfish growth rates, and more significantly could build up to harmful levels within the food chain.

Ocean acidification is expected to have severe impacts on several economically important marine resources including fish stocks and aquaculture. The inhibition of shell growth is one major concern, and CO_2 increases may also cause shifts in tolerance ranges in growing and reproductive capabilities.

2.8.4 C-SCOPE MMA

Three areas within the MMA - Portland Harbour East, Portland Harbour West and the Shambles Bank – are designated shellfish waters, under the EC Shellfish Waters Directive (Figure 27).

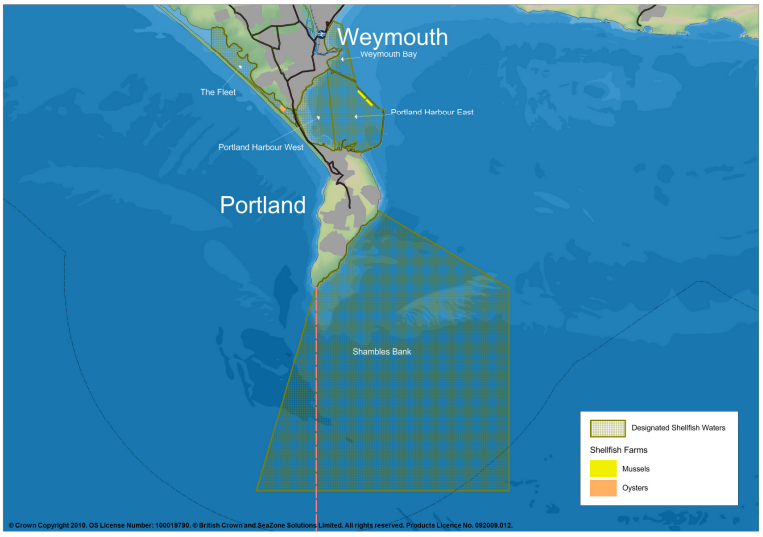

Figure 27: Designated shellfish waters, aquaculture sites and several orders.

Within Portland Harbour there are two mussel farms. One is located on the inner southern arm of the Port and is run by Portland Oystermen Ltd. Buoys demarcate the farm to alert vessels to its location. There are currently two lines capable of producing 10 tonnes of mussels per year, but there is potential for up to 10 lines with a production of up to 100 tonnes. Natural spat is collected from the surrounding waters, usually from mooring ropes and take 13 months to two years to reach maturity and a marketable size. Because the water is generally A quality with occasional B ratings, the mussels are sold on to purchasers for filtration and purification.

The second farm is managed by Lyme Bay Shellfish on the northern arm of the Harbour. The site is on lease to the consortium from Portland Port Ltd until 2013. The farm also rents the breakwater and the Vernon building. Plans exist to install a purification plant, although it is not currently authorised for depuration, and to purchase a new crane to enable larger lines to be lifted. Mussel spat is collected from the end of Portland Bill and the farm currently holds fourteen ropes with one hundred drop down lines, producing 800 kilos of mussels a week.

A several order, Portland Harbour Fishery (Variation) order 1999, covered most of the south western side of the harbour. Attempts were made to establish a scallop ranch here, but due to water quality issues and lack of purification facilities there were no commercial harvests. This several order expired in 2010, and hasn't been extended.

The deep water off Portland Bill is an important natural source of seed Mussels; some are taken from the area and stored in Portland Harbour to meet winter demand, but the majority are re-laid on subtidal ground lays in Poole Harbour for fattening, which accounts for 90% of the Mussel production from Poole Harbour.

The Fleet Oyster Farm lies at the southern end of The Fleet, and is authorised as a Purification Centre and Shellfish Aquaculture Production Business. The Farm covers approximately two hectares and uses an Australian system, which consists of twenty 50-metre timber post and rail rows carrying purpose made enclosed plastic mesh baskets. Part grown Oysters (30-40mm) are sourced from the Channel Islands and re-laid in the Fleet for between 7-12 months until they are of marketable size.

2.8.5 C-SCOPE MMA Future

The Crown Estate has recently granted a lease for a pilot scale mussel farm development in the north west area of Lyme Bay. The Lyme Bay mussel farm proposal is 2.5-6nm off-shore, and covers an area of 18km^2. If demand for mussels continue to grow and the Lyme Bay farm proves successful, Weymouth Bay could be targeted for future development. A constraints-mapping exercise has identified two areas within the MMA as having suitable conditions for shellfish mariculture development (Figure 28).

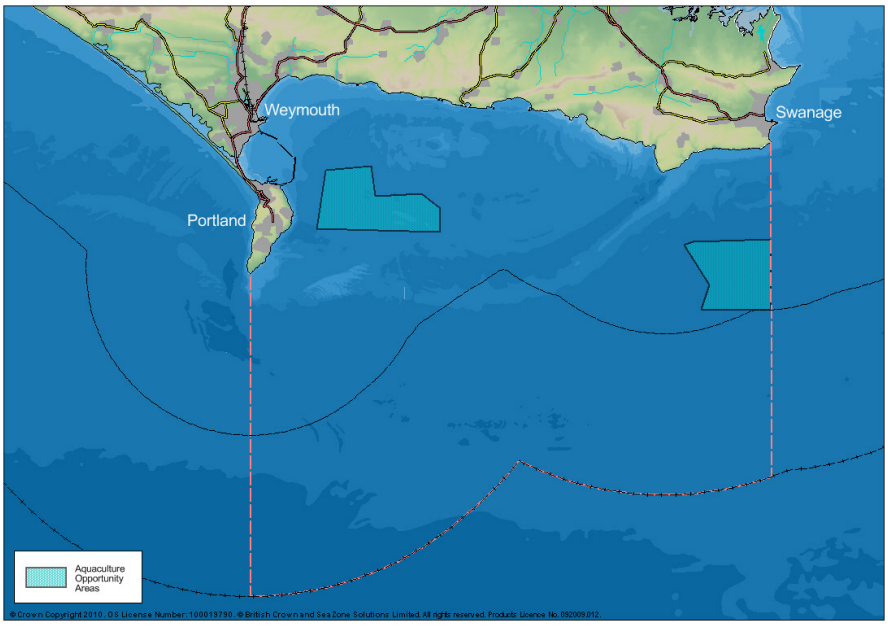

Figure 28: Sites suitable for shellfish mariculture development within the MMA.

It is highly likely that the Navitus Bay windfarm will start its construction phase in 2016. In the short term it seems unlikely that any aquaculture co-location will take place but, as technology improves in both industries, it could be a possibility in the next 20-30 years.

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2.9. Marine Aggregates

2.9.1 National Overview

The marine aggregates industry is highly regulated; extraction requires a licence, both for prospecting and commercial extraction from the seabed owner (in most cases The Crown Estate) and an environmental permission from the relevant regulator. It is also well coordinated by the industry's trade association, The British Marine Aggregate Producers Associate (BMAPA). There are eleven companies generally involved in the production of marine aggregates, running a fleet of 28 specialised aggregate dredgers. In 2009 a total of 20.10 million tonnes of sand and gravel were dredged from Crown Estate licences in England and Wales; this figure has varied by less than 4 million tonnes over the last ten years and is reflected by the area of seabed dredged (Figures 29 a) and b).

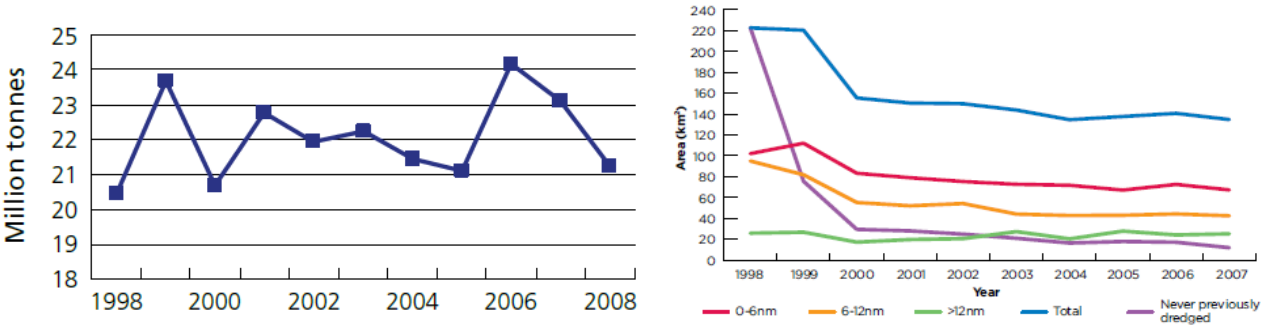

Figure 29a): Quantity of marine sand and gravel dredged between 1998 and 2007, and b) area of seabed dredged 1998-2007. Source: BMAPA, Marine Aggregate Dredging 1998 – 2007.

