Marine Management Organisation

Economic baseline assessment for the North East, North West, South East and South West marine plans

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MMO1119: Economic baseline assessment for the North East, North West, South East and South West marine plans

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ATKINS

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Executive summary

Atkins was commissioned by the Marine Management Organisation (MMO) to undertake an economic baseline assessment of the North East, North West, South East and South West marine plan areas.

The aim of this research is to provide economic baseline information for the marine plan areas which will inform the development of the marine plans. This research is focused on the following sectors' activity within the plan areas:

- Aggregates
- Aquaculture
- Carbon Capture and Storage
- Coastal Protection
- Coastal Tourism
- Defence
- Dredging
- Fisheries
- Marine Recreation
- Nuclear
- Oil and Gas
- Ports
- Shipping
- Renewables
- Telecoms and Communications

The research assesses employment, business and Gross Value Added (GVA) information in each of the marine plan areas. In doing so, the report follows the approaches outlined in MMO 1050 and MMO 1075. This approach draws heavily upon Government data and relies on sectoral definitions that use standard industrial classifications. However, in the cases of marine aggregates and renewables we have taken slightly different approaches. There is little available data on coastal protection and dredging.

We have attempted to standardise the approach to support future assessment or replication of information. The research largely utilises standard industrial classification definitions of employment (using the Business Register and Employment Survey (BRES)) and businesses (Office for National Statistics (ONS) Enterprise Counts). The approach to calculating GVA contribution multiplies employment for an industry by GVA per worker estimates for the industry available from the ONS. Economic contribution for the Renewables and Aggregates sectors was calculated using industry information as the level of detail within Government data was not sufficient.

Marine Plan Areas

The marine environment is interlinked with our economy. The attributes of the physical geography, geology, ecology and other environmental assets in the marine plan areas have played an important role in shaping local economies and will continue to affect the paths of local and national economies in the future.

Across all of the marine plan areas, the marine sectors have been assessed in detail, looking at their contribution to the economy in terms of direct and indirect employment, number of businesses and GVA.

The economic contributions of the marine sectors in the four marine plan areas are as follows:

- North West: 343,000 direct and indirect jobs, £24.7 billion GVA contribution.

- South East: 419,640 direct and indirect jobs, £42.6 billion GVA contribution.
- South West: 350,250 direct and indirect jobs, £16.4 billion GVA contribution.
- North East: 67,980 direct and indirect jobs, £4.1 billion GVA contribution.

The largest contributing sectors in terms of employment and GVA across all marine plan areas are:

- Coastal Tourism
- Nuclear
- Ports & Shipping
- Oil & Gas (North West and North East)
- Defence (South West)

The analysis demonstrates features of England's economic geography in all of the marine sectors which are important for marine planning activities and decision making. For example, the higher contribution of Oil and Gas in the North East and North West which is linked to the Chemicals, Oil and Gas Processing clusters in Teesside (North East) and Runcorn (North West).

The report rates the confidence in the figures and notes that not all of the outputs are in line with other industry or research reports. As such, we highlight where confidence in the outputs (employment, business numbers and GVA) is not assured and therefore caution should be applied in using these figures.

The analysis also highlighted difficulties in assessing sector information for the following sectors;

- Coastal Protection, whereby the sector's broader contribution to Construction of water projects is utilised as a proxy for the size of the sector.
- The Dredging sector had no suitable information available with economic activity likely to be captured in Aggregates and Coastal Protection economic information.
- Carbon Capture and Storage sectors had no suitable information available due to the limited economic activity in this sector (as of 2016).

In assessing the economic activity for all of the marine sectors we draw upon a private dataset from Intelligent Data Group to provide further insight. The private datasets appears to provide further insight into the following sectors: shipping & ports, telecoms, marine recreation and nuclear.

We note that private data could be utilised further to assess sectors where government statistics are not available at a detailed level (e.g. renewables). This could require bespoke research.

To support the assessment of sector information. The team produced a series of maps in Google Fusion© to support ongoing economic assessment of marine plans and to support live and flexible project work. An example is produced within this report and the steps taken to deliver these maps are outlined in more detail (Chapter 8).

Conclusions

The conclusions, focused on data and analysis, are presented below:

- **Government data –** There are constraints around coverage and ability to define certain sectors. However, the level of detail and manipulability of Government data support a robust analysis of most marine sectors.
- **Temporal -** Research for several of the data sources and reports was undertaken in different time frames. As a result, the information available for certain sectors can be out of date.
- **Sector definitions -** Several sectors are challenging to define using SIC codes. This is largely to do with how sectors are categorised in SIC format. Where this occurs, other sources of information are needed, such as private data or industry reports. Furthermore, some sector activities are captured by multiple SIC codes.
- **Indirect & Direct Employment/Supply Chain -** In the absence of reliable quantitative data on supply chains for each sector, the use of indirect employment multipliers provides a broad estimate of the scale of indirect employment rather than a complete picture of indirect economic activity.
- **Industry reports -** This report relies on several industry reports and research papers. We have identified research which is primarily marketing or political material and is less robust. The use of industry reports, data and research should be considered to ensure robustness in the analysis of data.
- **Private data -** Our assessment of private data has shown that in some cases more economic activity is captured in data purchased from private agencies/suppliers. There is precedent in other research where private data has provided useful assessments of the low carbon sector (DBIS 2015), although careful consideration should be made into the type and format of the data that is purchased.
- **Calculating GVA -** The analysis of GVA contribution could benefit from more detailed GVA per head figures, which are available for some sectors in industry or academic research but require further assessment for their suitability.
- **Apportioning -** We avoid apportioning data from different sources where possible, in favour of a standardised approach. Furthermore, the assumptions for taking apportions are subject to uncertainties. We recommend that assumptions are evidenced where possible and that the outputs from any apportioning are checked against industry or academic research.
- **Geographically specific sectors -** The research has shown that economic geography should be a key consideration when analysing economic sectors to include all of the relevant marine activities.
- **Terrestrial and Marine Activities -** It is often difficult to distinguish marine from terrestrial activities in national and private data. The Google Fusion maps outline an approach to supporting the visualisation of this data.
- **Quality of data available -** Standardising the approach, assessing the quality of the data and rating confidence in it is a useful step in supporting research outputs which can be utilised in the future and can be considered robust

Recommendations

A series of recommendations are made to support the work of the MMO and future economic analysis:

- **Policy and contextual review -** Undertaking a review of the contextual background and policy in a Marine Plan Area at the regional, sub-regional and local levels is useful in supporting analysis of marine sectors. The reviews undertaken for this study provide useful information such as the identification of priority LEP sectors and local information about economic growth (e.g. local economic assessments).
- **Key assets -** Key economic assets (e.g. Power stations, military bases or beaches) are often identified in wider industry reports and local information. When considering these sectors it may be appropriate to undertake site visits or more detailed horizon scanning to explore where key assets are and their linkages with the economy.
- **Definitions -** The MMO may wish to consider endorsing the adjustment of how sectors are reported in national statistics. Liaising with the ONS and other appropriate bodies could support more detailed information for future economic analysis.
- **Standardised approaches -** The approach to economic analysis should focus on national statistics, industry reports and policy information. We would advise that future work draws upon this report and the preceding reports (MMO 1050 and MMO 1075) to standardise approaches to economic analysis and support decision making.
- **Detail of data -** Examining economic sectors at a detailed geographic level can highlight known areas of concentrated marine activities and areas where further research or investigation is required.
- **Mapping -** Further use of mapping tools will be valuable to understanding marine sectors, economic activity and other features of marine plan areas, adding value to MMO's future marine planning work.
- **Flexibility in sector coverage -** There is ambiguity around several sector definitions. Flexibility in defining a sector can support better decision making and analysis of local economic activities. For example the report draws in a wider Oil and Gas definition which is useful for assessing key economic activities.
- **Use of private data -** Where budget allows, private data should be used for the analysis of shipping & ports, telecoms, marine recreation and nuclear sectors. Private data may be suitable for analysis of other sectors if conversations with data suppliers identify ways of defining 'hard-to-define' sectors.
- **The geography of marine plan areas -** The geographies of the marine plan areas are outlined by the MMO. Economic analysis would benefit from more precise definitions for economic analysis and working across boundaries. Working with other government bodies and administrations can support marine planning activities.
- **Nature and the economy** - Approaches such as natural capital accounting and ecosystem services could add significant value to understanding how

local populations and certain sectors interact with nature as well as highlighting the social and economic benefits of the natural environment.

1. Introduction and scope

Atkins was commissioned by the Marine Management Organisation (MMO) in January 2016 to undertake an economic baseline assessment of the North East, North West, South East and South West Marine Plan areas. This follows on from the economic baseline assessment of the South marine plan areas conducted in 2014.

The MMO was established following the Marine and Coastal Access Act 2009 and one of its delegated responsibilities is preparing Marine Plans for the English inshore and offshore waters. Marine Plans set out priorities and directions for future development within the plan area, inform sustainable use of marine resources and help marine users understand the best locations for their activities. Marine Plans guide those who use and regulate the marine area to encourage sustainable development while considering the environment, economy and society.

The boundaries of the Marine Plan areas are shown in Figure 1. This report focuses on the following Marine Plan areas:

- North East – (Areas 1 and 2)
- South East – (Area 5)
- South West – (Areas 8 and 9)
- North West – (Areas 10 and 11)

This report provides a baseline for marine-related economic activities currently taking place in the plan areas, and considers their contribution to local, regional and national economies. The assessment also provides information and advice to support future baseline assessments or future benchmarking exercises. The report highlights gaps in the availability of economic evidence and considers potential sources of data for future updates.

1.1 Aims and scope of this research

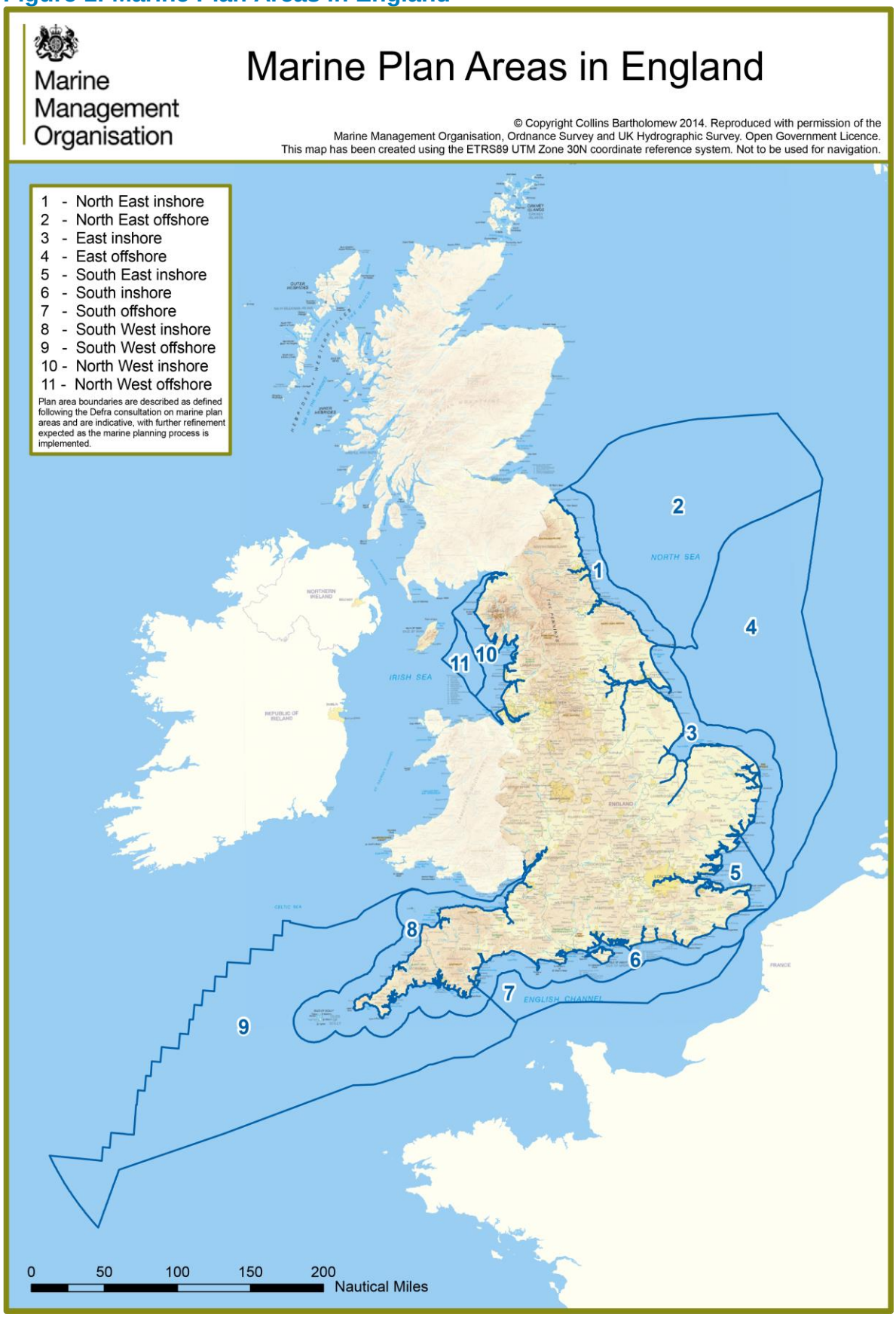
The aim of this research is to provide economic baseline information for the Marine Plan areas, to inform the development of the Marine Plans. It complements a number of other of pieces of research commissioned prior to the development of the plans. It is also anticipated that the findings of this project will contribute to other MMO functions by providing further understanding of economic activity within marine plan areas.

The core focus is to identify available baseline economic data, provide a policy review and highlight gaps in the available evidence. We focus upon the key economic metrics of employment (direct and indirect), business numbers, and productivity measured as Gross Value Added (GVA).

The scope of this research is concentrated on the following sectors' activity within the plan areas:

- Aggregates
- Aquaculture
- Carbon Capture & Storage
- Fisheries
- Marine Recreation
- Coastal Protection
- Coastal Tourism
- Defence
- Dredging
- Nuclear
- Oil and Gas
- Ports
- Shipping
- Renewables
- Telecoms & Communications

Figure 1: Marine Plan Areas in England



Source: Marine Management Organisation. © Crown copyright and database right. Map available at : https://www.gov.uk/government/publications/marine-plan-areas-in-england

1.2 Methodological approach

The following steps were undertaken in developing the economic baseline for the four Marine Plan areas. The process undertaken is outlined below, it should be noted that the steps are not sequential due to the nature of the research process.

1.2.1 Policy review

The team assessed policy documents in all of the Marine Plan areas focusing upon sub-regional and planning documentation. This included:

- Local Enterprise Partnership documents including Strategic Economic Plans, Growth Plans and Sector Studies;
- Local planning documentation such as Local Plans and Local Core Strategies, employment land reviews, housing strategies and national infrastructure plans;
- Independent reviews and Government data on economic growth or sectors;
- National Policy Statements;
- Revoked Regional Spatial Strategies (RSSs);
- Local Transport Plans; and
- Reviews of sectors undertaken by industry bodies or other organisations.

This information has fed into the review of local and national policy for each Marine Plan area and sector assessments.

1.2.2 Sector economic baseline assessment

For this economic baseline assessment, we have focused on three types of economic data:

- The direct and indirect employment;
- The number of business; and
- The Gross Value Added (GVA).

Our approach differs from the MMO 1050 and MMO 1075. This stems from professional judgement on the method applied to sectoral analysis, the scope of activities within each sector, the distinct features of each Marine Plan area, and a recognition that standardising the information makes replication in the future possible.

We have utilised geographies for data collection which are of most relevance to the Marine Plan areas. In most cases this means using former Government Office (or NUTS 1[1]) Regions with reference to activities outside of these boundaries where required. However, for the South East Marine Plan area a bespoke geography was created. This is due to the requirement to capture suitable activities within the Marine Plan area and the incompatibility of existing boundaries (NUTS 1 or Local Enterprise Partnership geographies) in analysis of this Marine Plan area. We note in our mapping section that the boundaries of administrative geographies can limit analysis and as such we outline an approach to mapping data which supports access of data.

[1] Nomenclature of Territorial Units for Statistics (NUTS) is a standard referencing geography for statistical purposes which is developed and regulated by the European Union.

We outline the steps taken to assess the direct and indirect employment, businesses and GVA below.

Direct employment and businesses

To assess direct employment and businesses for each of the sectors we have utilised Office for National Statistics (ONS) sector data from the Business Register and Employment Survey (BRES) and from the ONS Enterprise Counts which draws upon the Inter-Departmental Business Register (IDBR). We have utilised standard industrial classifications (SICs) at the most detailed level (five digit-codes) to assess the sector definitions.

To standardise the information we have provided information on the economy in 2014 which uses the most up to date (at time of analysis) BRES and ONS data.

The report draws upon:

- MMO 1050: Economic baseline assessment of the South Coast (2013)
- MMO 1075: Exploring the potential of using Office for National Statistics (ONS) data for Marine Planning (2014)

MMO 1050 and MMO 1075 are used as a starting point for defining sector activities and definitions or analysis are built upon or adjusted where it was adjudged that this would be suitable for the study.

We outline the sector definitions and SICs utilised in Appendix A1a and A1b.

In aligning this study with MMO 1050 and MMO 1075 we have sought to utilise similar definitions and approaches where the data available allows and is suitable. Where suitable definitions do not exist in ONS data or are not aligned to marine activities we have utilised other sources. We have outlined where we have undertaken a different approach to employment and businesses in Table 1 below.

Table 1: Direct Employment and Business Methodological Approaches

Sector	Approach
Aggregates	There is no ONS data at the level of detail required to assess the sector's employment or businesses accurately. We draw upon British Marine Aggregate Producers Association (BMAPA) 2015 report estimates for employment in Britain and further work by BMAPA in 2007 which helps us to understand the composition of employment in the industry in England. This provides an overall employment figure for the industry of 1,144 (which breaks down as 409 in extraction, 385 on wharves and 350 in the delivery of sand and gravel). National level figures break down to a regional level by applying the proportion of the total amount of aggregate landed in the region, which is multiplied by the total employment. Business numbers are calculated on the basis of the number of firms which have licenses although we note that this may slightly underestimate the direct aggregate business numbers.
Aquaculture	The level of information within ONS data is sufficient for analysis of this sector. MMO 1075 reduces the freshwater employment and business numbers through apportionment. This assessment takes a different approach due to confidence in methodology and to support future replication, The analysis is supported by maps of aquaculture sites in England produced by Defra/Cefas which support the assessment of the scale of marine activities in this sector (Appendix A2).
Carbon Capture & Storage	There is no information from industry or national statistics. We highlight where local developments could in future create data and where data at a national level includes CCS activities.
Coastal Protection	The level of information within ONS data is sufficient for analysis of this sector although we note that this sector is likely to be captured across several sectors. We follow guidance from MMO 1075 to use 42910: Construction of water projects SIC and apply a 50% apportionment to employment and businesses numbers to account for activity linked to marine or coastal activities.
Coastal Tourism	There is good industry information available for this sector at a broad level. However, it frequently does not separate coastal tourism from other tourism activities and data cannot always be interrogated. We use ONS data for our assessment of the sector and also utilise MMO 1075 guidance on apportioning activity in SIC: 93290: Other amusement and recreation activities, which splits activity between tourism and recreation.
Defence	The level of information within ONS data is sufficient for analysis of this sector. However, we note that there is no information to isolate marine elements
Dredging	There is no suitable information from industry or national statistics with much economic activity captured in Coastal Protection or Aggregates sector definitions or industry data. We highlight where data is likely to be captured in ONS data and also note the importance of this sector to other marine sectors.

Sector	Approach
Fisheries	The level of information within ONS data is sufficient for analysis of this sector. We include further fish processing and manufacturing activities in our analysis because of the strong linkages across marine activities, noting that this inclusion may overstate the employment and business counts in this sector.
Marine Recreation	The level of information within ONS data is sufficient for analysis of this sector. MMO 1075 identifies how certain recreation activities in the Marine Plan areas are not referenced in ONS classifications. For example '93210: Activities of Sports Clubs' and '93199: Other Sports Activities' includes some activities which are relevant and some which are not. MMO 1075 highlights that there is no data available to indicate the share of sport club economic activity and employment associated with marine sports and indicates that an assumption that 10% is comprised of marine-associated activity is reasonable for the analysis. We have therefore apportioned the 'Activities of sports clubs and other sports activities' to 10% of the total and used 50% of 'Other amusement and recreation activities' (as in Coastal Tourism above). Industry reports, such as those produced by the British Marine membership organisation, are of use in assessing employment and economic contribution. We have used this information as a test for ONS data.
Nuclear	The level of information within ONS data is sufficient for analysis of this sector. We also highlight industry employer information from Nuclear Power Stations, which provides useful insight into the regional concentration of activity, and the wider energy industry, to show the importance of Nuclear Power in each of the regions.
Oil and Gas	The level of information within ONS data is sufficient for analysis of this sector. However, we took a wider definition of the sector in account of regions where there are wider economic activities linked to chemicals, processing and manufacturing. In the North East and North West there are employer organisations which support the assessment of the industry's employment and business base. Where this information was available it was used to test the ONS data.
Ports & Shipping	The level of information within ONS data is sufficient for analysis of this sector. This is also how industry reports such as those produced by Maritime UK have come to their assessment of the both the Ports and Shipping sectors. MMO 1075 and MMO 1050 highlight the close interactions between Ports and Shipping and, whilst it is possible to separate out these activities, we have grouped them together because of their close proximity and likely marine interactions.
Renewables	Definitions of the sector do not map well to Standard Industrial Classification (SIC) codes and many of the businesses operating in renewables also participate in other, non-low carbon sectors (e.g. traditional energy generation, oil and gas and so on). (DBIS 2015) For this study it is also important to assess offshore wind, wave and tidal energy, rather than the renewables industry in its entirety. Although most Local Enterprise Partnerships provide a broad understanding of the economic profile of the

Sector	Approach
	renewables (or low carbon) sector, often this data is neither detailed nor broken down to sector level. The most useful information for the whole renewables industry available is from the Renewable Energy Association (now RenewableUK) in 2012 which highlights broad numbers of employment, businesses (not for all regions) and economic contribution for the regions of England. However, due to the timescales of that report and lack of raw information to assess, we adopt an alternative approach relying on the assumption that the scale of employment is equivalent to gigawatts of energy produced. Utilising employment information across several wind energy projects, we estimate the employment per gigawatt and apply this to the amount of wind energy produced in that region. This provides employment figures for the industry which are lower than overall sector estimates but can be readily updated and can be assumed to be marine focused. Businesses numbers are calculated using the ratio of employment to businesses in industry literature and applying this to the regional employment figures. In addition to this, the South West estimates utilise wave and tidal information from an industry report produced by South West Marine Energy Park. Although the employment is not up to date, it is assumed to be consistent. We utilise this information as UK Marine Energy Database (UKMED) indicates that most activity is based in the South West.
Telecoms and Communications	There is a good level of information within ONS data for this sector. However, it is unknown to what extent activities across all SICs are marine based. Much of the economic data associated with the sector is associated with the onshore telecommunications industry rather than activity which relates to the offshore. To overcome this issue we build on guidance within MMO 1075 and reduce the assumption of suitable activity (from 10% to 5%) in 61900: Other telecommunications activities. This also overcomes the large employment figures in this sector which could be connected to telecommunications resellers.

Indirect employment

To provide a standardised approach to calculating indirect employment we utilise employment multipliers provided by the Scottish Government which draw upon economic analysis for the years 1998 to 2012. While this data is specific to Scotland, it can also be used as a proxy to broadly estimate indirect impacts in English regions. However, like the sectors, the multipliers are not always at the required level of detail. Where this is the case we have used the most similar or broad industry multipliers. For example, we use the multiplier for Electricity in place of a multiplier for renewables.

In some cases detailed indirect employment information is available from other sources. However, we have not utilised this information and instead apply a standard approach. Industry publications and the information within them are considered and where the context is different. For example, in MMO 1075 the assessment of marine aggregate uses the indirect employment ratio from a Lafarge Granulats study for the quarrying industry in France.

GVA estimates

Estimates for the economic contribution of each sector measured by GVA is another area where we have utilised a standardised approach. This differs from approaches outlined in MMO 1075. However, as this report demonstrates, there can be a degree of confidence in the figures used and information can be replicated in the future.

The approach multiplies employment (indirect and direct) for an industry by GVA per worker estimates for the industry (at a regional level) available from the ONS. GVA figures for 2014 were not available so 2012 figures have been projected forward. We have utilised regional GVA per worker figures which are calculated by dividing the regional GVA for the broad industry (publically available and most detailed level) by employment in that industry. This provided GVA figures per worker at the broad sector level. The assessments for each sector then utilise GVA per worker figures for the broad industry it is within or aligned with. For example, the GVA per worker estimate for Fisheries uses the GVA per worker for Agriculture, forestry and fishing.

More detailed GVA per worker estimates for certain sectors are available from industry or academic literature. The approach used to calculate GVA overcomes challenges of variety and uneven coverage of information available by maintaining a consistent approach. The GVA calculations are reliant on robust sources of employment and GVA per worker estimates. However, they should be treated with caution and there is potential for further research work to provide more detailed estimates.

Sensitivity & confidence

Across all assessments of employment, business and GVA contribution we have undertaken a sensitivity test by referring to other economic information or literature on the sectors. This is largely qualitative and focuses on where differences exist between our assessment and other assessments. We highlight where differences are substantial or where our assessments are more closely aligned, noting that there will be several differences between our methodology and data sources and others, often where the data or approach is unknown or not publically available.

Private Data Analysis

In order to assess the sectors in further detail, the MMO purchased privately available data (from Intelligent Data Group, IDG) to support the analysis of marine sectors. For private data we have used the same SIC codes where available (where not available, we have highlighted this in the analysis and confidence rating and in Appendix A1b) and the same apportioning assumptions.

Private business data from data providers[2] can add significant value to research of business sectors. This data often has a larger coverage of the business base than Government data and is often validated by checking with individual companies and against other figures.

The data purchased from Intelligent Data Group provides another analysis of the economic contribution and size of the sectors in terms of employees, businesses and turnover. It should be noted that the analysis of private data assesses direct employment (not indirect employment), and turnover rather than GVA. When making comparisons between the private and Government data, it must be noted that the latter two indicators are different measures of economic contribution. Measured GVA is usually a proportion of turnover, this can vary by industry. We also assessed broader sector information to support understanding of the whole supply chain in absence of indirect employment analysis.

There are some disadvantages which affect the ability to make comparisons between analyses supported by private and by Government data. As mentioned above, GVA and turnover are not equivalent measures of economic contribution, and private data does not include estimates of indirect employment. Other issues include those around business definitions whereby companies self-report or are allocated a different code. In some cases this means that data is more accurate but it can mean that some more detailed SICs are not captured. This is an issue for all data providers as company activities can cut across a range of sectors. For example, marine engineering activities could be within several. There are also instances where coverage of sectors is lower, this is due to inability to validate information or incomplete information. In some cases missing information can be modelled on the basis of existing information. The information created by data providers is often focused upon marketing activities and as such the format and characteristics do not always lend themselves towards economic analysis.

We highlight in Appendix A4 the reasons behind differences between publically available data and private data figures.

Mapping

To support the analysis we have mapped the sector employment using ONS data on employment from BRES. This works across industries where an SIC definition is possible. Mapping is possible for any other datasets that may be suitable at a local level (e.g. businesses or demographic information).

[2] Data providers such as Experian, Dun and Bradstreet, Intelligent Data Company and TBR ltd

Rather than present this data in the report we have provided the MMO with the tools and interactive mapping capability through Google Fusion © so that the data can be assessed in more detail in future planning or evidence work.

1.4 Structure of this report

This report is structured and covers the following topics:

- **Chapter 2** assesses the National Policy looking at the relevant UK Government policy drivers and economic development statements including those connected to national policy statements.

- **Chapter 3** provides an overview of the Marine Sectors which are assessed in this report, highlighting their scope and national important.

- **Chapters 4 to 7** assess the economic baselines for the four Marine Plan areas and explore the:
    - Relevant policy that affect the local economy
    - An overview of the state of the environment;
    - An assessment of all Marine Plan sectors and subsequent analysis of employment, business and GVA contribution;
    - We undertake an analysis of privately owned data to supplement the analysis
    - We look at the overall economic contribution of the sectors and the confidence that the authors have in the data and sources of information.

- **Chapter 8** outlines how to create sector maps using Google fusion.

- **Chapter 9** outlines the report's summary and conclusions, identifying issues connected to data availability and quality as well as lessons learned and recommendations.

- The **Appendices** outline the sector definitions, highlight important maps used in the report and provide references used in the collation of this report.

2. Study Context

This section provides a review of national policy documents relevant to marine planning. This provides context for the subsequent analysis of the economy in the Marine Plan areas.

2.1 National policy

Marine planning
The Marine and Coastal Access Act 2009 introduced a new system of marine management. This includes a new marine planning system, aimed at achieving sustainable development in the UK marine area.

The Government is using the reforms enabled by the Planning Act 2008 ('The Planning Act') and the Marine and Coastal Access Act 2009 to strengthen the system, offering greater certainty both to those who propose new developments and to people who wish to make representations on those proposals.

The process and policy for deciding large infrastructure projects has changed in recent years, following the introduction of the Planning Act which establishes the regime for obtaining consent for Nationally Significant Infrastructure Projects (NSIP). Previously, the majority of planning decisions for infrastructure were either decided locally through the Town and Country Planning Act 1990 (TCPA 1990) or under separate specialist regimes by the relevant Secretary of State. Most infrastructure below the nationally significant thresholds in the Planning Act is still decided locally under the TCPA 1990.

Marine Policy Statement (MPS)
The 2011 Marine Policy Statement (MPS) provides the framework for preparing Marine Plans and taking decisions affecting the marine environment, required for the purposes of section 44 of the Marine and Coastal Access Act 2009. All UK administrations have jointly adopted the MPS through primary legislation.

The MPS supports the formulation of high level Marine Plans, which ensure marine resources are used in a sustainable way. The objectives of the MPS are to promote sustainable economic development, enable a move towards a low-carbon economy, ensure a sustainable marine environment, and contribute to the societal benefits of the marine area. The MPS aims to achieve integration between different objectives including: recognise that the demand and pressure for use of our seas will continue to increase, managing competing demands, take an ecosystem- approach, enable co-existence of compatible activities and integrate with terrestrial planning.

The MPS and marine planning systems sits alongside and interacts with existing planning regimes across the UK. These include planning and other legislation, guidance and development plans in each administration. In England and Wales this also includes the development consent order regime for NSIPs. In England (and Wales), consents for nationally significant infrastructure projects, including offshore renewable energy and port developments, need to be determined in accordance with the Planning Act 2008. Where a relevant National Policy Statement (NPS) has been

designated, nationally significant infrastructure project applications must be decided in accordance with the NPS, subject to certain exceptions, and having regard to the MPS, or the decision is for the Secretary of State. The Marine Plan authorities in England (and Wales) should have regard to any relevant NPS in developing Marine Plans and in advising other bodies.

The MPS area boundaries physically overlap with that of terrestrial plans. This overlap ensures that marine and land planning addresses the whole of the marine and terrestrial environments respectively, and is not restricted by artificial boundaries at the coast. Integration of planning will be achieved through liaison between respective authorities, sharing evidence and data, creating consistency between marine and terrestrial policy documents and guidance.

Activities taking place on both land and sea can have impacts on both environments. The coast and estuaries are highly valued environments, as well as social and economic assets, and activities taking place on these environments can have significant impacts. The activities taking place within coastal areas, are managed in an integrated and holistic way in line with the principles of Integrated Coastal Zone Management (ICZM).

Marine Plans should promote economic growth and sustain local jobs. The Marine Plan authority should contribute, through engagement and integration with terrestrial planning, securing sustainable economic growth supporting both regeneration areas and existing strong local economies.

Effectively planned developments can provide environmental and social benefits as well as drive economic development in the marine area. They can also provide opportunities for investment, and generate export and tax revenues. Long established marine-related activities and industries such as fishing, marine transport, port related storage and processing, and oil and gas can provide opportunities for employment providing significant socio-economic benefits to coastal communities.

Local Planning Authorities

As required by the Marine and Coastal Access Act 2009, Local Planning Authorities (LPA) in coastal areas should take account of the UK Marine Policy Statement and Marine Plans and apply Integrated Coastal Zone Management across land and sea boundaries to ensure integration of the terrestrial and marine planning regimes.

Local authorities should work with neighbouring authorities and transport providers to develop infrastructure strategies including large scale facilities such as rail freight interchanges, roadside facilities or transport investment necessary to support strategies for the growth of ports, airports or other major generators of travel demand.

LPA's should work collaboratively with other bodies to ensure that strategic priorities across local boundaries are properly coordinated and reflected in Local Plans. In marine areas, LPA's should collaborate with the Marine Management Organisation to ensure that policies across the land and sea boundary are integrated. As part of this joint working process, they should consider producing joint planning policies on

strategic matters and informal strategies such as joint infrastructure and investment plans.

Mineral Planning Authorities
Mineral Planning Authorities (MPA) plan for a steady and adequate supply of aggregates including marine dredged, secondary and recycled sources by preparing an annual Local Aggregate Assessment. This can be produced individually, jointly or with other MPA's based on data from rolling average of 10 years sales and other relevant local information, including an assessment of all supply options.

2.2 National policy statements

National Policy Statements (NPS) provide the framework for making decisions on proposals for new developments and outline the Government's objectives relating to nationally significant infrastructure.

Ports
The National Policy Statement for Ports directs proposals for new port developments and is a relevant consideration for the Marine Management Organisation and for local planning authorities. It applies to associated development such as road and rail links, for which consent is sought alongside that for the principal development. Non-ports associated developments are considered on a case-by-case basis.

The Government seeks to encourage port related policies which cater for the projected long-term growth in volumes of imports and exports by sea through sustainable port development. This promotes a competitive and efficient port industry capable of meeting the needs of importers and exporters. Policy will allow judgments about when and where new port industry developments might be proposed to be made on the basis of commercial and environmental factors. Policies will ensure all proposed developments satisfy the relevant legal, environmental and social constraints and objectives, including those in the relevant European Directives and corresponding national regulations.

Port development, wherever possible, will be an engine for economic growth, support sustainable transport by offering more efficient transport links with lower external costs, and support sustainable development by providing additional capacity for the development of renewable energy. These policies are intended to support the improvement of economic, social and environmental welfare through sustainable development.

Energy
The National Policy Statement for Energy (NPS EN-1) provides the primary basis for decisions by the Infrastructure Planning Commission (IPC) on applications it receives for nationally significant energy infrastructure. It highlights the increasing reliance on imports of oil and gas as a result of declining North Sea reserves.

The NPS highlights a range of different marine activities including how finished petroleum products are distributed from the refineries to around 50 major distribution terminals in the UK by pipeline (51%), by sea via coastal tankers (34%), or by rail

(15%). At several coastal terminals finished products are imported from abroad. Onward distribution to customers is mostly by road tanker, but some of the larger customers have pipeline connections.

New pipeline infrastructure could require associated works including oil processing plant to pump or filter blend products, storage tanks for bulk storage and product settling, road handling facilities for discharge into road tankers and jetties for loading and offloading sea tankers.

Renewable Energy

The National Policy Statement (NPS EN-3) taken together with the Overarching National Policy Statement for Energy (EN-1) provides the primary basis for decisions by the Infrastructure Planning Commission (IPC) on applications it receives for nationally significant renewable energy infrastructure.

The renewable energy NPS highlights several marine activities linked to offshore renewable or coastal renewable energy sources. It highlights how the impacts of dredging and spoil deposition at an LNG facility fit within licensable dredging and is a licensable activity under Part 4 of the Marine and Coastal Access Act 2009.

The NPS highlights how offshore wind farm site selection should be made with a view to avoiding or minimising disruption or economic loss to the shipping and navigation industries with particular regard to approaches to ports and to strategic routes essential to regional, national and international trade. The NPS outlines a pragmatic approach where proposed offshore wind farm is likely to affect less strategically important shipping routes.

National Networks

The National Policy Statement for National Networks (NPSNN) provides guidance on how decisions will be made relating to development consent orders for nationally significant infrastructure projects. It provides planning guidance for promoters of nationally significant infrastructure projects on the road and rail networks, and the basis for the examination by the Examining Authority and decisions by the Secretary of State (SoS).

The national networks support national and local economic growth and regeneration in the most disadvantaged areas. Improved and new transport links can facilitate economic growth by bringing businesses closer to their workers, their markets and each other. The national networks support national and local economic growth and regeneration in the most disadvantaged areas, helping to rebalance the economy. The NPSNN promotes the improvement and better integration between the transport modes, including the linkages to ports and airports. A modal shift to rail to reduce congestion around ports support ports. The railways are promoted to transport freight across the country, and to and from ports, from a network of Strategic Rail Freight Interchanges, which will improve trade links to Europe.

2.3 Economic development

Local Enterprise Partnerships
The UK Government initiated the establishment of Local Enterprise Partnerships (LEPs) in June 2010 based on the geographies that reflected the functional economic areas they serve. LEPs replaced Regional Development Agencies (RDAs) to an extent, providing a geographic focus thought to be more appropriate and fewer responsibilities. Local authorities and LEPs are leading local and sub-regional economic development activities in England. This supports the Government's strategy to increase national productivity, 'rebalance' the economy away from public sector employment, and further diversify the economy.

Productivity and infrastructure
The Government's productivity plan 'Fixing the foundations: Creating a more prosperous nation' (July 2015) sets out a 15 point plan to boost the UK's productivity growth. It is centred on two key pillars: encouraging long-term investment and promoting a dynamic economy. It sets out the Government's long-term strategy for tackling the issues that matter most for productivity growth, including publishing a new long-term National Infrastructure Plan (NIP) for the key economic infrastructure sectors – transport, energy, flood defences, water, waste, communications and science. The NIP is underpinned by the Infrastructure Pipeline and is supported by a dedicated National Infrastructure Plan for Skills, to deliver and maintain strategic infrastructure.

The National Infrastructure Commission works with the Government to support strategic decision making for the NIP and to ensure that "effective and efficient infrastructure" is delivered in the UK. The commission has a mandate to examine all sectors of economic infrastructure including energy, transport (roads, rail, ports and airports), water and sewage, waste, flood defences, and digital communications. The commission's role is to enable decisions to be made at a strategic level across sectors, looking at how the infrastructure system as a whole supports economic and social activity.

The Government is committed to attracting investment in energy infrastructure and production by reforming the oil and gas fiscal and regulatory regime and maximising the economic production of remaining reserves from the UK Continental Shelf. This is aimed at driving down costs and increasing production efficiency. There is also potential to develop the shale industry, which could support thousands of jobs in producing areas, including through a sovereign wealth fund for communities that host shale gas development.

To deliver reliable and low carbon energy, the Government is seeking to ensure the UK attracts the necessary investment to guarantee secure energy supplies, including through the development of shale gas, North Sea oil and gas production, and new nuclear power stations. The long term decarbonisation of the UK's energy sector is a long term aim, supported by a framework of cost effective low carbon investment.

The Government will support the market to deliver fixed and mobile digital communications infrastructure to businesses by reducing regulatory red tape and

barriers to investment, which will enable the UK to remain at the forefront of the digital economy.

3. Marine sectors

Marine Planning requires baseline data that relates to and quantifies each of the sectors highlighted in the Marine Policy Statement. Many of the policies contained within the Marine Plans are expected to be focused at the sectoral level. As such, this report focuses upon the following sectors:

- Aggregates
- Aquaculture
- Carbon Capture and Storage
- Coastal Protection
- Coastal Tourism
- Defence
- Dredging
- Fisheries
- Marine Recreation
- Oil and Gas
- Ports
- Shipping
- Renewables
- Telecoms and Communications.

3.1 Sector overview

This section provides an introduction to all of the sectors and their activities, identifying some high-level information about each sector to inform marine planning activities.

3.1.1 Aggregates

Aggregates can be extracted at onshore or offshore sites. The extraction of aggregates from offshore sites plays an integral role in meeting the needs of the construction industry. Marine aggregate dredging in England and Wales produces around 20 million tonnes of primary sand and gravel each year and satisfies some 6% of the nation's need for aggregates (Quarry Products Association 2005). Sea dredged aggregates also play a key role in beach replenishment, which is one method of protecting the coast against the impacts of coastal erosion.

3.1.2. Aquaculture

The majority of existing food finfish aquaculture activity (99%) is located in Scotland, although it is reported to be increasing in England (Productive Seas Report). Shellfish culture is spread more evenly throughout the UK. The value of both finfish and shellfish production in England in 2012 was £31.5 million (DEFRA 2015). Information on value and distribution of aquaculture production is not broken down on a regional level in England.

3.1.3 Carbon capture and storage

The commercial viability of carbon capture and storage (CCS) is yet to be demonstrated and the industry has been affected by early setbacks in terms of financing - the Government ran a 'UK Carbon Capture and Storage (CCS)

Commercialisation Competition' which made £1 billion of capital funding available to promote the design, construction and operation of the UK's first commercial-scale CCS projects, however the Government withdrew funding in 2015[3]. Despite the setback, the ambition to have a full scale CCS project operational in the UK before 2020 remains. Information on any developments in CCS technologies or projects is likely to become available at a local level within planning documentation or other evidence bases.