Over the past four years, the area of new seabed dredged per year has averaged just 15.7 km^2, despite a number of significant new permitted dredging areas. This can be attributed to operators improving resource management, and requirements under the Marine Minerals Guidance Note 1 (DCLG, 2002) for them to minimise the area of seabed dredged at any one time, and to work areas to economic exhaustion before moving to new areas. This is highlighted by figures that show 90% of dredging from Crown Estate licences in 2009 took place from an area of 43.45km^2, despite a licensed area of 1,286km^2.

Research by the British Geological Survey in 2007 showed that of the total marine aggregates dredged, 29% is exported to Europe, 9% is used for beach replenishment and contract fill and the remainder is destined for UK construction markets (Figure 30).

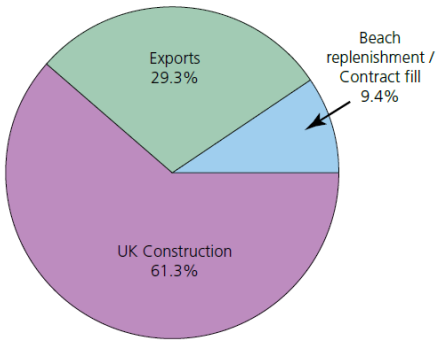

Figure 30: Landings of marine aggregates by market in 2007. Source: BGS (2007).

The supply of marine dredged sand and gravel for UK construction has been stable since the early 1970s, but there has been a recent dip in demand for marine aggregate material due to a decrease in land-based constructions linked to the 2008 economic recession. Strategic locations of landing wharves are crucial to the industry, particularly in London and the South East. Generally, resources dredged and landed within the UK have not travelled far from their original source often landed within the region of source. This is particularly true of material for beach replenishment which is often sourced locally in order to maintain the sediment characteristics of the beach and to reduce transportation cost.

Investment in vessels and new technology over the past 5 years has continued to increase. Key investments during 2008 included modifications to vessels to facilitate dredging in deeper waters. Currently dredgers cannot realistically work at depths deeper than 50m.

2.9.2 Future

There are unofficial statistics which show a rapid drop in the demand for marine aggregates due to decreases in land-based construction following the 2008 economic recession. Statistics released in that year by The Crown Estate reported a 7% reduction in landings to the UK construction market (from 14.45 million tonnes in 2007 to 13.12 million tonnes in 2008).

Over the next five to ten years however, home market demands could increase significantly with the implementation of major infrastructure developments such as Crossrail, Thames Gateway, nuclear and coastal defence programmes. In addition, a projected population rise in the UK of 5million to 55million by 2026 is influencing an increase in demand for aggregate material to build homes to achieve a housing target of 240 000 additional homes a year by 2016. The demand for these homes will be greatest in London, southern and eastern England.

Due to a lack of planning applications and an increasing number of planning refusals, land-based reserves of sand and gravel are declining in south-east England, so the role of marine aggregate supplies in supporting regional requirements for construction aggregates is likely to become more strategically important.

By far the most significant reserves of aggregate are in the Eastern English Channel and South Coast areas, which have proportionally higher in situ gravel contents than other areas. National primary marine sand reserves are extensive. Surveys carried out have suggested that existing deposits will be sufficient for at least the next 50 years, with production continuing at its current rate of extraction.

2.9.3 Climate Change

Climate change may increase the demand for protection against coastal flooding, which in turn may call for more soft engineered defences which use marine sand and gravels. There may also be more demand for marine aggregates in the manufacture of products that will be used for inland drainage infrastructure.

Increased storminess and wave height could make operating dredgers more difficult, which could dramatically reduce the amount of days spent at sea dredging for aggregates. Changing currents and storms could also affect the dispersal of suspended sediments.

Internationally, demand for exports may grow as continental low-lying countries such as the Netherlands and Belgium need to increase their sea-defences and their own land and marine supplies become exhausted.

2.9.4 C-SCOPE MMA

In 2009 the licensed area in the South Coast region was 204.46km^2, with 90.02 km^2 of that available to be dredged. From this 3.49 million tonnes of construction aggregate was dredged, plus 0.28 million tonnes specifically dredged for beach nourishment schemes; 2.35 million tonnes of this were landed at wharves along the South Coast, and 1.14 million tonnes were landed elsewhere in England. The Port at Poole has an active aggregates landing wharf, with 77,980 tonnes being landed there in 2010.

In contrast to the South East and South West regions, the area of seabed licensed in the South Coast region has remained very stable (Figure 31)

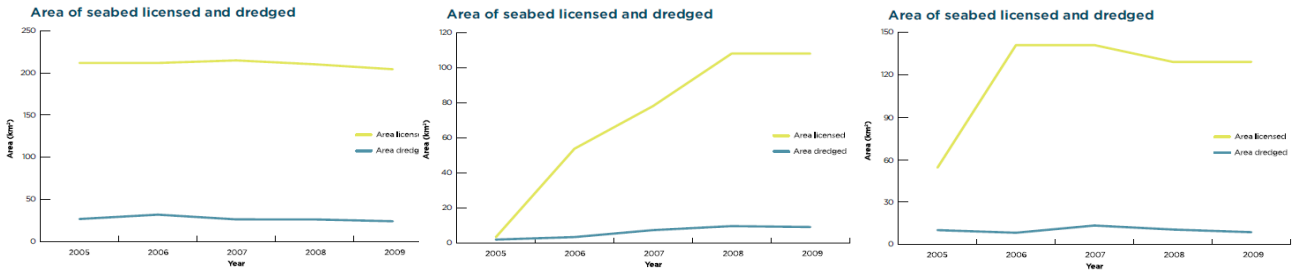

Figure 31: Area of seabed licensed and dredged in 2009 in a) South Coast b) East English Channel and c) South West Regions. Source: BMAPA 12th Annual Report

The South Coast aggregate region has 19 production licences, two of which lie to the east of the MMA; Hanson Aggregates Marine Ltd and Tarmac Marine Dredging Ltd hold licenses and currently dredge the South West Isle of Wight block, whilst Hanson Aggregates Marine Ltd and CEMEX UK Marine Ltd are licensed to and currently dredge the Needles Isle of Wight block (Figure 32). There are currently no licensed areas within the MMA.

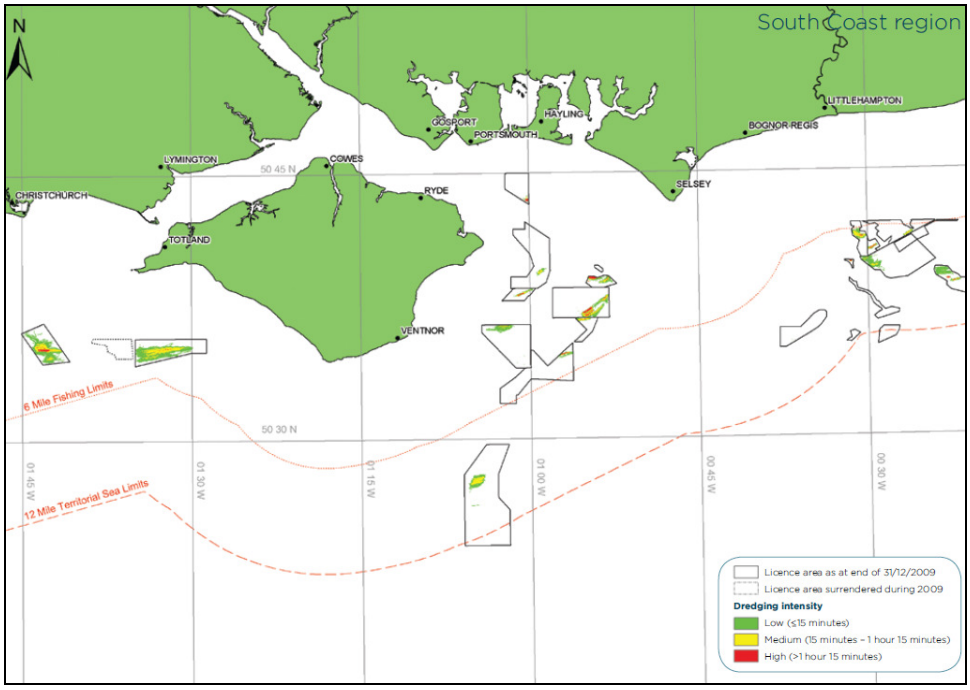

Figure 32: Licensed areas and intensity of dredging in the South Coast region during 2009. Source: BMAPA 12th Annual Report

2.9.5 C-SCOPE Forecast

Most of the locations of commercially viable sand and gravel deposits are fairly well known and studied. An area of 969km^2 to the east of the MMA, with an estimated resource value of £5.95 million per km^2, has been identified by The Crown Estate as of high interest for future prospecting in the medium to long term (Figure 33). There are currently no prospective areas within the MMA.

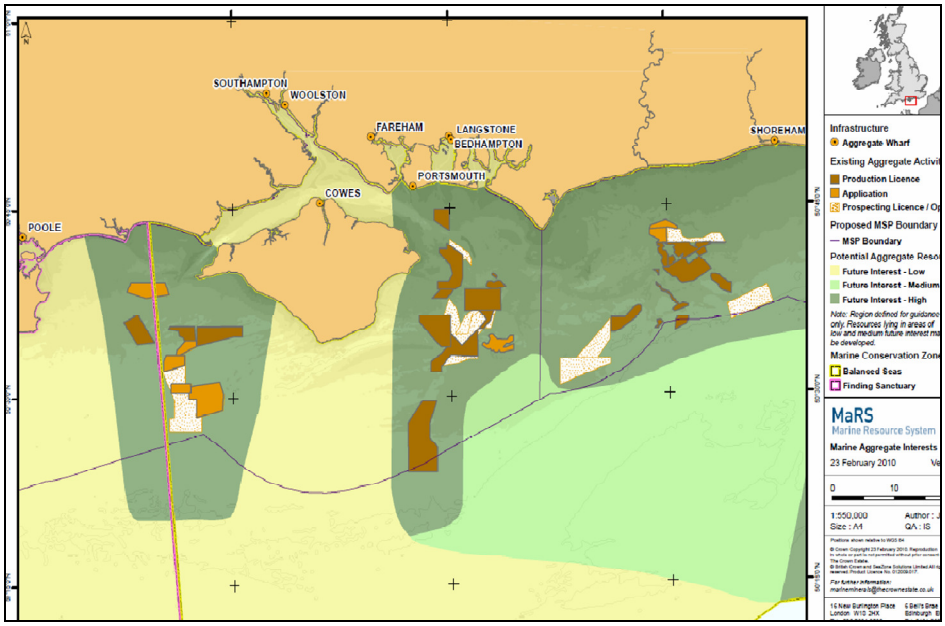

Figure 33: Current and Future Marine Aggregate Interests in the South Coast Region. Source: Mark Russell, BMAPA.

The South West and more specifically the Dorset area have a lower priority for extraction due to less market demand from the housing sector. The exception to this could be the increased need for coastal protection. However, given the policy move towards working with natural processes and reducing the need for coastal defence this seems unlikely in the short to medium term.

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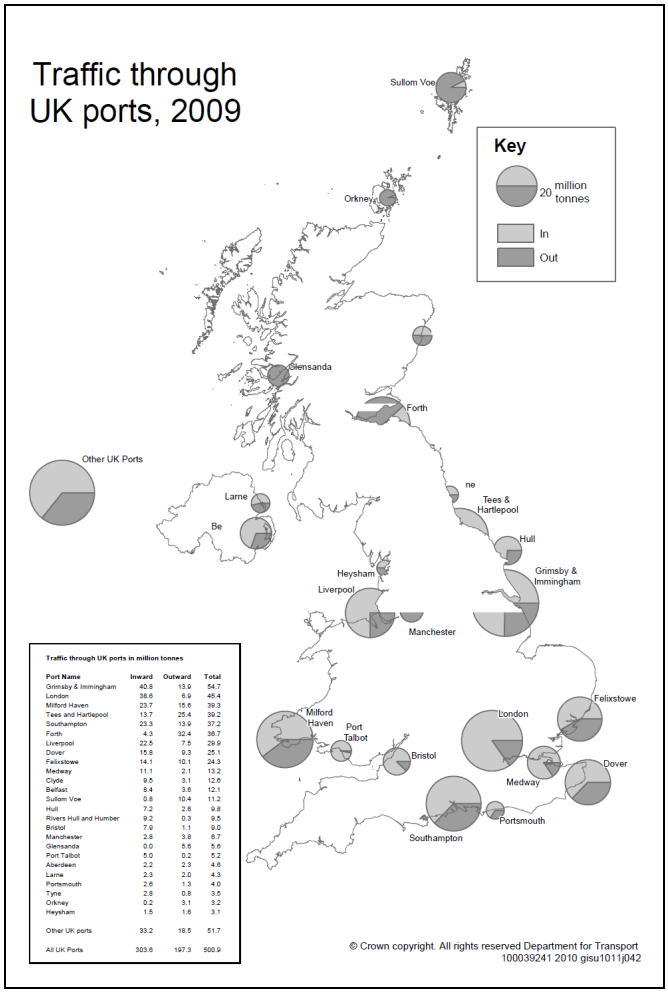
2.10. Ports and Shipping

2.10.1 National Overview

Around 95% of international goods to and from the UK go by sea, so ports play a vital role in the UK economy. A 2009 report estimated that from a turnover of £9.5 billion the shipping industry contributes around £4.7 billion GVA to GDP, which equates to 0.5% of the total output of the UK economy. Currently there are 650 ports in the UK of which 120 are commercially active.

The top ten ports accounted for just over two-thirds of all UK port traffic by tonnage in 2009, and the 52 major ports made up over 98% of the total (Figure 34). UK ports handled 501 million tonnes (Mt) of freight traffic in 2009, 61 million tonnes (11% less than in 2008, and 65 million tonnes (11%) less than in 1999 (Figure 35a). Broken down, liquid bulk traffic accounted for 46 per cent of the total, dry bulks 21 per cent, container and roll-on/roll-off (ro-ro) traffic 29 per cent and other cargo 4 per cent (Figure 35b).



Traffic through UK ports in million tonnes

Port Name	Inward	Outward	Total
Grimsby & Immingham	40.8	13.9	54.7
London	38.6	6.9	45.4
Milford Haven	23.7	15.6	39.3
Tees and Hartlepool	13.7	25.4	39.2
Southampton	23.3	13.9	37.2
Forth	4.3	32.4	36.7
Liverpool	22.5	7.5	29.9
Dover	15.8	9.3	25.1
Felixstowe	14.1	10.1	24.3
Medway	11.1	2.1	13.2
Clyde	9.5	3.1	12.6
Belfast	8.4	3.6	12.1
Sullom Voe	0.8	10.4	11.2
Hull	7.2	2.6	9.8
Rivers Hull and Humber	9.2	0.3	9.5
Bristol	7.9	1.1	9.0
Manchester	2.8	3.8	6.7
Glensanda	0.0	5.6	5.6
Port Talbot	5.0	0.2	5.2
Aberdeen	2.2	2.3	4.6
Larne	2.3	2.0	4.3
Portsmouth	2.6	1.3	4.0
Tyne	2.8	0.8	3.5
Orkney	0.2	3.1	3.2
Heysham	1.5	1.6	3.1
Other UK ports	33.2	18.5	51.7
All UK Ports	303.6	197.3	500.9

Figure 34: Traffic through UK ports, 2009. Source: Transport Statistics Report; Maritime Statistics 2009.

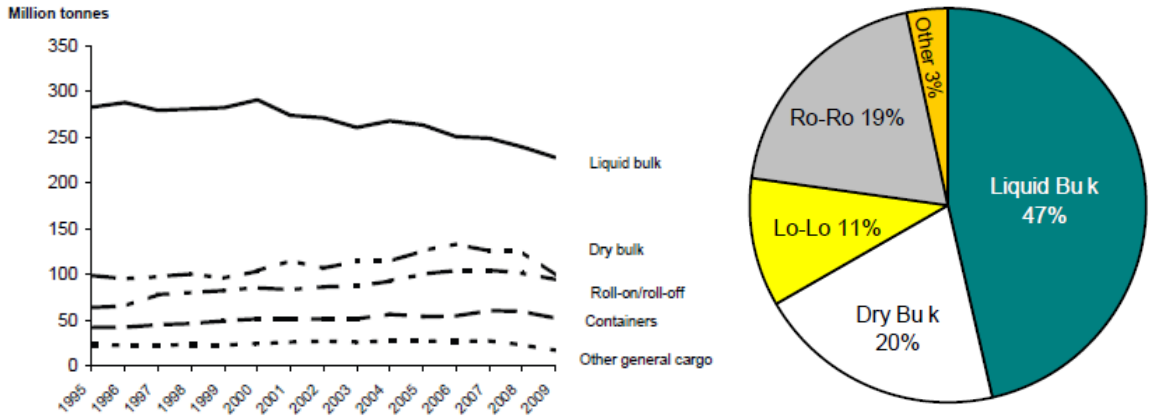


Figure 35a: UK major port traffic, by cargo category groups: 1995–2009 and b) UK Major port traffic by mode of appearance 2009 (100% = 490 Mt). Source: Transport Statistics Report; Maritime Statistics 2009

During the same period, international sea passenger journeys fell by 5% to 23 million passengers, accompanied passenger car traffic fell by 1% to 6.4 million vehicles and the number of passenger ship arrivals fell by 9% to 119,000.

Ports and shipping also include a diverse range of ancillary activities including boat building and harbour management. A Department for Transport survey estimate there were 58,100 FTE employees working in jobs directly related to commercial port operations (Table 4).

Table 4: Port related employment in the UK, 2009-2010. Source: Transport Statistics Report; Maritime Statistics 2009.