3.1.4 Coastal protection

Coastal erosion is common around the UK, especially in soft sediment and soft rock coastlines. The Environment Agency estimates that over 700 properties in England could be lost to coastal erosion by around 2030, and over 2,000 could be lost by around 2060 (Environment Agency 2015). These estimates take into account the interventions proposed in shoreline management plans (SMPs). Without these interventions, these figures could increase to about 5,000 properties by 2030 and about 28,000 by 2060 (Environment Agency 2015).

The Environment Agency and Department for Communities and Local Government are the key Government bodies involved in sea defences. In 2014, the Government announced a 6 year capital funding settlement to reduce flood and coastal risk in England. Risk management authorities working together have developed a programme that will benefit from £2.3 billion of Government grant-in-aid between 2015 and 2021 and provide better protection to 300,000 households. This increased with the commitment of an additional £700 million in flood defence funding from the Government in 2016.

3.1.5 Coastal tourism

Coastal and maritime tourism is the largest maritime activity in Europe and employs almost 3.2 million people, generating a total of €183 billion in GVA (European Commission 2014). Coastal and maritime tourism is an important tourism sector in England, which features several tourist assets with coastal or marine linkages. The quality of landscapes, cultural wealth, heritage importance and diversity of England's coastal areas make them a popular attraction for day trips and holidaymakers.

3.1.6 Defence

The UK defence industry is a key employer and contributor to the national economy, employing over 146,000 people directly with a turnover of £22 billion[4]. The Ministry of Defence (MOD) has a £34.3 billion budget for 2015/16 and a longer term commitment to meet NATO's target of spending 2% of national income on defence every year up to 2020[5]. There has also been consolidation in the defence industry, with reductions in spending on personnel, sale of assets and redirection of funds to areas identified as important for national security (e.g. surveillance).

[3] Guardian article on CCS funding: http://www.theguardian.com/environment/2015/nov/25/uk-cancels-pioneering-1bn-carbon-capture-and-storage-competition

[4] ADS Websites (Aerospace, Defence, Security and Space sector body), available at: https://www.adsgroup.org.uk/2015-industry-facts-figures/

[5] As outlined in 2015 Autumn Budget: https://www.gov.uk/government/publications/spending-review-and-autumn-statement-2015-documents/spending-review-and-autumn-statement-2015

3.1.7 Dredging

Dredging is closely linked with the ports sector and consists of gathering up or moving sediments and depositing them at a different location. Dredging ensures that the depths of ports, harbours and navigational channels are maintained for vessels to navigate through. There are two main types of dredging:

- Capital dredging, an infrequent process which results in the removal of large amounts of material from the sea bed to create or deepen a shipping channel in order to serve larger ships; and
- Maintenance Dredging, which involves removing the silt and sediment that has been deposited in the shipping channel over time.

Dredging is only permitted to take place in licenced areas if no significant environmental impacts are predicted. The environmental effects of dredging are continually monitored and reviewed throughout the lifetime of any dredging licence. Both types of dredging are important for a number of marine activities and consideration of several factors is required, including disposal and storage of material, reporting and environmental management.

3.1.8 Fisheries

It is estimated that UK vessels land around 400,000 tonnes of fish each year in the UK, as well as between 200,000 and 300,000 tonnes abroad (House of Commons 2016). Information produced for the UK Parliament reports that the "total number of fishermen is around 12,000, down from around 20,000 in the mid-1990s".This is linked to the decrease in number of fishing vessels in the UK fleet. Despite the decrease in employment, the UK fleet is the second largest (in gross tonnage terms) and has the second-largest total catch (in terms of landed weight) in the EU (second only to Spain on both measures).

The economic impact of fisheries is important and cuts across a number of areas. Fish processing has become an important market, with high concentrations of manufacturing activity in certain areas around the UK. Seafish, the body that improve efficiency and raise standards across the seafood industry estimates that the UK fish processing sector has 403 fish units which provide a total of 19,511 jobs. GVA of the sea fish processing industry was an estimated £766 million in 2012 whilst the fishing industry's GVA is estimated at £426 million (MMO 2014).

3.1.9 Marine recreation

There are strong linkages between recreation and tourism. Recreation activities connected to marine activities are varied and include land and vessel based wildlife watching, beach activities, paddle sports, surfing, windsurfing, sailing, motor-boating, personal water craft, SCUBA-diving and offshore and shore angling.

At a national level, several of these activities have been assessed for their economic contribution. The methodologies and sources of information vary, as do the reasons for the research being conducted. We provide a series of examples for some of the key activities below:

- Surfing – Surfing reportedly contributes between £1 billion and £1.8 billion per year to the UK economy (Mills 2013).

- Sea angling - when indirect and induced effects are taken into account, sea angling was estimated to result in £2.1 billion of total spend (Comley and Mackintosh 2014).
- Leisure boating – Leisure boating is estimated to contribute £1.3 billion per annum to the UK economy (RYA 2014).

3.1.10 Nuclear

Nuclear energy is central to the UK Government's energy policy. The UK Government is committed to nuclear energy and is looking to transition from the current energy strategy, focused on the operation and life extension of reactors, to building a new generation of nuclear infrastructure. It is reported (CQI 2012) that the current workforce in the nuclear sector consists of 44,000 people in civil nuclear and a further 14,000 employed in defence. In the future investment of around £930 billion is planned globally to build new reactors and £250 billion to decommission those that are coming off-line.

3.1.11 Oil and gas

Oil and gas provides a significant proportion of the UK's primary energy supply, satisfying between 70 and 80% of demand annually. There are several areas of the UK which are key locations for the Oil and Gas industry. Aberdeen and Aberdeenshire, regarded as the centre of Europe's petroleum industry, is the main location for the industry due to significant oil deposits in the North Sea. Several other areas play a role in the oil and gas industry including the processing of oil, petroleum and chemicals in several clusters across England. Oil and Gas UK reports that employment in the industry is concentrated in Scotland (45% of jobs) whilst just over 21% are in London and South East England.

3.1.12 Ports and shipping

Ports undertake a wide variety of activities, including cargo handling, sea and coastal freight transport, and building and repair of ships and sea structures (e.g. wind turbines or oil and gas platforms). About 90% of world trade is carried by the international shipping industry, with total freight tonnage through UK major ports totalling 120.1 million tonnes. Ports also facilitate passenger sea travel. In 2014 the total number of sea passengers (domestic and international) was 65.9 million (Department for Transport 2015).

3.1.13 Renewables

Key activities within the marine renewable energy sector include harnessing the power of wind, wave and tidal energy in both inshore and offshore environments. The largest renewable energy sources in the UK are onshore and offshore wind which in 2015 generated 11% of the UK's electricity (an increase of 9.5% from 2014)[6]:

- **Offshore wind –** The industry body for the renewables industry in the UK (RenewableUK) reports that the UK has been the "world leader in offshore

[6] Renewable UK press release in January 2015, New records set in best ever year for British wind energy generation - 5 January 2016, available at: http://www.renewableuk.com/en/news/press-releases.cfm/05-01-2016-new-records-set-in-best-ever-year-for-british-wind-energy-generation

wind since October 2008, with as much capacity already installed as the rest of the world combined".

Renewable energy can also be generated from wave and tidal movements, with the potential to meet up to 20% of the UK's current electricity demand from these sources[7]. However, the industry is still in its early stages and further research and development is needed to develop technologies and exploit the energy of wave and tidal movements.

- **Wave -** wave energy occurs in the movements of the water, caused by the wind, near the sea surface. This energy is strongest offshore, but can also be harnessed near the coast. A wide range of energy converter technologies has been proposed, some of which are being tested as full scale prototypes.
- **Tidal –** Tidal energy can be harnessed in two ways: by exploiting the change in height of water as the tide flows and ebbs (tidal range), or by extracting energy directly from the flowing current (tidal current)[8].

3.1.14 Telecoms and communications

The telecoms and communications activity of most relevance to this report is the laying, operation and maintenance of submarine telecommunication cables and their associated facilities such as sub-stations. Several active telecommunications and power cables and pipelines land in and around the mouths of rivers in the UK (Figure 6 in Appendix A2).

Telecoms and communications cables can affect and be affected by the activities of other business sectors. For example, there is risk to and from the fishing industry as trawls and anchors may become caught on submarine cables, which can prove costly to both fishing and pipeline operations in terms of maintenance.

The overall telecoms and communications sector is estimated to contribute approximately £45 billion to the economy and employ approximately 250,000 people across 8,000 companies[9]. Some data is available at a regional level through analysis of Government statistics but there are challenges associated with breaking this down by sector activities in marine areas.

[7] Climate change and energy – guidance. Wave and tidal energy: part of the UK's energy mix (Department of Energy & Climate Change) 22 January 2013 - Low carbon energy and Climate change and energy. An explanation of the energy-producing potential of wave and tidal stream energy in the UK. Available at: https://www.gov.uk/guidance/wave-and-tidal-energy-part-of-the-uks-energy-mix

[8] The Crown Estate, Wave and Tidal Resources and technologies webpage, available at: http://www.thecrownestate.co.uk/energy-minerals-and-infrastructure/wave-and-tidal/

[9] Telecentre Data Centre, available at: http://www.telehouse.net/uk-data-centres/

4. North West Marine Plan Area

The North West Inshore and Offshore Marine Plan areas cover approximately 7,100km^2. The coast line stretches approximately 1,300km. The area is important for energy production and fishing. Within the area there are seven Special Protection Areas (SPA) and seven Special Areas of Conservation including one of the only two entirely marine SPAs, Liverpool Bay.

This section reviews the relevant policy context, provides a brief review of the current state of the environment, and assesses the area's marine-related sectors and their value to the North West economy.

4.1 Policy Review

Northern Powerhouse
The idea of a 'Northern Powerhouse' was first introduced in June 2014 by the Chancellor of the Exchequer, George Osborne, in a speech in Manchester. The case was made that the lack of economic and physical connections between the cities and city regions of the North of England was holding back their growth, with significant implications for the national economy.

The creation of a Northern Powerhouse, through the commitment of £13 billion of investment to transport in the north of England over this Parliament; backing major new science, and technology and culture projects; and agreeing to devolve significant powers over transport, housing, health, planning and policing. The Northern Powerhouse will also help ensure that rural areas can also contribute to, and benefit from, increased productivity and growth

The Northern Powerhouse proposal is a strategic approach to improve productivity and achieve growth through decentralisation of power to, and increased investment in, the North of England. George Osborne pointed to long-standing regional disparities in the UK's economic output: "the cities of the north are individually strong, but collectively not strong enough". As a result it was stated that "we need a Northern Powerhouse too" comprised of "a collection of northern cities, sufficiently close to each other that combined they can take on the world.

The Cities and Devolution Bill, announced during the 2015 Queen's Speech, provides the legislative framework necessary to decentralise powers to local councils. A new body, Transport for the North (TfN) has been created to have similar responsibilities to Transport for London. TfN will be put on a statutory footing and given a focused remit around transport infrastructure and in the future; a budget to transform the infrastructure of the North of England.

Devolution
There is an increasing focus on the redistribution of power within England and particularly greater devolution to the North of England. Although the focus of devolution has been upon Greater Manchester, other areas are seeking to acquire

devolved powers. There are a number of key developments which are relevant this to study:

- Greater Manchester is to get its own directly elected mayor with powers over transport, housing, planning and policing in a devolution deal worth more than £1 billion. Greater Manchester is also the first part of England to get full control of health spending.
- Councils in Greater Manchester and Cheshire are to be allowed to retain all additional business rate growth under a pilot scheme which ran in April 2015.
- Liverpool has a directly elected mayor which was part of the Localism Act (2011) and has also agreed further devolved powers to give local authorities new freedoms and flexibility in funding and service delivery.
- Local Enterprise Partnerships (LEPs) are also increasingly characterised by devolved decision making in order to support the economic development of the local areas for which they are responsible. This has seen 'City Deals' negotiated across the North West which allow LEPs to take responsibility for funding major schemes at a local level. It will ensure that more decisions on how money is spent on skills and transport in the sub-region will now be made by local business representatives and other partners / stakeholders who understand what is needed.

Going forward it has been announced that further devolved powers will be given to LEPs, City Regions and local authorities to support local economic development and ensure that services are aligned with local needs.

LEP Strategic Economic Plans

Local Enterprise Partnerships (LEPs) outline their planned activities and ambitions for development in Strategic Economic Plans (SEPs). The North West marine plan area is mainly impacted by the activities of the following LEPs:

- Lancashire LEP;
- Greater Manchester LEP;
- Cumbria LEP;
- Cheshire & Warrington LEP;
- Liverpool City Region LEP.

Prior to the LEPs being established The North West Regional Development Agency's (now closed) regional spatial strategy noted the North West's coast had the unique combination of exceptionally high economic, social, environmental importance and potential.

The proximity to the North Wales coast also highlights the cross boundary issues and the potential for activity in this area to impact upon marine activities in the North West. We have not assessed the Welsh areas due to the focus of this study but note that close working is needed particularly where any activities of work is near to the English and Welsh border. The four UK Government administrations are committed to planning jointly in cross-border areas where it is practicable.

The LEPs have a series of aims and objectives for economic development. We have highlighted these in Table 2 below as well as the key metrics (frequently jobs and GVA growth) which LEPs will be measuring.

Table 2: Strategic Economic Plan Visions[10]

LEP	Vision	Plans for Economic Growth
Lancashire LEP	"The overarching purpose of the SEP and Growth Deal is to re-establish Lancashire as an economic powerhouse and a national centre of excellence in advanced manufacturing by maximising its clear competitive strengths and capabilities in the aerospace, automotive, energy and health science related sectors."	Lancashire's Strategic Economic Plan (SEP) sets out an ambitious plan to create 50,000 new jobs, 40,000 new houses and add £3 billion of additional economic activity to the Lancashire economy over a ten year period.
Greater Manchester LEP	"Our vision for Greater Manchester is that by 2020, the city region will have pioneered a new model for sustainable economic growth"	The combined authorities in Greater Manchester are seeking to become a net contributor to the UK economy by 2020. And eliminate the present gap between public spending and tax generated which is calculated to be £4.7 billion a year.
Cumbria LEP	"The vision is for Cumbria to have one of the fastest growing economies in the UK, in an energised and healthy environment."	The Cumbria LEP is seeking to create (between now and 2024) 15,000 additional full-time equivalent jobs and increase the county's GVA growth by 0.6 percentage points above current forecasts.
Cheshire & Warrington LEP	Cheshire & Warrington's LEP has ambitions for "an economy of £26.6 billion with GVA per head 110% of the UK average in 2021" and by 2030 Cheshire to have: "An economy of £35 billion with GVA per head 115% of the UK average, and; Home to an additional 100,000 residents, 75,000 new jobs and 70,000 new homes"	
Liverpool City Region	"A globally connected City Region delivering sustainable growth, opportunity and prosperity for people and businesses."	The Liverpool City Region LEP is targeting the addressing of a £8.2 billion GVA output gap and 90,000 deficit in jobs.

[10] LEP Strategic Economic Plans (see references for more details)

The LEPs also outline key sectors which are important in the sub-regional economy. We highlight those identified by the LEPs in Table 3 below.

Table 3: Key Sectors of the Local Economy[11]

LEP	Key Sectors for Economic Growth
Lancashire LEP	• Aerospace • Digital and creative • Advanced manufacturing • Professional and business services • Energy and environmental • Tourism • Food and drink
Greater Manchester LEP	• Digital/media • Information technology • Bio-medical • Advanced manufacturing • Financial services
Cumbria LEP	• Energy • Manufacturing • Food & Drink • Visitor Economy
Cheshire & Warrington LEP	• Advanced Engineering • Life Sciences and Chemicals • Energy and Environment • Nuclear • Financial and Professional Services • Manufacturing
Liverpool City Region	• SuperPort (Ports & Shipping) • Visitor Economy • Advanced Manufacturing • Low Carbon • Financial and Professional Services • Life Sciences

Several sectors within the North West are of significant relevance to marine planning. These include energy (specifically nuclear and renewables), tourism and logistics. However, marine activities are present or influence several key sectors. For example, advanced manufacturing in Lancashire is seen as a key economic driver and a subset of this sector is windfarm manufacturing and engineering.

We outline the linkages from marine activities to key sectors within the North West below:

- Logistics – The logistics industry is highly dependent on the ports in the North West (as well as several outside) which play a key role in transporting goods

[11] LEP Strategic Economic Plans (see references for more details)

and services across the UK and Europe. These link to other sectors including shipping, retail and manufacturing.

- Life Sciences and Chemicals – The life sciences and chemicals sectors link to several activities which help to transport raw and processed products. The North West contains the largest chemicals cluster in the UK[12] which is near to the Mersey and Port of Liverpool. There have been several infrastructure developments to support these sectors such as recent investment in Port infrastructure (e.g. new ship-to-shore (STS) megamax quay cranes) as well as more industry specific investments such as the University of Liverpool's recent upgrades of their medical resource facilities.
- Advanced Manufacturing – The activities of this sector are wide and varied and include some subsets which are more terrestrial (e.g. aerospace) and others which link to marine sectors (e.g. subsea submersibles).
- Colleges and Universities – Education and training providers within the North West are involved in marine academic research as well as producing graduates for key industries. Several colleges and universities run marine specific courses and many have sites on coastal areas (e.g. Blackpool College) which play a key role in research and teaching.
- Energy – The coastline at Cumbria is branded 'Britain's Energy Coast' and includes renewables (offshore and wave) technologies and includes the largest nuclear site in Europe (Sellafield). The coast in and around Liverpool City region is also important for energy (e.g. North Hoyle Wind Farm near Liverpool) as well as key assets across the North West like ports, canals and rivers which support the wider energy industry.
- Tourism – The tourism industry is highly dependent on natural (e.g. beaches) and manmade (e.g. piers) marine assets. This includes urban areas like Liverpool or Blackpool and more sparsely populated areas like the Cumbria and Lancashire coasts.

Local Economic Policy

There are a range of local policy documents which are of relevance to this study. These documents include local economic assessments, local planning documentation, masterplans and other authority planning, evidence and strategy documents. We have reviewed many of the key local authority documents relevant to economic development and marine activities in the North West. We have highlighted the following key messages which relate to marine activities in Table 4.

Table 4: Key Local Economic Considerations

Theme	Comment
Key Sectors	In addition to the LEP strategic economic plans, several local authorities in the North West identify key sectors. Three key sectors which are identified as being particularly important across local authorities in the North West are Tourism (& visitor economy), Renewable energy and Ports. • Tourism (and visitor economy) as a key sector for several local areas. This is often captured where built infrastructure like ports or natural infrastructure is a key

[12] Chemicals North West Webpage, available at: http://www.chemicalsnorthwest.org.uk/

Theme	Comment
	asset in the local areas. For example, Blackpool Borough Council identifies the seafront as a key focal point for spatial development and economic development for the visitor economy and wider regeneration (Blackpool Council 2014). • Offshore wind is identified as a key growth sector with several local authority areas identifying key assets of their coastline as being able to unlock economic growth in this sector. Liverpool City, Wirral and Knowsley Councils identify ongoing and planned investment in docks, facilities and manufacturing as key to unlocking growth for this sector. Equally the Walney Offshore Wind Farm is supported by operations in Morecambe and Fleetwod and Cumbria County Council note that offshore wind as well as wave and tidal technologies could contribute further to the energy mix and designation of Cumbria as Britain's 'Energy Coast'. • Ports is a key sector for many of the Liverpool City Region local authorities, which note that the redevelopment of Liverpool Port (e.g. SuperPort) could unlock job opportunities for local residents. SUPERPORT is the name given to the coordination of projects, investment and activity across the Liverpool City Region to develop a multimodal freight hub to rival international port locations Liverpool City Council is supporting investment in the port which will unlock jobs in logistics and other sectors like Renewables (Liverpool City Council 2012). Furthermore, the Atlantic Gateway initiative shows that inland ports like Salford will also increasingly become important considerations going forward (Atlantic Gateway 2012). The above gives a snapshot of the key sectors locally but also shows the multi-faceted nature of the key sectors in the North West and how they are linked together.
Energy	Energy infrastructure is a key consideration in the North West and particularly in local authorities in Britain's Energy Coast; Allerdale Borough Council, Copeland Borough Council and Cumbria County Council. Due to the decommissioning of Sellafield and construction of Moorside there are large investments being made and there is potential upgrades of transport and community infrastructure which will see investment. For example, significant investment is planned for the Port of Workington, particularly concerning its facilities and surface access. This is to serve the planned and existing energy infrastructure with the aim of trebling activities and introducing new services (e.g. a weekly scheduled feeder

Theme	Comment
	container service into mainland Europe). A planned tidal lagoon in Cumbria is another potential investment which may be the recipient of further infrastructure and resources.
Housing & Commercial Developments	Local authority strategy and planning documents highlight most key development sites. Through local authority planning documentation and strategies it is possible to understand how these sites connect with the local economy and marine activities. Across the North West there are several local areas which are seeing and have seen economic and population growth (e.g. Warrington has seen a 5.8% increase during the last 10 years[13]). Other areas are experiencing economic stagnation and population decline. Space for housing and business premises is an important consideration in coastal areas and there are several key housing sites in coastal areas across the North West. The review of employment and housing land is ongoing, particularly since requirements change. For example, in Liverpool City Region employment land is being reviewed to identify the scale of land required going forward. This is in the context of significant urban renewal over the past 10 years and a key focus on further economic growth from the city centre, airports and ports.
Transport Infrastructure	Investment in transport infrastructure is a key priority across England. The North West is a key area for investment due to its dense concentrations of population and economic activity. High speed rail (HS2 and potentially HS3) and road upgrades are continuing to be progressed (Department for Transport 2016) and these could have significant impacts upon the movements of people and goods in marine areas. For example, any new rail or road routes could unlock capacity for freight and passengers, with potential resulting impacts on marine activities as a result.
Key Businesses	All local authorities in the North West identify key local employers or businesses which have a key role in the local economy in their strategy documentation. For example, within Cumbria and Lancashire there are several key businesses linked to energy and advanced manufacturing such as Sellafield, EDF energy and BAE Systems. Other key employers in the region such as Jaguar Landrover in Halewood and AO.com in Bolton (as well as Manchester & Crewe) have less explicit linkages to marine activities but are worth considering for certain activities (e.g. importing and exporting which utilises

[13] Warrington Borough Council, 2011 Census Statistics, available at: https://www.warrington.gov.uk/info/201114/publications_and_strategies/1073/census

Theme	Comment
	ports and shipping).
Skills & Labour Market	A key focus for many local authorities is how the local labour market is functioning: the availability of jobs, the health of the economy and levels of unemployment. Several local authorities note that some coastal communities score highly in terms of employment, skills and training deprivation measures. There are also several skills strategies or mentions of skills in local plan documentation across the North West. Some of these include working with businesses in marine sectors, marine assets (e.g. SuperPort in Liverpool City Region) or education and training facilities in coastal areas (e.g. Blackpool College offshore working training and marine engineering courses). The Local Enterprise Partnerships in the North West recently worked together on a skills strategy for High Speed Rail and where transformational changes are expected further collaborative working can be expected.

4.2 Current state of the environment

The following information about the state of the environment and current activity pressures in the Marine Plan areas has been derived from Charting Progress 2 (CP2) (2010). This report provides an assessment of the status of the UK marine environment based on a robust, peer-reviewed evidence base. It is a source of the key findings from UK marine research and monitoring and is intended to be used in policy-making to help protect our oceans and seas. CP2 is made up of a series of feeder reports that have been reviewed to obtain the required information. The regions used within CP2 are not exactly the same as the Marine Plan areas but are suitable to give the high level description of the state of the environment required for this project.

4.2.1 Marine environment

The physical characteristics of a region can determine the habitats and species that exist there and can also have an influence on the human uses of the environment. The North West Inshore and Offshore Marine Plan areas cover approximately 7,100km^2. The coast line stretches approximately 1,300km.

The North West area is characterised by water depths mostly less than 50m. Overall mean flow of water is northwards and large tides and strong currents create a generally well mixed water column. The large tidal range is accompanied by susceptibility to wind-forced surges and occasional flooding of low-lying areas. Waves tend to be short and steep and combine with strong tidal currents in extensive shallow areas to give high sediment mobility, coastal erosion and turbidity. There are large seasonal variations in sea-surface temperature, ranging from 4 °C in winter to 18 °C in summer. Salinity is typically between 34 and 35, but is can be as

low as 31 approaching the coastline due to the large volume of freshwater inflow from rivers such as the Mersey and Ribble.

The region has a wide variety of habitats ranging from rocky coasts to extensive areas of sediment in Morecambe Bay and the Solway Firth. The seabed offshore is largely sandy sediments. Within the area there are seven Special Protection Areas (SPA) and seven Special Areas of Conservation including one of the only two entirely marine SPAs, Liverpool Bay. There are also numerous Marine Conservation Zones (MCZ) and recommended Marine Conservation Zones (rMCZ).

Across the region, intertidal rocky habitats are considered to be moderately impacted, principally through the widespread but low volume collection of edible shellfish. Intertidal sediments are heavily impacted by historical land claim, coastal defence and marine construction, while both intertidal and subtidal sediments in many estuaries are impacted by eutrophication and contamination. Impacts on subtidal rocky habitats are mainly based on removal of, and damage to living reefs such as horse mussels through fishing activities. Fishing activities are identified as a pressure on grey and harbour seal populations through removal of prey species and damage to the habitat that the seals' prey depends upon. Seabird populations are doing well: breeding numbers have increased substantially over the past 21 years. The number of waterbirds, such as waders, has decreased as more are now wintering in east coast estuaries.

Linkages between Environment and Economic Activity

Maritime transport activities primarily comprise of freight traffic between Scotland, The Isle of Man, Northern Ireland and the Republic of Ireland. The distribution of commercial ports reflects the historical importance of certain areas for trade and also the physical characteristics of the environment such as natural shelter from prevailing environmental conditions. Key pressures relate to pollution (from oil spills, loss of cargo and leaching of antifoulants), introduction and spread of non-native species (through ships' hulls and ballast water), noise impacts from ship movement and habitat damage. Most of the shipping impacts are managed through the International Maritime Organization. Impacts from local development are managed through local planning policies and conservation objectives where they apply.

The region also has a large number of waste disposal sites, although not all are in use at any one time. These are related to the number of ports in the region and the need to dispose of material dredged to maintain navigation channels. The waste disposal sector relies on the physical environment to assimilate wastes and specific environmental conditions are required to facilitate this. The disposal of wastes to the marine environment is strictly controlled.

Oil and gas is a key industry with a few discrete but productive reserves. The industry requires environmental conditions in the provision of a stable physical environment in which to operate, and chemical cycling/water purification (to assimilate wastes) in order to exploit the resource. Oil and gas presents a diverse range of environmental pressures including noise impacts from exploration and construction activities through to contamination from operational activities.

In addition, there are important gas pipeline links and power and telecommunication links to Northern Ireland, the Republic of Ireland and the Isle of Man. The pipeline and cables sectors relate to the transport of materials and rely on various ecosystem services that support its activity, including the provision of a stable physical environment in which to operate. The physical features of greatest significance include shallow gradients, areas of limited seabed surface change, and soft sediments which allow for trenching. Impacts from pipeline or cable installation on the seabed are short term and spatially minor.

The location of economically viable renewable energy projects is constrained by a number of factors, including sea conditions and other existing sea users of the marine environment. The North West has among the best wind energy resource in the UK, which combined with a stable physical environment and shallow water depths makes it a suitable site for locating offshore wind farms. There are already numerous operating in the area (e.g. Burbo Bank, Barrow, Robin Rigg) with more proposed.

The North West has coastal and flood protection due to low-lying land and dynamic coastlines. Defences may involve hard structures such as concrete seawalls, and soft engineering such as beach replenishment and managed realignment. Flood and coastal erosion risk management projects often have substantial impacts on the coastal environment, for example from construction, physical footprint, changes in geomorphology and coastal squeeze, as well as other forms of habitat degradation and loss. Sea-level rise and the potential for increasingly severe storm events due to climate change will increase the importance of this sector, particularly for the low-lying areas.

The North West is home to strategically important power stations. Abstractions from estuarine and coastal waters occur to provide cooling water to these power stations as power output is higher compared to air cooled condensers. The North West with well mixed waters provides a suitable location for locating such developments however, abstracting large volumes of water poses environmental risks associated with the impingement of fish, invertebrates and algae on cooling water intake drum screens.

There are long lengths of attractive coast within easy reach of the population making recreation activities important. Environmental pressures as a result of recreational use of the seas may include the removal of marine fauna and flora, physical or visual disturbance of wildlife, pollution from wastewater and litter and alteration of coastlines to facilitate access. They are generally managed through a number of local planning policies and best practice guidance.

Fishing activity is located in areas where commercially important fish stocks are present, which is influenced by the characteristics of the environment including water depth, salinity and temperature. Fishing has historically constituted a major activity causing pressures on habitats and species but reducing fishing pressure is a likely contributing factor to the improvement in fish communities in the Irish Sea over the past decade. In previously polluted estuaries such as the Mersey, fish assemblages have become more diverse in recent years, associated with lower contaminant and nutrient loads.

Although the environmental pressures from each activity are highly localised and discrete at a regional level, the resulting cumulative pressures are likely to be the highest of all the Marine Plan areas.

4.3 Sectoral analysis

The following sections describe the current activities within each of the relevant marine sectors identified from the Marine Policy Statement and an analysis of these sectors' contribution to the labour market and business base. We follow this up by assessing the productivity (GVA) contributions of the sectors.

We draw upon the most up to date and relevant data for this analysis and note that overlaps can exist between sectors and that the contribution could be overstated where this occurs. The contribution can also be understated due to lack of available information. We advise caution in any subsequent use of our analysis.

The focus of our analysis is the North West region as defined by the former Government Offices for the Regions (GOR). However, we refer to North Wales and the Scottish borders where there is a significant elements of activity.

4.3.1 Aggregates

Marine dredged sand and gravel is currently supplied from six key areas around the British coastline including the North West. Marine dredged material in the North West is landed at the following wharves:

- Barrow
- Eastham
- Glasson
- Heysham
- Liverpool Wharves (Albert Dock, Birkenhead, Bramley Moore Dock, Garston, Liverpool)
- Penrhyn (Wales)

In 2014 not all wharves saw material landed but, where landed, almost all material is used locally, with a small proportion going to Wales (The Crown Estate 2014a). The Crown Estate identified 241,578 tonnes of marine aggregate landed at wharves in the North West area. Table 5 below displays the breakdown by wharf, showing that aggregate activity is mainly concentrated in the Liverpool Wharves. The amount of marine dredged aggregates landed in the North West has been falling over several years and has always been lower than the authorised extraction rates. However this trend could reverse with upgrades at ports in Cumbria and developments at Sellafield and Moorside facilitating increased material extraction and landing in the North West.

Table 5: Marine Dredged Primary Aggregates (2014)[14]

Description	Tonnage
Barrow	3,790

[14] The Crown Estate (2014)

Liverpool Wharves	202,714
Penrhyn	35,074
Total	**241,578**

Employment and business base

Using latest employment figures from the British Marine Aggregate Producers Association (BMAPA 2015) and a further study from BMAPA in 2007 which breaks down the industry composition (Highley et al 2007), we have divided the national industry figures for extraction (14.8 million tonnes) by the proportion of total marine aggregate landed in the North West (241,578 tonnes) and applied this to national employment to estimate the number of people employed in the sector in the North West. We estimate the direct employment in the North West to be 19 jobs.

Utilising the multiplier for Mining Support (1.42) which includes activities connected to geological observations and drilling and extraction of minerals, we calculate the indirect jobs supported by the marine aggregates to number 27.

There are 3 production licences in the North West and this is connected to 4 businesses (The Crown Estate 2014b). The aggregates market is competitive and faces significant barriers to entry for small and medium sized businesses (Competition Commission - Date Unknown). As such this is likely to be a representative number of core businesses in the North West. Several more businesses are likely to be part of the supply chain – such as in processing and transport - although there is uncertainty over the number of businesses involved.

4.3.2. Aquaculture

A large proportion of aquaculture activity is located in Scotland and a 2011 study on the North West reports that aquaculture plays a small role in the wider fishing industry (Newcastle University 2011). Yet the study highlights that there is potential for expansion due to natural shellfish populations (which are often managed involving some degree of husbandry). The study also notes that the husbandry and collection of shellfish is deeply ingrained in the culture of areas such as Morecambe Bay and is seen as an important cultural tradition by populations of local fishing villages such as Sunderland Point and Flookburgh.

Employment and Business

The direct employment in the sector is 120 people across 10 businesses (Table 6).

Table 6: Business and Employment in Aquaculture (2014)[15]

Sector (SIC)	Employment	Businesses
03210 : Marine aquaculture	85	5
03220 : Freshwater aquaculture	35	5
Total	**120**	**10**

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We have not apportioned the employment set out in MMO 1075 but note from the map of aquaculture sites in England produced by Defta /CEFAS (Figure 3 in

[15] ONS data. Note: Tables may not add due to rounding

Appendix A2) that some sites are inland and are likely to have little relation to marine activities. An assessment of the map indicates that there are around 38 (mainly freshwater) aquaculture sites in the North West, of a total of 415 sites in England and Wales. This supports the analysis of employment and businesses.

We utilise the employment multiplier for Aquaculture SIC (1.6) in Scottish Government[16] guidance to calculate that indirect jobs supported by the aquaculture number 190.

4.3.3 Carbon capture and storage

Areas in Cumbria and Lancashire have been identified by academics and businesses as potential locations for this industry. Sectoral linkages which could deliver a CCS project have been highlighted (Tyndall Centre for Climate Change Research 2005).

Employment and business base

There is little available data on employment, business numbers and economic contribution of the Carbon Capture and Storage (CCS) sector. ONS produces information on the Low Carbon and Renewable Energy Economy regularly which shows that a total of 96,510 businesses were active in this broad sector. These businesses provided 233,000 full-time equivalent (FTE) jobs and generated £45.3 billion in turnover in 2014 (Office for National Statistics 2014). There is no breakdown of data provided in the analysis to identify CCS activities in the North West.

4.3.4 Coastal protection

The North West has seen significant investment in coastal and flood protection due to several areas of low-lying land and dynamic coastlines (North West & North Wales Coastal Group 2010). Figure 4 in Appendix A2 from the National Oceanography Centre highlights the key areas in the North West which could be at risk of coastal erosion and flooding.

The coastal protection industry in the North West is complex, with some natural resources providing protection. The National Oceanography Centre highlights how the Sefton Coast is protected by both natural and man-made defences with the largest UK sand dune system providing natural protection for the low-lying ground behind. However, during periods of stormy weather and high tidal levels the dune system is at risk of erosion. Coastal erosion is also a cross-border issue with activities in England impacting Wales and vice-versa.

Employment and business base

Employment for this sector is difficult to measure as several of the activities cut across a number of sectors (e.g. aggregates, ports). The employment and businesses estimates for the coastal protection sector in Table 7 below show that the industry employs 100 people across 10 businesses.

[16] Scottish Government Input-Output model (2015) - Type I and Type II output, income, employment and GVA multipliers - available at: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads

Table 7: Business and Employment in Coastal Protection (2014)[17]

Sector (SIC)	Employment	Businesses
42910 : Construction of water projects	100	10

This analysis should be treated with caution as a large focus of SIC 42910: Construction of water projects used is upon construction of ports, marinas, waterways, dams and dykes and dredging.

To calculate indirect employment the analysis utilises the multiplier for Water Transport (2.4)[18]. This estimates that Coastal Protection indirectly supports an additional 260 jobs.

4.3.5 Coastal tourism

There are several tourist assets in the North West plan area with coastal or marine linkages. These are varied and include heritage coasts, urban leisure areas and recreation coastal areas. Some areas of the North West have a large proportion of their inhabitants who are supported by coastal tourism, including Blackpool and Southport, West Kirby, Fleetwood, Morecambe and Lytham and St Annes (Beatty 2010).

In 2006 the North West Regional Development Agency estimated that the visitor economy was worth £7 billion per annum to the region's economy and supported an estimated 40,000 jobs (NWDA 2006). More recent research by the LEPs show that the tourism and visitor economy continues to be important. The Liverpool City Region reports that the visitor economy in the LEP area contributes £3.8 billion to the economy and supports over 49,000 jobs[19]. Cumbria is one of the UK's most visited destinations and the tourism sector supports 5,000 businesses and 36,000 jobs (Cumbria Local Enterprise Partnership 2011). In Lancashire the sector represents 7% of the county's GVA, employing 1 in 10 of the working population and contributing £3.5 billion a year (Visit Lancashire 2015). Further inland, Greater Manchester's visitor economy generates £6.6 billion a year for the local economy and supports nearly 84,000 jobs (Marketing Manchester 2014) and in the Cheshire area it is reported that 31 million people visited Cheshire West and Chester and 15 million travelled to the neighbouring Cheshire East in 2014.[20]

Coastal tourism is also a big contributor to the economy in Wales, estimated to add £300 million a year to the Welsh economy (Beatty 2010). In North Wales around 11,000 jobs are supported by seaside tourism, although it is noted that a substantial range of indicators seaside towns in Wales appear on average more disadvantaged than their counterparts in England (Beatty 2010).

[17] ONS data. Note: Tables may not add due to rounding.
[18] Scottish Government Input-Output model (2015) - Type I and Type II output, income, employment and GVA multipliers - available at: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads
[19] Liverpool Local Enterprise Partnership webpage on the visitor economy, available at: https://www.liverpoollep.org/core-sectors/visitor-economy/
[20] Cheshire East Council Webpage on the Visitor Economy available at: http://www.cheshireeast.gov.uk/business/business_information/visitor_economy/visitor_economy.aspx

Employment and business base

Totalling the research from the LEPs, it is estimated that approximately 130,000 jobs are supported. However, it is difficult to separate terrestrial tourism from coastal tourism and direct from indirect jobs. Furthermore, although jobs supported by tourism in areas near to coastal areas are often intrinsically linked to coastal and marine assets, those inland frequently are not.

We have utilised the definition outlined in MMO 1075 to estimate the contribution of coastal tourism to employment.

Table 8: Business and Employment in Tourism (2014)[21]

Sector (SIC)	Employment	Businesses
55100 : Hotels and similar accommodation	41,680	940
55201 : Holiday centres and villages	2,480	70
55202 : Youth hostels	300	10
55209 : Other holiday and other short-stay accommodation NEC	1,840	220
55300 : Camping grounds, recreational vehicle parks and trailer parks	2,970	190
79901 : Activities of tourist guides	30	10
91020 : Museum activities	1,280	60
91030 : Operation of historical sites and buildings and similar visitor attractions	300	30
91040 : Botanical and zoological gardens and nature reserve activities	1,450	30
93210 : Activities of amusement parks and theme parks	1,410	40
93290 : Other amusement and recreation activities	3,100	240
55900 : Other accommodation	1,140	70
Total	**57,970**	**1,890**

The analysis uses the most relevant SIC codes and shows that coastal tourism activities in the North West employ 57,970 people across 1,890 businesses (Table 8). A large proportion of employment is in the SIC 55100 Hotels and similar accommodation, which may slightly inflate estimates of employment and businesses.

To calculate indirect employment we use the employment multiplier from the Scottish Government[22] for Sports & recreation (1.22) to estimate that indirect and induced jobs number 70,525.

4.3.6 Defence

Due to the confidential nature of military defence activities it is difficult to accurately assess the extent and frequency of activity within the North West plan area. Activity tends to be associated with specific defence assets such as naval bases, ship

[21] ONS data. Note: Tables may not add due to rounding. NEC = not elsewhere classified.

[22] Scottish Government Input-Output model (2015) - Type I and Type II output, income, employment and GVA multipliers - available at: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads

building or transport. There are also several important businesses involved in the production of defence related materials (e.g. BAE systems is estimated to employ around 5,000 people at its Barrow site).

The North West is a key area for the manufacturing of military products and materials as well as home to several defence assets such as military bases, naval ship yards, combat systems and highly integrated marine equipment.

Employment and business base

Identifying defence activities through national statistics seems straightforward when looking at the SIC codes. However, there are challenges in identifying where these defence activities connect to marine activities and assessing the scale of the Government funded activities. Due to the sensitivity of the data and data suppression requirements, we are unable to identify how much employment or business activity is connected to marine activities or the true size of activity.

We have identified the following activities as linked to the defence industry, showing that the sector employs just over 10,000 people across 30 businesses (Table 9).

Table 9: Business and Employment in Defence (2014)[23]

Sector (SIC)	Employment	Businesses
84220 : Defence activities	1,850	0
30400 : Manufacture of military fighting vehicles	-	0
25400 : Manufacture of weapons and ammunition	1,060	0
30110 : Building of ships and floating structures	7,220	30
Total	**10,130**	**30**

The business figures outlined in ONS Enterprise Counts are low due to suppression. They are also likely to exclude many Ministry of Defence funded activities. However, the figures provided are estimates based on the best available evidence.

Calculations of the indirect employment in Defence use the employment multiplier from the Scottish Government[24] for Research & development (1.5). This estimates that indirect employment for the Defence sector in the North East employment is 15,561.

4.3.7 Dredging

Employment and business information for dredging is captured in employment data for the aggregates sector. However, a small amount of activity will not be. National statistics do not assess the sector in detail and there is a lack of available information from industry or academic sources. Furthermore, there are several other sectors under which dredging activities can be captured, such as ports and shipping and coastal protection.