Type	Number (fte)	Range'
Directly related, on port	37,000	30,500-43,500
Other employment on port	12,200	8,400-15,900
Directly related, off port	21,100	18,800-23,400
Indirect & induced, off port		18,000-96,000

There are a number of key pressures relating to ports and shipping including oil spills and the introduction and movement of non-native species. Most shipping impacts are managed by the International Maritime Organisation (IMO).

2.10.2 Future

In the container and Ro-Ro sectors, an average annual growth rate of around 3% to 4% is expected (Figure 36); this will require a significant increase in capacity in the longer term, beyond that which has already been approved in the last two years.

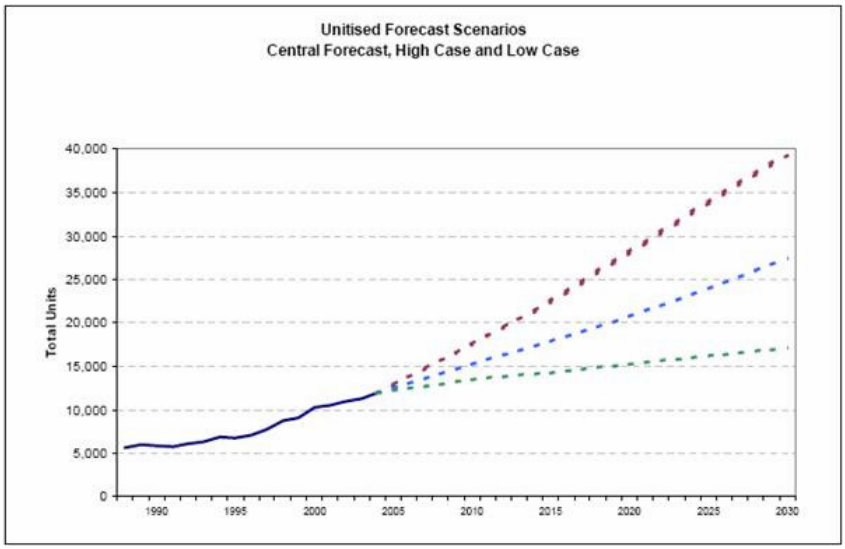


Figure 36: Forecast scenarios for growth in unitised (containers/ro-ro) shipping transport. Transport Ports policy review interim report 2007.

Vessels are becoming increasingly wider and deep-draughted, to enable International shipping companies to achieve economies of scale in the transportation of goods. This is causing access issues into tidally-constricted ports, and those with insufficient water depth to accommodate these bigger vessels. Delays to commercial traffic are increasing, which is impacting upon efficient berth utilisation and causing greater congestion. As demand for port capacity continues to grow, this will be a key driver for the need for commercial ports to deepen and/or widen navigation channels.

Costs for cross country container transport continues to increase, and with a growing need to cut emissions short-sea shipping is becoming an increasingly viable option; but for this to grow there also needs to be further developments in ports across the UK.

An IMO Convention relating to ballast water controls to prevent the transport of non-native species and to phase-out harmful antifoulants is currently being progressed, and this could have significant effects on how ports manage shipping.

2.10.3 Climate Change

Climate Change and Carbon emission controls have been highlighted as a key area for ports to work with. Short sea shipping has been identified as way of reducing road transport and therefore a potential solution to reducing carbon emissions.

Retreating Arctic sea ice is increasing the accessibility of the 'Northern Sea Route' between Europe and Asia for a limited period of the year. In September 2009, two cargo ships symbolically utilised the 'Northern Sea Route'. Should this retreat continue as forecast, the Route could stay open for longer periods of time, creating the potential for new trade routes with the Northwest Passage and Northeast Passage. However, melting sea ice could also result in an increased frequency of ice-bergs which could cause damage to vessels, pipelines and offshore infrastructure. Increases in extreme weather patterns could cause disruption to some shipping routes.

Projected increases suggest that emissions from shipping in 2050 will account for 15-30% of all UK CO_2 emissions. Currently much of shipping is fossil fuel based but advances in

renewable technologies could potentially see this changed. Little has been studied on the impacts of climate change and ports themselves.

2.10.4 C-SCOPE MMA

Shipping is mainly transitory through the MMA, with higher density around the ports. Bunkering is available at Portland Port, and there is a rough weather anchorage within Weymouth Bay which is sheltered from the prevailing westerlies. The major Channel shipping lanes lie just to the south of the MMA, and this includes a traffic separation scheme. Navy vessels, particularly the Royal Fleet Auxiliary, can often be seen anchored within Weymouth Bay, waiting to enter Portland Harbour.

There are two main ports, Portland Port and Weymouth Harbour, within the MMA, with Poole Harbour to the east of the area.

2.10.4.1 Weymouth Harbour

Weymouth Harbour, owned by Weymouth & Portland Borough Council, provides services predominantly for local businesses and industries. It benefits from a greater diversity of business streams than many small harbours; principle sources of income are the Condor Ferry, inner harbour mooring holders, commercial boat operators and visiting yachts. The Weymouth Harbour Board's Annual Report 2009/2010 showed that the Harbour had an overall turnover for the year of £1,960,000.

With the current economic climate and the effect of the recession there has been a decline in the number of visiting leisure craft and there are vacant permanent berths. However, there is currently a waiting list for commercial boats offering fishing, diving and day trips.

Condor Ferries operates a cross-channel ferry service to Jersey, Guernsey and St. Malo out of Weymouth. This is a year-round service that makes daily crossings to each destination between April and October and twice weekly crossings from November to March Passenger numbers have declined since 2004 by around 9-10,000.

Weymouth is equipped to provide some services to commercial shipping, although many are provided in nearby Portland Port. Weymouth Harbour is able to handle 'bulk cargo and utilised commodities'. Other services include storage and pilotage. Facilities in the port include two marinas, one private and one council-run, offering moorings/berthing for privately owned boats. The Harbour also has a diesel re-fuelling station, electricity & water supplies and showers & washrooms for visiting vessels.

2.10.4.2 Portland Port

Following closure of the navy base at Portland Harbour, its assets were purchased by Langham Industries Ltd in 1996, bringing about the creation a new deep-water commercial Port. Portland Harbour Authority Ltd became the statutory Harbour Authority for Portland Harbour and its surrounds following the adoption of the Portland Harbour Revision Order (HRO) on 1st January 1998. Turnover figures for The Port were not readily available.

There are seventeen designated anchorages, as well as numerous berths, piers and jetties, serving diverse traffic including cruise ships, cable ships and general cargo vessels. The Port

also maintains strong links with the navy, particularly the Royal Fleet Auxiliary, and it is also able to accommodate cruise liners in the port up to a length of 250 metres.

The Port has the capacity to handle all types of cargo from unit load/containers, general cargo and bulk through to project cargos, heavy lifts and most categories of hazardous goods. A new development in 2009 provided 8,400m^2 of cargo handling hard standing with an adjacent cargo shed, suitable for Ro-Ro and General Cargo operations. Fuelling services are operated by Portland Bunkers International Ltd and Aegean Oil. The Port is also licensed to handle explosives.

There are 25 companies based within the Port's estate. These include: Shipbuilders and engineers Manor Marine, Global Marine Systems, the world's largest independent provider of marine cable installation and maintenance, bunkering providers Aegean Oil, and underwater maintenance providers, UMC International.

Osprey Quay also sits within Portland Harbour and hosts a number of businesses and organisations including the Royal Yachting Association (RYA), O'Three, Sunseeker and Portland Marina.

2.10.4.3 Poole Harbour

Although Poole Harbour is not within the MMA, it serves as a home port for much of the local fishing fleet and many of the 6,000 registered leisure craft located there travel through the MMA. The actual port in is located in the north eastern side of Poole Harbour and is owned by a trust; Poole Harbour Commissioners. It provides many services for commercial ships/ferries sailing in the English Channel as well as supporting the local fishing and tourist industry. Freight handling facilities include storage, cargo forwarding, weighbridges, cranage, pilotage and forklift trucks.

Data from Poole Harbour Commissioners' Annual Commerce Statistics shows that the majority of cargo handled in Poole Port is Roll on/Roll off. In 2009/2010, Ro-Ro freight accounted for approximately two-thirds of the total tonnage shifted. From 2005/6 to 2009/10 the amount of cargo passing through Poole Port declined by 56,000 tonnes (32%); however an upturn of 40% was recorded in 2010-2011.

Two passenger ferry companies operate out of Poole Harbour, sailing to the Channel Islands and Cherbourg and St Malo in France, but passenger numbers from have dropped by a third from 747,500 in 2004 to 493,500 in 2009. In February 2010 the Barfleur ferry service to Cherbourg was withdrawn, with a consequent loss of 40 jobs at the Harbour. It was reintroduced in February 2011 and will run until October; passenger numbers have so far proved viable.

There is a diverse range of leisure activities in and around Poole Harbour. Activities such as yacht racing, water-skiing, rowing, canoeing, windsurfing, kite surfing, diving and angling are popular with both locals and visitors. A zoning scheme is in place through the Poole Harbour Aquatic Management Plan 2011.

2.10.5 C-SCOPE Future

At Weymouth, the condition of some of the main harbour structures such as harbour walls, jetties and accommodation is poor in parts. It was hoped that the proposed Pavilion/Ferry

Terminal development plans would help to fund repairs and improvements to the Harbour, but with the failure of the scheme this is now looking doubtful. In late 2010, Councillors at Weymouth & Portland Borough Council granted £210,000 towards enhancing the facilities located in and around the harbour such as additional toilets and improving the ferry terminal. In addition, there is dedicated additional funding of £171,200 to repair and maintain the harbour walls.

The Portland Harbour Revision Order 2010 authorises Portland Harbour Authority Limited (PHAL) to construct works at the harbour including quay walls, reclamation of land and facilitates, and permanent mooring of a floating dry-dock (Figure 37). This will enable the Port to expand to cope with extra demand on service, accommodate large cruise liners and take advantage of the significant opportunities that the Navitus Bay windfarm should offer. In its 2007 HRO application, PHAL estimated that these works could increase employment by approximately 579 jobs.

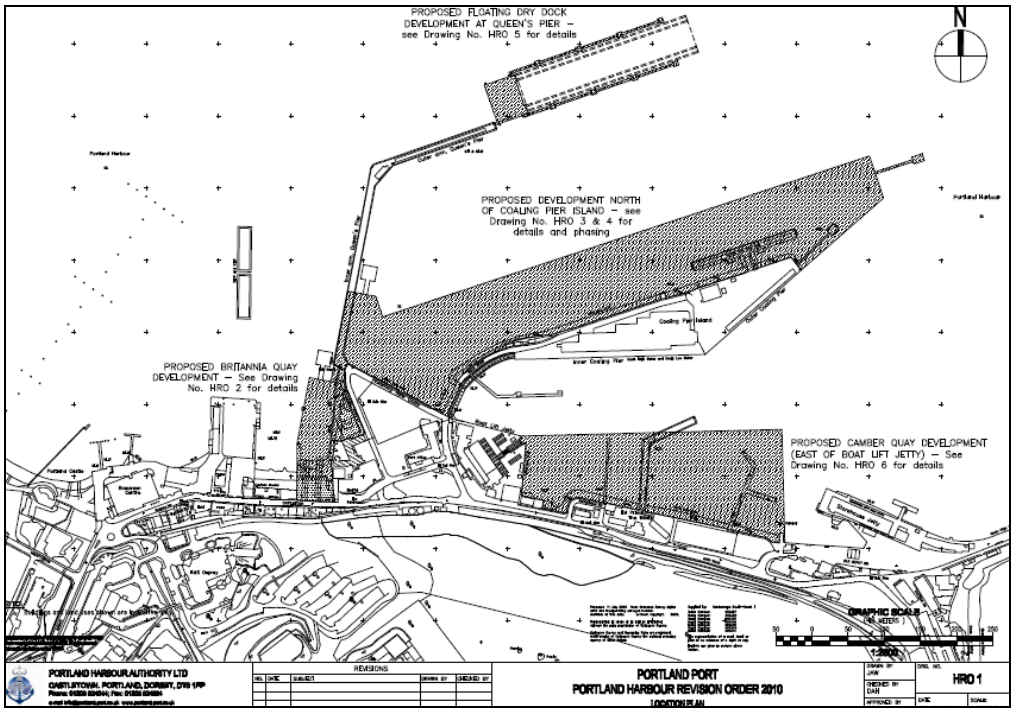


Figure 37: Portland Harbour Revision Order 2010, proposed developments.

With opportunities arising from the Navitus Bay wind farm, PHAL is looking to become a centre of excellence for offshore renewables, and it hopes to provide both construction and service facilities for the wind farm. Eneco have stated that for the construction port it will need 20 acres+ of lay-down land and deepwater berths, plus facilities that support foundation, turbine and cabling operations. The choice of construction methods will influence location. For the operations port, which will be required from 2016 onwards, distance to project is critical to maximize time offshore. Port selection should be confirmed in 2014.

The Portland Gas Storage development is covered in sections 2.3.3.5 and 2.3.3.5. Other development plans within Portland Harbour include the W4BUK liquid biomass power station at a brownfield site at Balaclava Bay. The plant is expected to deliver up to 20% of Dorset's agreed contribution to the UK's target of 15% by 2015, and planning permission was given in January 24th 2010. Construction was due to start in early 2011 but as of July 2011 it hasn't. The site will consist of a power oil production facility, stationary power plant

comprising two 8.9MW engines, tank farm for the storage of up to 10,000 tonnes of vegetable oil and a step-up transformer to allow electricity connection to the national grid. Ships bringing in the vegetable oil will berth at the existing deepwater berth at Portland Port (Figure 38) and both vegetable oil and urea (necessary for the process) will be transported via separate pipes from the ship to the site via flexible hoses.

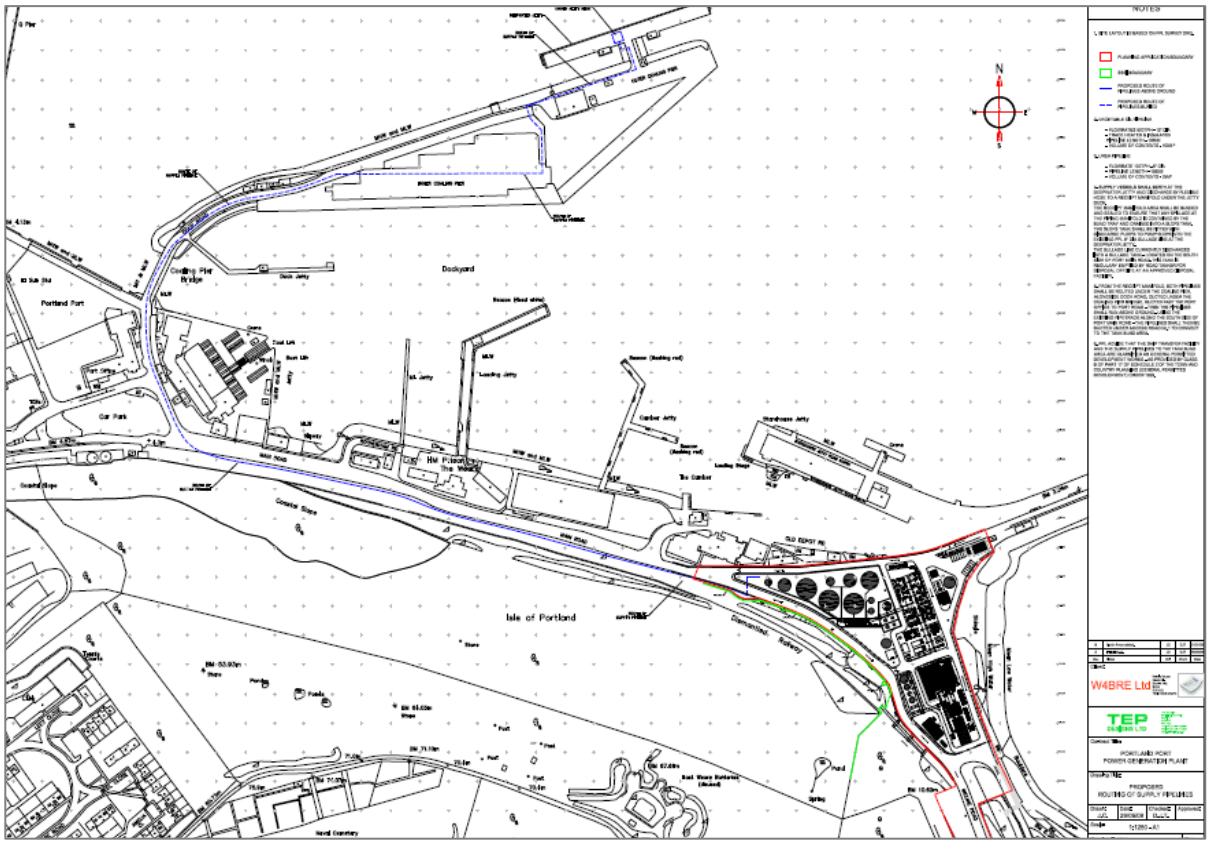


Figure 38: Location of Portland liquid biomass power station and pipelines. Source: W4BUK

The area in which the competition events for the London 2012 Olympic Games sailing events are taking place extends over both Weymouth and Portland Harbour jurisdictions. To provide a unified management plan for these areas during the Games, The Weymouth and Portland (The London 2012 Olympics and Paralympic Games) Harbour Revision Order 2011 was granted, in which PHAL will temporarily become the Harbour Authority for Weymouth outer harbour and an additional area of open water (Figure 39) between16th July 2012 to 9th September 2012. There will be navigational and access restrictions during this time.