[23] ONS data. Note: Tables may not add due to rounding.
[24] Scottish Government Input-Output model (2015) - Type I and Type II output, income, employment and GVA multipliers - available at: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads

Despite the lack of information on employment and businesses, it is known that the industry is an important economic contributor and supporter of other industries. In 2013 the Regional Growth Fund allocated a grant of £35 million to dredge the approach channel in the Mersey Estuary which was overseen by Peel Ports. This had economic benefits of deepening the approach channel of the Mersey to 16 metres it will allow access for post-Panamax size container ships as well as widening the tidal access window for a range of other river users. It was also reported that this activity would support the SuperPort developments (see Ports and Shipping sections) and ultimately the creation of 5,000 jobs.

4.3.8 Fisheries

The North West plays a small role in the fishing and fish processing industry, with much of the activity based in Lancashire and Cumbria. The principal fishing ports of Fleetwood and Whitehaven are the focus for much fishing and fish processing activities. Research in 2002 by the Government Office for the North West and the North West Coastal Forum noted that the fisheries industry "plays an important role in the region, not just in direct and related employment, but also in terms of heritage and cultural capital" (Government Office for the North West and the North West Coastal Forum 2002). However, the outlook for the fisheries sector is uncertain. Companies like Cumbrian Seafoods have seen consolidation and reduced activity in recent years in the face of multiple challenges including rising costs and intense competition.

Employment and business base

Fishing is one only element of the fisheries sector; MMO 1075 highlights how fish processing and wholesale are important activities. We suggest that fish processing should be included and have identified employment and business numbers for this subsector. This is due to the interrelated nature of the fish processing industry which is reliant on fresh fish from abroad and from in the UK and is often located in coastal areas.

The fisheries industry is well covered in national statistics and shows that the industry employs over 5,220 people across 100 businesses (Table 10).

Table 10: Business and Employment in Fisheries (2014)[25]

Sector (SIC)	Employment	Businesses
10.20 Processing and preserving of fish, crustaceans and molluscs	80	60
10.85 Manufacture of prepared meals and dishes	560	20
03.11 Marine Fishing	4,580	20
Total	**5,220**	**100**

Using the employment multiplier from the Scottish Government[26] for Fish & fruit processing (1.9) we calculate the indirect employment for the sector to be 10,390.

[25] ONS data. Note: Tables may not add due to rounding.
[26] Scottish Type I and Type II output, income, employment and GVA multipliers, available at: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads

4.3.9 Marine recreation

There are significant marine recreation activities in North West England and North Wales. The North West has a range of beaches, marinas and other recreation assets which are used by businesses and residents. Surfing from North Wales and North West Coast reportedly contributes approximately £14 million to the economy (Mill 2013).

Sport England captures information on sports participation, with some of this sporting activity relating to recreation in marine environments. The Clubmark register provides an indication of the number of clubs which are based in the region that provide an *"environment which ensures the welfare of members and encourages everyone to enjoy sport and stay involved throughout their lives".* This shows that there are several clubs which could have marine interactions (Table 11).

Table 11: Marine Related Sports Clubs with a Clubmark[27]

Club mark Type	North West
Angling	25
Canoeing	18
Rowing	6
Swimming	85

Employment and business base

A 2014 report by the British Marine Membership Organisation which assesses the economic contribution of the marine recreation sector shows that the North West employs 2,917 people across the Marine Industry (British Marine Federation 2014). The industry contributes £69 million and £342 million to the UK economy in direct and indirect GVA respectively.

The estimates suggest that the North West's recreation employment numbers 5,540 across 370 businesses (Table 12). Using a multiplier for the Sports & recreation industry of 1.22 we estimate the indirect employment to be 6,740.

Table 12: Business and Employment in Recreation (2014)[28]

Sector (SIC)	Employment	Businesses
93120 Activities of sport clubs	1,940	90
93199 Other sports activities	500	40
93290 Other amusement and recreation activities	3,100	240
Total	**5,540**	**370**

4.3.10 Nuclear

There are two nuclear power station plants in the North West, in Sellafield and Heysham. There are also new reactors proposed for Moorside (near to Sellafield) and Wylfa (North Wales). There are further nuclear industry assets in the area including Capenhurst and Springfields fuel processing plants, as well as activities

[27] Sport England; Local Sport Profile Tool. https://www.sportengland.org/our-work/partnering-local-government/tools-directory/local-sport-profile-tool/

[28] ONS data. Note: Tables may not add due to rounding

connected to the decommissioning of existing nuclear power stations at sites in Sellafield, Wylfa (Wales) and Chapelcross (South Scotland).

Employment and business base

Data on employment is available from many of the power stations directly; Sellafield employs approximately 10,000 employees[29] whilst Moorside and Wylfa are expected to both create 1,000 jobs and also support 8,500 jobs during construction.

The range of different activities within the nuclear industry is complex. Power stations account for much of the employment in this sector. However, there could be wider energy related economic activities (e.g. safety) which are also relevance to this assessment.

Our assessment of the industry shows that 15,396 people were employed across 345 businesses. We have also assessed the wider Energy industry, given that some activities in other energy sectors have marine linkages and intersect with nuclear. Our assessment provided in Table 13 shows that the nuclear industry makes up just under half of all energy employment (31,480 people across 4,590 businesses). A full breakdown of the sector's definition is provided in Appendix A1a.

Table 13: Business and Employment in Nuclear and Energy (2014)[30]

Sector	Employment	Businesses
Nuclear	15,400	350
Energy	31,480	4,590

Using the employment multiplier for electricity generation[31] (3.5) we calculate the indirect employment in the Nuclear sector to number 53,950. It should be noted that the multiplier could be even larger given that the industry has several safety and technical requirements which distinguish it from other energy sectors.

4.3.11 Oil and gas

The North West of England contains a cluster of activity in the wider Oil and Gas sector, despite Scotland being the main focus of activity in the sector. The North West, and specifically the area around Runcorn which is described as the largest chemical cluster in the UK. The area is home to a range of key businesses in the chemical sector including refining, petrochemicals, chemicals, plastics, biotechnology and pharmaceuticals. There is also a small area of Oil and Gas fields (Oil & gas infrastructure maps from the Department of Energy and Climate Change (DECC) and Oil and Gas Authority (OGA)) in the Irish Sea between the North West and the Isle of Man.

Employment and business base

The Chemicals North West employer organisation comprises 650 businesses who directly employ 50,000 people and make an annual contribution of £3 billion to the

[29] Sellafield Webpage on company facts, available at: http://www.sellafieldsites.com/press-office/facts/

[30] ONS data. Note: Tables may not add due to rounding.

[31] Scottish Type I and Type II output, income, employment and GVA multipliers, available at: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads

regional economy[32]. This source of these figures is largely focused on the chemicals manufacturing and processing activities of the sector and the date of publication is unknown.

To assess this sector in more detail we assess the employment and businesses using national statistics, drawing upon the definition outlined in MMO 1075 and widening this to include several more chemical and processing industries which are of relevance in the North West. This is similar to the approach taken in the North East which has a similarly strong chemical and process industry cluster and high profile employer organisation. A full breakdown of the sector's definition is provided in Appendix A1a.

Table 14: Business and Employment in Oil & gas (2014)[33]

Oil & Gas Definition	Employment	Businesses
ONS BRES & ONS Enterprise Counts	8,940	1,510
Chemicals North West	50,000	650

Table 14 above shows the figures from ONS data and Chemicals North West. It shows a disparity which may be accounted for by the wider definition used by NEPIC or the lack of data on businesses which are not captured in ONS data (above the VAT threshold). The analysis taken forward utilises the ONS analysis as this is believed to account for the direct industry and the information can be easily replicated. Therefore we estimate employment at 8,940 across 1,510 businesses. A full breakdown of the sector's definition is provided in Appendix A1a.

To calculate the indirect jobs supported by the sector we can use the employment multiplier[34] for Gas (1.4) which estimates that indirect employment is 12,680.

4.3.12 Ports and shipping

There are several international passenger routes from Holyhead and Liverpool (mainly to Ireland). There are also several commercial shipping routes across the region with several key connections to world markets. There are 9 key ports in the North West and 3 in North Wales:

- Birkenhead
- Port of Liverpool (including commercial and cruise)
- Manchester
- Fleetwood
- Heysham
- Barrow-in-Furness
- Port of Barrow
- Whitehaven
- Workington
- Llandulas (Wales)
- Mostyn (Wales)

[32] Chemicals North West website
[33] ONS data and Chemicals North West. Note: Tables may not add due to rounding.
[34] Scottish Type I and Type II output, income, employment and GVA multipliers: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads

- Holyhead (Wales)

The major port in the North West is the Port of Liverpool, whilst Heysham and Holyhead also play a role in the transport of freight and people. The Port of Liverpool is owned by Peel Ports and transports commodities (e.g. cars, energy and dry bulk) as well as people (e.g. cruises). The Port of Liverpool and the smaller ports along the River Mersey are seen as key to economic activities in the future through the Atlantic gateway initiative which is seeking to create 250,000 new jobs and generate £14 billion of new investment by 2030. Plans for the Atlantic Gateway include upgrades of port facilities and other port infrastructure such as SUPERPORT.

SUPERPORT is the name given to the coordination of projects, investment and activity across the Liverpool City Region to develop a multimodal freight hub to rival international port locations (e.g. New York and Singapore.) The vision of SUPERPORT is "to bring together and integrate the strengths of the Ports, Airports and Freight Community to create a SUPERPORT for freight and passenger operations within the Liverpool City Region that will become a key driver of its economy. It will create the most effective and cost efficient environment for freight cargo and passenger transit in the UK. As part of the SUPERPORT developments; Liverpool2 is being constructed. This is a £300 million project which will deliver a new deep water container terminal at the Port of Liverpool, removing vessel restrictions and unlocking an ability to unload two 13,500 TEU ships simultaneously.

At the moment the freight handled (both units and tonnage) by ports in the North West is around 15% of the total of all ports in England. The North West is a major manufacturing base and key area for UK exports with several ports playing an increasing role in export of key products like chemicals, cars (e.g. Jaguar LandRover) and textiles. The ports and shipping services in the North West also support the renewable energy sector in both production and assembly of renewable facilities.

Employment and business base

Many of the major UK ports provide information about their economic contribution. The Port of Liverpool's own research (2009) reports that the port infrastructure contributes over 34,000 jobs and £1.1 billion of GVA per annum to the Liverpool City Region economy (MDS Transmodal 2009).

There is robust and detailed (regional level) information from MaritimeUK on the economic impact of the port and shipping sectors. The approach taken by the authors utilises an SIC-based analysis of employment in the sector scaled up using information from the Department for Transport and information on public sector workforce at ports (e.g. border patrol). There are separate reports for the Ports (Oxford Economics 2015a) and Shipping (Oxford Economics 2015b) sectors which show that the impact in the North West from the sectors is as follows;

- Ports is GVA £2.4 billion million and 34,600 employed
- Shipping is GVA of £560 million and 13,900 employed

This information is at the draft stage and therefore the overall breakdown of the whole maritime industry is not available. The reports are produced regularly (the

report used was produced in 2015 and outlines data for 2013) it is not known whether the work will continue to be used in the future.

As a result we have undertaken a separate analysis of the sectors below which shows that the Ports and Shipping sector employs 10,870 people across 280 businesses (Table 15). A full breakdown of the sector's definition is provided in Appendix A1a.

Table 15: Business and Employment in Ports and shipping (2014)[35]

Sector	Employment	Businesses
Ports & Shipping	10,869	280

For indirect employment we have used the employment multiplier [36] for Water Transport (2.5) which allows us to estimate that indirect jobs supported by the ports and shipping sector number 27,469. In total this provides employment figures which are in line with the MaritimeUK assessment of the industry.

4.3.13 Renewables

There are a series of renewables activities in the Irish Sea, highlighted in Figure 5 (Appendix A2). In the North West, economic activity connected to the renewables industry is concentrated on the ports (see 4.3.12 Ports and shipping) with some sites inshore. There are a number of key economic assets in the North West related to the renewables, including enterprise zones and business assets such as Cammell Laird's shipyard, the Port of Liverpool, Port Wirral, Port Ince, the 3MG/Stobart facility at Halton and the Former Bridgewater Paper Mill at Ellesmere Port. There are also plans for further renewables and energy developments, with proposals for Fracking undergoing consideration in Lancashire and plans outlined for a Tidal Lagoon in Cumbria.

Employment and business base

Many LEPs group renewables together as part of the low carbon sector. This loose and varied definition creates challenges for assessing the size and contribution of the renewables energy element of this sector.

The sector is also difficult to assess through Government statistics owing to few suitable classifications. There is a range of information on the renewables industry with sources including RenewableUK. The Government has established a survey on Low Carbon and Renewable Energy to collect information from businesses working within the green economy including low carbon and renewable energy activities. UK Government departments and other public sector bodies use this information to assess and develop policies relating to green job creation, potential growth and investment opportunities both nationally and regionally.

The ONS study on the Low Carbon and Renewable Energy Economy (Office for National Statistics 2014) provides employment information which shows that low carbon electricity employs approximately 31,500 employees across just over 21,354

[35] ONS data. Note: Tables may not add due to rounding.
[36] Scottish Government Input-Output model (2015) - Type I and Type II output, income, employment and GVA multipliers - available at: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads

businesses. The survey does not break down information by regional or sub-regional geography. As a result, it is not known what percentage of this activity takes place in the North West and there are no proportioning assumptions which could support the analysis.

Research by Renewable Energy Association (now RenewableUK) in 2012 shows that the UK renewable energy in the North West employs 9,400 with a turnover of £1.2 billion in 2010/11. This research highlighted that, after London and the South East, the North West has the largest employment in wind (Renewable Energy Association 2012). As this research is out of date, we have tested the analysis by an assessment of offshore and onshore wind operational infrastructure in the North West. This has the advantage of taking a bottom up approach to assessing the sector, as well as providing up to date and replicable information.

Focusing upon the data available for offshore and onshore wind, the UK Wind Energy Database (UKWED) identifies 524 operational turbines (295 offshore and 229 onshore) generating 1,389 MW of power in the North West. Additionally, there are 315 operational windfarms in North Wales delivering 810MW of power.

Applying employment and electrical output information on wind farms to electrical output for the North West (1,389 MW) provides a range of employment for the sector in the North West (between 4,700 and 13,200). Using the median for these ranges (2,070) provides an estimate of the employment in the sector.

To calculate indirect employment we have used the multiplier for Electricity which is 3.5[37]. This provides an employment figure of 7,240.

Business numbers in the sector are uncertain and to assess them we have utilised the ratio of jobs to businesses in the Renewable Energy Association (2012) report and apply this to the industry in the North West. This provides us with an estimate of 610 businesses.

Our testing of the Renewable Energy Association Research provides figures for employment which are of a similar scale. The tested approach has the advantage of being up to date and as such we have taken this forward to assess the economic value of the sector. However, it must be noted that the tested approach only takes into account wind and as such the size of the wider renewables sector may be larger.

4.3.14 Telecoms and communications

There are important gas pipeline links and power and telecommunication links to Northern Ireland, the Republic of Ireland and the Isle of Man. These make land fall in and around the mouths of the River Mersey and Ribble as well as power cables serving the energy infrastructure on the Cumbrian coast (Figure 6 in Appendix A2).

Employment and business base

[37] Scottish Government Input-Output model (2015) - Type I and Type II output, income, employment and GVA multipliers - available at: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads

Employment and business figures are difficult to define for this sector as a whole, as much of the economic data for the sector is associated with the onshore telecommunications industry rather than activity which relates to the offshore. Our assessment of the industry, which relies on assumptions about the activity which is marine-specific, shows that the industry employs 10,060 people across 180 businesses (Table 16).

Table 16: Business and Employment in Telecoms & communications (2014)[38]

Sector (SIC)	Employment	Business
61200 : Wireless telecommunications activities	2,310	90
61900 : Other telecommunications activities	820	20
42220 : Construction of utility projects for electricity and telecommunications	6,940	70
Total	**10,060**	**180**

To calculate indirect jobs we use the multiplier assumption from the Scottish Government[39] for Information services (1.18). This provides us with an estimate of 11,860 indirect jobs.

4.4 North West – Employment & businesses in marine sectors

Table 17 below displays the employment and business count estimates across the key marine sectors. We have highlighted where data is not available for analysis of both employment and businesses.

As stated above we utilise multipliers to calculate indirect employment. These multipliers relate to the broad sectors which the sectors are within and were selected using professional judgement.

Table 17: Employment and Businesses across Sectors[40]

Sector	Employment	Multiplier	Indirect Employment	Businesses
Aggregates	20	1.42	30	5
Aquaculture	120	1.57	190	20
CCS	*			
Coastal Protection	100	2.52	260	10
Coastal Tourism	57,970	1.22	70,530	1,890
Defence	10,130	1.54	15,560	30
Dredging	*			
Fisheries	5,220	1.99	10,390	100
Marine Recreation	5,540	1.22	6,740	370

[38] ONS data. Note: Tables may not add due to rounding.
[39] Scottish Government Input-Output model (2015) - Type I and Type II output, income, employment and GVA multipliers - available at: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads
[40] ONS data. Note: Tables may not add due to rounding. *Sectors with asterisks are excluded from the analysis on the basis of lack of available information.

Sector	Employment	Multiplier	Indirect Employment	Businesses
Nuclear	15,400	3.50	53,950	130
Oil & Gas	8,940	1.42	12,680	350
Ports & Shipping	10,870	2.53	27,470	280
Renewables	2,070	3.50	7,240	610
Telecoms & Comms	10,060	1.18	11,860	180
Total	**126,420**		**216,880**	**3,960**

4.5 Economic value of marine sectors

We have taken a standardised approach to calculating the contribution of the each sector to the national economy using employment and GVA per worker estimates. As outlined in our Methodological Approach, the GVA figures (Table 18) should be treated as broadly indicative due to our use of assumptions and the lack of GVA per worker figures at the detailed SIC level.

Overall the marine sectors in the North West employ directly and indirectly 343,000 people and contributes £24.7 billion to GVA.

Table 18: Summary table of GVA and employment contribution (2014)[41]

Sector	Total Employment	GVA per Worker Assumption	Total GVA (Rounded)
Aggregates	50	£59,110	£2,722,000
Aquaculture	300	£21,950	£6,663,000
CCS	*		
Coastal Protection	360	£54,590	£19,448,000
Coastal Tourism	128,490	£19,410	£2,493,344,000
Defence	25,690	£37,700	£968,659,000
Dredging	*		
Fisheries	15,610	£21,950	£342,631,000
Marine Recreation	12,290	£27,540	£338,252,000
Nuclear	69,350	£176,800	£12,260,758,000
Oil & Gas	21,620	£176,800	£3,821,436,000
Ports & Shipping	38,340	£59,870	£2,295,439,000
Renewables	9,310	£66,250	£616,629,000
Telecoms and Comms	21,910	£73,550	£1,611,680,000
Total	**343,300**		**£24,777,661,000**

To ensure consistency and to assess the applicability of the GVA outputs we have assessed the figures generated against industry reports and other literature. This

[41]ONS data. Note: Tables may not add due to rounding. *Sectors with asterisks are excluded from the analysis on the basis of lack of available information.

shows the difference and broad similarity in the estimates and also supports the rating of confidence for each sector (Table 19).

Table 19: GVA comparison and sensitivity

Sector	GVA	Comment on Sensitivity	Confidence Rating
Aggregates	£2,722,000	The industry body MPA estimates that the industry generates GVA of £4billion in 2014 (Mineral Products Association (2014) whilst figures for 2008 estimate that the industry's GVA is £54 million (Leeds City Council 2014). Within these estimates the lower figure appears to be of most applicability and suggests that the GVA for the sector is within the range of expected GVA given that the North West is not a large region for extraction.	**3**
Aquaculture	£6,663,000	It has been previously estimated for the South Marine Plan area that GVA for the UK industry is £2.98m (MMO 1050) whereas separate estimates of GVA for Scotland have estimates GVA to be £165.8m (Marine Scotland 2014). Given that the North West has a comparatively strong amount of aquaculture but not as strong as Scotland this activity this falls within the range expected.	**3**
CCS	-	*The CCS Association and TUC in 2014 estimated that CCS could contribute £150 million a year (Trade Union Congress and Carbon Capture & Storage Association (2014). Figures for the sector at a North West are unavailable.*	
Coastal Protection	£19,448,000	There are no industry reports on the GVA contribution of this industry. MMO 1050 estimates that the GVA for the industry at a UK level is £82.9 million in 2013. Using the employment and GVA per worker estimates for analysis, the figure for GVA suggests that the North West's industry is worth around 20% of the total which is within the range that could be expected for this industry given the erosion activity, shoreline and industrial base.	**3**
Coastal Tourism	£2,493,344,000	A range of figures exist. Beatty (2010) state that the North East's GVA in 2007 for this industry was £110 million. However, reports such European Commission's (2013) Report on Tourism in the UK highlights how the overall Tourism sector is worth £40.6 billion GVA and a report by Tourism Alliance states that the value of tourism is £56bn in 2013 (Tourism Alliance 2015). Beatty (2010) shows that in England and Wales coastal tourism supports around 210,000 jobs and contributes around £3.6 billion to the economy. This latter analysis suggests that the North West is slightly more than could be expected but could be accounted for by a wider definition of tourism.	**2**
Defence	£968,659,000	Work by the ADS (the trade body of the aerospace and defence industry in the UK) suggests that the defence industry is worth £22billion[42]. As such the GVA figure may be slightly smaller than expected but perhaps representative of the marine activities in the private sector and those related just to marine activities.	**3**
Dredging	-	MMO 1050 *estimates GVA for the industry of £0.61 million of GVA in 2013/14. A study in 2008 valued the marine aggregate dredging contribution of £114m (The Crown Estate 2008). Figures for the sector at a North East level are unavailable.*	
Fisheries	£342,631,000	Agriculture, forestry and fishing in the North West was worth £701 million to GVA in 2014. The figure for GVA calculated is slightly more than one would expect given that fishing is one element	**3**

[42] ADS webpage on UK Defence Sector in 2015, available at: https://www.adsgroup.org.uk/uk-defence-outlook-2014/

Sector	GVA	Comment on Sensitivity	Confidence Rating
		of the wider Agriculture, forestry and fishing sector. However, the analysis also includes fish processing.	
Marine Recreation	£338,252,000	The British Marine Federation has produced research in estimates that across the UK marine the leisure, superyacht and small commercial marine industry contributes £5.2 billion in GVA in 2012/13 (British Marine Federation 2014). The report estimates the total GVA contribution of the North West to be £69 million for direct and £342 million for direct and indirect. The figure calculated suggests that this falls somewhere in the middle suggesting the figures are broadly acceptable.	**3**
Nuclear	£12,260,758,000	The Electricity, gas, steam and air-conditioning supply sector contributed £998 million to GVA for the North East in 2014. Research by Energy UK and Ernst and Young shows how the wider energy industry is worth £28 billion to the economy and the North West power and gas sector contributed 1.34% of the regional economy in 2010 (Ernst & Young 2011). This suggests that the figure may be slightly higher than expected for the North West. However, given the classification approach used for employment it is likely that this also includes other energy activities.	**2**
Oil & Gas	£3,821,436,000	The Oil and Gas industry's GVA for the UK is £24.0bn (UK Government 2015) and whilst much of the activity is based in Scotland activity within the North of England is also significant. Oil and Gas UK's (2015) Economic Report estimates that the industry contributed around £17 billion to UK GVA. Furthermore, the process industries based in the North West are estimated to contribute £3bn to the regional economy by the Industry body; Chemicals North West. This suggests that the calculation is broadly correct and indicative of the industry.	**3**
Ports & Shipping	£2,295,439,000	Maritime UK estimate that the in the North West the ports sector produces £2.4 billion million GVA output and the shipping sector produces GVA of £560 million (Oxford Economics 2015a). This suggests that our calculations could slightly underestimate the contribution of both sectors. This could be down to methodological differences or the assumptions used.	**2**
Renewables	£616,629,000	The Electricity, gas, steam and air-conditioning supply sector contributed £1.8 billion to GVA for the North West in 2014[43]. The renewables industry is calculated to be worth £2.2bn to the UK economy whilst the wider Environmental Goods and Services sector contributed £26.3 billion to the UK Economy (Office for National Statistics 2015). The figure for renewables GVA output fits in with the assessment of the wider electricity, gas, steam and air condition supply sector in the North West.	**2**
Telecoms and Communications	£1,611,680,000	The contribution of the telecoms and communications sector to the UK economy is estimated to be £45 billion to the economy. [44]. Department for Culture Media & Sport values the telecoms sector at £25.7 million in 2015 (DCMS 2015) suggesting that the estimates are perhaps slightly higher than one might expect for the North West. This is likely to be both due to the definition of	**1**

[43] ONS Gross Value Added (Income Approach)at current basic prices 2014
[44] Telecentre Data Centre, available at: http://www.telehouse.net/uk-data-centres/

Sector	GVA	Comment on Sensitivity	Confidence Rating
		the sector as well as the method taken and assumptions used in our calculations.	

4.5.1 Confidence

Table 20 below sets out our confidence in the data for each of the sectors highlighting areas where data can be used for decision making. This is consistent with confidence criteria developed for MMO 1050 which we provide in Appendix A3.

The data and outputs from the assessment for each economic indicators within each sector have been given a confidence rating which considers the;

- Date of the information source;
- Spatial location of the data source;
- Methodology and techniques used to gather the data; and,
- Applicability of the activities covered by the data to the activities defined for each sector.

Table 20: Summary Table of Confidence

Sector	Employment	Businesses	GVA
Aggregates	2	3	2
	There is reliable information from the number of licenses and firms involved at a regional level whilst employment is captured at a national level. There is uncertainty as a result on the employment at a regional level and the GVA (which relies on employment), although estimates of both are		
Aquaculture	3	3	3
	The aquaculture sector is well accounted for in national statistics and industry (and Government) literature although there is little understanding of the linkages specifically to marine activities. GVA calculated is in line with other assessments of productivity.		
CCS	0		
	The CCS sector is currently not large enough to be captured in national statistics and little industry information exists to draw an assessment of the industry at a regional level.		
Coastal Protection	1	1	1
	The coastal protection has linkages across the economy and is captured in several other sectors in national statistics. However, there are assumptions which can be made on the size of the sector and the scale of activity within the North East. Those using this information should be aware of the limitations and that assessment may be needed.		
Coastal Tourism	2	2	2
	Tourism is captured in national statistic, industry literature and sub-regional studies. However, it is unknown whether activities are linked to coastal or marine activities. It can be assumed in certain areas that activity is and the data supports analysis of jobs, businesses and productivity. GVA calculated is in line with other assessments of productivity but is reliant on the employment estimates.		
Defence	2	2	2
	The defence industry is largely Government funded and information about it is often classified. However, there is a significant private sector and information in national statistics is available to assess the size of the industry. However, it is unknown whether this information covers the whole sector due to suppression of data.		
Dredging	0		
	The dredging industry is captured within several other industry sector reports and is not captured on its own within national statistics. It is clearly a highly valuable industry to the economy but there is little clarity on the size in terms of employment, businesses and GVA at a regional level to make any assessments.		
Fisheries	3	3	3
	Fisheries sector information is captured in national statistic, industry literature and sub-regional studies. GVA calculated is in line with other assessments of productivity.		
Marine Recreation	2	2	2
	Marine recreation has several linkages with the tourism sector. As a result, whilst a good level of detail is available from national statistics, industry literature and sub-regional studies. However, it is unknown whether activities are linked to coastal or marine activities and there may be overlap between Tourism and recreation.		

Sector	Employment	Businesses	GVA
Nuclear	3	3	2
	Data on employment and businesses is available from industry research, key employers and national statistics. The size of the productivity for the industry is reliant on estimates for employment and GVA per worker estimates. Our assessment suggests that this may be slightly inflated but appears to be broadly indicative of the industry.		
Oil & Gas	3	3	3
	There is good information on the size of the Oil and Gas industry due to definitions in national statistics and research from industry bodies in the North East. GVA calculated is in line with other assessments of productivity.		
Ports & Shipping	3	3	3
	The ports & shipping sector information is captured in national statistic, industry literature and sub-regional studies. The GVA calculated is in line with other assessments of productivity.		
Renewables	2	2	2
	The renewables industry is a poorly defined industry. It is often defined more broadly by including low carbon. Several subsectors like wave and tidal wave are less developed than renewables. However, there is an increasing body of sector and regional information on this sector and this supports the analysis of the sector which is good but is not transparent. As such the assessment in this report may under-estimate activities in sector due to the focus upon wind energy.		
Telecoms and Communications	2	2	1
	The telecoms and communications sector is well defined but the specific activities being assessed as part of the MMOs work are difficult to draw out in industry research and national statistics. As such the analysis provides numbers which fit in with other assessments but may include other activities making employment, business numbers and GVA appear slightly inflated.		

4.6 Private data for the North West – Employment, businesses and turnover of marine sectors

This section outlines employment, business count and turnover figures obtained from private data purchased from Intelligent Data Group for the key marine sectors in the North West, providing an important counterpart to our analysis of Government data.

Where direct data was not available for marine sectors using a comparable definition (Appendix A1a), we have provided figures for employment, businesses and turnover either in a wider or a related sector (italicised; see Appendix A1b for detailed definitions). Figures for the wider sector overstate the level of activity due to the inclusion of a broader range of economic activities, only a minority of which are likely to be included in our sector definitions or have marine linkages. Nevertheless, the information can be used to approximate the level of employment, number of businesses and value of turnover relevant to marine areas.

4.6.1. Sector data

The section below reviews the estimates of employment, businesses and turnover from the privately held data which was purchased for this project.

Aggregates

No data available due to the use of definitions based on SICs; no suitable marine aggregate SICs exist which could be used to construct detailed sector information.

Aquaculture

Estimates indicate that freshwater aquaculture supports 30 jobs across 10 businesses in the North West and has a total turnover of £5,675,000. Data is not available for marine aquaculture sector, which is likely to be a more significant economic activity in the North West. The size of the wider fishing and aquaculture sector is estimated as follows: 280 jobs, 60 businesses and £26,480,000 total turnover. The level of direct aquaculture activity is therefore likely to be between these two sets of estimates. This produces broadly similar figures to the Government data estimates for aquaculture activity (120 jobs, 10 businesses, GVA of £6,663,000[45]).

Carbon Capture and Storage

No data available. As outlined in Section 3.3.3., the commercial viability of carbon capture and storage (CCS) is yet to be demonstrated and the industry has been affected by early setbacks in terms of financing. Data is likely to become available in future with the further development of this sector.

Coastal Protection

Private data indicates that the coastal protection sector in the North West provides 160 jobs across 20 businesses with a total turnover of £23,210,000. These estimates are slightly higher than those based on Government data, which state that employment in the sector numbers 100, businesses 10 and the GVA contribution is £19,448,000. The private data captures more employment and businesses than

[45] The GVA estimate correlates with turnover as GVA is a proportion of turnover. For further details, see Section 1.3 Methodological Approach.

Government data, indicating that the private data is more detailed. There is potential for private data to explore this sector using other information. For example assessing the business activity or linking it with other business data which can be more indicative of sectoral activity.

Coastal Tourism

Coastal tourism is estimated by private data analysis to employ 65,650 people across 5,300 businesses and produce a turnover of £5,881,726,000. The analysis based on Government data shows that coastal tourism activities in the North West employ 57,970 people across 1,890 businesses and produce a GVA of £2,493,344,000. The higher economic activity in terms of employment and businesses reported by private data indicates that this data has a greater level of detail. Analysis of this sector could be developed further through examining individual firms or clusters. As explained above, the turnover and GVA estimates broadly correlate.

Defence

Estimates based on private data show that the defence industry employs 3,070 people across 140 businesses in the North West, and has a turnover of £252,230,000. The employment calculated is significantly lower than that based on Government data, which provides a figure of 10,130 jobs. Government data also provides a business count of 30 and GVA contribution of £968,659,000. Government data is therefore more detailed, owing to the significance of Government activity in this sector and the suppression of data to private sources.

Dredging

No data available. Economic activity in this sector is captured in the Aggregates and Coastal Protection sectors in the private data.

Fisheries

Private data provides estimates of economic activity in the North West's fisheries sector as follows: 40 jobs, 10 businesses and turnover of £6,110,000. This is a significantly lower level of economic activity than that based on Government data, which shows that the sector employs 5,220 people across 100 businesses with a total GVA of £342,631,000. Part of this can be accounted for by the lack of private data for manufacture of prepared meals and dishes. However, the majority of the fisheries sector activity is comprised of marine fishing (according to Government data) and this is included in private data, though reported activity is significantly lower. This indicates that the private data also has a lower level of detail than Government data for the sector as a whole.

Marine Recreation

Estimates based on private data indicate that the marine recreation sector in the North West employs 6,000 people and encompasses 730 businesses with a total turnover of £693,437,000. Whilst employment figures are similar, estimates of business numbers are roughly double those produced using Government data (total employment of 5,540, business count of 370 and GVA of £338,252,000). Private data thus provides more detail for this sector, although not all reported activity is necessarily marine based.

Nuclear
Our estimates based on private data show that the nuclear sector employs 4,100 people across 270 businesses. Total turnover is estimated at £333,882,600. Government data estimates for economic activity in the nuclear sector in the North West are as follows: employment of 15,400, business count of 350 and GVA of £12,260,758,000. Private data may underestimate the economic contribution of this sector as it does not include the significant levels of indirect economic activity.

Oil and Gas
Private data for the oil and gas sector in the North West produces estimates of 8,800 jobs, 440 businesses, and turnover of £1,473,491,300. Based on Government data, we estimate employment at 8,940 across 1,510 businesses and GVA at £3,821,436,000. The two sets of estimates for employment and businesses are broadly similar, however turnover is significantly lower than expected based on GVA. The economic contribution could be understated owing to private data excluding some activities within, and indirect economic activity of, the sector.

Ports and shipping
The North West's ports and shipping sector is estimated to contribute 4,950 jobs, 190 businesses and turnover of £653,855,700. Government data estimates the level of employment to number 10,870, businesses 280 and GVA to amount to £2,295,439,000. The private source understates economic activity levels in this sector because it does not provide data on activities within the sector such as warehousing, cargo and storage. Private data on warehousing and support activities for transportation as whole in the North West indicates that this is a large sector (employment numbering 80,110, businesses 2,390 and turnover of £150,790,119,653).

Renewables
No data available from IDG. Working with private data providers on definitions and other approaches to identifying the sector may provide detailed data on this sector.

Telecoms and Communications
Private data estimates employment in the sector of 630, a business count of 30 and turnover of £102,969,890. Our estimates based on Government data indicate that the sector employs 10,060 people across 180 businesses and produces a GVA of £1,611,680,000. The private data may provide better estimates of marine activities in this sector as Government data includes activities which are not marine in nature.

Summary
Compared with our estimates based on Government data, the private data indicates a broadly similar pattern of employment, with coastal tourism as the most significant sector. Key differentials are in defence activities and fisheries (both significantly higher in Government data estimates) and telecoms and marine recreation (both significantly higher in private data estimates). The number of businesses across sectors in the private data is generally higher, whilst the estimated value of the sectors varies. For example, private data indicates that the largest economic contribution (turnover) is by the coastal tourism sector, whilst Government data GVA

estimates are highest for the nuclear sector. Our analysis indicates that private data is of use in assessing certain sectors in more detail, namely coastal protection, coastal tourism and marine recreation. Private data may also provide more useful estimates for marine telecoms and communications activities. On the other hand, Government data appears more suitable for analysis of the defence, fisheries, nuclear and oil and gas sectors in the North West.

We provide further explanation of the differences between the two data sources in Appendix A4.

5. South East Marine Plan Area

The South East Inshore Marine Plan area is the smallest Marine Plan area, covering 4,000km^2 of sea and 1,500km of coast spanning from Felixstowe to Folkestone. The plan area reaches inland as far as Richmond in London. Since the Marine Plan area incorporates several administrative regions, we take a bespoke geographical region for analysis which incorporates the South East Local Enterprise Partnership (LEP) area, the Boroughs of Greater London, and following local authorities: Suffolk Coastal, Ipswich and Babergh District Councils (part of Suffolk and the New Anglia LEP).

This section reviews the relevant policy context; provides a brief review of the current state of the environment, and assesses the area's marine-related sectors and their value to the South East economy.

5.1 Policy review

Spatial rebalancing of the UK economy

London and the South East have consistently higher growth than the UK average. London contributes £364 billion to the UK economy (2016 Budget). The priority for London is ensuring continued growth through long-term, strategic investment in infrastructure. The South East contributes £240 billion in GVA to the national economy (2016 Budget). The region benefits from strong physical and economic links with London and Europe due to its location, key employment clusters and concentration of transport and logistics activity. It acts as a conduit between the rest of the UK and Europe.

Yet the South East also suffers high levels of out-commuting (to London) and deprivation in some areas, particularly in coastal communities. With the impetus to rebalance the UK economy, there is potential to increase the South East's economic growth through improving productivity, creating local employment opportunities and increasing investment in infrastructure, and reduce the region's dependence on London.

The Cities and Devolution Bill, announced during the 2015 Queen's Speech, provides the legislative framework necessary to decentralise powers to local councils. In September 2015, the 15 Council Leaders in Greater Essex commenced negotiations for a devolution deal underpinned by aims to improve housing, skills and training and infrastructure.

The 2016 Budget announces other measures to stimulate growth, infrastructure development, transport and connectivity in areas of the South East, including piloting a £15m Connected Corridor on the A2-M2 from London to Dover which will enable vehicles to communicate wirelessly with infrastructure and other vehicles. The Budget reports that Lord Heseltine will lead the Thames Estuary 2050 Growth Commission, which will develop an ambitious vision and delivery plan for North Kent, South Essex and East London. The Commission will focus on supporting the development of high productivity clusters in specific locations, examine how the area

can develop, attract and retain skilled workers, and seek to make the most of opportunities from planned infrastructure such as the Lower Thames Crossing. A delivery plan is to be prepared for the Autumn Statement 2017.

LEP Strategic Economic Plans

Another part of the economic development landscape are Local Enterprise Partnerships (LEPs). These public and private (and third sector) sector partnerships have outlined their planned activities and ambitions for economic development in Strategic Economic Plans (SEPs). The South East Marine Plan area is mainly impacted by the activities of the South East LEP and London Enterprise Panel (the London LEP). It overlaps with the coastal area of New Anglia – which includes Felixstowe - and is therefore also affected by the activities of this LEP.

The LEPs have a series of aims and objectives which they are seeking to meet over their lifespan. We have highlighted the key visions for the local economy and the key metrics (often jobs and GVA growth) for the LEPs in the South East in Table 21 below:

Table 21: Strategic Economic Plan Visions[46]

LEP	Vision	Economic Growth
South East LEP	"Creating the most enterprising economy in England"	The South East LEP's Growth Deal will create at least 45,000 jobs and investment of £632.1m by 2021.
London Enterprise Panel	"Deliver a London economy with: • the fastest income growth among cities of its scale and type, with growth in GVA per head that is faster over the long term than New York, Paris or Tokyo's, and that delivers more benefit to the wider UK; • job growth that translates into opportunity, with employment rates higher than both the UK average and the equivalent rates in New York and Paris; and • diversity and resilience, with strong performance across more of the economy in order to improve the city's resilience against crises, with no single sector driving	The number of jobs in London is projected to increase from 4,896,000 in 2011 to 5,757,000 in 2036. This equates to annual average growth of just over 35,000 jobs per year and results in over 850,000 additional jobs in London by 2036.

[46] LEP Strategic Economic Plans (see references for more details)

LEP	Vision	Economic Growth
	more than 40% of GVA or jobs growth."	
New Anglia LEP	"To transform the economy of Norfolk and Suffolk and establish the New Anglia area as a centre of global business excellence."	The LEP seeks to deliver 95,000 more jobs (an increase of 50% on 2012) and 10,000 new businesses and close the 10% gap in GVA compared with the national average by 2026.

The LEPs also outline key sectors which are important in the sub-regional economy. We highlight the key sectors for each LEP area in Table 22 below.

Table 22: Key Sectors of the Local Economy[47]

LEP	Key Sectors for Economic Growth
South East LEP	Transport and logistics, Advanced manufacturing, Life sciences and medical technology, Low carbon and renewable energy, Universities, Tourism, Creative, cultural and media.
London Enterprise Partnership	Financial services, Business services, Professional services, Technology, Life sciences, Creative, Tourism.
New Anglia LEP	Transport and logistics, Financial and insurance services, Advanced manufacturing and engineering, Agri-tech, Energy, Digital creative and ICT, Life sciences, Tourism.

Several sectors within the South East of direct and significant relevance to marine planning. These include transport and logistics, low carbon and renewable energy, and tourism. However, marine activities are also present in or influenced by other key sectors. For example, Ipswich in New Anglia LEP is developing a specialism in marine insurance within the Financial and insurance services sector.

We have assessed the linkages between key sectors and marine activities, as follows:

- Transport and logistics – The South East relies upon marine facilities (sea ports, Channel Tunnel) in its role as 'Gateway to the World' in terms of both passenger and freight traffic. It includes the Ports of Dover, Felixstowe and London, which comprises over 70 terminals along the Thames. Ports are also connected with the North Sea energy, offshore wind, and oil and gas decommissioning sectors.
- Low carbon and renewable energy; energy – The key links are between offshore wind, wave and tide-related renewable technologies (North Kent and along the coast to Ramsgate is a nationally designated Centre for Offshore Renewable Energy), and oil and gas sectors. Energy companies operate in

[47] LEP Strategic Economic Plans (see references for more details)

offshore, marine, and subsea engineering, drilling technology and decommissioning capabilities, as well as sea logistic operations.

- Tourism – The tourism industry in the South East is partly dependent on natural (e.g. beaches) and manmade (e.g. piers) marine assets, as well as activities on the River Thames.
- Advanced manufacturing - The offshore manufacturing and engineering sectors are a key marine consideration in the wider South East region, as are their links with other sectors such as renewables technology and transport and logistics.
- Universities – Higher Education institutions within the South East produce graduates for key industries with marine linkages listed above. Institutions are also involved in maritime research, such as University of Greenwich Maritime Centre, or have sites in coastal locations, such as University Campus Suffolk or Universities at Medway partnership campus.
- Agri-tech - There are fewer direct links between marine planning and this sector as it is largely based upon terrestrial activities. However, growth and investment in this industry is frequently a response to issues important for marine areas such as food security, supply-chain integrity and energy. The sector is also connected with transport and logistics via imports and exports; some of the most significant food and drink companies in Europe have a major presence in the New Anglia area (including Adnams, Bernard Matthews and British Sugar).

Local Economic Policy

There are a range of local policy documents of relevance to this study and future economic development studies. These documents include local economic assessments, local planning documentation, masterplans and other authority evidence, planning and strategy documents.

We have reviewed many of the key local authority documents relevant to economic development and marine activities in the South East and highlight key messages in Table 23 below.

Table 23: Key Local Economic Considerations

Theme	Comment
Key Sectors	Further to the LEP strategic economic plans, several local authorities in the South East identify key sectors. The following sectors with significant marine impacts and dependencies are identified as being particularly important across local authorities in the South East: • Transport and logistics, centred on the South East's geographic position which offers easy access to Europe as well as London and the East Midlands. For example, Felixstowe is the UK's biggest container port and is anticipated to grow substantially. The transport and logistics sector also has links with the advanced manufacturing and engineering - by facilitating import and export of inputs and finished products - and renewables sectors – such as the role of Harwich International

Theme	Comment
	Port (Tendring District Council 2015) in operations related to research, development and innovation as well as the manufacture, assembly, transportation, maintenance and servicing of off-shore wind-farm developments in the North Sea. • Offshore wind and renewable energy is identified as a key growth sector for which several local authorities identify assets capable of unlocking growth – such as ports; scientific, engineering and technology clusters; and workforce skill development. • Tourism based upon coastal built and natural infrastructure. For example, the Suffolk Coastal Core Strategy (2013) calls for regeneration of Felixstowe through seaside tourism exploiting an adjacent coastal Area of Outstanding Natural Beauty, whilst Swanscombe Peninsula is a 353 ha site identified by the Thames Gateway Kent as the location for a world-class leisure resort under the Paramount brand.
Housing & Commercial Developments	The South East is home to some of the UK's most significant port infrastructure, emerging sectors and ongoing regeneration initiatives. The intense pressure on land supply and prices in London also contributes to the requirement for further housing and commercial development in the South East, a sample of which is given below. Local authority strategy and planning documents highlight most key development sites. Through local authority planning documentation and strategies it is possible to understand how these sites connect with the local economy and marine activities. Several towns have been awarded Growth Point status, including Harwich, Maidstone and Dover. Regeneration initiatives for towns such as Canterbury often seek to promote seaside tourism and culture-led growth. The Thames Gateway South Essex (TGSE) partnership of local authorities (Basildon Borough, Castle Point Borough, Rochford District, Southend-on-Sea, Thurrock and Essex County Councils) and representatives of the South Essex business community identifies 13 priority large-scale development programmes on the north bank of the Thames for which it is seeking support from the Local Growth Fund. These include: • Up to 9,200 new homes split between six coastal sites, and a further 8,300 in the TGSE area. These

Theme	Comment
	sites will contribute to delivering the requirement of 55,200 houses between 2013 and 2031 (2,800 annually) identified by the TGSE region's Strategic Housing Market Assessment. • £12m investment in London Gateway Port and Logistics Park, to include nearly 1m sq.m of warehousing. • Thames Enterprise Park: developing a green technology or energy hub on 400 acres of land adjoining a former refinery. • Local authorities south of the Thames also plan for significant housing and commercial growth, delivered partly through the Thames Gateway Kent (supporting delivery of 50,000 new homes 2006-2026, including a cluster of waterfront sites at Medway) and newly-designated Kent Innovation Corridor (to deliver 230,000sqm of high quality business premises for life sciences, advanced manufacturing and engineering by 2027). Further north, the Haven Gateway Public-Private Partnership (including Essex County, Braintree District, Colchester Borough, Tendring District, Maldon District, Mid Suffolk District and Babergh District Councils) identifies over 45 ha of land around Harwich ports for the development of commercial uses in the offshore renewables sector. The Haven Gateway region is to require 65,100 new dwellings between 2011 and 2031. The Suffolk Coastal Local Plan (2013) identifies a need in excess of 8,700 homes, with Felixstowe and eastern Ipswich identified as capable of accommodating 22% and 29% of these respectively (2010-2027).
Key Businesses	The strategy documentation of many local authorities in the South East refers to or identifies local employers or businesses which play a key role in the local economy. These are largely knowledge-economy and technology businesses. For example, there are established clusters of advanced manufacturing businesses in Basildon which are home to leading industry names such as Ford, Selex Galileo and First Data. Martlesham Business Campus, at Adastral Park in Ipswich, is recognised for its importance to both the region and the Haven Gateway. It is designated a Strategic Employment Area, and consists of a variety of business uses including British Telecom (BT), intel and cisco.

Theme	Comment
	Medway Council's Local Plan Consultation document (Medway Council 2016) identifies the Higher Education sector as a provider of high value employment in itself and an enabler of further economic development based on a knowledge economy. This is centred on the Chatham Maritime 'learning quarter', which includes Universities at Medway, Mid Kent College and the University Technical College. Key local businesses also include those making use of the area's transport connectivity and may link with marine activities through import/export movements. Examples are Diary Crest and Nicholls and Clarke in the London Borough of Dagenham (2015).
Skills & Labour Market	A key focus for many local authorities is how the local labour market is functioning; the availability of jobs, the skills profile, the success of the economy and levels of unemployment. Local authorities note that coastal areas of the South East are associated with: - Ageing populations; - Higher than regional average rates of economic inactivity (partly due to early retirement); - Higher than regional average proportions of working-age adults who are benefits claimants; - Lower than average levels of qualifications; - A concentration of deprived areas, particularly on the Essex and Kent coasts; - A high percentage of tourism-related jobs, and industry relating to the ports; - Out-commuting, evident as there are generally higher numbers of residents than jobs. Significant out-commuting flows are to London and main urban centres in the South East such as Maidstone (from Medway); and, - Out-commuters have higher average levels of qualifications and incomes than the workforce based in coastal labour markets, indicating a skills mismatch in local labour markets. Local plans and strategies acknowledge the shortage and mismatch in skills and frequently seek to: - Develop the skills of the local labour force to cater for high growth sectors, with a particular focus on STEM (Science Technology Engineering and Mathematics) and technical skills for

Theme	Comment
	renewables/low carbon, life sciences, tourism and ICT sectors. - Provide high-skilled employment in key sectors to retain a younger, highly qualified labour force and reduce levels of out-commuting. Key strategic mechanisms have been established for a new approach to demand-led training through local employer-led Employment and Skills Boards in Greater Essex and Kent and Medway: ***"****We seek to provide a bridge between providers and employers. Its aim is to create a 'two way street' whereby employers inform the curriculum of education and training providers, while providers supply work-ready employees to the local and wider economy. This will be achieved by brokering strong, long-term relationships, built on mutual interest and understanding, between employers and providers"* (South East Local Enterprise Partnership 2014). Higher Education institutions are building on their strengths in support of priority sectors. Further Education College strategies also increasingly focus on employer engagement and development of Apprenticeships. Examples of vocational, sector-led training include the Swale Skills Centre (engineering and sustainable technologies); facilities in Sittingbourne and Medway associated with the South East Centre for Offshore Renewable Engineering; and the National Maritime Training Centre in Gravesend.

5.2 Current state of the environment

The following information about the state of the environment and current activity pressures in the Marine Plan areas has been derived from Charting Progress 2 (CP2) (2010). This report provides an assessment of the status of the UK marine environment based on a robust, peer-reviewed evidence base. It is a source of the key findings from UK marine research and monitoring and is intended to be used in policy-making to help protect our oceans and seas. CP2 is made up of a series of feeder reports that have been reviewed to obtain the required information.

The regions used within CP2 are not exactly the same as the Marine Plan areas but are suitable to give the high level description of the state of the environment required for this project.

5.2.1 Marine environment

Spanning from Felixstowe to Folkestone, the South East Inshore Marine Plan area is the smallest Marine Plan area, covering nearly 1,500km of coast and 4,000km2 of

sea but reaching inland as far as Richmond in London[48]. The South East area is characterised by water depths of less than 50 m. Most of the region is well mixed by tides and wind throughout the year. The main offshore habitats are large expanses of sands and coarser sediments. There are large seasonal variations in sea-surface temperature, ranging from 4 °C in winter to 19 °C in summer. Salinity may be as low as 30 due to freshwater input from the river such as the Thames. The area is relatively sheltered from prevailing westerly winds and average wave heights are relatively small.

The coastline is dominated by sedimentary habitats and offshore is mainly made up of sands and gravels with a high degree of turbidity (Hiscock 1998). The value of marine diversity within the South East Plan area has long been recognised. There are over 20 designations which ensure that over 50% of the Marine Plan area is protected through National and European legislation.

The physical characteristics of a region can determine the habitats and species that exist there and can also have an influence on the human uses of the environment. Despite its relatively small size, numerous interests operate throughout the South East Plan area, meaning space is at a premium at the coast and at sea.

Linkages between Environment and Economic Activity

The Thames and Orwell provides easy access to several large urban areas hub of the UK. Furthermore the naturally sheltered ports of Felixstowe, Thamesport and Dover are strategically important for container and passenger traffic, with the area being one of the busiest UK freight ports. Pressures from shipping on the environment include noise, risk of oil spills and other forms of contamination, and introductions of non-native species through ballast water. Given the wide-ranging nature of ships, these pressures are all managed through the International Maritime Organization. The occurrence of dredged material disposal sites within the area are associated with the large number of ports and harbours in the region which need to dispose of material dredged to maintain navigation channels. The waste disposal sector relies on the physical environment to assimilate wastes and specific environmental conditions are required to facilitate this. The disposal of wastes to the marine environment is strictly controlled.

The location of economically viable renewable energy projects is constrained by a number of factors, such as the capacity of national grid networks, sea conditions and other existing sea users like fisheries and shipping. Shallow water depths, good wind resource and proximity to demand means that renewable energy production from the Thanet Coast and Thames Array offshore wind farms is important for this area. This has also driven related investment in the Thames Estuary.

The area supports a high proportion of water discharge outlets related to the location of dense population centres. The naturally large volume of water moving down the areas estuaries accommodate this, but intertidal sediments in some estuaries are impacted by pollution and eutrophication.

[48] Marine Management Organisation Marine Information System http://mis.marinemanagement.org.uk/south-east

As with all areas of the UK, sea level is rising and saltmarsh communities are being affected by coastal 'squeeze'. This is caused by hard coastal defence structures, which have been constructed to protect populated areas, preventing the landward migration of saltmarsh communities in response to sea level rise.

Well established fisheries operate from the many of harbours found throughout the region, targeting commercially viable species that occur in region due to the environmental conditions (e.g. water depth, temperature, salinity). Both Whitstable and West Mersea retain strong connections to fishing. Fishing activities are widespread both spatially and temporally resulting in a high level of pressure from mobile fishing gears. Seabed sediments are heavily impacted by mobile fisheries such as trawling, which have caused damage to these habitats and led to the disappearance of living reefs.

5.3 Sectoral analysis

As with the other Marine Plan Area Chapters, the following sections describe the current activities within each of the relevant marine sectors identified from the Marine Policy Statement and an analysis of these sectors' contribution to the labour market and business base. We follow this up by assessing the productivity (GVA) contributions of the sectors.

We draw upon the most up to date and relevant data for this analysis. Yet we note that there could be overlaps between sectors which would result in contributions being overstated where this occurs. The significance of high-skilled and office-based employment in the London (and South East) economy makes it likely that a significant proportion of any sectoral activity will be head office activity. Therefore the contribution of marine activities within the marine sectors could also be overestimated. The contribution could alternatively be understated due to lack of available information. Consequently, we advise caution in any subsequent use of our analysis.

The focus of our analysis is the South East Marine Plan area, which crosses several administrative regions. Therefore we have created a bespoke geography for analysis which incorporates the South East LEP area, all London boroughs, and following local authorities: Suffolk Coastal, Ipswich and Babergh District Councils.

5.3.1 Aggregates

Marine dredged sand and gravel is currently supplied from seven key areas around the British coastline. A total of 10,273,740 tonnes was dredged in the South East in 2014. Marine aggregates are dredged and landed at the following locations in the South East:

- Aggregates dredged in the East Coast region are landed at Ipswich (Hanson/ARC Ipswich, Ipswich) ports;
- Aggregates dredged in the Thames Estuary region are landed at:
    - Barking (Barking, Docklands Wharf)
    - Cliffe (Alpha Wharf, Cliffe, North Sea Terminal)
    - Dagenham (Hanson/ARC Dagenham, Dagenham)
    - Denton (Denton, Denton B.A.D, Denton Sand)
    - Erith (Erith, Pioneer Wharf)

  - Greenhithe (Greenhithe)
  - Greenwich Wharves (Angerstein, Blackwall Wharf, Charlton, Delta Wharf, Greenwich, Murphy's Wharf, Phoenix Wharf, Victoria Deep Wharf)
  - London Docklands Wharves – mostly disused (Canning Town, Cargo Fleet Wharf, Clarence Wharf, East India Dock, Heron Quay, Millwall, Orchard Wharf, Peruvian Wharf, Rotherhithe, Silvertown, Thames Wharf, Thamesmea, Union Wharf, Victoria Wharf)
  - Northfleet (Northfleet, Northfleet Brett, Robin's Wharf)
  - River Medway & Swale Wharves (Queenborough, Ridham, Rochester, Rochester Hanson, Sheerness)
  - Thurrock (Purfleet, Purfleet PAL, Thurrock); and
- Aggregates dredged in the East English Channel region are landed at Dover port.

In 2014, 7,382,941 tonnes of marine aggregate was landed at wharves in the South East Area. Table 24 below shows the breakdown by wharf showing that aggregate activity is mainly concentrated on the Thames Estuary, specifically in Greater London (Dagenham and Greenwich Wharves).

Table 24: Marine Dredged Primary Aggregates - 2014[49]

Description	Tonnage
Ipswich	57,085
Thames Estuary (sub-total)	**7,325,856**
Cliffe	682,718
Dagenham	1,530,319
Denton	641,222
Erith	210,915
Greenhithe	241,227
Greenwich Wharves	2,692,686
Northfleet	652,079
River Medway & Swale Wharves	436,359
Thurrock	238,331
Total	**7,382,941**

Employment and business base

As outlined in the methodology, using latest employment figures and more detailed estimates of the split of employment in the sector we have derived figures for overall employment in the UK for the sector. We have apportioned national figures to total tonnage of marine aggregate (14.8 million) divided by total South East tonnage (7,382,941) to provide estimates for employment in the South East. We estimate this to be a total of 570 people employed in the South East.

We utilise the multiplier for Mining Support[50] (1.42) which includes activities connected to geological observations as well as drilling and extraction of minerals to

[49] The Crown Estate (2014)
[50] Scottish Type I and Type II output, income, employment and GVA multipliers, available at: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads

calculate the indirect jobs supported by the marine aggregates number 811. The amount of direct employment does not reflect the importance of the sector. The sector creates a significant number of indirect jobs further down the supply chain and also acts as an 'enabler' for employment generation in other industries, such as construction.

There are 4 production licences in the Thames Estuary (where much of the South East material is extracted), connected to 4 businesses (The Crown Estate 2014b). This is likely to be a representative number of the direct businesses in this industry in the South East. Several more businesses are likely to be part of the supply chain although there is uncertainty over the number of businesses involved in aggregate processing and transports.

5.3.2. Aquaculture

Information on value and distribution of aquaculture production is not broken down on a regional level in England. However, a map of aquaculture sites in England produced by Defra/Cefas (Figure 3 in Appendix A2) shows the location of aquaculture businesses.

Employment and Business

Analysis of the national statistics estimates that the sector employs 160 people across 30 businesses (Table 25).

Table 25: Business and Employment in Aquaculture (2014)[51]

Sector (SIC)	Employment	Businesses
03210 : Marine aquaculture	80	20
03220 : Freshwater aquaculture	80	10
Total	160	30

This detail of national statistics is highly important in supporting an analysis of aquaculture employment and business base. We have not apportioned the employment as set out in MMO 1075 due to uncertainties over the location of freshwater aquaculture although we note that research by Defra displays a map of aquaculture sites in England (Figure 3 in Appendix A2). This can be used to estimate the level of activities within certain areas. This also supports the national statistics data by showing that there are more than 50 freshwater, saltwater and shellfish aquaculture sites in the South East, some of which are near to coastal areas. There are 415 sites in England and Wales.

We utilise the employment multiplier for Aquaculture SIC (1.57)[52] to calculate that indirect jobs supported by the aquaculture number 250.

5.3.3 Carbon capture and storage

The commercial viability of CCS is yet to be demonstrated but the South East has the potential to become a key location for this industry owing to its growing

[51] ONS data. Note: Tables may not add due to rounding.
[52] Scottish Type I and Type II output, income, employment and GVA multipliers: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads

concentration of engineering and technology expertise, and its ports' connections with North Sea sites which offer abundant CCS capacities (Carbon Capture & Storage Association 2013).

Employment and business base

There is little available data on employment, business numbers and economic contribution of the Carbon Capture and Storage (CCS) sector. At a national level the ONS regularly produces information on the Low Carbon and Renewable Energy Economy which shows that the sector contributes a total of 96,510 businesses, 233,000 jobs and £45.3 billion in turnover in 2014. This information does not break figures down by sub-sector leading to an inability to identify CCS activities across the UK or regionally.

5.3.4 Coastal protection

Erosion on the east coast of England is a particular concern. It is likely to increase as mean sea level rises due to downward land movement and increases in storm severity and frequency. Figure 4 (in Appendix A2) shows that the entire coast of the South East region is significantly impacted by coastal erosion, the management of which is critical to mitigate flood risk.

Protection from coastal erosion has linkages across many marine industries and as such there is likely to be significant overlap. For example, replenishment of beaches and natural sea defences draws upon the aggregates industry, whilst sea defences are often located in areas of tourist or urban areas. The Government has recently spent £10 million on protecting 1,500 homes in Felixstowe from flooding, whilst extreme weather continues to threaten homes on the Norfolk coast.

Employment and business base

Employment and business counts for this sector are challenging due to activities cutting across a number of sectors (e.g. aggregates, ports). Using the construction of 42910: Construction of water projects SIC and applying a 50% apportionment to activities to account for activity not linked to marine or coastal activities shows that the sector employs 190 people across 20 businesses (Table 26).

Table 26: Business and Employment in Coastal protection (2014)[53]

Sector (SIC)	Employment	Businesses
42910 : Construction of water projects	190	20

This analysis should be treated with caution as a large focus of the SIC used is upon construction of ports, marinas, waterways, dams and dykes and dredging. There are also other classifications which could apply to coastal protection (e.g. civil engineering, Service activities incidental to water transportation) and the apportionment of employment or business data could be considered to be an insufficiently robust measurement.

To calculate indirect employment the analysis utilises the multiplier for Water Transport (2.53)[54] to estimate that coastal protection sector supports an additional 480 jobs.

[53] ONS data. Note: Tables may not add due to rounding.

5.3.5 Coastal tourism

Tourism is a significant and growing sector in the South East Marine Plan area. It forms the basis for regeneration of coastal towns such as Felixstowe and Canterbury. Tourism assets frequently have natural or built coastal or marine linkages, such as heritage attractions, beaches and more urban leisure and recreation coastal areas.

The South East Local Enterprise Partnership reports that the tourism employs 95,900 people and accounts for approximately 6.6% of total employment and 2.7% of total economic output in the South East LEP area[55]. London's tourism economy is worth £36 million[56], and part of this can be attributed to activities on the River Thames.

The Suffolk Coastal District Council, in tandem with the Suffolk Coast Ltd Destination Management Organisation, Suffolk Coast & Heaths Area of Outstanding Natural Beauty, and Waveney District Council, runs the project 'Developing prospects on the Suffolk Coast: Economy, People, Environment'. The project will develop key assets and deliver events and activities to encourage more year-round visitors and employment in the coastal tourism sector which is estimated to be worth more than £500 million annually to the Suffolk coastal economy and to provide one in every nine jobs in the area.[57]

Employment and business base

The lack of comparable evidence provided by regional and local governance structures makes it difficult to quantify the contribution of tourism to the economy of the South East Marine Plan Area. Furthermore, it is difficult to disentangle terrestrial tourism jobs from marine and coastal tourism jobs. We have therefore utilised the definition outlined in MMO 1075 to estimate the contribution of coastal tourism to employment (Table 27) which shows that the sector employs 109,860 people across 3,300 businesses.

Table 27: Business and Employment in Tourism (2014)[58]

Sector (SIC)	Employment	Businesses
55100 : Hotels and similar accommodation	79,980	1,680
55201 : Holiday centres and villages	710	70
55202 : Youth hostels	670	30
55209 : Other holiday & other short-stay accommodation NEC	1,710	300
55300 : Camping grounds, recreational vehicle parks and trailer parks	3,490	120
79901 : Activities of tourist guides	110	70

[54] Scottish Type I and Type II output, income, employment and GVA multipliers: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads
[55] South East Local Enterprise Partnership, Key Facts webpage, available at: http://southeastlep.com/about-us/key-facts
[56] London Enterprise Panel, Tourism Strategy for London webpage, available at: http://tourism.london/
[57] Suffolk Coastal News Page, (2015) Boost for East Suffolk tourism, available at: http://www.suffolkcoastal.gov.uk/news/boost-for-east-suffolk-tourism/
[58] ONS data. Note: Tables may not add due to rounding. NEC = Not Elsewhere Classified

91020 : Museum activities	9,410	130
91030 : Operation of historical sites and buildings and similar visitor attractions	2,350	70
91040 : Botanical and zoological gardens and nature reserve activities	3,220	50
93210 : Activities of amusement parks and theme parks	2,050	40
93290 : Other amusement and recreation activities	3,670	580
55900 : Other accommodation	2,480	190
Total	**109,860**	**3,300**

We recognise the findings made in MM0 1075 around the suitability of including transport facilities; shops and restaurants; travel agents (likely to be serving the travel needs of local residents). We also applied the apportionment outlined in MMO 1075 to 93290: Other amusement and recreation activities (whereby 50% of this activity is in Tourism and 50% in recreation). The analysis uses the most relevant SIC codes and shows that coastal tourism activities in the South East employ 109,858 people across 3,300 businesses. Using the employment multiplier from the Scottish Government[59] for Sports & recreation (1.22) we calculate the indirect jobs for the tourism sector to be 133,660.

5.3.6 Defence

Due to the confidential nature of many defence activities it is difficult to accurately assess the extent and scale of economic activity within the South East Marine Plan area. Activity tends to be associated with specific defence assets such as naval bases, ship building or transport. There are also businesses involved in the production of defence related materials which are unrelated to the marine sector, such as aerospace. There are several defence assets including Royal Navy Reserves and training establishments in the South East and several more which are decommissioned (e.g. HMS Belfast on the Thames) and have linkages to other industries (e.g. recreation and tourism). The economic activity linked to this industry is focused in coastal areas and the centre of London, where the head offices of some firms are based.

Employment and business base

Identifying defence activities is relatively straightforward in national statistics, although a limiting factor is that it is unknown where defence activities are connected to marine activities.

We have identified the following activities as being linked to the defence industry (Table 28 below) which shows that the defence industry employs 8,310 people across 70 businesses in the South East.

[59] Scottish Type I and Type II output, income, employment and GVA multipliers: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads

Table 28: Business and Employment in Defence (2014)[60]

Sector (SIC)	Employment	Businesses
84220 : Defence activities	6,590	0
30400 : Manufacture of military fighting vehicles	110	0
25400 : Manufacture of weapons and ammunition	1,370	20
30110 : Building of ships and floating structures	250	50
Total	**8,310**	**70**

The business figures outlined in ONS Enterprise Counts are low which is likely linked to suppression, confidentiality and the significance of Government funded activities. However, the figures provided are best estimates making use of the information available.

Our calculations of the indirect and induced employment in Defence use the employment multiplier[61] for Research & development (1.54). The estimate for indirect and induced employment is 12,760 jobs.

5.3.7 Dredging

Dredging is only permitted to take place in licenced areas if no significant environmental impacts are predicted. Most ports in the South East have dredged access channels allowing them to accommodate vessels.

Employment and business base

Employment and business information for dredging is captured in employment data for the aggregates sector. National statistics do not assess the sector in geographic or sectoral detail and there are several other sectors under which dredging activities can be captured, such as ports and shipping, coastal protection and aggregates.

5.3.8 Fisheries

Several areas on the South East of England were important historically for the fish industry. Some areas retain links to the fishing industry, with Leigh-on-Sea and Shoreham amongst the top 20 UK ports for quantity and volume of fish landed in 2013 (Marine Management Organisation 2014). The South East plays a minor role in the fish processing industry and the ports in the South East provide a base for a small amount of fishing activity, which despite its scale is important culturally and cuts across several aspects of fishery activity.

Employment and business base

The analysis of the sector shows that the sector in the South East employs 6,190 people across 250 businesses (Table 29 below). The sector is likely to be slightly overstating the employment in fish processing which is one element of 10.85 Manufacture of prepared meals and dishes.

[60] ONS data. Note: Tables may not add due to rounding.
[61] Scottish Type I and Type II output, income, employment and GVA multipliers: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads

Table 29: Business and Employment in Fisheries (2014)[62]

Sector (SIC)	Employment	Businesses
03.11 Marine fishing	370	180
10.20 Processing and preserving of fish, crustaceans and molluscs	270	20
10.85 Manufacture of prepared meals and dishes	5,550	50
Total	**6,190**	**250**

Using the employment multiplier[63] for Fish & fruit processing (1.99) we calculate the indirect employment for the Fisheries industry to be 12,340.

5.3.9 Marine recreation

Recreation activities connected to marine activities are varied and include land and vessel based wildlife watching, beach activities, paddle sports, surfing, windsurfing, sailing, motor-boating, personal water craft, SCUBA-diving, offshore and shore angling. There is a range of industry information including evidence that surfing on the East Coast contributes £68 million to the economy (Mills 2013).

A 2014 report by the British Marine membership organisation which assesses the economic contribution of the Marine recreation sector shows that the South East and London employ 15,622 and 2,651 people respectively across the Marine Industry. The South East alone accounts for 26% of total Marine employment. The industry in the South East and London regions contributes £635 million in direct and indirect GVA to the UK economy. These regions together correspond most closely with the South East Marine Plan area, although the size of the sector may be overstated as the South East Marine Plan area does not incorporate the entire South East region.

In addition to this, Sport England captures information on sports participation, with some of this sporting activity relating to marine environments through the Clubmark register (Table 30). This data shows that there are several clubs which could have marine interactions, although many will also operate in terrestrial environments.

Table 30: Marine Related Sports Clubs with a Club Mark[64]

Club mark type	South East
Angling	24
Canoeing	28
Rowing	21
Swimming	109

Employment and business base

MMO 1075 identifies how certain recreation activities in the Marine Plan areas are not referenced in ONS classifications. As a result the analysis apportions the activities of sports clubs and sports activities to 10% of the total and 50% of other

[62] ONS data. Note: Tables may not add due to rounding.
[63] Scottish Type I and Type II output, income, employment and GVA multipliers: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads
[64] Sport England; Local Sport Profile Tool. https://www.sportengland.org/our-work/partnering-local-government/tools-directory/local-sport-profile-tool/

amusement and recreation activities. This provides totals for the South East's recreation employment numbering 6,630 across 1,190 businesses (Table 31). Using a multiplier for the Sports & recreation industry of 1.22 we estimate the indirect employment to be 8,070.

Table 31: Business and Employment in Recreation (2014)[65]

Sector (SIC)	Employment	Businesses
93120 Activities of sport clubs	2,370	210
93199 Other sports activities	590	140
93290 Other amusement and recreation activities	3,670	830
Total	**6,630**	**1,190**

5.3.10 Nuclear

There is currently one nuclear power station in the South East Marine Plan area: Bradwell, on the Dengie peninsula in Essex although Sizewell is on the Suffolk Coast. Bradwell power station is partially decommissioned but has been identified by the Government as a site suitable for future nuclear development. An October 2015 Strategic Investment Agreement between EDF Energy and the China General Nuclear Power Corporation set up a UK partnership to develop a new nuclear power station at Bradwell, although a target date is yet to be determined[66].

Employment and business base

There is no information on current employment at Bradwell and as a result we have utilised an assessment of national statistics. We have focused our analysis in the South East upon relevant classifications in employment and business data for the Nuclear industry as well as the wider Energy industry given that some activities in other energy sectors have marine linkages and cross over with Nuclear.

This shows that employment in the nuclear industry is 6,820 across 275 businesses (Table 32). This is larger than some regions with operational nuclear power stations. A large proportion of employment and businesses within this industry in the South East is likely to be accounted for by head office activities, as well as activities of businesses not near any nuclear power stations. We also provide an assessment of the wider energy sector to show how nuclear sector fits in with other energy activities.

Table 32: Business and Employment in Nuclear and Energy (2014)[67]

Sector	Employment	Businesses
Nuclear	6,820	280
Energy	59,880	3,200

Using the employment multiplier[68] for electricity generation (3.5) we calculate the indirect and induced employment in the Nuclear sector to be 23,900.

[65] ONS data. Note: Tables may not add due to rounding.
[66] BBC website new story on Nuclear Agreements, October (2015), available at: http://www.bbc.co.uk/news/business-34587650
[67] ONS data. Note: Tables may not add due to rounding.
[68] Scottish Type I and Type II output, income, employment and GVA multipliers: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads

5.3.11 Oil and gas

According to Oil and Gas UK, 21% of employment in the sector is located in South East England and London[69]. There are no offshore oil or gas fields in the South East Marine Plan area (Oil & gas infrastructure maps from the Department of Energy and Climate Change (DECC) and Oil and Gas Authority (OGA)). However the area is a point of entry for oil and gas by sea and pipeline and is home to clusters in the chemical sector including biotechnology and pharmaceuticals and the head offices of several oil and gas companies.

Employment and business base

To assess the employment (and businesses) we can utilise national statistics, drawing upon the definition outlined in MMO 1075 and widening this to include several more processing industries as in other regions. SIC 71122: Engineering related scientific and technical consulting activities does not appear in MMO 1075 but cuts across several sectors including Oil and Gas. Its inclusion would inflate the size of the sector significantly. As such we have reduced this by applying an apportionment of 10% to the activities, noting that other regions are likely to have stronger linkages to Oil and Gas. Furthermore, we have applied an apportionment of 10% to the number of jobs and businesses falling under 06100: Extraction of crude petroleum. This is with the recognition that the majority of the employment in this activity in the South East is likely to be head office rather than marine-based roles (Oil and Gas UK report that only 7% of the industry's workforce works offshore). We calculate employment in the sector to be 2,770 across 430 businesses (Table 33).

Table 33: Business and Employment in Oil & gas (2014)[70]

Sector (SIC)	Employment	Businesses
05101 : Mining of hard coal from deep coal mines (underground mining)	-	-
05102 : Mining of hard coal from open cast coal working (surface mining)	-	-
05200 : Mining of lignite	-	-
06100 : Extraction of crude petroleum	310	-
06200 : Extraction of natural gas	50	10
07210 : Mining of uranium and thorium ores	-	-
08910 : Mining of chemical and fertiliser minerals	-	-
08990 : Other mining and quarrying NEC	210	70
09100 : Support activities for petroleum and natural gas extraction	170	20
09900 : Support activities for other mining and quarrying	60	40
71122 : Engineering related scientific and technical consulting activities	1,460	280
19100 : Manufacture of coke oven products	-	-
19201 : Mineral oil refining	310	10
19209 : Other treatment of petroleum products (excluding	80	10

[69] Oil & Gas UK Webpage on employment in the Oil & Gas sector, available at: http://oilandgasuk.co.uk/employment.cfm

[70] ONS data. Note: Tables may not add due to rounding. NEC = Not Elsewhere Classified

mineral oil refining petrochemicals manufacture)		
20110 : Manufacture of industrial gases	130	10
Total	**2,770**	**430**

To calculate the indirect jobs supported by the sector we can use the employment multiplier [71] for Gas (1.42) which provides an estimate of 3,930.

5.3.12 Ports and shipping

The South East is often described as the 'Gateway to the World' due to the volumes of both passenger and freight traffic; the region is home to the UK's largest concentration of ports. The South East LEP reports that around 14 million passengers and 85 million tonnes of freight pass through ports in the LEP area, accounting for over half and for one quarter of England's international sea passenger population and sea freight respectively. Ports in the South East are also connected with the North Sea energy, offshore wind, and oil and gas decommissioning sectors.

Major ports in the South East Marine Plan area include:

- The Port of Felixstowe on the Suffolk Coast is Britain's biggest and busiest container port, handling more than 4 million TEUs and 3,000 ships each year.[72]
- The Port of London, with 70 terminals and operations mainly in Thurrock and Medway, is the second largest UK port by freight traffic[73]. It supports 45,000 full time equivalent jobs and generates over £4 billion of GVA per year. Specialisms include the handling of paper and forest products, containers and roll-on/roll-off, grain and bulk commodities, construction and building materials, vehicles (Ford at Dagenham) and raw cane sugar (Tate & Lyle Sugars at Silvertown) (Port of London Authority 2015).
- The Port of Dover is Europe's busiest ferry port. The Dover-Calais route has consistently handled the largest amount of passengers of all international short sea ferry routes (Port of Dover 2014). The Port also includes a cargo terminal which handled 2.2 million freight vehicles and £100 billion of trade in 2014. The Dover Western Docks Revival will develop a new cargo terminal and port-centric distribution facility (Port of Dover 2014).
- The Port of Ipswich handles around 2 million tonnes per year of aggregates, grain, animal feed, fertilisers and cement[74].
- Several other ports which contribute mainly to freight traffic include Port of Harwich, Port of Medway, Port of Ramsgate and Port of Whitstable. Whilst smaller compared to London, Dover and Felixstowe, these ports individually are more significant in terms of freight than some of the larger ports in other regions.

[71] Scottish Type I and Type II output, income, employment and GVA multipliers: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads
[72] Port of Felixstowe webpage, available at: https://www.portoffelixstowe.co.uk/
[73] South East Local Enterprise Partnership, Key Facts webpage, available at: http://southeastlep.com/about-us/key-facts
[74] AB Ports Webpage on Ipswich port, available at: http://www.abports.co.uk/Our_Locations/Short_Sea_Ports/Ipswich/

Economic baseline assessment for the North East, North West, South East and South West marine plans

Employment and business base

There is robust and detailed (at a regional level) information from MaritimeUK on the economic impact of the port and shipping sectors. Separate reports for the Ports (Oxford Economics 2014a) and Shipping(Oxford Economics 2014b) sectors show that the direct impact on the South East and London from;

- Ports is GVA £1.43 billion and 33,900 employed
- Shipping is GVA of £650 million and 5,700 employed.

A separate analysis of the sector, provided below (Table 34), shows that the Ports and Shipping sector employs 14,180 across 420 businesses. A full breakdown of the sector's definition is provided in Appendix A1a.

Table 34: Business and Employment in Ports and shipping (2014)[75]

Sector	Employment	Businesses
Ports & Shipping	14,180	420

We have used the employment multiplier[76] for Water Transport (2.53) to estimate that indirect jobs supported by the ports and shipping sector is 35,825. This estimates employment figures which are lower than the MaritimeUK assessment of the industry but still demonstrate the importance of the sector to employment and business base. The lower figure could be due to differences in methodology and assumptions used.

5.3.13 Renewables

Renewable activities in the South East Marine Plan area are focused on offshore wind farms, as shown in Figure 5 (in Appendix A2). Central to this is the South East Centre for Renewable Offshore Engineering (CORE), one of the six areas in England designated by Government as most suitable to meet the needs of offshore renewable energy industries. The area's advantage stems from its shallow waters and strong wind resources, strengths in infrastructure and port logistics, local supply chain, land availability, offshore access and skilled workforce.

The South East CORE covers the Thames Estuary and extends from Ramsgate to Harwich and Brightlingsea. Three offshore wind farms are serviced from Kent - Thanet, Kentish Flats and London Array – with associated and supporting companies concentrated in the North Kent and Medway region[77].

The fourth offshore wind farm in the Marine Plan area, Gunfleet Sands, is serviced from Brightlingsea in Essex. Ports such as Ramsgate, Harwich Navyard, Brightlingsea and Whistable have become important centres for operations and maintenance bases and related services, and further locations like Sittingbourne (the Swales Skills Centre for engineering and renewable technologies training) and Medway are the home to supply chain businesses, R&D and training facilities.

[75] ONS data. Note: Tables may not add due to rounding.
[76] Scottish Type I and Type II output, income, employment and GVA multipliers: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads
[77] Thames Gateway Kent Partnership webpage on Centre for Offshore Renewable Engineering, available at: http://www.tgkp.org/kent-centre-for-offshore-renewable-engineering

Employment and business base

Many LEPs group renewables together as part of the low carbon sector. This varied definition creates challenges for assessing the size and contribution of the sector.

The sector is also difficult to assess through Government statistics which provide few suitable classifications. There is a range of information on the renewables industry with sources including RenewableUK and a survey on Low Carbon and Renewable Energy established by the Government to collect information from businesses working within the green economy. UK Government departments and other public sector bodies use this information to assess and develop policies relating to green job creation, potential growth and investment opportunities both nationally and regionally.

The ONS study on the Low Carbon and Renewable Energy Economy (ONS 2014) reports that low carbon electricity employs approximately 31,500 employees across just over 21,354 businesses. The survey does not break down information by regional or sub-regional geography. As a result, it is not known what percentage of this activity takes place in the South East and there are no proportioning assumptions which could support the analysis.

Lack of employment and business data for this sector is a concern for the industry[78] and several approaches have sought to take a top down and bottom up approach whereby local information and national statistics are used together. We take a bottom up approach in our assessment, using other data sources to identify employment and business information and checking the outputs against other sources.

Research by Renewable Energy Association (now RenewableUK) in 2012 shows that the UK renewable energy in Greater London and the South East employed over people 31,000 and had a turnover in excess of £4 billion in 2010/11 (Renewable Energy Association 2012). To test this information we have assessed offshore and onshore wind operational infrastructure in the South East to estimate the scale of employment in the sector. This has the advantage of providing up to date and easily replicable information.

The UK Wind Energy Database (UKWED) identifies 566 operational offshore turbines generating 2,094.3 MW of power within the South East Marine Plan area. Using a range of employment per electrical output figures, we have assessed power output for wind powered renewable energy for the South East (2,094.3 MW) by employment figures for the example windfarms to provide a range of job estimates for the sector in the South East (between 1,131 and 5,236). Using the mean for these ranges (3,120) provides an estimate of the employment in the South East.

To calculate indirect employment we have used the multiplier for electricity which is 3.5, which provides a figure of 10,920.

[78] Nature.com webpage on Renewables: Share data on wind energy (2016), available at: http://www.nature.com/news/renewables-share-data-on-wind-energy-1.19104

To calculate the number of businesses in the sector we apply the ratio of jobs to businesses provided in the Renewable Energy Association report (2012) on the Low Carbon Electricity industry at a UK level (1.47) to the South East and apply this to the South East. This provides us with an estimate of 2,110 businesses, which suggests a large SME base.

We have taken forward the tested assessment of renewables employment and businesses due to the replicable and up to date nature of the estimates. We note that this is significantly lower than the Renewable Energy Association report in 2012, which could be accounted for by the exclusive focus on wind energy.

5.3.14 Telecoms and communications

Telecoms and communications cables can affect and be affected by the activities of other economic sectors. For example, there is risk to and from the fishing industry as trawls and anchors may become caught on submarine cables, which can prove costly in terms of maintenance to both fishing and pipeline operations. There are several active telecommunications and power cables which land in the South East (Figure 6 in Appendix A2).

Employment and business base

Employment and business figures are difficult to define for this sector as a whole as much of the economic data for the sector is associated with the onshore telecommunications industry rather than activity which relates to the offshore. Our assessment of the industry, which relies on assumptions about the activity which is marine-specific, shows that the industry employs 8,220 people across 720 businesses (Table 35).

Table 35: Business and Employment in Telecoms & communications (2014)[79]

Sector (SIC)	Employment	Business
61200 : Wireless telecommunications activities	5,430	500
61900 : Other telecommunications activities	2,330	110
42220 : Construction of utility projects for electricity and telecommunications	460	110
Total	**8,220**	**720**

We use an employment multiplier assumption Government[80] for Information services (1.18) to calculate the indirect and induced employment for telecoms and communications to number 9,695.

5.4 South East – Employment & Businesses in Marine Sectors

Table 36 below displays the employment and business count estimates across the key marine sectors. We have also highlighted where data is not available for analysis of both employment and businesses.