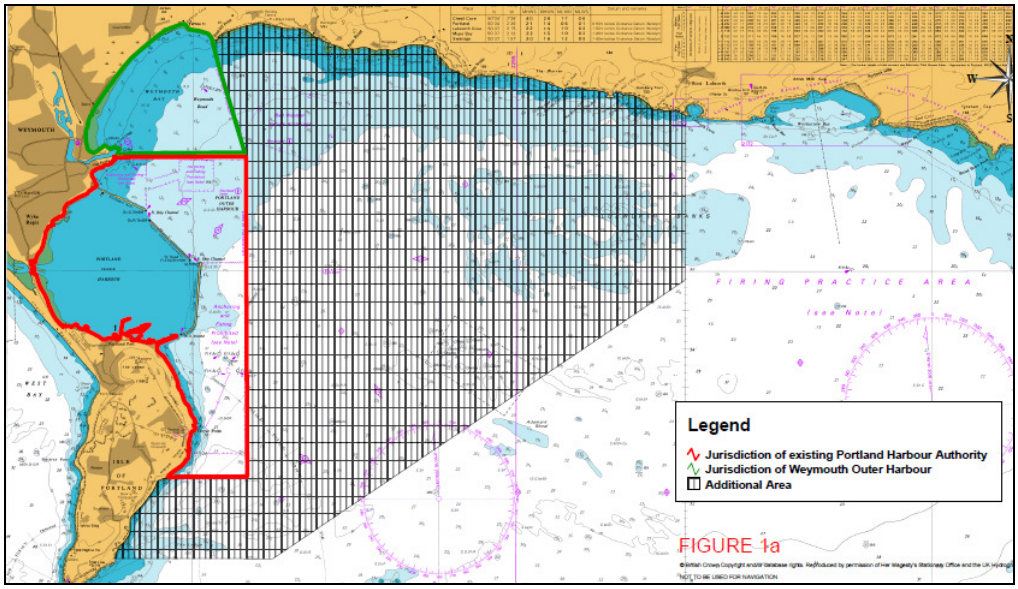


Figure 39: Existing harbour authority jurisdictions and extended area for The Weymouth and Portland (The London 2012 Olympics and Paralympic Games) Harbour Revision Order 2011. Source. PHAL HRO application.

Poole Harbour Commissioners are looking to install a Liquid Petroleum Gas Tank and to purchase a new LPG run plant. The Port of Poole Marina is complete and there is a longer term plan to build Poole Harbour Marine Centre (Figure 40); a £20m, 950-berth marina at Hamworthy, which would include a cruise ship berth and a marine business park, creating 120 jobs. An Environmental Impact Assessment will commence shortly, lasting through to autumn 2012.

Figure 40: Proposed Poole Harbour Marine Centre. Source: Poole Harbour Commissioners.

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2.11. Tourism and Recreation

2.11.1 National Overview

With 29.9 million overseas visitors to the UK in 2009, visitor tourism is currently worth £115 billion to the economy. In addition, residents made an estimated 126 million trips within the UK in 2009, 21% of which were coastal trips. The estimated income for coastal towns from tourism in the UK is calculated at £4.8 billion, resulting in a GVA of £2.26 billion. There was a 19% growth in overseas visitors, especially from France and Spain, but overall there has been a 15% decline in UK staying visitors between 2000 and 2009. Seasonality is very much apparent in both the visitor and domestic markets.

The last decade has seen a decrease in the relative proportion of younger age groups taking trips and, in line with the UK population, older age groups have increased in relative importance of taking trips. In relative terms, seaside destinations have experienced a decline – most noticeable in terms of spend from 34% to 23% in 2006. Accommodation trends have also seen an increase in the proportion using serviced accommodation has increased slightly, with a corresponding fall in the use of self catering. The car remains the dominant form of transport for taking trips (74% in 2006), while the use of bus and coaches (regular and organised) have declined in relative terms (8% to 5%).

It is estimated that between 5.4 and 13.2 million people participate in watersports in the UK, with 800,000 participating in sea angling alone; contributing £538 million to the economy in England and Wales in 2003. The total estimated market turnover due to leisure and recreation is £2.74 billion and £1.29 billion Gross Value Added (GVA). Secondary value from coastal tourism including accommodation and food is also significant, with an estimated expenditure for coastal towns of £4.8 billion in 2005.

Over recent years many new watersports have emerged, including paddle boarding, coasteering, and kite surfing. More 'traditional' watersports are also becoming increasingly popular; surfing, kayaking and open water swimming have all increased dramatically. Factors such as increasingly active lifestyles, leisure time and affluence, have led to these increases, while ongoing technological improvements have extended the season for many recreational activities. Marine wildlife tourism is also continuing to increase; cetacean watching is estimated to be growing at 10% a year. Sea angling, however, appears to have stabilised.

Leisure activities are dependent on the UK economy. The healthier the economy, the more disposable income people have. In 2008, there was a noticeable dip in recreational activities, most likely having been affected by the recession, although there are predicted growth rates over the long term. Other substantial benefits include employment and cultural values to local communities.

2.11.2 Future

It is estimated that tourism could be worth £188bn by 2020, with the potential to support an additional 250,000 jobs. Growth and stability of the sector is heavily dependent on the general health of the UK economy and this makes forecasting for the next few years difficult. It is, however, anticipated that there will be steady growth in most leisure and tourism activities.

Whilst sea angling is currently stable, many charter skippers believe improved technology masks the full impact of stock declines; participation could decrease in the near future if successful stock recover measures are not put in place. The Bass Anglers' Sportfishing Society, for example, believes that an annual value of £150 million is achievable within five years of the introduction of specific management measures aimed at providing more and bigger bass.

Research for Visit Britain shows that in the future last minute decision making and short trips will become more prevalent, with social media networking increasingly becoming the main resource for knowledge, entertainment and safety. There will be a need to develop more niche products to cater for tourists who are looking for higher quality or deeper, more meaningful travel experiences. It is also predicted that there will likely be fewer repeat visitors. Should predicted climate change occur, growth opportunities could emerge for the revival of northern European resorts as excessive heat and water shortages disrupt tourism in the Mediterranean.

The UK's visitor economy is also set to benefit from the 2012 Olympic Games which will place the UK firmly on the domestic and international visitor's destination list.

2.11.3 Climate Change

Climate Change will most likely affect both tourism and recreation in the longer term. Warmer weather is more likely to attract an increase of visitors to coastal locations across the UK. There is a prediction on an increase in 'summer' months i.e. April and May being warmer and also September/October. However, negative impacts are an increase in 'extreme weather' events which could discourage tourists and disrupt travel. An increase in harmful algal blooms (HABs) and an increase in jellyfish abundance could cause a decrease in coastal tourism and recreation as well as added pressure to local health services. Increased storminess could also cause health issues should storm drains be unable to cope with the associated heavy rain. Carbon emissions are a contentious issue with regards to recreation; people are now travelling large distances to take part in recreation - living inland and travelling to the coast to go surfing is just one example. It is also very difficult to take sporting equipment on public transport as there are often restrictions.

2.11.4 C-SCOPE MMA

Tourism is one of Dorset's predominant industries, and the coast is arguably Dorset's most important single tourism asset; in 2008 just over 5 million day visits were spent there (Figure 41). As well as traditional beach holidays, walking, angling, scuba diving, sailing and other watersports are all popular attractions. In a South West Tourism survey in 2008, 6% of respondents said they would be doing some sailing, 19% mentioned other water sports (surfing etc), 68 % swimming in the sea, 94% spending half day or more at the beach.

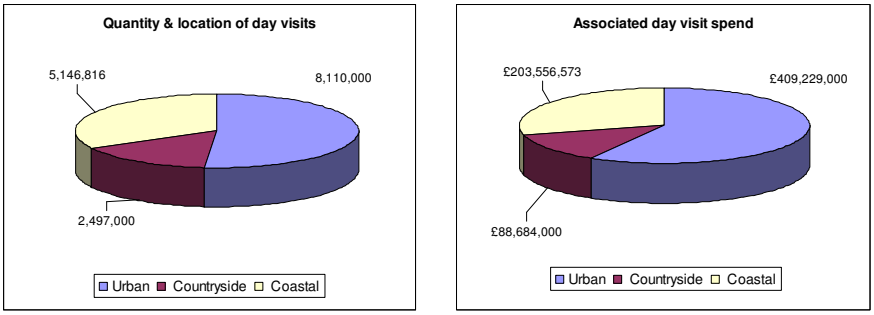

Figure 41: Quantity and location of day visits and associated spend in Dorset. Source: SW Tourism.

The leisure and tourism sector accounts for 10% of workplaces within the MMA, which equates to approximately 13,500 jobs. In 2008, the total visitor related spend in Dorset was £1.5 billion, with tourism adding approximately £361.4 million to GVA within the MMA (Table 5).