[79] ONS data. Note: Tables may not add due to rounding.
[80] Scottish Type I and Type II output, income, employment and GVA multipliers: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads

We utilise multipliers to calculate indirect employment. These multipliers relate to the broad sectors which the sectors are within. These were selected on the basis of professional judgement. The multipliers used refer to the most detailed source available. This is provided by the Scottish Government[81] which, though specific to Scotland and out of date, can also be used as a proxy to broadly estimate indirect and induced impacts in English regions.

Table 36: Employment and businesses across marine sectors[82]

Sector	Employment	Multiplier	Indirect Employment	Businesses
Aggregates	570	1.42	810	10
Aquaculture	160	1.57	250	30
CCS	*			
Coastal Protection	190	2.53	480	20
Coastal Tourism	109,860	1.22	133,660	3,300
Defence	8,310	1.54	12,760	70
Dredging	*			
Fisheries	6,190	1.99	12,340	250
Marine Recreation	6,630	1.22	8,070	1,190
Nuclear	6,820	3.50	23,900	280
Oil & Gas	2,770	1.42	3,930	430
Ports & Shipping	14,180	2.53	35,830	420
Renewables	3,120	3.50	10,920	2,110
Telecoms and Communications	8,220	1.18	9,700	720
Total	**167,010**	**-**	**252,630**	**6,710**

5.5 Economic value of marine sectors

We have taken a standardised approach to calculating the contribution of the each sector to the national economy using employment and GVA per worker estimates. As outlined in our Methodological Approach, the GVA figures (Table 37) should be treated as broadly indicative due to our use of assumptions and the lack of GVA per worker figures at the detailed SIC level.

Overall the marine sectors in the South East employ directly and indirectly 419,640 people and contributes £42.6 billion to GVA.

[81] Scottish Type I and Type II output, income, employment and GVA multipliers: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads

[82] ONS data. Note: Tables may not add due to rounding. *Sectors with asterisks are excluded from the analysis on the basis of lack of available information.

Table 37: Summary table of employment and GVA contribution[83]

Sector	Total Employment	GVA per Worker Assumption	Total GVA (Rounded)
Aggregates	1,380	£97,520	£134,715,000
Aquaculture	410	£35,190	£14,482,000
CCS	*		
Coastal Protection	670	£37,390	£24,925,000
Coastal Tourism	243,510	£24,990	£6,084,499,000
Defence	21,060	£70,860	£1,492,540,000
Dredging	*		
Fisheries	18,530	£35,190	£652,248,000
Marine Recreation	14,700	£42,770	£628,697,000
Nuclear	30,720	£313,830	£9,640,668,000
Oil & Gas	6,700	£313,830	£2,100,997,000
Ports & Shipping	50,000	£40,610	£15,691,290,000
Renewables	14,040	£111,780	£1,568,840,000
Telecoms and Communications	17,920	£258,960	£4,639,877,000
Total	**419,640**	**-**	**£42,673,778,000**

To ensure consistency and to assess the applicability of the GVA outputs we have assessed the figures generated against industry reports and other literature. This shows the difference and broad similarity in the workings and also supports the rating of confidence for each sector's information (Table 38).

[83] ONS data. Note: Tables may not add due to rounding. *Sectors with asterisks are excluded from the analysis on the basis of lack of available information. Note: Tables may not add due to rounding.

Table 38: GVA comparison and sensitivity

Sector	GVA	Comment on Sensitivity	Confidence
Aggregates	£134,715,000	The industry body Mineral Products Association estimates that the industry generates GVA of £4billion in 2014(Mineral Products Association 2014) whilst figures for 2008 estimate that the industry's GVA is £54 million (Leeds City Council 2014). These estimates suggest that our estimated GVA for the sector is within the range of expected GVA given that the South East is an important region for extraction.	1
Aquaculture	£14,482,000	It has been previously estimated for the South Marine Plan area that GVA for the UK industry is £2.98m (MMO 1050) whereas separate estimates of GVA for Scotland have estimates GVA to be £165.8m (Marine Scotland 2014). The figure calculated for the South East appears to be within the range which might be expected for a region with a comparatively small amount of aquaculture activity.	1
CCS	-	*The CCS Association and TUC in 2014 estimated that CCS could contribute £150 million a year (CCS Association & TUC 2014). Figures for the sector at a regional level are unavailable.*	
Coastal Protection	£24,925,000	There are no industry reports on the GVA contribution of this industry. MMO 1050 estimates that the GVA for the industry is £82.9 million in 2013. Using the employment and GVA per worker estimates for analysis, the figure for GVA suggests that the South East's industry is worth around 28% of the total which is around what could be expected for the industry.	1
Coastal Tourism	£6,084,499,000	A range of figures exist. Beatty (2010) state that the South East's GVA in 2007 for this industry was £910 million. However, the European Commission's (2013) Report on Tourism in the UK highlights how the overall Tourism sector is worth £40.6bn GVA, whilst a report by Tourism Alliance (2015) states that the value of tourism is £56bn in 2013. Given the South East and London has a significant coastal tourism industry, these figures indicate that our estimate is approximately what could be expected.	1
Defence	£1,492,540,000	Work by the ADS (the trade body of the aerospace and defence industry in the UK) suggests that the defence industry is worth £22billion[84]. As such the GVA figure may be slightly smaller than expected but perhaps representative of the marine activities in the private sector and those related just to marine activities.	1
Dredging	-	MMO 1050 *estimates GVA for the industry of £0.61 million in 2013/14. A study in 2008 valued the marine aggregate* dredging contribution of £114m (The Crown Estate 2008). Figures for the sector at a regional level *are unavailable.*	
Fisheries	£652,248,000	Agriculture, forestry and fishing in the South East was worth £1.27 billion to GVA in 2012. The figure for GVA calculated is within the expected range given that fishing is just one element of the wider Agriculture, forestry and fishing sector.	1

[84] ADS webpage on UK Defence Sector in 2015, available at: https://www.adsgroup.org.uk/uk-defence-outlook-2014/

Marine Recreation	£628,697,000	The British Marine Federation has produced research which estimates that across the UK marine the leisure, superyacht and small commercial marine industry contributes £5.3 billion in GVA in 2012/13 (British Marine Federation (2014). The report estimates the total GVA contribution of the South East, London and East to be £821 million for direct and £947 million for indirect. The figure calculated (£3.5 billion) suggests that this falls somewhere in the middle suggesting the figures are within the range expected.	1
Nuclear	£9,640,668,000	The Electricity, gas, steam and air-conditioning supply sector contributed £3.05 billion to GVA for the South East in 2012. Research by Energy UK and Ernst and Young shows how the wider energy industry is worth £28 billion to the economy and a report by Oxford Economics and Atkins projects that the UK nuclear supply chain has the potential to generate £37 billion GVA to 2030 (Oxford Economics & Atkins 2013). Since the South East only forms part of the UK's nuclear industry, this suggests that our estimate may be slightly higher than expected. However, given the classification approach used for employment it is likely that this also includes other energy activities.	2
Oil & Gas	£2,100,997,000	The Oil and Gas industry's GVA for the UK is £24.0bn (UK Government 2015) and, as much activity is based in Scotland and the North of England, this supports our GVA estimate for the South East.	1
Ports & Shipping	£15,691,290,000	Maritime UK estimate that in 2013 the South East and London ports sector produces GVA of £5.49 billion and Shipping produces GVA of £2.32 billion(Oxford Economics 2015a & 2015b). Although the sectors have likely grown since 2013, our calculations could slightly overestimate their contributions. This could be down to methodological differences and the assumptions used.	2
Renewables	£1,568,840,000	The Electricity, gas, steam and air-conditioning supply sector is contributed £3.05 billion to GVA for the South East in 2012. The renewables industry is calculated to be worth £2.2bn to the UK economy whilst the wider Environmental Goods and Services sector contributed £26.3 billion (Office for National Statistics 2015). The figure for renewables GVA output fits in with the assessment of the wider electricity, gas, steam and air condition supply sector in the South East and is likely to be lower due to the specific focus upon renewable wind energy. The renewables sector was estimated to be "turning over £2.4 billion in 2010/11" and as such this assessment is slightly less. However this can be accounted by the focus upon wind energy.	2
Telecoms and Communications	£4,639,877,000	The contribution of the telecoms and communications sector to the economy is estimated to be £45 billion to the economy. [85]. Department for Culture Media & Sport values the telecoms sector at £25.7 million in 2015 (DCMS 2015) suggesting that our estimates are slightly higher than one might expect for the South East. This may be due to methodological reasons or assumptions used in our calculations.	3

[85] Telecentre Data Centre, available at: http://www.telehouse.net/uk-data-centres/

5.5.1 Confidence

Table 39 below sets out our confidence in the data for each of the sectors highlighting areas where data can be used for decision making. This is consistent with confidence criteria developed for MMO 1050 which we provide in Appendix A3.

The data and outputs from the assessment for each economic indicators within each sector have been given a confidence rating which considers the;

- Date of the information source;
- Spatial location of the data source;
- Methodology and techniques used to gather the data; and,
- Applicability of the activities covered by the data to the activities defined for each sector.

Table 39: Summary table of confidence

Sector	Employment	Businesses	GVA
Aggregates	2	3	2
	There is reliable information from the number of licenses and firms involved at a regional level whilst employment is captured at a national level. There is uncertainty as a result on the employment at a regional level and the GVA (which relies on employment).		
Aquaculture	3	3	3
	The aquaculture sector is well accounted for in national statistics and industry (and Government) literature although there is little understanding of the linkages specifically to marine activities. GVA calculated is in line with other assessments of productivity.		
CCS	0		
	The CCS sector is currently not large enough to be captured in national statistics and little industry information exists to draw an assessment of the industry at a regional level.		
Coastal Protection	1	1	1
	The coastal protection has linkages across the economy and is captured in several different sectors in national statistics. There are assumptions which can be made on the size of the sector and the scale of activity within the South East, however those using this information should be aware of the limitations and that assessment may be needed.		
Coastal Tourism	2	2	2
	Tourism is captured in national statistics, industry literature and sub-regional studies. However, it is unknown if activities are linked to coastal or marine activities. It can be assumed in certain areas that activity is connected with marine or coasts, and the data supports analysis of jobs, businesses and productivity. GVA calculated is in line with other assessments of productivity but is reliant on the employment estimates.		
Defence	1	1	1
	The defence industry is largely Government funded and information about it is often classified. However, there is a significant private sector for which information in national statistics is available to assess the size of the industry, yet it remains unknown		

Sector	Employment	Businesses	GVA
	whether this information covers the whole sector due to suppression of data.		
Dredging	0		
	The dredging industry is captured within several other industry sector reports and is not captured on its own within national statistics. It is clearly a highly valuable industry to the economy of the South East but there is little clarity on the size in terms of employment, businesses and GVA at a regional level to make any assessments.		
Fisheries	3	3	3
	Fisheries sector information is captured in national statistic, industry literature and sub-regional studies. GVA calculated is in line with other assessments of productivity.		
Marine Recreation	2	2	2
	Marine recreation has several linkages with the tourism sector therefore although a good level of detail is available from national statistics, industry literature and sub-regional studies, it is hard to disentangle the two overlapping sectors. It is also unknown whether activities are coastal/marine or whether they are confined to terrestrial environments.		
Nuclear	3	3	2
	Data on employment and businesses is available from industry research, key employers and national statistics. The size of GVA for the industry is reliant on estimates for employment and GVA per worker estimates. Our assessment suggests that this may be slightly inflated but appears to be broadly indicative of the industry.		
Oil & Gas	2	2	2
	There is good information on the size of the Oil and Gas industry due to definitions in national statistics and research from industry bodies. However, our estimates rely upon apportions which is based on assumptions about the nature of employment in the industry and overlap with other sectors. GVA calculated is in line with other assessments of productivity.		
Ports & Shipping	3	3	3
	The ports & shipping sector information is captured in national statistics, industry literature and sub-regional studies. The GVA calculated is based upon other assessments of productivity.		
Renewables	2	1	2
	There is an increasing body of sectoral and regional information to support analysis, yet the renewables industry remains poorly defined. It is often defined more broadly by including low carbon. Several subsectors like wave and tidal wave are less developed than other renewables. The assessment in this report may under-estimate activities in sector due to the focus upon wind energy. Furthermore, our estimate of business numbers relies upon our employment estimates as well as a low carbon electricity-wide ratio of jobs to businesses.		
Telecoms and Communications	2	2	1
	The telecoms and communications sector is well defined but the specific activities being assessed as part of the MMO's work - namely, marine activities, excluding onshore activities - are difficult to draw out in industry research and national statistics. As such the analysis relies upon an assumption of the proportion of the total activity in the industry which is offshore.		

5.6 Private data for the South East – Employment, businesses and turnover of marine sectors

This section outlines employment, business count and turnover figures obtained from private data purchased from Intelligent Data Group for the key marine sectors in the South East, providing an important counterpart to our analysis of Government data.

Where direct data was not available for entire marine sectors as defined according to our methodology, we have provided figures for employment, businesses and turnover either in a wider or a related sector (italicised; see Appendix A1b for detailed definitions). Figures for the wider sector overstate the level of activity due to the inclusion of a broader range of economic activities, only a minority of which are likely to be included in our sector definitions or have marine linkages. Nevertheless, the information can be used to approximate the level of employment, number of businesses and value of turnover relevant to marine areas.

5.6.1. Sector data

The section below reviews the estimates of employment, businesses and turnover from the privately held data which was purchased for this project.

Aggregates

No data available due to the use of definitions based on SICs; no suitable marine aggregate SICs exist which could be used to construct detailed sector information.

Aquaculture

Estimates indicate that freshwater aquaculture supports 180 jobs across 30 businesses in the South East and has a total turnover of £42,480,000. Data is not available for marine aquaculture. The size of the wider fishing and aquaculture sector is estimated as follows: 620 jobs, 420 businesses and £134,390,000 total turnover. The level of direct aquaculture activity is therefore likely to be between these two sets of estimates, which results in figures significantly higher than the Government data estimates for aquaculture activity (160 jobs, 30 businesses, GVA of £14,482,000), indicating that private data provides a greater level of detail than the Government data and therefore captures more economic activity in this sector.

Carbon Capture and Storage

No data available. As outlined in Section 3.3.3., the commercial viability of carbon capture and storage (CCS) is yet to be demonstrated and the industry has been affected by early setbacks in terms of financing. Data is likely to become available in future with the further development of this sector.

Coastal Protection

Private data indicates that the coastal protection sector in the South East supports 530 jobs across 100 businesses and has a total turnover of £61,506,450. These estimates are higher than those based on Government data, which state that employment in the sector numbers 190, businesses 20 and the GVA contribution is £24,925,000. The private data captures more employment and businesses than Government data, indicating that the private data is more detailed. There is potential for private data to explore this sector using other information. For example assessing

the business activity or linking it with other business data which can be more indicative of sectoral activity.

Coastal Tourism
Coastal tourism in the South East is estimated by private data analysis to employ 151,800 people across 8,810 businesses and produce a turnover of £11,884,594,940. The analysis based on Government data shows that coastal tourism activities employ 109,860 people across 3,300 businesses and produce GVA of £6,084,499,000. The higher economic activity in terms of employment and businesses reported by private data indicates that this data has a greater level of detail. Analysis of this sector could be developed further through examining individual firms or clusters. As explained above, the turnover and GVA estimates broadly correlate.

Defence
Estimates based on private data show that the defence industry employs 4,240 people across 280 businesses in the South East, and has a turnover of £453,393,915. Government data provides an employment estimate of 8,310, a business count of 70 and GVA contribution of £1,492,540,000. Government data is more detailed, owing to the significance of Government activity in this sector and the suppression of data to private sources.

Dredging
No data available. Economic activity in this sector is captured in the Aggregates and Coastal Protection sectors in the private data.

Fisheries
Private data provides estimates of economic activity in the fisheries sector in the South East as follows: 50 jobs, 20 businesses and turnover of £40,725,000. This is a significantly lower level of economic activity than that based on Government data, which shows that the sector employs 6,190 people across 250 businesses with a total GVA of £652,248,000. This indicates that the private data has a lower level of detail than Government data for the sector.

Marine Recreation
Estimates based on private data indicate that the marine recreation sector in the South East employs 17,100 people across 1,820 businesses with a total turnover of £1,731,725,490. Estimates of economic activity are similar to those produced using Government data (total employment of 16,630, business count of 1,190 and GVA of £628,697,000).

Nuclear
Our estimates based on private data show that the nuclear sector employs 10,020 people across 580 businesses. Total turnover is estimated at £4,412,445,857. Government data provides estimates for economic activity in the nuclear sector in the South East as follows: employment of 6,820, business count of 280 and GVA of £9,640,668,000. This suggests that private data is more detailed in terms of employment and businesses, but may underestimate the economic contribution of this sector.

Oil and Gas

Private data for the oil and gas sector in the South East produces estimates of 29,120 jobs, 1,040 businesses, and turnover of £37,252,736,781. Based on Government data, we estimate employment at 2,770 across 430 businesses and GVA at £2,100,997,000. This indicates that private data has a greater level of detail but may also include head office activities of businesses (leading to inflated turnover figures) and requires further exploration of the data.

Ports and shipping

The ports and shipping sector in the South East is estimated to contribute 9,341 jobs, 582 businesses and turnover of £1,669,069,080. Government data estimates the level of employment to number 14,175, businesses 420 and GVA to amount to £15,691,290,000. The private source understates employment and value associated with this sector because it does not provide data on activities within the sector such as warehousing, cargo and storage. Private data on warehousing and support activities for transportation as whole in the South East indicates that this is a large sector (employment numbering 121,836, businesses 5,401 and turnover of £42,775,742,458). Therefore, if it is taken into account that a small proportion of this sector's activity will be related to water transportation, the level of economic activity in the ports and shipping sector according to private data could be expected to be more similar to that calculated using Government data.

Renewables

No data available from IDG. Working with private data providers on definitions and other approaches to identifying the sector may provide detailed data on this sector.

Telecoms and Communications

Private data estimates employment in the sector of 1,472, a business count of 76 and turnover of £800,230,863. Our estimates based on Government data indicate that the sector employs 8,222 people across 722 businesses and produces a GVA of £4,639,877,000. The latter estimates are higher because private data for wireless telecommunications and for construction of utility projects for electricity and telecommunications is unavailable. Even so, the private data may provide better estimates of marine activities in this sector as Government data includes activities which are not marine in nature.

Summary

Compared with our estimates based on Government data, the private data indicates a broadly similar pattern of employment, with coastal tourism as the most significant sector. Key differentials are in defence activities and fisheries (both significantly higher in Government data estimates) and telecoms and marine recreation (both significantly higher in private data estimates). The number of businesses across sectors in the private data is generally higher, whilst the estimated value of the sectors varies. For example, private data figures indicate that the oil and gas, telecoms and coastal tourism sectors have the largest turnover out of the marine sectors defined according to our methodology. However, Government data estimates suggest that the nuclear sector is the largest in terms of GVA. Our analysis indicates that private data is of use in assessing certain sectors in more detail, namely aquaculture, coastal protection and coastal tourism. Private data may also provide more useful estimates for marine telecoms and communications activities and oil and

gas. On the other hand, Government data appears more suitable for analysis of the defence and fisheries sectors in the South East.

We provide further explanation of the differences between the two data sources in Appendix A4.

6. South West Marine Plan Area

The South West inshore and offshore Marine Plan areas comprise the area of sea stretching from the estuary of the River Dart at Dartmouth to the estuary of the River Wye. The area extends out to the seaward limit of the EEZ covering an area of approximately 84,000km^2 with a coastline of almost 2000km.

The following section reviews the relevant policy context, provides a brief review of the current state of the environment, and assesses the area's marine-related sectors and their value to the South West economy.

6.1 Policy review

Spatial rebalancing of the UK economy
Combined Authorities and LEPs across the country have been offered the chance to bid for significant investment and similar powers. In the build up to the spending review the Government received 38 proposals for devolution deals from across the country. In the South West region the Gloucestershire First LEP, Heart of the South West LEP and West of England LEP submitted proposals by the September 2015 deadline. These bids were preceded by Cornwall County Council's successful devolution deal some months earlier.

The Cornwall Devolution Deal, agreed in July 2015, is the only deal thus far to have been agreed with a single unitary authority. The agreed powers and £5 billion of Government funding are given to Cornwall County Council, the deal does not require the establishment of a combined authority or elected mayor. Powers transferred to the County Council include, but are not limited to, control of local transport funding, the responsibility for selecting projects for funding from the EU Regional Development Fund and EU Social Fund and working with partners to create a low carbon enterprise zone relating to geothermal energy.

Gloucestershire, formed of the county council, 6 district, borough and city councils and GFirst LEP, proposes to create a combined authority with increased responsibility for economy, skills, employment, planning, transport and infrastructure. The details of the requested powers are set out in in its devolution bid submission *'We are Gloucestershire'.*

In September 2015 the Heart of the South West LEP (HotSW), on behalf of its 15 district, borough and city councils and two National Parks across Somerset and Devon County Councils, submitted a devolution deal proposal. The Statement of Intent set out the LEPs desire for additional powers over economic growth and productivity, infrastructure and local resilience, and health, social care and wellbeing. The Prospectus for Productivity produced by the HotSW promises that, with greater freedom to act at a strategic level, local councils would help deliver £4 billion uplift to the economy, 163,000 new jobs, 179,000 new homes as well as a range of employment, training and education improvements by 2030.

Economic baseline assessment for the North East, North West, South East and South West marine plans

The West of England (WofE) area is the most economically productive in the South West region, comprising the local authorities of Bath and North East Somerset, Bristol, North Somerset and South Gloucestershire. In September 2015 the four WofE authorities and the WofE LEP submitted their bid for a devolution deal combined with a Payment by Results funding deal. The proposal submitted to the Government in September 2015 states that the deal would deliver a £2 billion increase in annual GVA over and above what could be delivered under business-as-usual. The bid includes a 10 year Infrastructure Fund of £1 billion to support the Joint Spatial Plan and Joint Transport Plan.

LEP Strategic Economic Plans

There are four LEPs of relevance to the South West Marine Plan area:

- Cornwall and Isles of Scilly LEP;
- GFirst LEP;
- Heart of the South West LEP; and
- West of England LEP.

The visions, aims and objectives of the LEPs are set out in their Strategic Economic Plans (SEPs). Table 40 below outlines this information as well as the headline economic figures.

Table 40: Strategic Economic Plan Visions[86]

LEP	Vision	Economic Growth
Cornwall and Isles of Scilly LEP	"Our growth vision is a thriving and vibrant Cornwall and Isles of Scilly economy benefitting from our vast local assets and innovating our way into global markets."	The Cornwall and Isles of Scilly LEP seeks to exceed predicted GVA growth by an additional £338m (5% stretch) by 2020 and invest in 18,313 new additional jobs over the plan period.
GFirst LEP	"We will create an environment in Gloucestershire that tells the world we're open for business and the county of choice for exceptional high performance companies. Our plan will accelerate economic growth and address the particular challenges we face."	The GFirst LEP targets 33,909 jobs created and 2,125 jobs protected by 2021 and seeks to drive growth of 4.8% GVA per annum to 2021.
Heart of the South West LEP	"Our vision is to transform the reputation and positioning of our area nationally and globally by 2030. We want the key strengths of the Heart of the South West to be seen as key assets of UK plc."	The HotSW LEP targets the creation of up to 163,000 jobs by 2030.

[86] LEP Strategic Economic Plans (see references for more details)

LEP	Vision	Economic Growth
West of England LEP	The West of England Vision describes an area which is and will continue to be one of the fastest growing sub-regions in the Country.	The WofE LEP has ambitions for 3.4% GVA growth by 2030 and 95,000 new additional jobs.

The SEPs also outline key sectors which are important in the sub-regional economy. We highlight the most relevant in Table 41 below.

Table 41: Key sectors for Economic Growth[87]

LEP	Key Sectors for Economic Growth
Cornwall and Isles of Scilly LEP	Aerospace, Agri-Food, Agri-Tech, Digital Industries, E-Health, Renewable Energy.
GFirst LEP	Aerospace, Logistics, Nuclear and Renewable Energy, Precision Engineering, Professional Services, Finance and Insurance, Digital Industries
Heart of the South West LEP	Advanced Manufacturing, Aerospace, Marine Sector, Research and Development
West of England LEP	Advanced Engineering, Aerospace, High Tech, Creative and Digital Industries, Low Carbon and Professional Services.

There are several key sectors of the economy in the South West which bear relevance to marine planning; particularly tourism, logistics and renewable energy. As outlined below there are a number of links between key sectors in the South West and marine activities and the marine environment:

- Tourism – The tourism industry is a significant sector of the South West economy and relies on the quality of natural and manmade marine assets.
- Logistics – The import and export of goods is dependent on the South West region's ports. The lack of a strong strategic road network in Cornwall encourages short sea shipping.
- Renewable Energy – There are several tidal and wave energy testing sites in Cornwall and Devon with the River Severn with the third highest tidal range in the world, making it well placed to test and run renewable energy projects.
- Military – The Royal Navy have a notable presence in the South West with the largest helicopter base in Europe at RAF Culdrose, the largest naval base in Western Europe at The Royal Devonport Dockyard in Plymouth and the Britannia Royal Navy College at Dartmouth.
- Fishing – The South West region has the largest fleet of fishing vessels in the UK.
- Communications – the South West region is a landing point for a significant number of transatlantic cable connections.

[87] LEP Strategic Economic Plans (see references for more details)

- Universities – The Marine Institute at Plymouth University is the largest of its kind in the UK with over 3000 students, staff and researchers. The University is home to the Marine Navigation Centre, Marine Innovation Centre and the COAST laboratory.
- Advanced Manufacturing – The offshore/subsea manufacturing sector is a key consideration and other activities such as manufacturing and testing of renewables technology are also a key consideration across marine areas.

Local Economic Policy

Within the South West region there are a range of local policy documents containing local economic assessments, planning policy and masterplans. All of these documents are underpinned by extensive evidence bases and strategy documents. Table 42 below identifies common messages drawn from the relevant policy documents.

Table 42: Key Local Economic Considerations

Theme	Comment
Key Sectors	Local authority policy documents identify the key sectors of their local economy, these key sectors vary throughout the South West region. The tourism (and visitor) economy is identified as a key sector throughout the South West region but is a particular focus of Cornwall and Devon where a decline in certain industries and lack of major employment centres has resulted in a reliance on tourism and agriculture. The more economically productive West of England area demonstrates a more diversified economy. Key industry sectors identified across this area include financial services, environmental technologies, logistics, advanced engineering and aerospace.
Economic Assets in Marine Areas	A number of the local authorities in the South West region identify key employers or businesses which play an important role in the local economy. For example, EDF operate Hinkley Point B and are constructing Hinkley Point C (HPC) in the district of West Somerset. HPC has wide reaching implications for the economy of West Somerset and the wider South West region, particularly for Small and medium enterprises benefiting from the construction phase. The Devonport Royal Dockyards employ approximately 2,500 people, supports 400 businesses and generates close to 10% of Plymouth economy. Princess Yachts are another key employer in Plymouth and have a demonstrable link to the marine sector. There are several tourist assets across the South West, with some tourist resorts and businesses such as Butlins at Minehead as key employers.

Key Businesses	There are several important companies in the South West who employ over 2,500 people in Bristol and South Gloucestershire. These include Airbus, GKN Aerospace, Rolls Royce, Lloyds Banking Group, MoD, NHS, UWE and UoB.
Transport Infrastructure	Cornwall and to some extent Devon are perceived as having weak road and rail connections to the regional and national strategic road networks. The A30 is the main highway linking key Cornish economic centres to the rest of the country. Cornwall Council's Proposed Schedule of Further Significant Changes local plan document prioritises the delivery of improvements to the A30 as well as the A391, A393, the rail network and Newquay Airport. Major investment is committed to improving sections of the A303 between Amesbury and Berwick Down, in order to relieve a pinch-point on the strategic route between London and the South West which has restricted the local economy. The ongoing electrification of the Great Western Mainline to Bristol is referenced throughout a range of local policy documents. The works are expected to benefit the wider South West economy by reducing journey times to London and the South East.
Skills & Labour Market	A key focus for many local authorities is how the local labour market is functioning; the availability of jobs, the success of the economy and levels of unemployment. The four LEPs in the South West region place great value in improving employment skills and a number of local authorities have created employment skills strategies which align with the LEP ambitions for skills; • Cornwall and Isles of Scilly LEP: "We aim to make investments which will increase productivity and competitiveness. Labour market skills and employability will also feature strongly". • GFirst LEP: "Our plan will accelerate economic growth and… ensure a ready supply of skilled workforce to support the growth of key sectors;" • HotSW LEP: "Creating the conditions for growth… where businesses and individuals can reach their potential: Skills infrastructure and facilities". • WofE LEP: "By 2030 the West of England will have… a high level of graduate and vocational skills."

6.2 Current state of the environment

The following information about the state of the environment and current activity pressures in the Marine Plan areas has been derived primarily from Charting Progress 2 (CP2) (2010). This report provides an assessment of the status of the UK marine environment based on a robust, peer-reviewed evidence base. It is a source of the key findings from UK marine research and monitoring and is intended to be used in policy-making to help protect our oceans and seas. CP2 is made up of a series of feeder reports that have been reviewed to obtain the required information. The regions used within CP2 are not exactly the same as the Marine Plan areas but are suitable to give the high level description of the state of the environment required for this project. The South East Marine Plan area was the most difficult to match to the information provided in CP2 due to the small size of the Marine Plan area compared to the relevant CP2 region. More assumptions have therefore been made with regards to the baseline environment in this region.

Spanning a distance along the coast just short of 2,000km from the River Dart in Devon to the Bristol Channel, the South West Inshore Marine Plan area has a marine area of more than 16,000km^2. The South West Offshore Marine Plan area is the largest Marine Plan area at over 68000km^2 [88].

Water depths are mostly between 50 and 150 m (shallower near coasts), increasing rapidly at the edge of the continental shelf to more than 4000 m. The largest tidal ranges in Britain occur in this area and as a result there are strong tidal currents. There are big seasonal variations in sea surface temperature, ranging from 8 °C in winter to 18 °C in summer. Some areas become stratified in summer and the strong tides generate tidal fronts, which influence water circulation. Salinities are typically greater than 34.5 except in the Bristol Channel and where river outflows reduce salinity locally.

The region is very exposed to the Atlantic in the west, resulting in large average wave heights. Turbidity is high in the Bristol Channel but moderate in deeper waters. Sea level is rising, increasing the risk of coastal erosion and flooding. This is a particular concern for the soft sediment coasts especially around the Bristol Channel where high tides and storm surges increase the risk of flooding.

There is a wide range of habitats along this very extensive coastline ranging from high exposed cliffs to sandy beaches and sheltered rias and estuaries. The geology ranges from the softer lias found at Lyme Regis to the hard granite outcrops of North Cornwall (Hiscock 1998). This region also has a high diversity of habitats and species. Offshore, the seabed is mainly composed of sand and gravel with rocky outcrops. The South West Marine Plan area comprises a number of Marine Protected Areas and deep sea habitats unique in England to this plan area. The region also includes some important seabird and seal habitats.

[88] Marine Management Organisation Marine Information System http://mis.marinemanagement.org.uk/south-west

Linkages between Environment and Economic Activity

Large areas of intertidal sediment have been impacted, largely through historical land claim, coastal defence and marine construction. Within estuaries, many intertidal sediments are impacted by pollution and eutrophication. Coastal lagoons have been particularly impacted by infilling and marine construction.

This plan area is home to a significant number of activities, particularly around the coast which are linked to the natural resources that the area provides. The regions large average wave heights give high potential for the generation of electricity from wave energy, and the Severn Estuary's huge tidal range has the greatest potential for harnessing tidal range energy in the UK. Pressures from such activities range from low for discrete offshore wave devices to high for barrages that present a permanent and unrecoverable impact on entire estuarine ecosystems.

Shallow waters and naturally occurring sand deposits on the seabed of the Severn Estuary and Bristol Channel provide a well located and economical source of sand for the local construction market. Demand for marine aggregate materials in the region could significantly increase to support large-scale infrastructure projects such as tidal energy projects, new nuclear power stations and coastal defence programmes. Pressures from dredging activities are well understood, highly localised and low in magnitude and frequency although they may still result in significant site specific impacts where they interact with sensitive features.

Due to its geographical location, the southwest corner of the UK is a key point of landfall for international telecommunication connections from America and Africa, providing significant indirect economic value and presenting negligible levels of environmental pressure from installation and operational activity. The sector relies environmental parameters to support its activity, the most important of which is a stable physical environment in which to operate. The physical features of greatest significance include shallow gradients, areas of limited seabed surface change, and soft sediments which allow for the trenching of cable systems.

The two most common fisheries in the area are beam trawling for fish and cuttlefish, and pot fishing for crabs and lobsters. The use of mobile fishing gear presents the most significant pressure within the area where it impacts on sensitive seabed communities. Fishing is also a pressure on grey seals through indirect effects on prey and habitat and directly through by-catch. By-catch is also significant for common dolphins and harbour porpoises and relates to the types of fishing gear deployed.

There are two naval bases in the region, at Plymouth and Dartmouth. These bases are located in deep water ports that provide natural shelter for vessels. Key pressures are likely to include noise from sonar and underwater explosions, habitat damage and introduction of marine litter and contaminants. The military defence sector relies on various ecosystem services that support its productivity, including: the physical environment, and chemical cycling/ water purification (to assimilate wastes).

The South West includes some attractive coastline ranging from exposed coasts to sheltered embayments that includes half of all English designated Heritage Coasts

and eight world heritage sites. As a result it is an important region for recreation particularly surfing and scuba diving and environmental pressures are present at most beaches throughout the region.

6.3 Sectoral analysis

As with the other Marine Plan Area Chapters, the following sections describe the current activities within each of the relevant marine sectors identified from the Marine Policy Statement and an analysis of these sectors' contribution to the labour market and business base. We follow this up by assessing the productivity (GVA) contributions of the sectors.

We draw upon the most up to date and relevant data for this analysis and note that there could be overlaps between sectors and that the contribution could be overstated where this could occur. The contribution can also be understated due to lack of available information. We advise caution in any subsequent use of our analysis.

The focus of our analysis is the South West region as defined by the former Government Offices for the Regions (GOR). However, we refer to South Wales and South of England where there is a significant element of activity which overlaps.

6.3.1 Aggregates

Marine dredged sand and gravel is currently supplied from seven regions around the British coastline. A total of 1,087,277 tonnes was dredged in the South West (including Wales) in 2014. Marine aggregates dredged in the South West region are landed at wharves in the South West including:

- Appledore: Appledore Wharves, Appledore Evans, Bidna
- Avonmouth: BCA Avonmouth, Cemex/BDL Avonmouth, TMD/UMD Avonmouth
- Barnstaple
- Bridgwater: Dunball Wharf

In 2014, 1,097,123 tonnes of marine aggregate was landed at wharves in the South West (including Wales). Table 43 below displays the breakdown by wharf in the South West region, showing that aggregate activity is mainly concentrated at Avonmouth.

Table 43: Marine Dredged Primary Aggregates (2014)[89]

Description	Tonnage
Appledore	35,691
Avonmouth	382,330
Bridgwater	35,667
Total	**453,688**

[89] The Crown Estate (2014)

Employment and business base

The latest employment figures from the UK Industry (BMAPA 2015) and more detailed estimates on the composition of employment in the sector (Highley et al 2007) have been used to calculate overall employment in the sector. We have then apportioned the national figures to total tonnage of marine aggregate (14.8 million) divided by total South West (including Wales) tonnage (1,097,123) to provide estimates for employment in the South West. We estimate this to be a total of 85 people employed in the South West. We utilise the multiplier for Mining Support[90] (1.42) which includes activities connected to geological observations as well as drilling and extraction of minerals. We calculate the indirect jobs supported by the marine aggregates to be 121 people.

Whilst this is larger than other regions (e.g. North East and North West), this is a comparatively small amount of direct employment which does not reflect the importance of the sector. The sector creates a significant number of indirect jobs further down the supply chain and also acts as an 'enabler' for employment generation in other industries, such as construction.

The South West region has 7 production licences connected to 5 businesses (The Crown Estate 2014b). The aggregates market is competitive and from industry evidence this is likely to be a representative figure for the direct businesses in this industry in the South West. Several more businesses are likely to be part of the supply chain although there is uncertainty over the number of businesses involved in aggregate processing and transports.

6.3.2. Aquaculture

Analysis of the national statistics estimates that the sector employs 270 people across 70 businesses (Table 44).

Table 44: Business and Employment in Aquaculture (2014)[91]

Sector (SIC)	Employment	Businesses
03210 : Marine aquaculture	100	40
03220 : Freshwater aquaculture	170	30
Total	**270**	**70**

This detail of national statistics is highly important in supporting an analysis of aquaculture employment and business base. We have not apportioned the employment as set out in MMO 1075 due to uncertainties over the location of freshwater aquaculture although we note that a map of aquaculture sites in England produced by Defra/Cefas (Figure 3 in Appendix A2) can be used to estimate the level of activities which may be impacted. This also supports the national statistics assessment, showing that there are more than 50 freshwater, saltwater and shellfish aquaculture sites in the South West, with many of them near to coastal areas. There are 415 sites in England and Wales.

[90] Scottish Type I and Type II output, income, employment and GVA multipliers: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads

[91] ONS data. Note: Tables may not add due to rounding.

We utilise the employment multiplier for Aquaculture SIC (1.6) in Scottish Government[92] guidance to calculate that indirect jobs supported by the aquaculture number 420.

6.3.3 Carbon capture and storage

The commercial viability of CCS is yet to be demonstrated and the industry has been affected by early setbacks in terms of financing, although the ambition to have one full scale CCS project operational in the UK before 2020 remains.

Employment and business base

There is little available data on employment, business numbers and economic contribution of the Carbon Capture and Storage (CCS) sector. ONS produces information on the Low Carbon and Renewable Energy Economy regularly which shows that a total of 96,510 businesses were active in this broad sector employing 233,000 workers and generating £45.3 billion in turnover in 2014 (Office for National Statistics 2014). However, there is no breakdown of data provided in the analysis. As a result we are unable to separate out the activities of CCS in the South West.

6.3.4 Coastal protection

The South West has a number of stretches of coastline which are impacted by coastal erosion, show in Figure 4 (in Appendix A2). Protection from coastal erosion has linkages across many marine industries and as such there is likely to be significant overlap. For example, replenishment of beaches and natural sea defences draws upon the aggregates industry, whilst sea defences are often located in areas with tourist assets or urban areas.

Storms in February 2014 destroyed around 100 metres of sea wall in Devon which impacted the Exeter to Plymouth line and closed the line for two months[93]. The closure has been estimated to cost the economy £1.2bn in the two months it was closed[94]. This demonstrates the importance of coastal protection across the wider economy.

Employment and business base

As noted above, employment and business counts for the sector are challenging due to activities cutting across a number of sectors (e.g. aggregates, ports). Those involved in undertaking work for the Dawlish sea defences and railway line will have come from several industries including construction, transport and engineering. As a result within national statistics there are several SIC codes which have relevance to coastal protection including (but not limited to) those which cover construction, aggregates, landscaping and engineering. Using a broad assessment would most likely overestimate the size of the sector.

[92] Scottish Type I and Type II output, income, employment and GVA multipliers: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads
[93] Network Rail Webpage Summary of damage to railway at Dawlish, available here: http://www.networkrail.co.uk/timetables-and-travel/storm-damage/dawlish/
[94] BBC News Story on Damage at Dawlish Sea Defences, February 2015, available at: http://www.bbc.co.uk/news/uk-england-devon-31140192

MMO 1075 uses 42910: Construction of water projects SIC and applies a 50% apportion to activities to account for the fact that not all activity will be linked to marine or coastal activities. This assessment for the coastal protection sector estimates that the sector employs 40 people across 20 businesses (Table 45).

Table 45: Business and Employment in Coastal Protection (2014)[95]

Sector (SIC)	Employment	Businesses
42910 : Construction of water projects	40	20

This analysis should be treated with caution as a large focus of this SIC is upon construction of ports, marinas, waterways, dams and dykes and dredging. There are also other classifications which could apply to coastal protection (e.g. civil engineering, service activities incidental to water transportation and construction) and the apportionment of employment or business data could be considered to be an insufficiently robust measurement. However, in the absence of other suitable approaches and to support consistent approaches the outputs from this are assumed to be of most use.

To calculate indirect employment the analysis utilise the multiplier for Water Transport (2.53)[96] to calculate that indirect jobs. This estimates that coastal protection sector indirectly supports an additional 90 jobs.

6.3.5 Coastal tourism

Tourism is a significant sector in the South West plan area, which possesses numerous tourism assets with coastal or marine linkages. These are varied and include beaches, rural and urban leisure and recreation facilities and heritage attractions.

Visit Cornwall's Value of Tourism (2011) report states that £1.85bn in visitor related spend was contributed to Cornwall's economy in 2011. This is the most recent report available for the county (Visit Cornwall 2011). The Tourism sector contributed £2.15b to Devon's economy and £1.1 billion to Somerset's over the same time period. The tourism and hospitality sector comprises 7.4% of the registered businesses in the HotSW LEP area.

In 2014, 103 cruise ships called at Destination South West member ports bringing 72,000 passengers and 15,000 crew to the region. Yachting and connected boating activity is also hugely important to the SWR economy (South West Regional Ports and Association British Ports Association 2015).

The Gloucestershire First Strategic Economic Plan (2015) identifies the importance of tourism to South Gloucestershire's economy as considerable. Annually, 16 million visitors contribute approximately £1bn to the local economy. With the Cotswolds, Wye Valley and Forest of Dean all situated in Gloucestershire, much of this is likely unrelated to coastal tourism. The tourism sector supports approximately 1,070 businesses in Gloucestershire

[95] ONS data. Note: Tables may not add due to rounding.
[96] Scottish Type I and Type II output, income, employment and GVA multipliers: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads

The West of England LEP Strategic Economic Plan (2015) reports that the GVA from tourism in 2010 was £871 million and the industry supported 55,700 jobs in 2012. The city of Bath and a number of other attractions are unrelated to coastal tourism.

Employment and business base

The lack of comparable evidence (recent or definition-wise) provided by the LEPs regarding jobs supported by the tourism economy makes it problematic to estimate the extent to which tourism contributes to the South West Marine Plan Area's economy. Moreover it is difficult to separate terrestrial tourism jobs from coastal tourism jobs. We have utilised the definition outlined in MMO 1075 to understand the contribution of coastal tourism to employment. This shows the sector employs 74,170 across 3,070 businesses (Table 46).

Table 46: Business and Employment in Tourism (2014)[97]

Sector (SIC)	Employment	Businesses
55100 : Hotels and similar accommodation	43,839	1360
55201 : Holiday centres and villages	6,138	185
55202 : Youth hostels	280	10
55209 : Other holiday & other short-stay accommodation NEC	3,085	570
55300 : Camping grounds, recreational vehicle parks and trailer parks	8,508	330
79901 : Activities of tourist guides	28	15
91020 : Museum activities	1,196	75
91030 : Operation of historical sites and buildings and similar visitor attractions	1,612	60
91040 : Botanical and zoological gardens and nature reserve activities	2,379	60
93210 : Activities of amusement parks and theme parks	2,139	60
93290 : Other amusement and recreation activities	3,431	250
55900 : Other accommodation	1,536	95
Total	**74,170**	**3,070**

We recognise the findings of MMO 1075 concerning the suitability of including transport facilities; shops and restaurants and travel agents (likely to be serving the travel needs of local residents). We also applied the apportion outlined in MMO 1075 to 93290: Other amusement and recreation activities (whereby 50% of this activity is in Tourism and 50% in recreation).

Using the employment multiplier for Sports & recreation (1.22) [98] we calculate the indirect jobs for the tourism sector to be 90,240.

[97] ONS data. Note: Tables may not add due to rounding. NEC = Not Elsewhere Classified.
[98] Scottish Type I and Type II output, income, employment and GVA multipliers: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads

6.3.6 Defence

Due to the confidential nature of many defence activities it is difficult to accurately assess the extent and scale of economic activity within the South West plan area. The defence industry is well established in the South West, where activity tends to be associated with naval bases, ship building and repair. There are also businesses involved in the production of defence related materials, particularly aerospace, which are less directly linked to the marine sector.

In Plymouth alone, approximately 12,000 people are employed directly or indirectly in the defence and marine sector. Approximately 7,500 military personnel, many of whom are stationed at Royal Devonport Docks, are included within this number. Major employers in defence across the South West plan area include BMT in Plymouth and Bristol, BAE in Bristol, Babcock in Bristol, Plymouth and Appledore[99].

Employment and business base

Identifying defence activities is relatively straightforward in national statistics. One limiting factor is that where defence activities are connected to marine activities is unknown.

We have identified the following activities as being linked to the defence industry (Table 47 below), to estimate that the industry employs 27,840 people across 100 businesses.

Table 47: Business and Employment in Defence (2014)[100]

Sector (SIC)	Employment	Businesses
84220 : Defence activities	20,040	10
30400 : Manufacture of military fighting vehicles	810	-
25400 : Manufacture of weapons and ammunition	760	10
30110 : Building of ships and floating structures	6,240	80
Total	**27,840**	**100**

The business figures outlined in ONS Enterprise Counts are low which is likely linked to suppression, confidentiality and the extent of activity carried out by the Ministry of Defence. However, the figures provided are best estimates with the information available.

Calculations of the indirect and induced employment in Defence use the employment multiplier[101] for Research & development (1.5). The estimate for indirect and induced employment is 42,770 people.

6.3.7 Dredging

Dredging is only permitted to take place in licenced areas if no significant environmental impacts are predicted. Dredging is important for a number of marine

[99] http://www.publications.parliament.uk/pa/cm200001/cmhansrd/vo010206/halltext/10206h05.htm
[100] ONS data. Note: Tables may not add due to rounding.
[101] Scottish Type I and Type II output, income, employment and GVA multipliers: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads

activities and several factors need to be considered including disposal and storage of material, reporting and environmental management. Many of the South West's ports have dredged access channels which allow them to accommodate vessels.

Employment and business base

Employment and business information for dredging is captured in employment data for the aggregates sector. National statistics do not assess the sector in detail and there is a lack of suitable information from industry or academic sources. Furthermore, there are several other sectors under which dredging activities can be captured, such as ports and shipping, coastal protection and aggregates.

6.3.8 Fisheries

The South West region has one of the largest fleets of fishing vessels in the UK, although the fleet is mostly comprised of small vessels. In terms of landings, each year more than 33 thousand tonnes of fish worth more than £57 million is landed at ports in the South West[102]. Fishing and fish processing in the South West is important economically and also culturally. Newlyn is ranked the UK's fifth biggest port by value of catch. Newlyn is one of the busiest fisheries in the South West, with approximately 10 thousand tonnes of fish being landed annually and over 13 thousand tonnes of fish landed at Plymouth every year. The remaining ports in the South West provide a base for smaller fleets and vessels which contribute to the South West's fishery activity.

Employment and business base

Fishing is linked to several industries. MMO 1075 highlights how fish processing and wholesale are important activities. We suggest that fish processing should be included due to the interrelated nature of the fish processing industry, which is often located in coastal areas and reliant on fresh fish from abroad and within the UK. We have therefore identified employment and business numbers for this subsector.

This analysis shows that the sector employs 2,590 people across 630 businesses (Table 48 below). The sector is likely to overstate the employment in fish processing, which is just one element of 10.85 Manufacture of prepared meals and dishes.

Table 48: Business and Employment in Fisheries (2014)[103]

Sector (SIC)	Employment	Businesses
03.11 Marine fishing	570	580
10.20 Processing and preserving of fish, crustaceans and molluscs	1,180	40
10.85 Manufacture of prepared meals and dishes	840	20
Total	2,590	630

Using the employment multiplier for Fish & fruit processing (1.9)[104] we calculate the indirect employment for the Fisheries industry to be 5,150.

[102] UK Sea Fisheries 2014. https://www.gov.uk/government/statistical-data-sets/uk-sea-fisheries-annual-statistics-report-2014

[103] ONS data. Note: Tables may not add due to rounding.

6.3.9 Marine recreation

Marine recreation cuts across several areas, many of which are also linked to tourism or sport. Research exists for some specific elements of marine recreation. For example, surfing in Cornwall, North and South Devon reportedly contributes approximately £244 million (Mills 2013) to the local economy.

Sport England captures information on sports participation, with some of this sporting activity relating to marine environments. The Clubmark register provides an indication of the number of clubs which are based in the region and Table 49 below shows that there are several clubs which could have marine interactions although many will also operate in terrestrial environments too.

Table 49: Marine Related Sports Clubs with a Clubmark[105]

Clubmark Type	South West
Angling	15
Canoeing	25
Rowing	28
Swimming	81

Employment and business base

A 2014 report by the British Marine Membership Organisation which assesses the economic contribution shows that the South West employs 17,295 people. The industry contributes £653 million and £550 million in direct and indirect GVA respectively to the UK economy.

We estimate that the South West's recreation employment numbers 4,960 across 140 businesses (Table 50). Using a multiplier for the Sports & recreation industry of 1.22 we estimate the indirect employment to be 6,040 jobs.

Table 50: Business and Employment in Recreation (2014)[106]

Sector (SIC)	Employment	Businesses
93120 Activities of sport clubs	1,260	100
93199 Other sports activities	280	40
93290 Other amusement and recreation activities	3,430	-
Total	4,960	140

6.3.10 Nuclear

There is one operational nuclear power station in the South West, at Hinkley Point in West Somerset. This power station is run by EDF Energy and is capable of

[104] Scottish Type I and Type II output, income, employment and GVA multipliers: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads

[105] Sport England Local Profile Tool https://www.sportengland.org/our-work/partnering-local-government/tools-directory/local-sport-profile-tool/

[106] ONS data. Note: Tables may not add due to rounding.

supplying electricity to over 2 million UK homes. Hinkley Point B will see operation continue for another 7 years (to 2023).

There are two confirmed new sites for nuclear power stations in the South West. Construction has commenced on EDF Energy's Hinkley Point C site in West Somerset. The construction of the new nuclear power station at Oldbury on the south bank of the Severn Estuary is expected to commence following completion of the Wylfa site in North Wales.

The Royal Devonport Dock at Plymouth is the Royal Navy's sole nuclear repair and refuel facility.

Employment and business base

Data is available from many of the power stations directly; Hinkley Point B power station employs approximately 535 full time employees plus over 220 full time contract partners[107]. Whilst power stations account for much of the employment in this sector, there are also wider energy related economic activities of relevance.

As a result, we have focused our analysis upon relevant classifications in employment and business data for the Nuclear industry as well as the wider Energy industry, given that some activities in other energy sectors have marine linkages and cross over with Nuclear.

This shows that the nuclear industry in the South West employs 5,520 people across 420 businesses. We have also provided an assessment of the wider energy industry's employment and business profile to provide a sense of the wider energy industry activity in the South West (Table 51). A full breakdown of the sector's definition is provided in Appendix A1a.

Table 51: Business and Employment in Nuclear and Energy (2014)[108]

Sector	Employment	Businesses
Nuclear	5,520	420
Energy	25,890	4,040

Using the employment multiplier from the Scottish Government[109] for Electricity Generation (3.5) we calculate the indirect and induced employment in the Nuclear sector to be 19,330. It should be noted that the multiplier could be even larger given that the industry has several safety and technical requirements which distinguish it from other energy sectors.

6.3.11 Oil and gas

The South West plays no direct role in this sector due to its distance from active onshore and offshore oil and gas fields (Oil & gas infrastructure maps from the Department of Energy and Climate Change (DECC) and Oil and Gas Authority (OGA)).

[107] EDF Energy, webpage on Hinkley Point B, available at: https://www.edfenergy.com/energy/power-stations/hinkley-point-b

[108] ONS data. Note: Tables may not add due to rounding.

[109] Scottish Type I and Type II output, income, employment and GVA multipliers: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads

Employment and business base

There are currently no offshore Oil or gas fields in the South West Marine Plan areas, with the majority of production being based in the North Sea. Unlike the North East and North West, there is no chemical industry cluster and there is little industry or economic information on the scale of employment, businesses and economic contribution in the South West for these sectors.

To assess the employment and businesses we can utilise national statistics, drawing upon the definition outlined in MMO 1075 and widening this to include several more processing industries as in other regions. We reduce the employment and businesses in 71122: Engineering related scientific and technical consulting activities as this inflates the size of the sector significantly. It does not appear in MMO 1075 but cuts across several sectors including Oil and gas. As such we have reduced this by applying an apportionment of 10% to the activities, noting that other regions are likely to have stronger linkages to Oil and gas. We calculate employment in the sector to be 1,510 across 170 businesses (Table 52).

Table 52: Business and Employment in Oil & gas (2014)[110]

SIC	Employment	Businesses
05101 : Mining of hard coal from deep coal mines (underground mining)	-	-
05102 : Mining of hard coal from open cast coal working (surface mining)	-	-
05200 : Mining of lignite	-	-
06100 : Extraction of crude petroleum	170	-
06200 : Extraction of natural gas	-	-
07210 : Mining of uranium and thorium ores	-	-
08910 : Mining of chemical and fertiliser minerals	-	-
08990 : Other mining and quarrying NEC	60	20
09100 : Support activities for petroleum and natural gas extraction	200	10
09900 : Support activities for other mining and quarrying	30	20
71122 : Engineering related scientific and technical consulting activities	770	130
19100 : Manufacture of coke oven products	-	-
19201 : Mineral oil refining	10	-
19209 : Other treatment of petroleum products (excluding mineral oil refining petrochemicals manufacture)	270	10
20110 : Manufacture of industrial gases	10	-
Total	1,510	170

To calculate the indirect jobs supported by the sector we can use the employment multiplier from the Scottish Government[111] for Gas (1.4) which estimates that indirect employment is 2,140.

[110] ONS data. Note: Tables may not add due to rounding. NEC = Not Elsewhere Classified.

6.3.12 Ports and shipping

The only international passenger port in the South West is Plymouth, with routes to Santander and Roscoff.

There are 35 ports in the South West[112]. Of these, 12 ports are of a considerable size, including 5 on the south coast of Devon and Cornwall and 7 on the north coast from Cornwall to Gloucestershire:

- Dartmouth
- Plymouth
- Fowey
- Falmouth
- Penzance
- St Ives
- Padstow
- Appledore
- Bideford
- Avonmouth
- Bristol
- Gloucester Canal

The Royal Portbury Dock and Avonmouth Dock form part of Bristol Port. The docks are a major importer of cars and coal. Plans are in place to increase capacity of Bristol Port by building a new deepsea container terminal.

Appledore Shipbuilders are based at Appledore port. Falmouth is a major bunker refuelling destination. Fishing is a common activity at Fowey, Falmouth, Penzance, St. Ives, Padstow and Bideford.

None of the UK's top ten busiest ports by tonnage of freight handled are located in the South West. Bristol is the largest in the area by units and tonnage. Nevertheless, several small harbours and marinas across the South West play an important role in recreation and larger ports and harbours play a supporting role to shipping activities.

Employment and business base

There is robust and detailed (regional level) information from MaritimeUK on the economic impact of the port and shipping sectors. The approach by the authors utilises an SIC-based analysis of employment in the sector scaled up using information from the Department for Transport and information on public sector workforce at ports (e.g. border patrol). There are separate reports for the Ports (Oxford Economics 2015a) and Shipping (Oxford Economics 2015b) sectors which show that the impact in the South West in 2013 from;

- Ports is GVA £1 billion and 23,300 employed; and,
- Shipping is GVA of £430 million and 10,800 employed.

[111] Scottish Type I and Type II output, income, employment and GVA multipliers: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads

[112] http://swrpa.org.uk/

This information is at draft stage and therefore the overall breakdown of the whole maritime industry is not available. The reports are produced regularly (the most recent in 2015 and outlines data for 2013), although it is unknown whether the work will continue to be used in the future. As a result, we have undertaken a separate analysis of the sectors which overcomes the need to apportion on the basis of assumptions and the uncertainty in business numbers.

Our analysis of the sector in Table 53 below shows that the Ports and Shipping sector employs 16,270 across 620 businesses. A full breakdown of the sector's definition is provided in Appendix A1a.

Table 53: Business and Employment in Ports and shipping (2014)[113]

Sector	Employment	Businesses
Ports & Shipping	16,270	620

To look at indirect employment we have used the employment multiplier from the Scottish Government[114] for Water Transport (2.5) which allows us to estimate that indirect jobs supported by the ports and shipping sector is 41,110. In total the estimates of employment figures are slightly higher than the MaritimeUK assessment of the industry. This may be accounted for by the assumption on multipliers used and also the large employment contribution of SIC 30110: Building of ships and floating structures, which employs over 6,000 people in the South West.

6.3.13 Renewables

RenewableUK highlights how wave and tidal stream energy has the potential to meet up to 20% of the UK's current electricity demand[115]. This is particularly relevant to the South West, proximate to the Atlantic and Irish Sea and home to the largest tidal range in the UK.

There are a series of renewables activities off the coast of the South West which are highlighted in

[113] ONS data. Note: Tables may not add due to rounding.
[114] Scottish Type I and Type II output, income, employment and GVA multipliers: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads
[115] Climate change and energy – guidance. Wave and tidal energy: part of the UK's energy mix (Department of Energy & Climate Change) 22 January 2013 - Low carbon energy and Climate change and energy. An explanation of the energy-producing potential of wave and tidal stream energy in the UK. Available at: https://www.gov.uk/guidance/wave-and-tidal-energy-part-of-the-uks-energy-mix

Figure 5Figure 5 (Appendix A2). There are also a number of key economic assets including the offshore Wave Hub wave power test site 10 miles off Hayle in Cornwall, a tidal demonstration zone in North Devon, and the South West Marine Energy Park. Plymouth University supports the renewable energy economy in the South West of England.

Employment and business base

Many LEPs group renewables together as part of the low carbon sector. This varied definition creates challenges for assessing the size and contribution of the sector.

The sector is also difficult to assess through Government statistics which provide few suitable classifications. There is a range of information on the renewables industry with sources such as RenewableUK and a Low Carbon and Renewable Energy survey established by the Government to collect information from businesses working within the green economy including low carbon and renewable energy activities. UK Government departments and other public sector bodies use this information to assess and develop policies relating to green job creation, potential growth and investment opportunities both nationally and regionally. The ONS study on the Low Carbon and Renewable Energy Economy provides employment information at national level, showing that Low Carbon Electricity employs 31,500 people across 21,350 businesses (Office for National Statistics 2014). The survey does not break down information by regional or sub-regional geography. As a result it is not known what percentage of this activity takes place in the South West and there are no proportioning assumptions which could support the analysis.

Research by Renewable Energy Association (now RenewableUK) in 2012 shows that the renewable energy in the South West employed 7,000 people across approximately 450 companies with a turnover of close to £1.0 billion in 2010/11 (Renewable Energy Association 2012). These figures are assumed to be broadly reflective of the current level of employment. However, given the pace of change in the industry and anticipated growth, we have tested these figures using the following other approaches:

- We examined detail on offshore and onshore wind infrastructure where available through the UK Wind Energy Database (UKWED). The UKWED identifies 185 operational turbines, all of which are onshore. Using an approach which looks at employment per gigawatt of energy, we estimate that employment from onshore wind is 960.
- The UK Marine Energy Database (UKMED) highlights 7 sites where tidal and wave technologies are being tested in the South West. A report by South West Marine Energy park in 2012 states that (South West Marine Energy Park 2012): *"there are at least 350 companies active, or with a high degree of potential, in the Marine Energy Sector. It is difficult to calculate the value of the sector within the overall economy, but a rough estimate suggests that the Marine Energy sector currently provides employment for between 300 and 500 people in the South West mainly working for technology developers, marine operations companies, consultancies, marine sciences and environmental, legal and financial, research and some manufacturing."* It can be assumed that this employment has remained in a similar range despite advances in technology and growth in the industry there are few large scale operations.

Together the employment figures can be calculated as 1,360 (assuming that 400 people are employed in tidal and wave). Calculating indirect employment using the multiplier for Electricity (3.5) provides an indirect employment figure for the sector of 4,770. Using the ratio of businesses to employees in the 2012 Renewable Energy Association Report provides a figure of 300 businesses in the sector.

We present the two assessments in Table 54 below.

Table 54: Business and Employment in Renewables (2014)[116]

Source	Employment	Businesses
Renewable Energy Association	7,000	450
South West Marine Energy Park & Atkins Calculations	6,130	300

The assessment of renewables provides figures which are close to the industry report and have the advantage of being easily updated in future. The approach using industry figures and calculating employment on the basis of renewable energy generation is only focused upon wind, tidal and wave and as such is not a full assessment of the whole renewables industry. The figures can be replicated in future and we have taken forward this assessment to explore the economic contribution of the sector.

6.3.14 Telecoms and communications

There are several transatlantic telecommunications and power cables and pipelines which land in the South West (Figure 6 in Appendix A2).

Employment and business base

Employment and business figures are difficult to define for this sector as a whole, as much of the economic data associated with the sector is associated with the onshore telecommunications industry rather than offshore activity. Our assessment of the industry, which relies on assumptions about the proportion of activity which is marine-specific, shows that the industry employs 1,600 people across 150 businesses (Table 55).

Table 55: Business and Employment in Telecoms & communications (2014)[117]

Sector (SIC)	Employment	Business
61200 : Wireless telecommunications activities	720	100
61900 : Other telecommunications activities	620	20
42220 : Construction of utility projects for electricity and telecommunications	260	30
Total	**1,600**	**150**

We use an employment multiplier assumption from the Scottish Government[118] for Information services (1.18) to calculate the indirect and induced jobs for telecoms and communications to number 1,890.

[116] ONS data. Note: Tables may not add due to rounding.
[117] ONS data. Note: Tables may not add due to rounding.

6.4 South West – Employment & Businesses in Marine Sectors

Table 56 below highlights the employment and business count estimates across the key marine sectors. We have also highlighted where data is not available for analysis of both employment and businesses.

We utilise multipliers to calculate indirect employment. These multipliers relate to the broad sectors which the sectors are within and were selected on the basis of professional judgement. The multipliers used refer to the most detailed source available. This is provided by the Scottish Government[119] which, though specific to Scotland and out of date, can also be used as a proxy to broadly estimate indirect and induced impacts in English regions.

Table 56: Employment (Direct & Indirect) and Businesses Across Sectors[120]

Sector	Employment	Multiplier	Indirect Employment	Businesses
Aggregates	90	1.42	120	10
Aquaculture	270	1.57	420	70
CCS	*			
Coastal Protection	40	2.50	90	20
Coastal Tourism	74,170	1.22	90,240	3,070
Defence	27,840	1.54	42,770	100
Dredging	*			
Fisheries	2,590	1.99	5,150	630
Marine Recreation	4,960	1.22	6,040	140
Nuclear	5,520	3.50	19,330	420
Oil & Gas	1,510	1.42	2,140	170
Ports & Shipping	16,270	2.53	41,110	630
Renewables	1,360	3.50	4,770	300
Telecoms and Communications	1,600	1.18	1,890	150
Total	**136,200**	**-**	**214,060**	**5,680**

6.5 Economic value of marine sectors

We have taken a standardised approach to calculating the contribution of the each sector to the national economy using employment and GVA per worker estimates. As outlined in our Methodological Approach, the GVA figures (Table 57) should be

[118] Scottish Type I and Type II output, income, employment and GVA multipliers: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads
[119] Scottish Type I and Type II output, income, employment and GVA multipliers: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads
[120] ONS data. Note: Tables may not add due to rounding. *Sectors with asterisks are excluded from the analysis on the basis of lack of available information.

treated as broadly indicative due to our use of assumptions and the lack of GVA per worker figures at the detailed SIC level.

Overall the marine sectors in the South West employ directly and indirectly 350.250 people and contributes £16.4 billion to GVA.

Table 57: Summary Table of GVA Contribution[121]

Sector	Total Employment	GVA per Worker Assumption	Total GVA (Rounded)
Aggregates	210	£59,260	£12,208,000
Aquaculture	690	£20,450	£14,040,000
CCS	*		
Coastal Protection	120	£51,990	£6,419,000
Coastal Tourism	164,410	£19,060	£3,134,080,000
Defence	70,620	£35,930	£2,537,484,000
Dredging	*		
Fisheries	7,730	£20,450	£158,142,000
Marine Recreation	11,000	£20,540	£225,987,000
Nuclear	24,850	£184,020	£4,572,067,000
Oil & Gas	3,650	£184,020	£670,918,000
Ports & Shipping	57,370	£74,790	£4,290,882,000
Renewables	6,130	£90,270	£553,009,310
Telecoms and Communications	3,490	£62,820	£219,316,000
Total	350,260	£823,600	£16,394,552,310

To ensure consistency and to assess the applicability of the GVA outputs, we have assessed the figures generated with industry reports and other literature. This shows the difference and broad similarity in the workings and also supports the rating of confidence for each sector's information (Table 58).

[121] ONS data. Note: Tables may not add due to rounding. *Sectors with asterisks are excluded from the analysis on the basis of lack of available information. Note: Tables may not add due to rounding.

Table 58: GVA Comparison and Sensitivity

Sector	GVA	Comment on Sensitivity	Confidence
Aggregates	£12,208,000	The industry body Minerals Product Association (2014) estimates that the industry generates GVA of £4billion in 2014 whilst figures for 2008 estimate that the industry's GVA is £54 million (Leeds City Council 2014). Within these estimates the lower figure appears to be of most relevance and suggests that the GVA for the sector is within the range of expected GVA given that the South West is one of the larger regions for extraction.	3
Aquaculture	£14,040,000	It has been previously estimated for the South Marine Plan area that GVA for the UK industry is £2.98m (MMO 1050) whereas separate estimates of GVA for Scotland have estimates GVA to be £165.8m (Marine Scotland 2014). The figure calculated for the South West appears to be within the range which might be expected for a region with a comparatively small amount of aquaculture activity compared to Scotland but one of the larger spread of activities compared to other regions.	3
CCS	-	*The CCS Association and TUC in 2014 estimated that CCS could contribute £150 million a year (CCS Association & TUC 2014). Figures for the sector at a South West level are unavailable.*	-
Coastal Protection	£6,419,000	There are no industry reports on the GVA contribution of this industry. MMO 1050 estimates that the GVA for the industry is £82.9 million in 2013. Using the employment and GVA per worker estimates for analysis, the figure for GVA suggests that the South West's industry is significant. This could be accounted for by the assumptions and definition but could also point to the geographic exposure of the South West to the Atlantic which increases the need for coastal protection.	2
Coastal Tourism	£3,134,080,000	A range of figures exist. Beatty (2010) state that the South West's GVA in 2007 for this industry was £860 million. However, reports such European Commission's Report on Tourism (2014) in the UK highlights how the overall Tourism sector is worth £40.6 bn GVA and a report by Tourism Alliance (2015) states that the value of tourism is £56bn in 2013. Beatty (2010) shows that in England and Wales coastal tourism supports around 210,000 jobs and contributes around £3.6 billion to the economy. This latter analysis suggests that the South West's output is slightly more than could be expected but could be accounted for by a wider definition of tourism.	2
Defence	£2,537,484,000	Work by the ADS (the trade body of the aerospace and defence industry in the UK) suggests that the defence industry is worth £22billion[122]. As such the GVA figure may be slightly smaller than expected but perhaps representative of the marine activities in the private sector and those related just to marine activities.	2
Dredging	-	MMO 1050 *estimates GVA for the industry of £0.61 million in 2013/14. A study in 2008 valued the marine aggregate dredging contribution of £114m (The Crown Estate 2008). Figures for the sector at a South West level are unavailable.*	-
Fisheries	£158,142,000	Agriculture, forestry and fishing in the South West was worth £1.4 billion to GVA in 2014. The figure for GVA calculated is within the expected range given that fishing is just one element of the wider	3

[122] ADS webpage on UK Defence Sector in 2015, available at: https://www.adsgroup.org.uk/uk-defence-outlook-2014/

		Agriculture, forestry and fishing sector.	
Marine Recreation	£225,987,000	The British Marine Federation has produced research in estimates that across the UK marine the leisure, superyacht and small commercial marine industry contributes £5.2 billion in GVA in 2012/13 (British Marine Foundation 2014). The report estimates the total GVA contribution of the South West to be £1.2 billion. The figure calculated suggests that our estimates are smaller than could be expected although this falls somewhere in the middle suggesting the figures are within the range expected.	3
Nuclear	£4,572,067,000	The Electricity, gas, steam and air-conditioning supply sector contributed £1.8 billion to GVA for the South West in 2014. Research by Energy UK and Ernst and Young shows how the wider energy industry is worth £28 billion to the economy and the South West power and gas sector contributed 2.67% of the regional economy in 2010 (Ernst & Young 2011). This suggests that the figure may be slightly higher than expected. However, given the classification approach used for employment it is likely that this also includes other energy activities.	2
Oil & Gas	£670,918,000	The Oil and Gas industry's GVA for the UK is £24.0bn (UK Government 2015) and whilst much of the activity is based in Scotland, some activity occurs within the South West. The value appears to be consistent with assessments of the industry and perhaps an over-estimation given the lack of oil and gas, as well as chemicals and processing industry activity in the South West.	2
Ports & Shipping	£4,290,882,000	Maritime UK estimates that the in the South West the ports and shipping sector produces GVA of £1.4 billion (Oxford Economics 2015a & 2015b). This suggests that our calculations are likely to over-estimate the contribution of the sector. This overestimation is likely to be linked to methodological differences and the assumptions used and as such should not be used in the analysis.	2
Renewables	£553,009,000	The Electricity, gas, steam and air-conditioning supply sector is contributed £1.8 million to GVA for the South West in 2014[123]. The renewables industry is calculated to be worth £2.2bn to the UK economy whilst the wider Environmental Goods and Services sector contributed £26.3 billion (Office of National Statistics 2015). The figure for renewables GVA output fits in with the assessment of the wider electricity, gas, steam and air condition supply sector in the South West and is likely to be indicative of the output of the growing but small wind and tidal energy. The GVA assessment is slightly less than the turnover estimates in Renewable Energy Association's estimates but this can be accounted for by the focus upon wind, wave and tidal energy.	3
Telecoms and Communications	£219,316,000	The contribution of the telecoms and communications sector to the economy is estimated to be £45 billion [124]. Department for Culture Media & Sport values the telecoms sector at £25.7 million in 2015 (DCMS 2015) suggesting that the estimates calculated are perhaps slightly higher than one might expect for the South West. This may be due to methodological reasons or assumptions used in our calculations.	2

[123] ONS Gross Value Added (Income Approach) at current basic prices 2014
[124] Telecentre Data Centre, available at: http://www.telehouse.net/uk-data-centres/

6.5.1 Confidence

Table 59 below outlines our confidence in the data for each of the sector, highlighting areas where data can be used for decision making. This is consistent with confidence criteria developed for MMO 1050 which we provide in Appendix A3.

The data and outputs from the assessment for each economic indicators within each sector have been given a confidence rating which considers the;

- Date of the information source;
- Spatial location of the data source;
- Methodology and techniques used to gather the data; and,
- Applicability of the activities covered by the data to the activities defined for each sector.

Table 59: Summary Table of Confidence

Sector	Employment	Businesses	GVA
Aggregates	2	3	2
	There is reliable information from the number of licenses and firms involved at a regional level whilst employment is captured at a national level. There is uncertainty as a result on the employment at a regional level and the GVA (which relies on employment).		
Aquaculture	3	3	3
	The aquaculture sector is well accounted for in national statistics and industry (and Government) literature although there is little understanding of the linkages specifically to marine activities. GVA calculated is in line with other assessments of productivity.		
CCS	0		
	The CCS sector is currently not large enough to be captured in national statistics and little industry information exists to draw an assessment of the industry at a regional level.		
Coastal Protection	1	1	1
	The coastal protection has linkages across the economy and is captured in several other sectors in national statistics. However, there are assumptions which can be made on the size of the sector and the scale of activity within the South West. Those using this information should be aware of the limitations and that assessment may be needed.		
Coastal Tourism	2	2	2
	Tourism is captured in national statistic, industry literature and sub-regional studies. However, it is unknown whether activities are linked to coastal or marine activities. It can be assumed in certain areas that activity is and the data supports analysis of jobs, businesses and productivity. GVA calculated is in line with other assessments of productivity but is reliant on the employment estimates.		
Defence	2	2	2
	The defence industry is largely Government funded and information about it is often classified. However, there is a significant private sector and information in national statistics is available to assess the size of the industry. However, it is unknown whether this information covers the whole sector due to suppression of data,		
Dredging	0		
	The dredging industry is captured within several other industry sector reports and is not captured on its own within national statistics. It is clearly a highly valuable industry to the economy but there is little clarity on the size in terms of employment, businesses and GVA at a regional level to make any assessments.		
Fisheries	3	3	3
	Fisheries sector information is captured in national statistic, industry literature and sub-regional studies. GVA calculated is in line with other assessments of productivity.		
Marine Recreation	2	2	2
	Marine recreation has several linkages with the tourism sector. As a result, whilst a good level of detail is available from national statistics, industry literature and sub-regional studies. However, it is unknown whether activities are linked to coastal or marine activities and there may be overlap between Tourism and recreation.		
Nuclear	3	3	2
	Data on employment and businesses is available from industry research, key employers and national statistics. The size of the productivity for the industry is reliant on estimates for employment and GVA per worker estimates. Our assessment suggests that this		

Sector	Employment	Businesses	GVA
	may be slightly inflated but appears to be broadly indicative of the industry.		
Oil & Gas	3	3	3
	There is good information on the size of the Oil and Gas industry due to definitions in national statistics. GVA calculated is in line with other assessments of productivity.		
Ports & Shipping	3	3	1
	The ports & shipping sector information is captured in national statistic, industry literature and sub-regional studies. The GVA calculated is well above other assessments of productivity for the sector in the South West.		
Renewables	3	3	2
	The renewables industry is a poorly defined industry. It is often defined more broadly by including low carbon. Several subsectors like wave and tidal wave are less developed than renewables. However, there is an increasing body of sector and regional information on this sector and this supports the analysis of the sector which is good but is not transparent. As such the assessment in this report may under-estimate activities in sector due to the focus upon wave and tidal technologies.		
Telecoms and Communications	2	2	1
	The telecoms and communications sector is well defined but the specific activities being assessed as part of the MMOs work are difficult to draw out in industry research and national statistics. As such the analysis provides numbers which fit in with other assessments but may include other activities making employment, business numbers and GVA appear slightly inflated.		

6.6 Private data for the South West – Employment, businesses and turnover of marine sectors

This section outlines employment, business count and turnover figures obtained from private data purchased from Intelligent Data Group for the key marine sectors in the South West, providing an important counterpart to our analysis of Government data.

Where direct data was not available for entire marine sectors as defined according to our methodology, we have provided figures for employment, businesses and turnover either in a wider or a related sector (italicised; see Appendix A1b for detailed definitions). Figures for the wider sector overstate the level of activity due to the inclusion of a broader range of economic activities, only a minority of which are likely to be included in our sector definitions or have marine linkages. Nevertheless, the information can be used to approximate the level of employment, number of businesses and value of turnover relevant to marine areas.

6.6.1. Sector data

The section below reviews the estimates of employment, businesses and turnover from the privately held data which was purchased for this project.

Aggregates

No data available due to the use of definitions based on SICs; no suitable marine aggregate SICs exist which could be used to construct detailed sector information.

Aquaculture

Estimates indicate that freshwater aquaculture supports 290 jobs across 27 businesses in the South West and has a total turnover of £97,819,767. Data is not available for marine aquaculture. The size of the wider fishing and aquaculture sector is estimated as follows: 666 jobs, 115 businesses and £160,460,991 total turnover. The level of aquaculture sector activity is therefore likely to be between these two sets of estimates. This results in figures significantly higher than the Government data estimates for aquaculture activity (267 jobs, 70 businesses, GVA of £14,040,000), indicating that private data is more detailed and captures a higher level of economic activity.

Carbon Capture and Storage

No data available. As outlined in Section 3.3.3., the commercial viability of carbon capture and storage (CCS) is yet to be demonstrated and the industry has been affected by early setbacks in terms of financing. Data is likely to become available in future with the further development of this sector.

Coastal Protection

Private data indicates that the coastal protection sector in the South West supports 188 jobs across 30 businesses and has a total turnover of £50,004,361. These estimates are higher than those based on Government data, which state that employment in the sector numbers 35, businesses number 15 and GVA contribution is £6,419,000. The private data captures more economic activity than Government data, indicating that the private data is more detailed. There is potential for private data to explore this sector using other information. For example assessing the

business activity or linking it with other business data which can be more indicative of sectoral activity.

Coastal Tourism
Coastal tourism in the South West is estimated by private data analysis to employ 56,864 people across 5,826 businesses and produce a turnover of £4,551,925,433. This is broadly similar to the analysis based on Government data, which shows that coastal tourism activities employ 74,171 people across 3,070 businesses with a GVA of £3,134,080,000. As explained in the methodology (Chapter 1), GVA is expected to have a lower value than turnover. As such, these two estimates correlate.

Defence
Estimates based on private data show that the defence industry employs 2,039 people across 94 businesses in the South West, and has a turnover of £163,793,565. Government data provides an employment estimate of 27,844, a business count of 95 and GVA contribution of £2,537,484,000. Government data is more detailed, owing to the significance of Government activity in this sector and the suppression of data to private sources.

Dredging
No data available. Economic activity in this sector is captured in the Aggregates and Coastal Protection sectors in the private data.

Fisheries
Private data provides estimates of the level of economic activity in the fisheries sector in the South West as follows: 170 jobs, 23 businesses and turnover of £8,525,000. This is a significantly lower level of economic activity than that based on Government data, which shows that the sector employs 2,585 people across 630 businesses with a total GVA of £158,142,000. This indicates that the private data has a lower level of detail than Government data for the sector.

Marine Recreation
Estimates based on private data indicate that the marine recreation sector in the South West employs 3,281 people across 514 businesses with a total turnover of £288,156,776. Estimates of economic activity are similar to those produced using Government data, although the business count is higher (total employment of 4,964, business count of 138 and GVA of £225,987,000). Private data thus provides more detail for this sector, although not all reported activity is necessarily marine based.

Nuclear
Our estimates based on private data show that the nuclear sector employs 2,047 people across 177 businesses. Total turnover is estimated at £184,197,616. Government data provides estimates for economic activity in the nuclear sector in the South West as follows: employment of 5,516, business count of 415 and GVA of £4,572,067,000. The disparity in employment and business figures may be linked to the lack of available private data for activities such as the processing of nuclear fuel and collection of hazardous waste. Private data underestimates the economic contribution of this sector because, further to excluding some direct nuclear activities, it excludes the significant levels of indirect economic activity.

Oil and Gas
Private data for the oil and gas sector in the South West produces estimates of 4,121 jobs, 256 businesses, and turnover of £885,534,276. Based on Government data, we estimate employment at 1,508 across 172 businesses and GVA at £670,918,000. This indicates that private data has a greater level of detail and may include a wider definition of the sector than that provided by SIC codes.

Ports and shipping
We estimate, using private data, that the ports and shipping sector in the South West contributes 12,577 jobs, 323 businesses and turnover of £859,259,382. Government data estimates the level of employment to number 16,265, businesses 624 and GVA to amount to £4,290,882,000. The private source understates employment and value associated with this sector because it does not provide data on activities within the sector such as warehousing, cargo and storage. Private data on warehousing and support activities for transportation as whole in the South West indicates that this is a large sector (employment numbering 44,989, businesses 1,314 and turnover value of £8,212,270,021).

Renewables
No data available from IDG. Working with private data providers on definitions and other approaches to identifying the sector may provide detailed data on this sector.

Telecoms and Communications
Private data estimates employment in the sector of 168, a business count of 13 and turnover of £30,788,739. Our estimates based on Government data indicate that the sector employs 1,602 people across 145 businesses and produces a GVA of£219,316,000. It is likely that the latter estimates are higher because private data for wireless telecommunications and for construction of utility projects for electricity and telecommunications is unavailable. Nevertheless, the private data may provide better estimates of marine activities in this sector as Government data includes activities which are not marine in nature.

Summary
Compared with our estimates based on Government data, the private data indicates a broadly similar pattern of employment, with coastal tourism as the most significant sector. Key differentials are in defence activities and fisheries (both significantly higher in Government data estimates) and telecoms and marine recreation (both significantly higher in private data estimates). The number of businesses across sectors in the private data is generally higher, whilst the estimated value of the sectors varies. Our analysis indicates that private data is of use in assessing certain sectors in more detail, namely aquaculture, coastal protection, marine recreation and oil and gas. Private data may also provide more useful estimates for marine telecoms and communications activities. On the other hand, Government data appears more suitable for analysis of the defence, fisheries and nuclear sectors in the South West.

We provide further explanation of the differences between the two data sources in Appendix A4.

7. North East Marine Plan Area

The North East inshore and offshore Marine Plan areas include the area of sea stretching from Flamborough Head to the Scottish border and extends out to the seaward limit of the Exclusive Economic Zone (EEZ). This plan area covers approximately 55,000km^2 with a coastline of nearly 700km.

This section reviews the relevant policy context, provides a brief review of the current state of the environment, and assesses the area's marine-related sectors and their value to the North East economy.

7.1 Policy review

Devolution and Northern Powerhouse

The idea of a 'Northern Powerhouse' was first introduced in June 2014 by the Chancellor of the Exchequer, George Osborne, in a speech in Manchester. The case was made that the lack of economic and physical connections between the cities and city regions of the North of England was holding back their growth, with significant implications for the national economy.

The creation of a Northern Powerhouse, through the commitment of £13 billion of investment to transport in the north of England over this Parliament; backing major new science, and technology and culture projects; and agreeing to devolve significant powers over transport, housing, health, planning and policing. The Northern Powerhouse will also help ensure that rural areas can also contribute to, and benefit from, increased productivity and growth

The Northern Powerhouse proposal is a strategic approach to improve productivity and achieve growth through decentralisation of power to, and increased investment in, the North of England. George Osborne pointed to long-standing regional disparities in the UK's economic output: "the cities of the north are individually strong, but collectively not strong enough". As a result it was stated that "we need a Northern Powerhouse too" comprised of "a collection of northern cities, sufficiently close to each other that combined they can take on the world.

The Cities and Devolution Bill, announced during the 2015 Queen's Speech, provides the legislative framework necessary to decentralise powers to local councils. A new body, Transport for the North (TfN) has been created with the aim of having similar responsibilities to Transport for London. TfN will be put on a statutory footing and given a focused remit around transport infrastructure and in the future; a budget to transform the infrastructure of the North of England.