Table 5: Value of tourism to the C-SCOPE MMA in 2008. Source: South West Tourism, 2008

	Purbeck	**West Dorset**	**Weymouth**
Staying visitor spend	£78,899,000	£128,900,000	£91,459,000
Day visitor spend	£71,377,000	£119,871,000	£57,404,000
Total visitor spend:	£150,276,000	£248,771,000	£148,863,000
GVA	£96,396,000	£161,389,000	£103,643,000
Tourism supported employment	14%	13%	16%

Holiday parks represent a large proportion of the accommodation stock in rural Dorset. In some cases these can be visually intrusive, and at present many local holiday park owners are undertaking environmental improvements - such as planting trees and improving the appearance of their sites. Some of these parks are located in areas which are vulnerable to coastal flooding.

Weymouth & Portland is one of the most popular diving locations in the UK, supporting 35,000 diver days per year. Based on a 2005 Weymouth & Portland survey, it is estimated today that diving tourism contributes about £8 million in demand for goods and services within Dorset (excluding Poole and Bournemouth), adding about £2 million to the GVA and supporting about 76 jobs in the local economy. However, diving operations are currently experiencing a downturn – partly due to the 2008 recession and also the availability of low-cost foreign dive trips.

Angling is widespread in Dorset, from both shore and boat and it is acknowledged as one of the best bass angling locations in the country. Weymouth has the UK's largest charter angling boat fleet.

Sailing is more popular than ever in Dorset, with the development of the Weymouth and Portland National Sailing Academy (WPNSA) and announcement that it would host the 2012 London Olympic and Paralympic Games sailing events. Since opening, WPNSA has created demand in service and marine industries worth in the region of £10 million, and it is predicted that it will be adding something in the region of £6m each year to the local economy.

Weymouth also provides the shortest crossing to France west of Folkestone, which makes it a popular berthing location. Weymouth Inner Harbour has two providing over 450 permanent

berths for vessels 6-12 metres in length. Weymouth Marina, which sits just beyond the town's lifting bridge, offers over 300 fully serviced berths. Portland Marina currently has 300 berths.

Apart from the 'normal' tourism spend associated with boating, additional expenditure on berthing charges, servicing and maintaining and upgrading of equipment accounted for an additional £2.1 million within the MMA. This gives a total spend of £2.7 million associated with boating – about one per cent of total staying visitor spending. Boating spend is most important to Weymouth & Portland, totalling about £2.3 million: about 2% of staying visitor spend.

The last ten years has seen an increase in both established and new watersports within the MMA. Portland Harbour provides a safe environment for many types of watersport; with windsurfing and kitesurfing being particularly popular. There are several training schools that cater for windsurfers, powerboating, waterskiing and kitesurfing in the area.

Kimmeridge Bay is highly popular for both surfers and windsurfers. It is acknowledged as one of the best surfing spots on the south coast, and when the wind is from the NW, N or NE, surfers flock to the Bay and it can get quite crowded. Kayaking is also popular many companies offer kayaking and camping tours of the area. Coasteering has seen a rapid increase in popularity, and the cliffs and caves of Purbeck have proved to be a major draw for companies offering this activity.

With an increase in availability of water sports this has led to further pressures in urban coastal areas. As Dorset has a very exposed coastline this limits access to beaches and harbours. Environmental pressures as a result of recreational use are difficult to quantify due to lack of spatial and temporal information. Pressures may include removal of marine fauna and flora, and physical or visual disturbances of wildlife.

2.11.5 C-SCOPE Future

As with the national situation, the growth and stability of the sector is heavily dependent on the general health of the UK economy and this makes forecasting for the next few years difficult. It is however highly probable that marine and coastal leisure will continue to grow within the MMA.

The Weymouth and Portland Wreck to Reef project aims to sink a ship as an artificial reef off Ringstead Bay (Figure 42). Drawing on the experiences and the resulting benefits of previous man made artificial reefs, notably The Scylla in Plymouth, it is believed that it will help redress the economic down-turn within the local diving industry. The project is in the final stages of conducting an EIA.

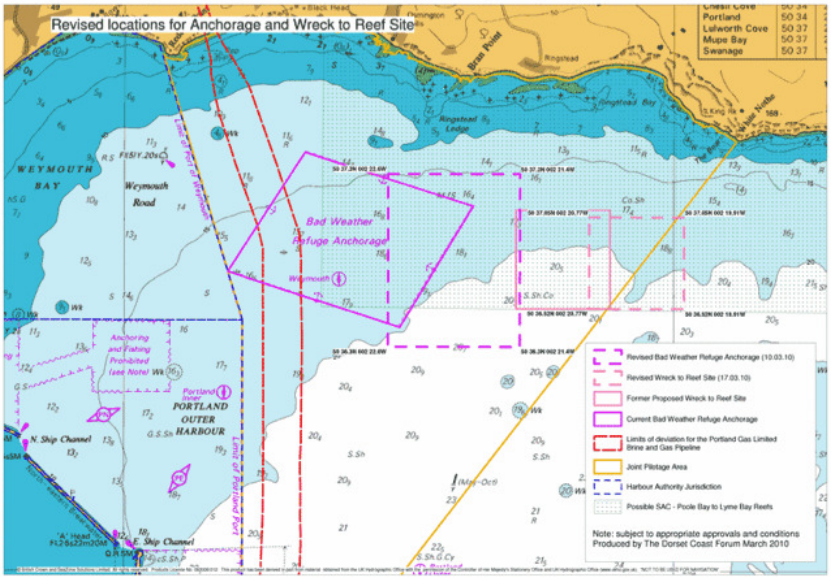

Figure 42: Location of proposed wreck to reef project. Source: Wreck to Reef

Climate change is likely to have a big influence on this sector. In 2003 a heat wave, with temperatures of 31+°C, attracted record numbers of visitors to Bournemouth; accommodation was full, there was 20% more traffic than usual causing pollution to rise to more than double the Government health limit and emergency vehicles access blocked. These temperatures are likely to become normal in summer by the 2040s and the resulting issues as well as 'coastal capacity 'should be taken into account for future planning. Warmer and more reliable summers could also provide major economic benefits.

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2.12. Coastal Defence

2.12.1 National Overview

Erosion and flooding by the sea are hazardous to property and infrastructure on the coast, and so there will always be demands for coastal defence works to protect property. This will mean that natural processes are inevitably interrupted. Data regarding climate change and sea level rise (SLR) suggest that these natural processes will accelerate during the 21st century and this will place greater pressure on both available finances and engineering solutions

Defra / EA policy is that publicly funded coastal defence schemes must typically achieve a cost / benefits ratio of approximately 1:5. This means that a £10M scheme must be able to demonstrate that £50M of infrastructure will be fully protected. National guidelines are set for the cost calculations. However there are still a number of areas, such as social benefit and public access, where it is less straightforward to reach a satisfactory assessment of costs vs benefits. The legislative and grants application process for obtaining funds for coastal defence works is becoming more stringent and a points system is in place. The design life requirement for a new sea-wall is usually 60-70 years and this figure assumes full and ongoing maintenance throughout the working life of that structure.

There is a growing recognition of the value of natural coastal defences and of the need to work with and protect natural processes. Soft engineering techniques are being used on a more frequent basis, and typically involve the use of sand, shingle or larger aggregates to replenish beach sediments. The materials used are typically imported from offshore dredging areas although quarried material can also be used

Soft coast defence techniques have the benefit of conserving sediments for defence use rather than erecting solid linear barriers along the shoreline. However, groynes are often required to stabilise the recharge material and to prevent drift. In recent years, the sustainability of soft engineering schemes has been brought into question. Typically, beach recharge schemes have to be repeated (or at least replenished) every 4-10 years.

SMPs are high level strategic documents that set the framework for the way that coast defence matters are managed for the next 100 years. The first iteration of Shoreline Management Plans for England and Wales was carried out in the late 1990's (SMP1). The second iteration began in 2008 and completion of all SMP reviews is scheduled for 2010 (SMP2). In a number of cases coastal cell boundaries have been altered since round one. The other distinct difference of note is that the plans have to extend up to all tidal limits within rivers and estuaries; this was not the case with SMP 1.

The four main options available for any given coastal cell are:

- Advance the existing defence line
- Managed realignment (either of existing defence measures or by managing and manipulating natural processes
- No active intervention (meaning that no financial obligations are intended)
- Hold the line (where existing measures to defend the coast and property are to be continued and maintained)

The review process recognises that coastal defence works need to be conceived in a way that takes due regard for the natural processes operating at sea and on the coast. These

processes can operate over large stretches of coastline, for example eroding cliffs on one part of the coast can provide the sediment which forms beaches elsewhere.