LEP Strategic Economic Plans

Another part of the economic development landscape are Local Enterprise Partnerships (LEPs). These public and private (and third sector) sector partnerships have outlined their planned activities and ambitions for economic development in Strategic Economic Plans (SEPs). The North East Marine Plan area is mainly impacted by the activities of the following LEPs:

Economic baseline assessment for the North East, North West, South East and South West marine plans

- North East LEP;
- Tees Valley LEP; and
- York, North Yorkshire and the East Riding LEP.

The LEPs have a series of aims and objectives which they are seeking to meet over their lifespan. We have highlighted the key visions for the local economy and the key metrics (often jobs and GVA growth) for the LEPs in the North East in Table 60 below.

Table 60: Strategic Economic Plan Visions[125]

LEP	Vision	Economic Growth
North East LEP	"By 2024 our economy will provide over one million jobs. Representing 100,000 new jobs and equivalent to an 11% increase in employment from today."	The North East LEP is seeking to create 100,000 new jobs and halve the GVA gap between the North East and the national average (excluding London).
Tees Valley LEP	"Working collaboratively with our partners, we will build on our competitive advantages and remove barriers to growth"	The Tees Valley LEP is facilitating the creation of 25,000 new jobs and £1 billion extra into the economy over the next decade.
York, North Yorkshire and the East Riding LEP	"Our vision is to make York, North Yorkshire & East Riding the place in England to grow a small business, combining a vibrant business location with an enviable quality of life."	York, North Yorkshire & East Riding will create a minimum of 300 additional jobs per year, equating to £15,000,000 of additional GVA, or around 0.1% of extra GVA growth.

The LEPs also outline key sectors which are important in the sub-regional economy. We highlight the key sectors for each LEP area in Table 61 below.

Table 61: Key Sectors of the Local Economy[126]

LEP	Key Sectors for Economic Growth
North East LEP	Business services, Professional services, Creative (New) economy, Universities, Low carbon, including renewable technologies, Healthcare and healthcare technologies, Tourism and Logistics.
Tees Valley LEP	Process Sector, Advanced Manufacturing, Low Carbon, Digital/Creative
York, North Yorkshire & the East Riding LEP	Agri-tech, biorenewables, Food Manufacturing and Tourism.

[125] LEP Strategic Economic Plans (see references for more details)
[126] LEP Strategic Economic Plans (see references for more details)

Several sectors within the North East are of direct relevance to marine planning. These include renewables, tourism and logistics. However, marine activities are present in or exert influence on other key sectors. For example, advanced manufacturing in Tees Valley is seen as a key economic driver and a key element of this sector is offshore / subsea manufacturing and engineering.

We have assessed the linkages between key sectors and marine activities below.

- Universities – Higher Education institutions within the North East are involved in marine research and produce graduates for key industries. Several institutions run marine specific courses and many have sites in coastal areas (e.g. Newcastle University's Dove Laboratory in Cullercoats) which play a key role in research and teaching.
- Low carbon, including renewable, technologies – The key marine links are between renewables technologies associated with wind, waves and tides in marine areas. The North East has a growing renewables industry connected to offshore wind in the Dogger Bank and Firth of Forth.
- Tourism – The tourism industry in the North East is highly dependent on natural (e.g. beaches) and manmade (e.g. piers) marine assets.
- Logistics – The logistics industry is highly dependent on port activity in the local area. The logistics sector plays a key role in transporting goods and services from and to ports across the UK and Europe.
- Chemical processing – The processing sector links to the ports and logistics sector through waterfront berths and logistics facilities which facilitate the transportation of raw and processed products.
- Advanced manufacturing – The offshore/subsea manufacturing sector is a key consideration in the North East, as are other activities such as manufacture of renewables technology or shipping.
- Agri-tech - There are not as many direct links with this sector as it is largely based on terrestrial activities. However, the industry and the research and development which occurs are responding to issues important for marine areas such as food security, supply-chain integrity and energy.

Local Economic Policy

There are a range of local policy documents which are of relevance for this study and future economic development studies. These documents include local economic assessments, local planning documentation, masterplans and other authority evidence, planning and strategy documents.

We have reviewed many of the key local authority documents relevant to economic development and marine activities in the North East and highlight key messages in Table 62 below.

Table 62: Key Local Economic Considerations

Theme	Comment
Key Sectors	In addition to the LEP strategic economic plans, several local authorities in the North East identify key sectors. Three key sectors which are identified as being particularly important across local authorities in the North East are Tourism (and visitor economy), Renewable

Theme	Comment
	energy and Logistics. • Tourism (and visitor economy) is a key sector for several local areas. This is often captured where built infrastructure like marinas or natural infrastructure is a key asset. For example, Redcar and Cleveland identify the seafront at Redcar and Teesport as key focal points for spatial development and economic development (Redcar & Cleveland Council 2007). • Offshore wind is identified as a key growth sector with several local authority areas identifying key assets of their coastline as being able to unlock economic growth in this sector. Hartlepool Borough Council identifies ongoing and planned investment at Victoria Harbour as potentially key to unlocking growth for this sector as well as broader demand across the economy (travel, health, education, leisure and retail facilities). • Logistics is also a key sector with North Tyneside identifying the potential for development of sites near to the Port of Tyne. North Tyneside Council's Pre-Submission Local Plan (2016) shows that the council is actively supporting growth in the logistics sector particularly in existing areas as well as new sectors like Renewables. The above gives a snapshot of the key sectors locally but also shows the multi-faceted nature of the key sectors in the North East and how they are linked together.
Housing & Commercial Developments	Local authority strategy and planning documents highlight most key development sites. Through local authority planning documentation and strategies it is possible to understand how these sites connect with the local economy and marine activities. The Infrastructure Delivery Plan for County Durham identifies potential development areas in the county. In looking at potential development in East Durham it is possible to identify potential future development and infrastructure upgrades connected to housing and employment land (four new sites for housing and employment land), transport (e.g. new rail stations), utilities (e.g. water sewage works) and social infrastructure (e.g. new schools). Across the North East there are several local areas which are seeing and have seen economic and population growth. There are also other areas which are experiencing economic stagnation and population decline. Space for housing and business premises is an important consideration in coastal areas and there are

Theme	Comment
	several key housing sites across the North East located in coastal areas. For example, across Northumberland employment land is identified through the employment land review (Northumberland County Council 2011) which highlights the suitability of Blyth and Blyth Estuary for commercial space (for Renewables). Housing sites in Northumberland are also identified in the Strategic Housing Market assessment which highlights how the coastal areas (mainly North and South East Northumberland) require in excess of 800 houses to be built per year between 2015-2020 (Northumberland County Council 2015).
Key Businesses	Many of the local authorities in the North East refer to or identify key local employers or businesses which have a key role in the local economy in their strategy documentation. For example, within Hartlepool and Stockton-on-Tees there are several key businesses including INEOS, Fine Organics, BP CATS, SABIC, Vertilus, Conoco Phillips, Vopak, Simon Storage, Harvest Energy and Greenergy connected to the Chemicals and Process Industries cluster which are strongly linked to port activities. Other key employers in the region such as Sage in Newcastle upon Tyne and Nissan in Sunderland have less explicit linkages to marine activities but are worth considering in the analysis.
Skills & Labour Market	A key focus for many local authorities is how the local labour market is functioning; the availability of jobs, the skills profile, the success of the economy and levels of unemployment. Several local areas note that some coastal communities score highly in terms of employment, skills and training deprivation measures. There are several skills strategies or mentions of skills in local plan documentation by Local Authorities which are seeking to develop skills. Some of these include working with businesses in marine sectors, marine assets (e.g. ports) or education and training facilities in coastal areas (e.g. Siemens offshore working training facility in Newcastle upon Tyne or South Shields College courses in marine engineering). The Local Authorities' strategies and ambitions align with the LEP ambitions for skills as follows: • North East LEP: "Provide a demand led system, reflecting the need of employers, including for high level skills in support of better jobs, with access to high quality training facilities for both general and specialist training". • Tees Valley LEP: "Secure improved skills levels to

Theme	Comment
	address future demand in growth sectors and in existing industries." • York, North Yorkshire & East Riding LEP: "Secure improved skills levels to address future demand in growth sectors and in existing industries."

7.2 Current state of the environment

The following information about the state of the environment and current activity pressures in the Marine Plan areas has been derived from Charting Progress 2 (CP2) (2010). This report provides an assessment of the status of the UK marine environment based on a robust, peer-reviewed evidence base. It is a source of the key findings from UK marine research and monitoring and is intended to be used in policy-making to help protect our oceans and seas. CP2 is made up of a series of feeder reports that have been reviewed to obtain the required information.

The regions used within CP2 are not exactly the same as the Marine Plan areas but are suitable to give the high level description of the state of the environment required for this project.

7.2.1 Marine environment

The physical characteristics of a region can determine the habitats and species that exist there and can also have an influence on the human uses of the environment. The North East area is characterised by salinity values that are near to open Atlantic values (above 35) except close to river outflows. Sea-surface temperature varies seasonally, ranging from 6 °C in winter to 14 °C in summer and much of the region becomes stratified in summer. The North Sea is most exposed to waves from the north, with average wave heights decreasing southwards. The area is relatively sheltered from prevailing westerly winds resulting in moderate turbidity levels.

The coastline between the Scottish Border and North is broadly comprises a series of dune systems and wide, sandy bays separated by lengths of cliffs and small islands (such as Holy Island, the Farne Islands and Coquet Island). The coast at North Northumberland, along with Durham and North Yorkshire & Cleveland are designated as Heritage Coasts. The main offshore habitats are large expanses of subtidal sands and muds. The area supports a substantial proportion of the UK's internationally important seal and seabird populations and has a high abundance of breeding seabirds.

This region is great nature conservation and tourist value due it its natural landscape character, and because of the wildlife and habitats. Much of this coastline is protected by national and international conservation designations. Research undertaken in 2011(AMEC 2012) showed that the North East National Parks and Areas of Outstanding Natural Beauty (AONBs) cover 30 per cent of the region and Sites of Special Scientific interest (SSSIs) cover about 13 per cent of the land area of the region. There are two National Parks (Northumberland and the North York Moors). The main concentrations of designated wildlife habitats and geological features are found in the North Pennines, Northumberland National Park and the

Northumberland, Teesmouth, Cleveland and Durham Coasts. Within the Marine Plan area itself there are several Special Area of Conservation (SAC), Special Protection Area (SPA), Ramsar designations and recommended Marine Conservation Zones.

The North East coastline has some of the highest rates of cliff recession in the UK, particularly along the Yorkshire coastline. This erosion provides sediment for other areas to the south from the Humber to the Wash (as well as areas beyond UK waters, such as the Wadden Sea). Elsewhere, the construction of hard coastal defence structures such as seawalls and breakwaters has led to reduced sediment input and intertidal sediment habitats being increasingly confined or 'squeezed' in estuarine areas. Intertidal habitats such as saltmarsh and mudflats have also been affected by habitat loss due to historical land-claim.

Linkages between Environment and Economic Activity
Widespread physical pressures on the marine environment arise from fishing, with small and more local impacts from oil and gas, shipping, leisure and recreation and defence. Fishing has historically constituted a major activity causing pressures on habitats and species. Fishing is still having an impact on commercial fish stocks, demersal fish and seabed sediment habitats, however, fishing pressure has decreased in recent years and there are signs of improvement. Fish assemblages in estuaries, in particular salmon, seem to have benefited from overall improvements in water quality and a reduction in netting effort.

The oil and gas sector is prevalent in this area due to the presence of major hydrocarbon fields and well established marine and land infrastructure. Oil and gas presents a diverse range of environmental pressures including noise impacts from exploration and construction activities through to contamination from operational activities. Although the industry is widely distributed, physical pressures are localised to installations and structures while contamination of the sea is declining due, for example, to a reduction in oil discharged with produced water.

Shipping activity is important in the area and provides links with northern Europe. The area also contains a high proportion of UK waste disposal sites most likely related to the number of ports in the region and the need to dispose of material dredged to maintain navigation channels.

Most industries using the seas are well regulated and create a low and localised pressure on the marine environment.

7.3 Sectoral analysis

As with the other Marine Plan Area Chapters, the following sections describe the current activities within each of the relevant marine sectors identified from the Marine Policy Statement and an analysis of these sectors' contribution to the labour market and business base. We follow this up by assessing the productivity (GVA) contributions of the sectors.

We draw upon the most up to date and relevant data for this analysis, although we note that the contribution of certain sectors could be overstated where there are

overlaps between sectors. The contribution can also be understated due to lack of information. We therefore advise caution in any subsequent use of our analysis.

The focus of our analysis is the North East region as defined by the former Government Offices for the Regions (GOR). However, we also refer to North Yorkshire and other areas where there is a significant element of activity.

7.3.1 Aggregates

Marine dredged sand and gravel is currently supplied from six key areas around the British coastline, none of which are in the North East. Marine aggregates dredged in the Humber region are landed at wharves in the North East including:

- River Tees Wharves: Able Tees, Billingham, Middlesbrough, Tees, Tees Sand, Terrc-Seaton
- River Tyne Wharves: Gateshead, Jarrow, Tyne
- Sunderland: Hendon, Hendon Dock, Sunderland

In 2014, 514,302 tonnes of marine aggregate was landed at wharves in the North East Area. Table 63 below shows the breakdown by wharf showing that aggregate activity is mainly concentrated on the River Tees and River Tyne.

Table 63: Marine Dredged Primary Aggregates (2014)[127]

Description	Tonnage
Blyth	22,946
River Tees Wharves	198,710
River Tyne Wharves	292,646
Total	**514,302**

Employment and business base

The latest employment figures from the British Marine Aggregate Producers Association (BMAPA 2015) report and further information on the sectoral composition from another industry report (Highley et al 2007) at a national level are apportioned to total tonnage of marine aggregate (14.8 million) and divided by total North East tonnage (514,302) to provide estimates for employment in the North East. We estimate that a total of 40 people are employed in the North East.

We utilise the multiplier for Mining Support SIC (1.42) which includes activities connected to geological observations as well as drilling and extraction of minerals. We calculate the indirect jobs supported by the marine aggregates to number 57.

The comparatively small amount of direct employment does not reflect the importance of the sector, which creates a significant number of indirect jobs further down the supply chain and acts as an 'enabler' for employment generation in other industries such as construction.

There are 8 production licences in the Humber (where much of the North East material is extracted) and these are connected to 6 businesses (The Crown Estate 2014b). The aggregates market is competitive and this figure is likely to be

[127] The Crown Estate (2014)

representative of the direct businesses in this industry in the North East. Several more businesses are likely to be part of the supply chain in aggregate processing and transports, although there is uncertainty over the number of businesses involved.

The Office for National Statistics does not separate marine aggregates from terrestrial aggregates in its classification approach (Standard Industrial Classifications – SIC codes) and as such these activities cannot be identified in employment or business data. This is highlighted as a challenge for this sector in MMO 1075.

7.3.2. Aquaculture

Information on value and distribution of aquaculture production is not broken down on a regional level in England.

Employment and Business

Analysis of the national statistics estimates that the sector employs 30 people across 10 businesses (Table 64).

Table 64: Business and Employment in Aquaculture (2014)[128]

SIC	Employment	Businesses
03210 : Marine aquaculture	30	10
03220 : Freshwater aquaculture	10	10
Total	**30**	**10**

This detail of national statistics is highly important in supporting an analysis of aquaculture employment and business base. We have not apportioned the employment as set out in MMO 1075 due to uncertainties over the location of freshwater aquaculture, although a map of aquaculture sites in England produced by Defra/Cefas (Figure 3) can be used to estimate the level of activities.

Figure 3 in Appendix A2 also supports the national statistics assessment, showing that there are approximately 8 freshwater, saltwater and shellfish aquaculture sites in the North East, many of which are near to coastal areas. There are a total of 415 sites in England and Wales.

We utilise the employment multiplier for Aquaculture SIC (1.6)[129] guidance to calculate that the number of indirect jobs supported by the aquaculture is 50.

7.3.3 Carbon capture and storage

The North East has been identified as key location for this industry, with its industrial base key to delivery of a CCS project (Carbon Capture & Storage Association 2013). However, there is no current activity which this research could identify beyond research projects in Higher Education.

[128] ONS data. Note: Tables may not add due to rounding.
[129] Scottish Type I and Type II output, income, employment and GVA multipliers: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads

Employment and business base

There is little available data on employment, business numbers and economic contribution of the Carbon Capture and Storage (CCS) sector. ONS produces information on the Low Carbon and Renewable Energy Economy regularly which shows that a total of 96,510 businesses employed 233,000 people and generated £45.3 billion in turnover in 2014 (ONS 2015). However, there is no geographic breakdown of data provided in the analysis. As a result we are unable to separate out the activities of CCS in the North East.

7.3.4 Coastal protection

The North East coastline has some of the highest rates of cliff recession in the UK. Figure 4 (in the Appendix A2) shows that there are several stretches of coastline which are impacted by coastal erosion. Protection from coastal erosion has linkages across many marine industries and as such there is likely to be significant overlap. For example, the replenishment of beaches and natural sea defences draws upon the aggregates industry, and often takes place in tourism or urban areas.

Employment and business base

As noted above, employment and business counts for the sector are challenging due to activities cutting across a number of sectors (e.g. aggregates, ports). We present the employment and business estimates for the coastal protection sector from national statistics in Table 65 below. The sector employs 110 people across 10 businesses.

Table 65: Business and Employment in Coastal protection (2014)[130]

SIC	Employment	Businesses
42910 : Construction of water projects	110	10

This analysis should be treated with caution as a large focus of the SIC used is upon construction of ports, marinas, waterways, dams and dykes and dredging. There are other classifications which could apply to coastal protection (e.g. Civil engineering, Service activities incidental to water transportation), and the apportionment of employment or business data could be considered an insufficiently robust measurement. However, in the absence of other information, this is assumed to be most suitable.

To calculate indirect employment the analysis utilises the multiplier for Water Transport (2.4)[131]. This estimates that coastal protection sector indirectly supports an additional 280 jobs.

7.3.5 Coastal tourism

There are several tourist assets in the North East plan area with coastal or marine linkages. These are varied and include heritage attractions, beaches and more urban leisure and recreation in coastal areas.

[130] ONS data. Note: Tables may not add due to rounding.
[131] Scottish Type I and Type II output, income, employment and GVA multipliers: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads

The North East Local Enterprise Partnership's Independent Economic Review (2013) reports that tourism in the North East LEP area accounted for over £2.2bn of direct expenditure (excluding VAT) in 2011 and supported over 54,000 jobs. With indirect expenditure and VAT considered, spend in the area represented over £3.5 billion to the North East LEP economy (North East Local Enterprise partnership 2015).

The Tees Valley Unlimited Local Enterprise Partnership undertook research in 2012 which found that the visitor economy was worth £563 million to the Tees Valley economy in 2009. Approximately 7,200 jobs (full time equivalents) were supported by direct tourist expenditure in Tees Valley, with a further 1800 jobs supported by indirect revenue from tourism (Tees Valley Unlimited 2009).

Estimates for North Yorkshire indicate that coastal tourism was worth £416 million to the local economy and supported 7,813 jobs in Scarborough and the surrounding area in 2009 (North York Moors 2012).

Employment and business base

Evidence from the LEPs suggests that tourism supports around 70,000 jobs. However, it is difficult to separate terrestrial tourism jobs from coastal tourism jobs, and the studies were undertaken at different dates. We have utilised the definition outlined in MMO 1075 to estimate the contribution of coastal tourism to employment (Table 66).

Table 66: Business and Employment in Tourism (2014)[132]

SIC	Employment	Businesses
55100 : Hotels and similar accommodation	8,810	250
55201 : Holiday centres and villages	90	20
55202 : Youth hostels	30	-
55209 : Other holiday & other short-stay accommodation nec	150	60
55300 : Camping grounds, recreational vehicle parks and trailer parks	1,300	50
79901 : Activities of tourist guides	-	10
91020 : Museum activities	1,070	20
91030 : Operation of historical sites and buildings and similar visitor attractions	580	10
91040 : Botanical and zoological gardens and nature reserve activities	410	10
93210 : Activities of amusement parks and theme parks	70	20
93290 : Other amusement and recreation activities	260	70
55900 : Other accommodation	150	20
Total	**12,920**	**510**

[132] ONS data. Note: Tables may not add due to rounding. NEC = Not Elsewhere Classified

The analysis shows that coastal tourism activities in the North East employs 12,920 people across 510 businesses. Using the employment multiplier from the Scottish Government[133] for Sports & recreation (1.22) we calculate that indirect jobs for the tourism sector number 15,720.

7.3.6 Defence

Due to the confidential nature of many defence activities it is difficult to accurately assess the extent and scale of economic activity within the North East plan area. Activity tends to be associated with specific defence assets such as naval bases, ship building or transport. There are also businesses involved in the production of defence related materials.

Previous research by One North East[134] showed that the defence and marine sector employed 20,000 people across areas such as building & repair, marine scientific research and engineering. It also identified major employers including BAE Land Systems, Joyce Loebl and Parker Domnick Hunter. This information has not been updated by the North East LEP, but the Tees Valley LEP highlight how the defence industry is an important part of the Tees Valley economy. Tees Valley LEP has more than 25 companies which act as active suppliers to the Ministry of Defence and the defence industry directly and indirectly employs around 2,000 in the North East (Tees Valley Unlimited 2014).

Employment and business base

Identifying defence activities is relatively straightforward through national statistics, although a limiting factor is that it is unknown where defence activities are connected to marine activities.

We have identified the following activities as being linked to the defence industry (Table 67 below) to estimate that the defence industry employs 1,150 people across 20 businesses.

Table 67: Business and Employment in Defence (2014)[135]

SIC	Employment	Businesses
84220 : Defence activities	320	-
30400 : Manufacture of military fighting vehicles	-	-
25400 : Manufacture of weapons and ammunition	610	-
30110 : Building of ships and floating structures	220	20
Total	**1,150**	**20**

The business figures outlined in ONS Enterprise Counts are low which is likely due to suppression, confidentiality and Government funded activities. However, the figures are the best estimates with the information available.

[133] Scottish Type I and Type II output, income, employment and GVA multipliers: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads

[134] Labour Market Information Portal for Tyne and Wear, Northumberland and Durham webpage, summary of the labour market available at: http://www.labourmarketnortheast.co.uk/app/assets/files/tourism/miniguide_ne.pdf

[135] ONS data. Note: Tables may not add due to rounding.

Calculations of the indirect and induced employment in Defence[136] use the employment multiplier for Research & development (1.5). The estimated indirect and induced employment numbers 1,760.

7.3.7 Dredging

All ports in the North East have dredged access channels allowing them to accommodate vessels.

Employment and business base

Employment and business information for dredging is captured in employment data for the aggregates sector. National statistics do not assess the sector in detail and there is a lack of available information from industry or academic sources. Furthermore, there are several other sectors under which dredging activities can be captured, such as ports and shipping, coastal protection and aggregates.

7.3.8 Fisheries

The North East plays a small role in the fish processing industry and the ports provide a base for a small amount of fishing activity which, despite its scale, is important culturally and cuts across several economic sectors. For example, the harbours of Seahouses in Northumberland are active for tourism as well as in catching fish for local restaurants and fish processing. Much of the fishing and fish processing activity is concentrated around the Port of Tyne (North Shields) and Whitby (in North Yorkshire), whilst other areas play a smaller role in fishing activity.

Employment and business base

The analysis shows that the sector employs 710 people across 130 businesses (Table 68 below). The estimates are likely to slightly overstate the employment in fish processing, which is just one element of 10.85 Manufacture of prepared meals and dishes.

Table 68: Business and Employment in Fisheries (2014)[137]

SIC	Employment	Businesses
03.11 Marine fishing	120	120
10.20 Processing and preserving of fish, crustaceans and molluscs	60	10
10.85 Manufacture of prepared meals and dishes	530	10
Total	**710**	**130**

Using the employment multiplier for Fish & fruit processing (1.9)[138] we calculate the indirect employment for the Fisheries industry to number 1,410.

7.3.9 Marine recreation

Recreation activities connected to marine activities are varied and include land and vessel based wildlife watching, beach activities, paddle sports, surfing, windsurfing,

[136] Scottish Type I and Type II output, income, employment and GVA multipliers: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads
[137] ONS data. Note: Tables may not add due to rounding.
[138] Scottish Type I and Type II output, income, employment and GVA multipliers: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads

sailing, motor-boating, personal water craft, SCUBA-diving, offshore and shore angling. Industry reports across a range of activities provide an overview of the sector's economic contribution. For example, surfing in the North East reportedly contributes £103 million to the economy (Mills 2013).

Sport England captures information on sports participation, with some of this sporting activity relating to marine environments. The Clubmark register provides an indication of the number of clubs which are based in the region and shows that there are several clubs which could have marine interactions (Table 69).

Table 69: Marine Related Sports Clubs with a Club Mark[139]

Club mark Type	North East
Angling	18
Canoeing	10
Rowing	8
Swimming	34

Employment and business base

A 2014 report by the British Marine membership organisation which assesses the economic contribution of the Marine recreation sector shows that the North East employs 627 people across the Marine Industry. The industry contributes £16 million and £54 million to the UK economy in direct and indirect GVA.

The assessment for the recreation sector shows that employment numbers 880 across 110 businesses (Table 70). Using a multiplier for the Sports & recreation industry of 1.22 we estimate the indirect employment to be 1,070.

Table 70: Business and Employment in Recreation (2014)[140]

SIC	Employment	Businesses
93120 Activities of sport clubs	530	30
93199 Other sports activities	100	10
93290 Other amusement and recreation activities	260	70
Total	**880**	**110**

7.3.10 Nuclear

There is one nuclear power station in the North East, in Hartlepool. This power station is run by EDF Energy and is capable of supplying electricity to over 2 million UK homes. The Hartlepool site will see operation to 2024. Following this, decommissioning or new stations in the North East could provide different employment and economic opportunities.

[139] Sport England Local Profile Tool. https://www.sportengland.org/our-work/partnering-local-government/tools-directory/local-sport-profile-tool/

[140] ONS data. Note: Tables may not add due to rounding.

Employment and business base

Data is available from the power station directly; the Hartlepool power station employs approximately 530 full time employees and over 200 full time contract partners[141].

The range of different activities within the nuclear industry is complex. Whilst power stations account for much of the employment in this sector, there are wider energy related economic activities that are also relevant. As a result, we have focused our analysis upon relevant national statistic classifications for employment and business data in both the Nuclear and wider Energy industries, given that some activities in other energy sectors have marine linkages and intersect with Nuclear.

The Nuclear industry employs 1,670 people across 130 businesses in the North East (Table 71). We have also provided an assessment of the wider energy industry's employment and business profile. A full breakdown of the sector's definition is provided in Appendix A1a.

Table 71: Business and Employment in Nuclear and Energy (2014)[142]

Sector	Employment	Businesses
Nuclear	1,670	130
Energy	*12,090*	*1,660*

Using the employment multiplier from the Scottish Government[143] for electricity generation (3.5) we calculate the indirect and induced employment in the nuclear sector to be 5,840. It should be noted that the multiplier could be even larger given that the industry has several safety and technical requirements which distinguish it from other energy sectors.

7.3.11 Oil and gas

The North East is a key location for the provision of products and services relating to the oil and gas industry due to its access points to UK Continental Shelf oil and gas areas, process industry, infrastructure and skills base (Oil & gas infrastructure maps from the Department of Energy and Climate Change (DECC) and Oil and Gas Authority (OGA)).

The North East, and specifically Tees Valley (Teesside), is home to an integrated chemical complex which, in terms of manufacturing capacity, is the largest in the UK and second largest in Western Europe. The area is home to a range of key clusters in the chemical sector including refining, petrochemicals, speciality and fine chemicals, plastics, biotechnology and pharmaceuticals.

As well as the above economic assets, a key asset in the North East is the Teesside Gas Processing facility, which has the capability to process up to 6% of UK demand for natural gas. The plant processes gas from the UK Central North Sea and Southern North Sea for a number of large multi-national oil and gas companies.

[141] EDF Energy Webpage on Hartlepool, available at: https://www.edfenergy.com/energy/power-stations/hartlepool
[142] ONS data. Note: Tables may not add due to rounding.
[143] Scottish Type I and Type II output, income, employment and GVA multipliers: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads

Employment and business base

Research by the North East of England Process Industry Cluster (NEPIC) in 2013 highlights how the oil and gas process industries in the North East made up between 22-26% of GVA (around £26 billion) and employed 29,500 people. Indirect employment is estimated to be much greater, with over 1,400 firms in the supply chain[144].

This information is a good resource for employment and economic contribution. However, the research utilises a wider sector definition (NEPIC's membership) which is largely focused on the manufacturing and processing activities of the oil and gas sector. Furthermore, the research is now 3 years out of date and it is unclear when updates will be produced.

To assess the employment (and businesses) we utilise national statistics, drawing upon the definition outlined in MMO 1075 and widening this to include several more processing industries which are of particular relevance to the Tees Valley sub-region.

Table 72: Business and Employment in Oil & gas (2014)[145]

Oil & Gas Definition	Employment	Businesses
ONS (2014)	3,550	720
NEPIC definition (2013)	29,500	1,400

Table 72 above shows a disparity between the NEPIC figures and ONS data. This may be due to a wider definition used by NEPIC or the lack of data on businesses which are not captured in ONS data (above the VAT threshold). The analysis taken forward utilises the ONS analysis as this is believed to account for the direct industry and the information can be easily replicated. Therefore we estimate employment at 3,550 across 720 businesses. A full breakdown of the sector's definition is provided in Appendix A1a.

To calculate the indirect jobs supported by the sector we can use the employment multiplier from the Scottish Government[146] for Gas (1.4) which estimates that indirect employment is 5,030.

7.3.12 Ports and shipping

The only international passenger route in the North East is between the Port of Tyne and Amsterdam, with 567,000 international sea movements in 2014. Several ports in the North East are highly important in the transport of freight. In total the freight handled (both units and tonnage) by ports in the North East is around 3% of the total of all ports in England. The North East is a major manufacturing base and key area for UK exports, with the ports playing an increasing role in export of key products such as cars (linked to Nissan's plant in Sunderland).

[144] NEPIC (Northeast of England Process Industry Cluster) webpage available at: http://www.nepic.co.uk/
[145] ONS data. Note: Tables may not add due to rounding.
[146] Scottish Type I and Type II output, income, employment and GVA multipliers: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads

There are 7 ports in the North East and 3 in North Yorkshire:

- Berwick-upon-Tweed
- Port of Tyne (North Shields)
- Sunderland
- Port of Blyth
- Hartlepool
- Teesport (Tees & Hartlepool)
- Redcar
- Whitby (North Yorkshire)
- Scarborough (North Yorkshire)

Two of the ports (Port of Tyne and Teesport) are major ports, whilst Port of Sunderland is considered to have potential for expansion. Each is involved in the import and export of materials and goods as follows:

- The Port of Tyne handles bulk and conventional cargo such as coal, wood-pellet, grain, scrap, steel and other cargoes, notably the importing of coal. The Port is now the UK's second largest coal importer.
- Teesport handles over 5,000 vessels each year and cargo handles includes steel, petrochemical, engineering products, general cargo, bulk storage and logistics.
- The Port of Sunderland is a local authority owned port which deals with imports of forest products, non-ferrous metals, steel, aggregates and refined oil products, together with exports of agricultural limestone, chemicals and maritime cranes.

The ports and shipping services in the North East also support the renewable energy sector both in production and in assembly of renewable facilities.

Employment and business base

Many of the major UK ports provide information about their economic contribution. The Port of Tyne's own research (2013) reports that the port employs 500 people directly, indirectly supports 10,500 jobs and adds £507 million to the regional economy[147]. Teesport (2013) highlights how the port employs 1,250 staff and has an annual turnover of more than £129 million (PD Ports 2014).

There is robust and detailed (regional level) information from MaritimeUK on the economic impact of the port and shipping sectors. The approach by the authors utilises an SIC-based analysis of employment in the sector scaled up using information from the Department for Transport and information on public sector workforce at ports (e.g. border patrol). There are separate reports for the Ports (Oxford Economics 2015a) and Shipping (Oxford Economics 2015b) sectors which show that the impact from;

- Ports is GVA of £710 million and 13,500 employed
- Shipping is GVA of £210 million and 6,300 employed

[147] Port of Tyne webpage, available at: http://www.portoftyne.co.uk/news/port-of-tyne/port-of-tyne-recognised-as-a-gold-investor-in-people

Our analysis of the sector in Table 73 Table 73below shows that the Ports and Shipping sector employs 3,350 across 125 businesses. A full breakdown of the sector's definition is provided in Appendix A1A.

Table 73: Business and Employment in Ports and shipping (2014)[148]

Sector	Employment	Businesses
Ports & Shipping	3,360	130

For indirect employment we have used the employment multiplier from the Scottish Government[149] for Water Transport (2.5) which allows us to estimate that indirect jobs supported by the ports and shipping sector number 8,487. This estimate provides employment figures which are in line with the MaritimeUK assessment of the industry.

7.3.13 Renewables

There are a series of renewables activities in the sea near to the North East (

[148] ONS data. Note: Tables may not add due to rounding.
[149] Scottish Type I and Type II output, income, employment and GVA multipliers: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads

Figure 5 in Appendix A2). In the North East, economic activity connected to the renewables industry is concentrated on the ports (see section above), with some sites inshore. There are a number of key economic assets including Siemen's offshore training centre, enterprise zones at the Port of Blyth, Port of Tyne and Teesport, and industry groups and universities supporting the development of the North East's renewables industry.

Transport for the North reports that firms in the renewables industry are making £150 million worth of investment in the marine and offshore sector in the North East, which contributes to the Northern Powerhouse agenda[150].

Employment and business base

Many LEPs group renewables together as part of the low carbon sector. This varied definition creates challenges for assessing the size and contribution of the sector.

The offshore wind sector is difficult to assess due to the range of ports which serve the windfarms. For example, several windfarms which are proximate to the ports in the North East are also served by ports in Yorkshire & Humber (e.g. Grimsby) and North Norfolk.

The sector is also difficult to assess through Government statistics which provide few suitable classifications. The Government has established a survey on Low Carbon and Renewable Energy to collect information from businesses working within the green economy including low carbon and renewable energy activities. The study shows that Low Carbon Electricity employs 31,500 people across 21,354 businesses (ONS 2015). However, the survey does not break down information by regional or sub-regional geography. As a result it is not known what percentage of this activity takes place in the North East and there are no proportioning assumptions which could support the analysis.

Research by Renewable Energy Association (now RenewableUK) in 2012 found that the UK renewable energy in the North East employed 3,600 people across approximately 235 companies with a turnover of £0.5 billion in 2010/11 (Renewable Energy Association 2012). This information is tested to assess the scale of the industry. We focus our assessment on offshore and onshore wind where detail on operational infrastructure is available through the UK Wind Energy Database (UKWED). The UKWED identifies 214 operational turbines (29 offshore and 185 onshore) generating 417MW of power.

Employment and electrical output information on wind farms across the UK provides a range of jobs for the sector in the North East (between 450 and 1,050). Using the mean for these ranges (620) provides an estimate of the employment in the North East.

To calculate indirect employment we have used the multiplier for Electricity which is 3.5[151]. This provides an indirect employment figure for the sector of 2,173.

[150] Transport for the North Webpage, available at: http://www.transportforthenorth.com/
[151] Scottish Type I and Type II output, income, employment and GVA multipliers: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads

Business numbers in the sector are also uncertain. We apply the ratio of jobs to businesses from the Renewable Energy Association study in 2012 to the North East to estimate that there are 60 businesses. These outputs are slightly smaller than LEP estimates of this industry (North East Local Enterprise Partnership 2011) but similar to Renewable Energy Association Figures. However, as our estimates only take into account the renewable wind element of the industry, they should be treated with caution.

7.3.14 Telecoms and communications

There are several active telecommunications and power cables and pipelines which land in and around the mouths of the River Tees and Tyne in the North East (Figure 6 in Appendix A2).

Telecoms and communications cables can affect and be affected by the activities of other business sectors. For example, there is risk to and from the fishing industry as trawls and anchors may become caught on submarine cables, which can prove costly in terms of maintenance to both fishing and pipeline operations.

The overall telecoms and communications sector is estimated to be worth approximately £45 billion to the economy and to employ approximately 250,000 people across 8,000 companies[152]. Some data is available at a regional level through analysis of Government statistics but there are challenges in breaking this down by sector activities in marine areas.

Employment and business base

Employment and business figures are difficult to define for this sector as a whole, as much of the economic data for the sector is associated with the onshore telecommunications industry rather than activity which relates to the offshore. Our assessment of the industry, which relies on assumptions about the activity which is marine–specific, shows that the industry employs 880 people across 40 businesses (Table 74).

Table 74: Business and Employment in Telecoms & communications (2014)[153]

Sector (SIC)	Employment	Business
61200 : Wireless telecommunications activities	260	20
61900 : Other telecommunications activities	470	10
42220 : Construction of utility projects for electricity and telecommunications	150	20
Total	880	40

We use the employment multiplier from the Scottish Government[154] for Information services (1.18) to calculate the indirect and induced jobs for telecoms and communications to number 1,035.

[152] Telecentre Data Centre, available at: http://www.telehouse.net/uk-data-centres/
[153] ONS data. Note: Tables may not add due to rounding.
[154] Scottish Type I and Type II output, income, employment and GVA multipliers: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads

7.4 North East – Employment & businesses in marine sectors

Table 75 below displays the employment and business count estimates across the key marine sectors. We have highlighted where data is not available for analysis of both employment and businesses.

The multipliers used to calculate indirect employment relate to the broad sectors which the sectors are within, selected on the basis of professional judgement. The multipliers used refer to the most detailed source available. This is provided by the Scottish Government[155]. Although specific to Scotland and out of date, it can be used as a proxy to estimate indirect and induced impacts in English regions.

Table 75: Employment and Businesses across Marine Sectors[156]

Sector	Employment	Multiplier	Indirect Employment	Businesses
Aggregates	40	1.42	60	10
Aquaculture	30	1.57	50	10
CCS	*			
Coastal Protection	110	2.52	280	10
Coastal Tourism	12,920	1.22	15,720	510
Defence	1,150	1.54	1,760	20
Dredging	*			
Fisheries	710	1.99	1,410	130
Marine Recreation	880	1.22	1,070	110
Nuclear	1,670	3.50	5,840	130
Oil & Gas	3,550	1.42	5,030	720
Ports & Shipping	3,360	2.53	8,490	130
Renewables	620	3.50	2,170	40
Telecoms and Communications	880	1.18	1,040	40
Total	25,910	-	42,910	1,830

7.5 Economic value of marine sectors

We have taken a standardised approach to calculating the contribution of the each sector to the national economy using employment and GVA per worker estimates. As outlined in our Methodological Approach, the GVA figures (Table 76) should be treated as broadly indicative due to our use of assumptions and the lack of GVA per worker figures at the detailed SIC level.

[155] Scottish Type I and Type II output, income, employment and GVA multipliers: http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Downloads

[156] ONS data. Note: Tables may not add due to rounding. *Sectors with asterisks are excluded from the analysis on the basis of lack of available information. Note: Totals may not add due to rounding.

Overall the marine sectors in the North East employ directly and indirectly 67,980 people and contributes £4.1 billion to GVA.

Table 76: Summary Table of employment and GVA Contribution (2014)[157]

Sector	Total Employment	GVA per Worker Assumption	Total GVA (Rounded)
Aggregates	100	£48,622	£4,714,000
Aquaculture	90	£26,412	£2,310,000
CCS	*		
Coastal Protection	380	£47,994	£18,453,000
Coastal Tourism	28,630	£16,930	£484,793,000
Defence	2,910	£38,291	£111,290,000
Dredging	*		
Fisheries	2,120	£26,412	£55,951,000
Marine Recreation	1,960	£23,189	£45,335,000
Nuclear	7,500	£146,862	£1,101,432,000
Oil & Gas	8,580	£146,862	£1,260,525,000
Ports & Shipping	11,850	£53,011	£627,900,000
Renewables	2,790	£99,337	£277,417,000
Telecoms and Communications	1,080	£70,423	£134,741,000
Total	67,980	£744,345	£4,124,861,000

To ensure consistency and to assess the applicability of the GVA outputs we have assessed the figures generated with industry reports and other literature. This shows the difference and broad similarity in the workings and also supports the rating of confidence for each sector's information (Table 77).

[157] ONS data. Note: Tables may not add due to rounding. *Sectors with asterisks are excluded from the analysis on the basis of lack of available information. Note: Totals may not add due to rounding.