2.12.2 Future

The current direction for coastal defence policies is to move away from the use of 'hard defences' (concrete, metal, stone etc), but to use natural processes wherever possible to reduce flood risk. Throughout England and Wales there are some 24,000 miles of flood defences. In 2010/11, the EA plan to spend £161 million maintaining existing flood defences and £270 million building new and improved ones. SMPs are to be reviewed every 10 years

2.12.3 Climate Change

Coastal sea levels in the western counties of Britain have been rising at approximately 2.5mm per year during the 20th century but this rate is now accelerating rapidly. Predictions for the next 100 years suggest a rate of up to 1cm per annum (averaged over the whole period). It is also likely that the frequency of extreme storm events will also increase. In the long-term, an increasing amount of property will become subject to flood and erosional risk. Whilst most urban coastline will continue to be defended, there are likely to be some places where property could not be defended without unjustifiable costs or environmental damage.

2.12.4 C-SCOPE MMA

On Dorset's rural coast the issue of coastal defence is also set within long-term conservation objectives. In particular there is a need to protect the natural processes that both underpin the coast's internationally important geomorphology and to maintain the UNESCO World Heritage designation awarded in December 2001.

With few developments along much of the MMA coastline, many sections remain without man-made defences. It is therefore the smaller coastal towns such as Portland and Swanage, and villages which are most at risk from loss. Within the last 10 years, new or upgraded coast protection schemes have been implemented at Ringstead, the Nothe (Weymouth) and Durlston.

Chiswell and Weymouth are more vulnerable to flooding, and major flood protection schemes have been built; at Chiswell, the EA has put in place a major flood defence scheme and maintains an advanced flood warning system for all local residents. They are seeking to further improve the effectiveness of the early warning system

2.12.5 C-SCOPE MMA Forecast

Within the MMA, the Durlston-Rame Head (South Devon and Dorset) SMP applies. This assesses the large-scale risks associated with coastal processes and helps reduce these risks to people and the developed, historic and natural environments. The Plan is the basis for deciding and putting in place specific flood and erosion risk management schemes, coastal erosion monitoring and further research on how communities can best adapt to change (Figure 43).

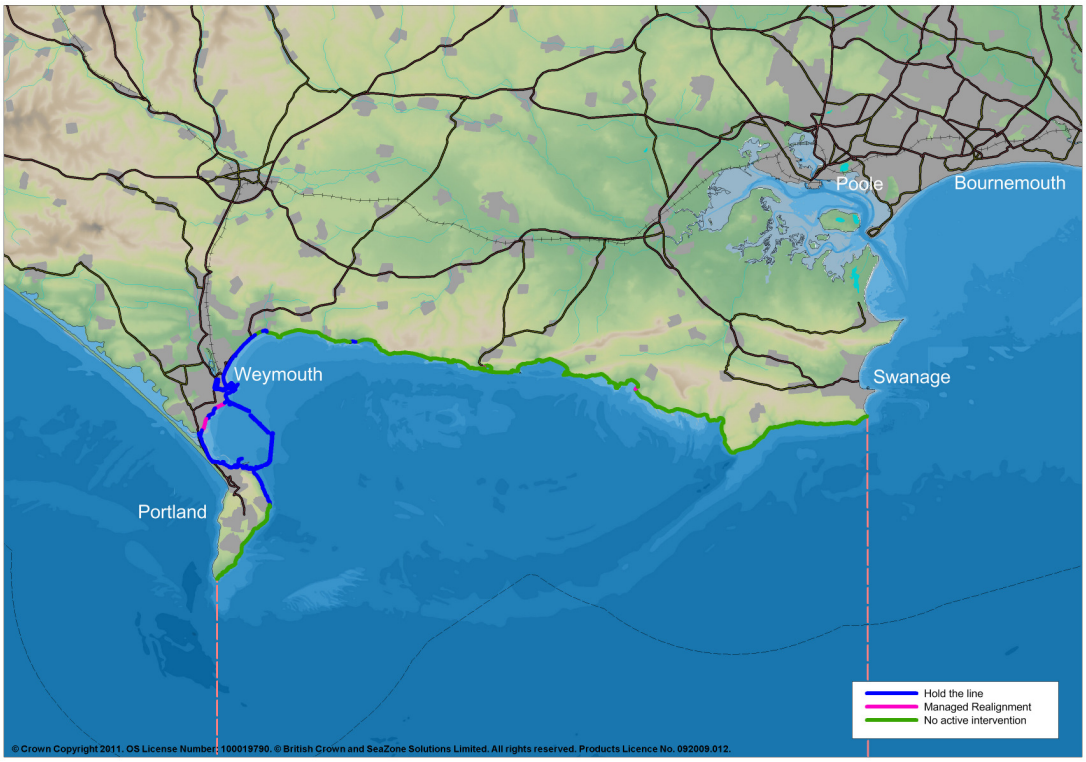

Figure 43: Durlston-Rame Head SMP twenty year epoch policies

The EA have indicated that a further level of more detailed 'Strategy Plans' may be required for some sections of the coast in the future. These aim to ensure more detailed strategic consideration of the long-term and knock-on effects of proposed schemes, and to ensure related schemes are tackled in an integrated way.

2.13. Ministry of Defence

UK defence policy demands the maintenance of capable armed forces, under the responsibility of the Ministry of Defence (MoD). In meeting this requirement, the military require residential bases, and access to adequate facilities for exercise and training. Dorset continues to play its part in fulfilling the MoD's requirements by hosting three significant military establishments, which represent long-term commitments: Army Gunnery School based at Lulworth, the Royal Marines landing craft training wing based at Poole and the Wyke Regis Training Area (Figure 44).

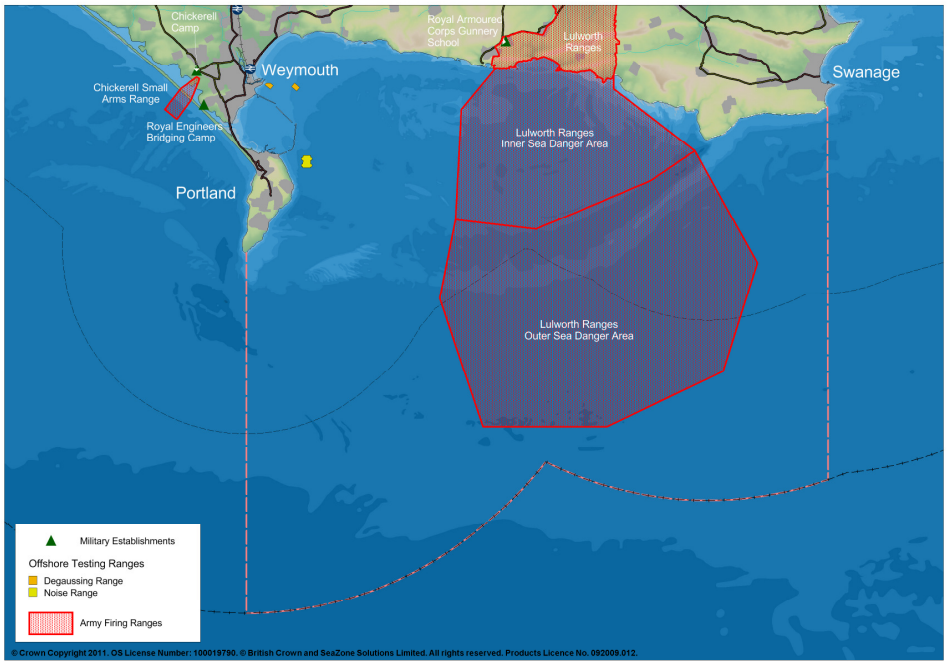

Figure 44: Military bases and exercise areas

Substantial offshore areas are marked on charts as Navy exercise areas. Dorset's coast has been used for naval training for many years but the closure of the Naval Base and relocation of the Navy's sea training unit has led to a substantial decrease in use. The Navy advises that surface use by warships is much reduced, and the main focus for exercise is now off South Devon and Cornwall extending out to the Atlantic. Ships will be found on passage and continue to conduct independent exercises off the Dorset coast. The Navy advise that submarine exercises are now extremely rare off the Dorset Coast and consider that this aspect can be discounted.

Portland Harbour is still used by the military. The Royal Fleet Auxiliary Service (RFA), a civilian manned fleet owned by the Ministry of Defence, supply warships of the Royal Navy at sea with fuel, food, stores and ammunition. The RFA Wave Ruler, RFA Bayleaf and other ships are regularly berthed for maintenance and to collect supplies.

RFA Sir Tristram, an ex-navy warship support vessel, is now permanently moored in Portland Harbour and is used by the military for helicopter, diving and ordinance operations. Royal Naval Reserve (RNR) Divers Branch have used RFA Tristram for part of a course specialising in Underwater Force Protection (UWFP) & Search techniques, where they learnt how to lay

and carry out underwater searches. The Noise and Magnetic/ Degaussing Ranges are within the Harbour limits.

Given the current economic climate and major budget cuts to the MoD, it is very unlikely that there will be any expansion of MoD activity.