Table 77: GVA Comparison and Sensitivity

Sector	GVA	Comment on Sensitivity	Confidence
Aggregates	£4,714,000	The industry body Mineral Products Association (2014) estimates that the industry generates GVA of £4billion in 2014 whilst figures for 2008 estimate that the industry's GVA is £54 million (Leeds City Council 2014). Within these estimates the lower figure appears to be of most relevance and suggests that the GVA for the sector is within the range of expected GVA given that the North East is not a large region for extraction.	3
Aquaculture	£2,310,000	It has been previously estimated for the South Marine Plan area that GVA for the UK industry is £2.98m (MMO 1050) whereas separate estimates of GVA for Scotland have estimates GVA to be £165.8m (Marine Scotland 2014). The figure calculated for the North East appears to be within the range which might be expected for a region with a comparatively small amount of aquaculture activity.	3
CCS	*	*The CCS Association and TUC in 2014 estimated that CCS could contribute £150 million a year (CCS Association & TUC 2014). Figures for the sector at a North East level are unavailable.*	
Coastal Protection	£18,453,000	There are no industry reports on the GVA contribution of this industry. MMO 1050 estimates that the GVA for the industry is £82.9 million in 2013. Using the employment and GVA per worker estimates for analysis, the figure for GVA suggests that the North East's industry is worth around 22% of the total which is slightly more than could be expected but could be accounted for by a wider definition of the industry.	3
Coastal Tourism	£484,793,000	A range of figures exist. Beatty (2010) state that the North East's GVA in 2007 for this industry was £110 million. However, reports such European Commission's Report on Tourism (2014) in the UK highlights how the overall Tourism sector is worth £40.6 bn GVA and a report by Tourism Alliance (2015) states that the value of tourism is £56bn in 2013. Beatty (2010) shows that in England and Wales coastal tourism supports around 210,000 jobs and contributes around £3.6 billion to the economy. This latter analysis suggests that the figures for the North East is slightly more than could be expected but could be accounted for by a wider definition of tourism.	3
Defence	£111,290,000	Work by the ADS (the trade body of the aerospace and defence industry in the UK) suggests that the defence industry is worth £22billion[158]. As such the GVA figure may be slightly smaller than expected but perhaps representative of the marine activities in the private sector and those related just to marine activities.	3
Dredging	*	MMO 1050 *estimates GVA for the industry of £0.61 million in 2013/14. A study in 2008 valued the marine aggregate dredging contribution of £114m (The Crown Estate 2008). Figures for the sector at a North East level are unavailable.*	
Fisheries	£55,951,000	Agriculture, forestry and fishing in the North East was worth £346 million to GVA in 2014. The figure for GVA calculated is within the expected range given that fishing is just one element of the wider Agriculture, forestry and fishing sector.	3

[158] ADS webpage on UK Defence Sector in 2015, available at: https://www.adsgroup.org.uk/uk-defence-outlook-2014/

Marine Recreation	£45,387,000	The British Marine Federation has produced research in estimates that across the UK marine the leisure, superyacht and small commercial marine industry contributes £5.2 billion in GVA in 2012/13 (British Marine Federation 2014). The report estimates the total GVA contribution of the North East to be £16 million for direct and £54 million for indirect. The figure calculated (£33.1 million) suggests that this falls somewhere in the middle suggesting the figures are within the range expected,	3
Nuclear	£1,101,432,000	The Electricity, gas, steam and air-conditioning supply sector contributed £998 million to GVA for the North East in 2014. Research by Energy UK and Ernst and Young shows how the wider energy industry is worth £28 billion to the economy and the North East power and gas sector contributed 2.37% of the regional economy in 2010 (Ernst & Young 2011). This suggests that the figure may be slightly higher than expected. However, given the classification approach used for employment it is likely that this also includes other energy activities.	2
Oil & Gas	£1,260,525,000	The Oil and Gas industry's GVA for the UK is £24.0bn (UK Government 2015) and whilst much of the activity is based in Scotland, activity within the North of England is also significant. Oil and Gas UK's Economic Report for (Oil & Gas UK 2015) estimates that the industry contributed around £17 billion to UK GVA. Furthermore, the process industries based in the North East add significant value with NEPIC estimating that the industry produces GVA worth £10bn. As such this may underestimate the output in the North East but it is within the scope of	2
Ports & Shipping	£627,900,000	Maritime UK estimate that the in the North West the ports sector produces GVA of £710 million and Shipping produces GVA of £210 million (Oxford Economics 2015a & 205b). This suggests that our calculations could slightly underestimate the contribution of the sector. This could be down to methodological differences and the assumptions used.	2
Renewables	£277,417,000	The Electricity, gas, steam and air-conditioning supply sector is contributed £998 million to GVA for the North East in 2014[159]. The renewables industry is calculated to be worth £2.2bn to the UK economy whilst the wider Environmental Goods and Services sector contributed £26.3 billion (ONS 2015). The figure for renewables GVA output fits in with the assessment of the wider electricity, gas, steam and air condition supply sector in the North East and the Renewables Industry Association's study in 2012.	3
Telecoms and Communications	£134,741,000	The contribution of the telecoms and communications sector to the economy is estimated to be £45 billion to the economy. [160]. Department for Culture Media and Sport values the telecoms sector at £25.7 million in 2015 (DCMS 2015) suggesting that the estimates are perhaps slightly higher than one might expect for the North East. This may be due to methodological reasons or assumptions used in our calculations.	1

[159] ONS Gross Value Added (Income Approach)at current basic prices 2014
[160] Telecentre Data Centre, available at: http://www.telehouse.net/uk-data-centres/

7.5.1 Confidence

Table 78 below sets out our confidence in the data for each of the sectors highlighting areas where data can be used for decision making. This is consistent with confidence criteria developed for MMO 1050 which we provide in Appendix A3.

The data and outputs from the assessment for each economic indicators within each sector have been given a confidence rating which considers the;

- Date of the information source;
- Spatial location of the data source;
- Methodology and techniques used to gather the data; and,
- Applicability of the activities covered by the data to the activities defined for each sector.

Table 78: Summary Table of Confidence

Sector	Employment	Businesses	GVA
Aggregates	2	3	2
	There is reliable information from the number of licenses and firms involved at a regional level whilst employment is captured at a national level. There is uncertainty as a result on the employment at a regional level and the GVA (which relies on employment).		
Aquaculture	3	3	3
	The aquaculture sector is well accounted for in national statistics and industry (and Government) literature although there is little understanding of the linkages specifically to marine activities. GVA calculated is in line with other assessments of productivity.		
CCS	0		
	The CCS sector is currently not large enough to be captured in national statistics and little industry information exists to draw an assessment of the industry at a regional level.		
Coastal Protection	1	1	3
	The coastal protection has linkages across the economy and is captured in several other sectors in national statistics. However, there are assumptions which can be made on the size of the sector and the scale of activity within the North East. The GVA for the sector appears to be within the range expected. However, Those using this information should be aware of the limitations and that further assessment may be needed.		
Coastal Tourism	2	2	3
	Tourism is captured in national statistic, industry literature and sub-regional studies. However, it is unknown whether activities are linked to coastal or marine activities. It can be assumed in certain areas that activity is and the data supports analysis of jobs, businesses and productivity. GVA calculated is in line with other assessments of productivity but is reliant on the employment estimates.		
Defence	2	2	3
	The defence industry is largely Government funded and information about it is often classified. However, there is a significant private sector and information in national statistics is available to assess the size of the industry. It is unknown whether this information covers the whole sector due to suppression of data. The size of the sector measured by productivity is within the ranges expected.		
Dredging	0		
	The dredging industry is captured within several other industry sector reports and is not captured on its own within national statistics. It is clearly a highly valuable industry to the economy but there is little clarity on the size in terms of employment, businesses and GVA at a regional level to make any assessments.		
Fisheries	3	3	3
	Fisheries sector information is captured in national statistic, industry literature and sub-regional studies. GVA calculated is in line with other assessments of productivity.		
Marine Recreation	2	2	2
	Marine recreation has several linkages with the tourism sector. As a result, whilst a good level of detail is available from national statistics, industry literature and sub-regional studies. However, it is unknown whether activities are linked to coastal or marine activities and there may be overlap between Tourism and recreation.		
Nuclear	3	3	2
	Data on employment and businesses is available from industry research, key employers and national statistics. The size of the productivity for the industry is reliant on estimates for employment and GVA per worker estimates. Our assessment suggests that this may be slightly inflated but appears to be		

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Sector	Employment	Businesses	GVA
	broadly indicative of the industry.		
Oil & Gas	3	3	2
	There is good information on the size of the Oil and Gas industry due to definitions in national statistics and research from industry bodies in the North East. GVA calculated is slightly lower than other assessments of productivity.		
Ports & Shipping	3	3	2
	The ports & shipping sector information is captured in national statistic, industry literature and sub-regional studies. The GVA calculated is below other assessments of productivity.		
Renewables	2	2	2
	The renewables industry is a poorly defined industry. It is often defined more broadly by including low carbon. Several subsectors like wave and tidal wave are less developed than renewables. However, there is an increasing body of sector and regional information on this sector and this supports the analysis of the sector which is good but is not transparent. As such the assessment in this report may under-estimate activities in sector due to the focus upon wind energy.		
Telecoms and Communications	2	2	1
	The telecoms and communications sector is well defined but the specific activities being assessed as part of the MMOs work are difficult to draw out in industry research and national statistics. As such the analysis provides numbers which fit in with other assessments but may include other activities making employment, business numbers and GVA appear slightly inflated.		

7.6 Private data for the North East – Employment, businesses and turnover of marine sectors

This section outlines employment, business count and turnover figures obtained from private data purchased from Intelligent Data Group for the key marine sectors in the North East, providing an important counterpart to our analysis of Government data.

Where direct data was not available for entire marine sectors as defined according to our methodology, we have provided figures for employment, businesses and turnover either in a wider or a related sector (italicised; see Appendix A1b for detailed definitions). Figures for the wider sector overstate the level of activity due to the inclusion of a broader range of economic activities, only a minority of which are likely to be included in our sector definitions or have marine linkages. Nevertheless, the information can be used to approximate the level of employment, number of businesses and value of turnover relevant to marine areas.

7.6.1. Sector data

The section below reviews the estimates of employment, businesses and turnover from the privately held data which was purchased for this project.

Aggregates

No data available due to the use of definitions based on SICs; no suitable marine aggregate SICs exist which could be used to construct detailed sector information.

Aquaculture

Estimates indicate that freshwater aquaculture in the North East supports 620 jobs across 30 businesses and has a total turnover of £177,659,250. Data is not available for marine aquaculture. The size of the wider fishing and aquaculture sector is estimated as follows: 870 jobs, 120 businesses and turnover of £211,379,250. The level of aquaculture sector activity is therefore likely to be between these two sets of estimates. Government data estimates for aquaculture show that the sector supports 30 jobs across 10 businesses and has a total GVA contribution of £2,310,000. This is significantly lower than the private data estimates, indicating that private data is more detailed and captures a higher level of activity in this sector.

Carbon Capture and Storage

No data available. As outlined in Section 3.3.3., the commercial viability of carbon capture and storage (CCS) is yet to be demonstrated and the industry has been affected by early setbacks in terms of financing. Data is likely to become available in future with the further development of this sector.

Coastal Protection

Private data indicates that the coastal protection sector in the North East supports 210 jobs across 20 businesses and has a total turnover of £46,066,280. These estimates are higher than those based on Government data, which state that employment in the sector numbers 110 and businesses number 10. GVA contribution from Government estimates is £18,453,000. The private data captures more employment and businesses than Government data, indicating that the private data could be more detailed. There is potential for private data to explore this sector

using other information. For example assessing the business activity or linking it with other business data can be more indicative of sectoral activity.

Coastal Tourism

Coastal tourism in the North East is estimated by private data analysis to employ 58,580 people across 4,960 businesses and produce a turnover of £7,374,080,650. This is significantly larger than the estimates based on Government data, which show that coastal tourism activities employ 12,920 people across 510 businesses and have a GVA of £484,793,000. The higher economic activity reported by private data indicates that this data has a greater level of detail. Analysis of this sector could be developed further through examining individual firms or clusters.

Defence

Estimates based on private data show that the defence industry employs 6,520 people across 180 businesses in the North East, and has a turnover of £466,780,000. Government data provides an employment estimate of 1,150, a business count of 20 and GVA contribution of £111,290,000. Private data provides a greater level of detail in terms of employment and businesses, which may reflect wider activity in this sector in the South West as well as alternative methodologies in collecting data which can avoid the problem of Government suppression in SIC code data. The lack of detail in other regions, means that the granularity of this data should be assessed in more detail.

Dredging

No data available. Economic activity in this sector is captured in the Aggregates and Coastal Protection sectors in the private data.

Fisheries

Private data provides estimates of the level of economic activity in the fisheries sector in the North East as follows: 60 jobs, 20 businesses and turnover of £7,970,000. This is a significantly lower level of economic activity than that based on Government data, which shows that the sector employs 710 people across 130 businesses with a total GVA of £55,951,000. This indicates that the private data has a lower level of detail than Government data for the sector.

Marine Recreation

Estimates based on private data indicate that the marine recreation sector in the employs 5,060 people across 700 businesses in the North East, with a total turnover of £516,758,270. Estimates of economic activity are significantly higher than to those produced using Government data (total employment of 880, business count of 110 and GVA of £45,335,000). Private data appears to provide more detail for this sector, although not all reported activity is necessarily marine based.

Nuclear

Our estimates based on private data show that the nuclear sector employs 6,070 people across 270 businesses in the North East. Total turnover is estimated at £735,008,910. Government data provides estimates for economic activity in the nuclear sector in the North East as follows: employment of 1,670, business count of 130 and GVA of £1,101,432,000. This suggests that private data is more detailed in terms of employment and businesses, but may underestimate the economic

contribution of this sector as it does not include the significant levels of indirect economic activity.

Oil and Gas
Private data for the oil and gas sector in the North East produces estimates of 14,580 jobs, 470 businesses, and turnover of £7,217,800,000. Based on Government data, we estimate employment at 3,550 across 720 businesses and GVA at £1,260,525,000. This indicates that private data has a greater level of detail and may include a wider definition of the sector than that provided by SIC codes.

Ports and shipping
We estimate, using private data, that the ports and shipping sector in the North East provides 4,950 jobs, 210 businesses and turnover of £821,777,480. Government data estimates the level of employment to number 3,360, businesses 130 and GVA to amount to £627,900,000. The private data-based estimates are slightly higher than the Government estimates. However, the real disparity between the two sets of data is likely to be larger, as the private source does not provide data on activities within the sector which are included within the Government data, such as warehousing, cargo and storage. The private data therefore seems to provide a higher level of detail than Government data for the sectoral activities which are covered.

Renewables
No data available from IDG. Working with private data providers on definitions and other approaches to identifying the sector may provide detailed data on this sector.

Telecoms and Communications
Private data estimates employment in the sector of 300, a business count of 20 and turnover of £55,549,620. Our estimates based on Government data indicate that the sector employs 880 people across 1,040 businesses and produces a GVA of £134,741,000. It is likely that the latter employment and economic value estimates are higher because private data for wireless telecommunications and for construction of utility projects for electricity and telecommunications is unavailable. Nevertheless, the private data may provide better estimates of marine activities in this sector as Government data includes activities which are not marine in nature.

Summary
Compared with our estimates based on Government data, the private data indicates a broadly similar pattern of employment, with coastal tourism as the most significant sector. Key differentials are in defence activities and fisheries (both significantly higher in Government data estimates) and marine recreation (significantly higher in private data estimates). The number of businesses across sectors in the private data is generally higher. Both private and Government data provide estimates that oil and gas is the largest sector in terms of economic contribution (turnover/GVA). Our analysis indicates that private data is of use in assessing certain sectors in more detail, namely aquaculture, coastal protection, coastal tourism, defence, marine recreation and oil and gas. Private data may also provide more useful estimates for marine telecoms and communications activities and for ports and shipping. On the other hand, Government data appears more suitable for analysis of the fisheries and nuclear sectors in the North West.

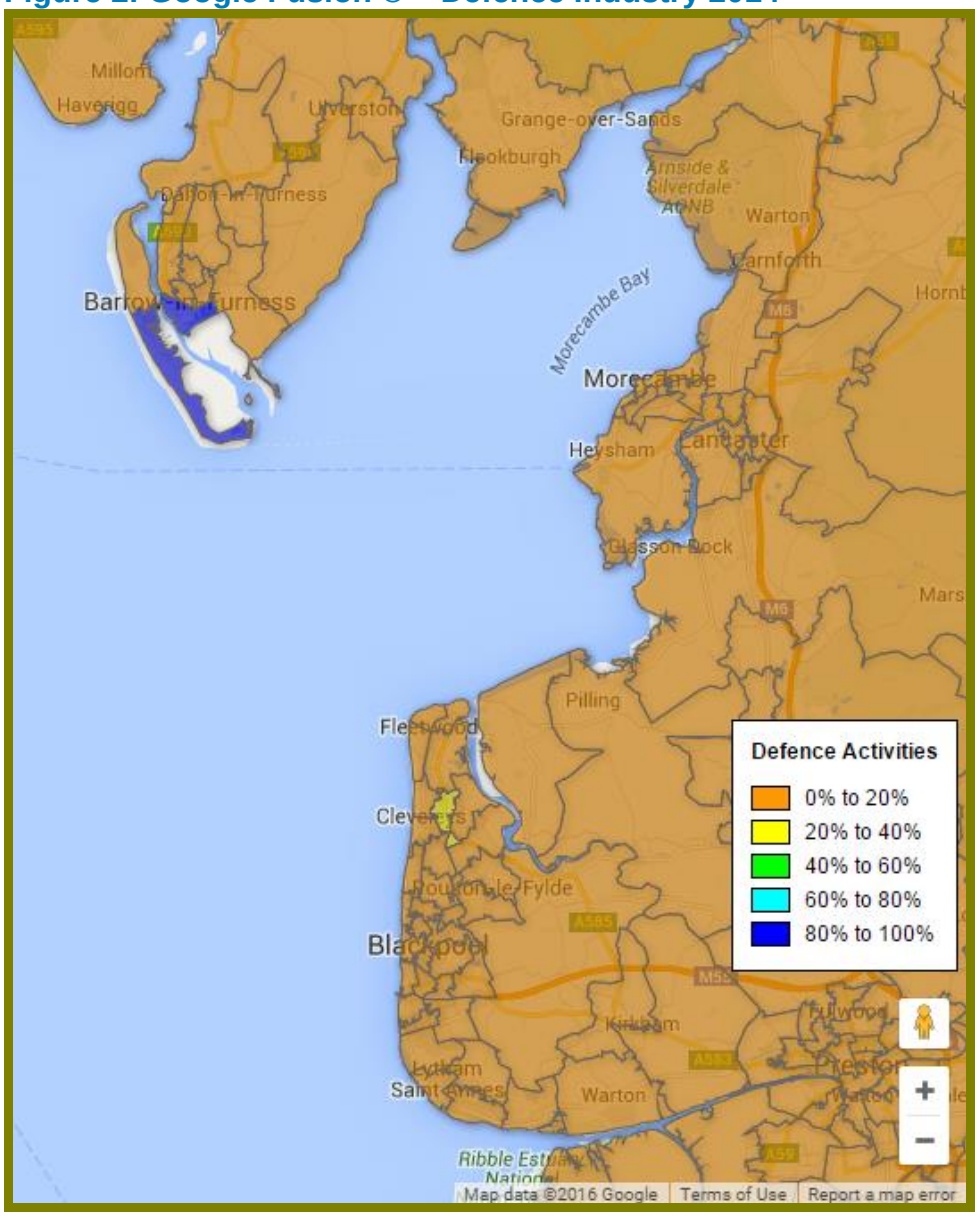
We provide further explanation of the differences between the two data sources in Appendix A4.

8. Sector maps

To accompany this report we have produced a series of interactive online maps which outline the concentration of employment from the sectors above. These are in the form of Google Fusion © interactive maps which can be edited, additions or notes added and explored in more detail as well as shared and kept current.

Below (Figure 2) we provide a screenshot of the defence activities in the North West and specifically in the Lancashire and Cumbrian coasts. This shows pockets of high employment in the Defence industry which can be linked to known strengths of BAE Systems at Barrow Shipyard. However, it also helps to identify other areas of strength which are not as well-known such as the area between Blackpool and Fleetwood which has strength in this sector. This is useful for those undertaking research or contributing to decisions without local knowledge.

Figure 2: Google Fusion © – Defence Industry 2014



Source: Atkins & Google Fusion © 2016. Map Copyright Google 2016.

Rather than provide maps across all sectors, which would lengthen this report significantly and also detract from some of the key messages, we have provided one example above.

Below we outline the steps which can be taken to undertake a similar mapping exercise to support decision making in the future.

8.1 Google fusion

Interactive maps provide the opportunity to layer data and look at more than one dataset. This can further support understanding of marine areas identifying activities, businesses and local communities which may be impacted by changes. For example, the maps above provide a good overlay between concentrations of activity as well as built infrastructure which is visible on Google maps.

Table 79: Recommendations for use of Google Fusion

Stage	Steps	Comments
Data Protection & Privacy	• Data should adhere to the data provider's requirements and if sensitive should not be downloadable or shared.	• Considering the use and presentation of the data from the outset should be considered.
Stage 1: Collection of Data	• Download data or purchase data which has the ability to match (join) data together. For example, ONS data often comes with an area code for local authority and other geographic areas. It is recommended that geographic areas which are unlikely to change are utilised.	• Stages 1 and 2 can be the most complex elements of the mapping process. Data can be manipulated in excel but where issues exist, such as data formats or inconsistency in data codes.
Stage 2: Manipulation of Data	• Often data will need to be manipulated so that it is in the correct format to upload. • This may include joining data together (e.g. connecting socio-economic data with a geography), transposing data or joining up sectors together.	
Stage 3: Geocoding	• Joining data such as businesses or employment with a geocode enables it to be mapped. The XML	• There is a lot of open source mapping information available publically and this should be assessed before

Stage	Steps	Comments
	geocodes can be gathered from open source sites or GIS specialists can generate it. • This needs to be linked to the data and this can be manipulated further within Google Fusion.	resource is placed upon matching geocodes with data. However, some open source data may not have complete coverage or be suitable and in these cases it may be necessary to draw upon other resource.
Stage 4: Google Fusion © Upload	• Uploading to Google Fusion © is fairly straightforward. There is also an option to merge data sources together, which can support Stage 3.	• There are several ways to present data and this should be considered at the outset. Data can be manipulated in Google Fusion © and individuals may require multiple uploads
Stage 5: Manipulation & Presentation	• Once in Google Fusion, data can be edited and generated into a map. This requires toggling of features and assessing the type of mapping that is required. For example points can be plotted, heatmaps or clothopleth maps can be created. • A legend for the data is possible and this can be supported through changing how data is interpreted by Google fusion.	
Stage 6: Share/Embed	• Data can be shared or embedded using a link.	• Considering when to share and who with will ensure that data guidelines and security is adhered to.

8.2 Geographical boundaries

The map above uses mid-layer super output areas (MSOAs) which is a highly detailed geographic unit for analysis. They are established to improve the reporting of small area statistics and each area has a similar number of people within it (minimum 5,000 and the mean is 7,200). This level of detail for analysing data geographically is useful but other geographic levels may be appropriate. For example, local authority geographies and local enterprise partnerships often provide an effective analysis of functional economic areas.

9. Summary and conclusions

9.1 Data availability and quality

In undertaking this research for the MMO, our team has collated the following messages concerning data availability and quality to support future work. We have aligned these to two broad categories: data sources and data analysis.

9.1.1 Data Sources

The team used a variety of data sources in analysing the marine sectors across the Marine Plan areas. The following issues were identified:

Government data: Despite some constraints around coverage and ability to define certain sectors (e.g. renewables), the level of detail and manipulability of Government data support a robust analysis of marine sectors.

Temporal: Much of the latest available data from ONS is for 2014, whereas reports written in 2014 often use data collected in 2013. In some cases, the latest available data, such as that from regional development agencies, dates from longer ago. As a result, the information available for certain sectors can be out of date. This could be a concern where sectors are nascent or where there have been recent local or national political or economic changes like recession.

Sector definitions: Several sectors are challenging to define using SIC codes. This is largely to do with how sectors are categorised in SIC format. Where this occurs, other sources of information are needed, such as private data or industry reports. Furthermore, some sector activities are captured by multiple SIC codes. Certain sectors (e.g. Carbon Capture & Storage, Renewables, Coastal Protection) have yet to establish a sector definition in Government statistics, although steps have been taken by Government agencies and sector bodies to achieve this. The alternative is for sector or independent bodies to create their own detailed information for each sector which can support future analysis.

Indirect & Direct Employment/Supply Chain: In absence of reliable quantitative data on supply chains for each sector, this report assesses indirect employment through the use of indirect employment multipliers. As a result, the analysis provides a broad estimate of the scale of indirect employment rather than a complete picture of the indirect economic activity.

Industry reports: This report relies on several industry reports and research papers. Many were undertaken as independent research projects and provide a good source of economic and employment information. However, we have also identified research which is primarily marketing or political material and could be considered to be less robust. As such, the use of wider industry reports, data and research should be considered to ensure robustness in the analysis of data.

Private data: Our assessment of private data has shown that in some cases more economic activity is captured in data purchased from private data suppliers. We note

that analysis of the shipping & ports, telecoms, marine recreation and nuclear sectors be supported further by using data held by private providers to provide additional insight into the activities of these sectors. This is already the case in the low carbon sector (DBIS 2015), although careful consideration should be made into the type and format of the data that is purchased. For example, considering the resource available to manipulate the data may require the data provider's own analysis teams.

9.1.2 Analysis & Quality

We have outlined all of the approaches and the assumptions used within our analysis. However, we note the following issues which should be considered in future research:

Calculating GVA: our approach to calculating GVA per sector relies on Government figures for GVA per head at a broad sector level. Further analysis could benefit from more detailed GVA per head figures, some of which are available for some sectors in industry or academic research but require further assessment of their suitability for this type of economic assessment.

Apportioning: We avoid apportioning data from different sources where possible, in favour of a standardised approach. Furthermore, the assumptions for taking apportions are subject to uncertainties. We recommend that assumptions are evidenced where possible and that the outputs from any apportioning are checked against industry or academic research.

Geographically specific sectors: The research has shown that economic geography should be a key consideration when analysing economic sectors. We widened our analysis of the oil and gas industry to include chemicals and processing as this is highly pertinent to the marine economy in certain areas. Furthermore, the inclusion of wave and tidal power in our analysis of the renewables industry in the South West was important in appreciating local strengths in these technologies.

Terrestrial and Marine Activities: It is often difficult to distinguish marine from terrestrial activities in national and private data. The mapping of data in a tool like Google Fusion (Chapter 8) of other GIS software can support this. For example, maps of aquaculture sites help to estimate the level of activity that occurs near the coast.

Quality of data available: Our approach seeks to standardise the available information where possible, assess the quality of the data and rate our confidence in the data outputs. These are useful steps in supporting outputs which can be replicated and considered robust.

9.2 Recommendations

We make a series of recommendations (below) to support the work of the MMO and future economic analysis:

Policy and contextual review
Undertaking a review of the contextual background and policy in a Marine Plan Area at the regional, sub-regional and local levels is useful in supporting analysis of marine sectors. The reviews undertaken for this study provide useful information such as the identification of priority LEP sectors and local information about economic growth (e.g. local economic assessments).

Key assets
The defence and coastal protection sectors are difficult to identify fully through national statistics. However, key economic assets (e.g. power stations, wind farms, beaches, military bases or infrastructure) are often identified in wider industry reports and local information. When considering these sectors it may be appropriate to undertake site visits or more detailed horizon scanning to explore where key assets are and their linkages with the economy.

Definitions
The MMO may wish to consider endorsing the adjustment of how sectors are reported in national statistics. Liaising with the ONS and other appropriate bodies could support more detailed information for future economic analysis.

Standardised approaches
The approach taken to this report draws upon MMO 1075 and MMO 1050. We would advise that future work draws upon this report and the preceding reports to standardise approaches to economic analysis. This can support decision making and reduce the amount of further work required or instances of duplication. The approach to economic analysis should focus on national statistics, industry reports and policy information.

Detail of data
The use of detailed information on employment and businesses is central to understanding marine sectors. We demonstrate this in our Google Fusion © maps which use Mid Layer Super Output Area (MSOA) geographies, one of the most detailed levels for collection and publication of small area statistics. Examining economic sectors at this level can highlight known areas of concentrated marine activities and areas for which further investigation is required. For example, one of the maps of economic activity showed that an area in the landlocked East Midlands is important for boat building. This was found on further investigation to be due to a major boat building company based in the area.

Mapping
As part of our analysis, we produced a range of sectoral activity maps. Using the Google Fusion © tool allowed us to present data in an accessible and practical format. Further use of mapping tools will be valuable to understanding marine sectors, economic activity and other features of Marine Plan areas, adding value to MMO's future marine planning work.

Flexibility in sector coverage
There is ambiguity around several sector definitions. Whilst MMO 1075 provides a summary of the definitions. However, flexibility in definitions is sometimes required to quantify economic activities of certain marine sectors. As such, considering the

broader definition of an industry or undertaking a policy review can help to identify where definitions need to be broader or consider other aspects of the economy.

Use of private data

Broadly, private data should be utilised where sectors are difficult to define using Government data and there is scope for MMO and the data provider to introduce flexibility into definitions. Conversations with data suppliers or others may identify ways of defining 'hard-to-define' sectors.

Private data should also be used where Government data underreports private sector activity Government (e.g. sector with large proportion of SMEs or where activity could be recorded in different sectors). Government data is robust and flexible but further work is required by Government agencies (in collaboration with the private sector) on defining sectors. Where budget allows, private data could be used for the analysis of shipping & ports, telecoms, marine recreation and nuclear sectors.

The geography of Marine Plan areas

Economic analysis would benefit from more precise definitions of the marine plan areas. The use of regional data is not always appropriate. For example the North East Marine Plan Area also included some North Yorkshire areas and the South East Marine Plan Area covering several regions, Local Enterprise Partnerships and local authorities. Providing geographic definitions to follow in future work may support more precise and detailed evidence gathering.

In terrestrial planning, the National Planning Policy Framework for England outlines how local planning authorities should work across boundaries. This could be adopted in future analysis of marine sector economic activity and could include crossing national boundaries. For example, several North West recreation activities are important in North Wales and have not been fully captured in this report.

Nature and the economy

This research has underscored that nature and the economy are intertwined. The assessment of the environment outlines these interactions and an increasing body of research seeks to explain the interconnections. Recent approaches to natural capital accounting and ecosystem services could add significant value through understanding how certain sectors interact with nature and the local social and economic benefits of the natural environment.

Appendix 1

A1a. Sector definitions

Table 80: SIC[161] Sector Definitions

Broad Sector	SIC Code
Aquaculture	03210 : Marine aquaculture
	03220 : Freshwater aquaculture
Coastal Protection	42910 : Construction of water projects
Coastal Tourism	55100 : Hotels and similar accommodation
	55201 : Holiday centres and villages
	55202 : Youth hostels
	55209 : Other holiday and other short-stay accommodation (not including holiday centres and villages or youth hostels) NEC
	55300 : Camping grounds, recreational vehicle parks and trailer parks
	79901 : Activities of tourist guides
	91020 : Museum activities
	91030 : Operation of historical sites and buildings and similar visitor attractions
	91040 : Botanical and zoological gardens and nature reserve activities
	93210 : Activities of amusement parks and theme parks
	93290 : Other amusement and recreation activities
	55900 : Other accommodation
Marine Recreation	93120 : Activities of sport clubs
	93199 : Other sports activities (not including activities of racehorse owners) NEC
	93290 : Other amusement and recreation activities
Defence Activities	84220 : Defence activities
	30400 : Manufacture of military fighting vehicles
	25400 : Manufacture of weapons and ammunition
	30110 : Building of ships and floating structures
Fisheries	03110 : Marine fishing
	10200 : Processing and preserving of fish, crustaceans and molluscs
	10850 : Manufacture of prepared meals and dishes
Nuclear	24460 : Processing of nuclear fuel
	25300 : Manufacture of steam generators, except central heating hot water boilers
	33110 : Repair of fabricated metal products
	35110 : Production of electricity
	38120 : Collection of hazardous waste
	38220 : Treatment and disposal of hazardous waste
	39000 : Remediation activities and other waste management services
Energy	05101 : Mining of hard coal from deep coal mines (underground mining)
	05102 : Mining of hard coal from open cast coal working (surface mining)
	05200 : Mining of lignite

[161] The Standard Industrial Classification (SIC) is used to classify economic functions (e.g. business establishments or employment) by the type of economic activity in which they are engaged. The new version of these codes (SIC 2007) was adopted by the UK as from 1st January 2008. Note: NEC = not elsewhere classified.

Broad Sector	SIC Code
	06100 : Extraction of crude petroleum
	06200 : Extraction of natural gas
	07210 : Mining of uranium and thorium ores
	08910 : Mining of chemical and fertiliser minerals
	08990 : Other mining and quarrying NEC
	09100 : Support activities for petroleum and natural gas extraction
	09900 : Support activities for other mining and quarrying
	71.12/2 Engineering related scientific and technical consulting activities
	19100 : Manufacture of coke oven products
	19201 : Mineral oil refining
	19209 : Other treatment of petroleum products (excluding mineral oil refining petrochemicals manufacture)
	20110 : Manufacture of industrial gases
	35110 : Production of electricity
	35120 : Transmission of electricity
	35130 : Distribution of electricity
	35140 : Trade of electricity
	35210 : Manufacture of gas
	35220 : Distribution of gaseous fuels through mains
	35230 : Trade of gas through mains
	38120 : Collection of hazardous waste
	38220 : Treatment and disposal of hazardous waste
	74901 : Environmental consulting activities
	74909 : Other professional, scientific and technical activities (not including environmental consultancy or quantity surveying)
Oil & Gas	05101 : Mining of hard coal from deep coal mines (underground mining)
	05102 : Mining of hard coal from open cast coal working (surface mining)
	05200 : Mining of lignite
	06100 : Extraction of crude petroleum
	06200 : Extraction of natural gas
	07210 : Mining of uranium and thorium ores
	08910 : Mining of chemical and fertiliser minerals
	08990 : Other mining and quarrying NEC
	09100 : Support activities for petroleum and natural gas extraction
	09900 : Support activities for other mining and quarrying
	71.12/2 Engineering related scientific and technical consulting activities
	19100 : Manufacture of coke oven products
	19201 : Mineral oil refining
	19209 : Other treatment of petroleum products (excluding mineral oil refining, petrochemicals manufacture)
	20110 : Manufacture of industrial gases
Ports & Shipping	30110 : Building of ships and floating structures
	30120 : Building of pleasure and sporting boats
	33150 : Repair and maintenance of ships and boats
	50100 : Sea and coastal passenger water transport
	50200 : Sea and coastal freight water transport
	50300 : Inland passenger water transport
	50400 : Inland freight water transport
	52101 : Operation of warehousing and storage facilities for water transport activities of division 50
	52220 : Service activities incidental to water transportation

Broad Sector	SIC Code
	52241 : Cargo handling for water transport activities of division 50
	77341 : Renting and leasing of passenger water transport equipment
	77342 : Renting and leasing of freight water transport equipment
Telecoms	61200 : Wireless telecommunications activities
	61900 : Other telecommunications activities
	42220 : Construction of utility projects for electricity and telecommunications

A1b. Private data sector definitions

The private data source did not provide data for some of the SIC codes within the broad sectors as we define them for our analysis (Appendix A1a Sector Definitions above). Where this occurs, we have included supplementary SICs which allow some insight into the likely total sectoral employment, business counts and turnover. It is important to make note of sectors where SIC data is missing, as this affects our confidence in the estimates (outlined in Table 82 below).

Table 81: Private Data Sector Definitions[162]

Broad Sector	SIC Codes and Apportionments, where applicable (Unavailable Italicised)	Supplementary SICs
Aquaculture	*03210 : Marine aquaculture*	3 : Fishing and aquaculture
	03220 : Freshwater aquaculture	
Coastal Protection	42910 : Construction of water projects (50% apportionment)	None
Coastal Tourism	55100 : Hotels and similar accommodation	None
	55201 : Holiday centres and villages	
	55202 : Youth hostels	
	55209 : Other holiday and other short-stay accommodation (not including holiday centres and villages or youth hostels) NEC	
	55300 : Camping grounds, recreational vehicle parks and trailer parks	
	79901 : Activities of tourist guides	
	91020 : Museum activities	
	91030 : Operation of historical sites and buildings and similar visitor attractions	
	91040 : Botanical and zoological gardens and nature reserve activities	
	93210 : Activities of amusement parks and theme parks	
	93290 : Other amusement and recreation activities (50% apportionment)	
	55900 : Other accommodation	
Defence Activities	84220 : Defence activities	None
	30400 : Manufacture of military fighting vehicles	
	25400 : Manufacture of weapons and ammunition	
	30110 : Building of ships and floating structures (missing for North East, North West)	
Fisheries	03110 : Marine fishing	None
	10200 : Processing and preserving of fish, crustaceans and molluscs (missing for North East, South East)	
	10850 : Manufacture of prepared meals and dishes	
Marine recreation	93120 : Activities of sport clubs (10% apportionment)	None
	93199 : Other sports activities (not including activities of racehorse owners) NEC (10% apportionment)	
	93290 : Other amusement and recreation activities	

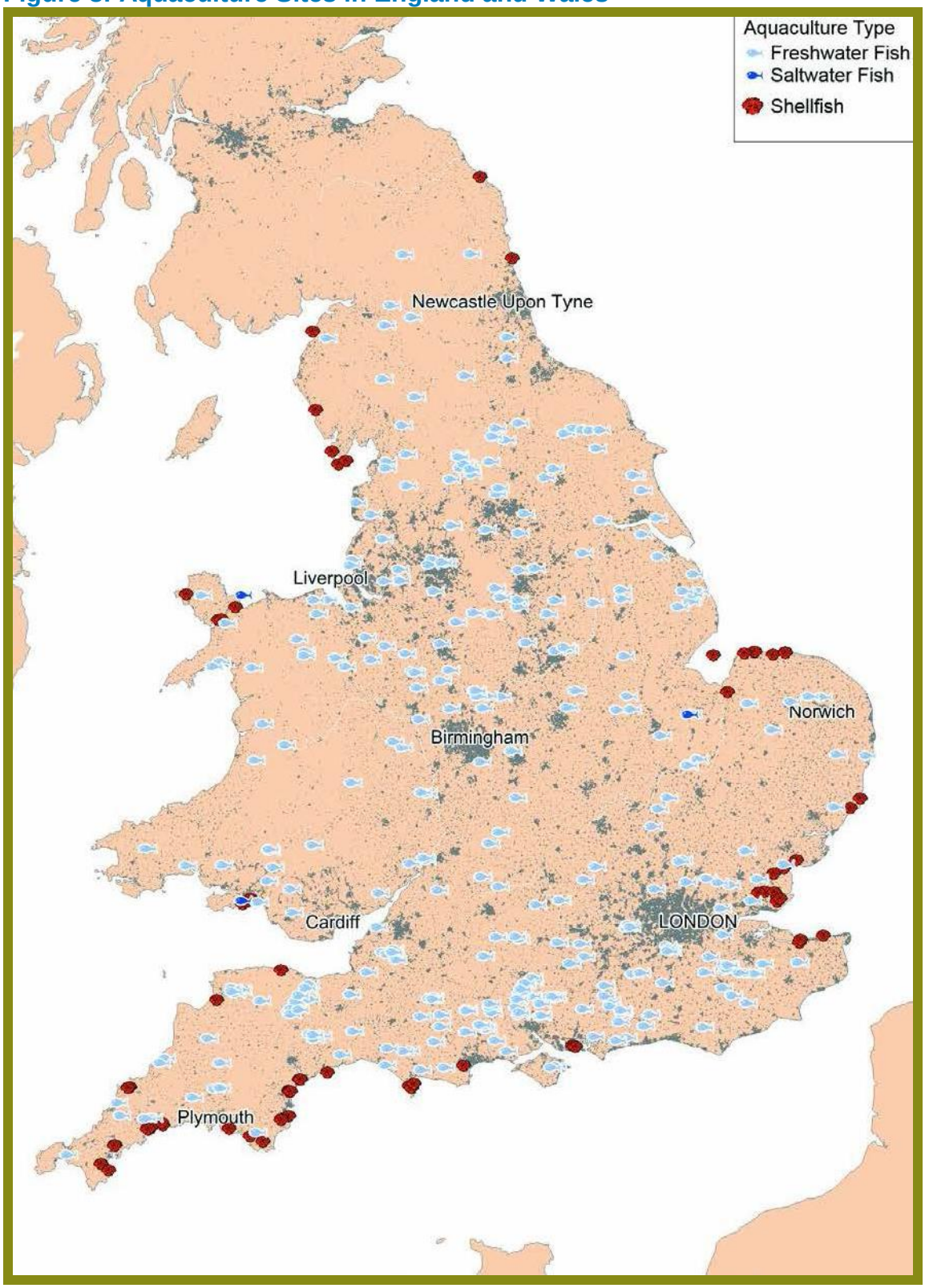
[162] The Standard Industrial Classification (SIC) is used to classify economic functions (e.g. business establishments or employment) by the type of economic activity in which they are engaged. The new version of these codes (SIC 2007) was adopted by the UK as from 1st January 2008. Note: NEC = Not Elsewhere Classified.

Broad Sector	SIC Codes and Apportionments, where applicable (Unavailable Italicised)	Supplementary SICs
	(50% apportionment)	
Nuclear	*24460 : Processing of nuclear fuel*	None
	25300 : Manufacture of steam generators, except central heating hot water boilers (missing for North West, South East, South West)	
	33110 : Repair of fabricated metal products	
	35110 : Production of electricity	
	38120 : Collection of hazardous waste	
	38220 : Treatment and disposal of hazardous waste	
	39000 : Remediation activities and other waste management services	
Oil & Gas	*05101 : Mining of hard coal from deep coal mines (underground mining) (missing for South West)*	None
	05102 : Mining of hard coal from open cast coal working (surface mining)	
	05200 : Mining of lignite	
	06100 : Extraction of crude petroleum	
	06200 : Extraction of natural gas	
	07210 : Mining of uranium and thorium ores	
	08910 : Mining of chemical and fertiliser minerals	
	08990 : Other mining and quarrying NEC	
	09100 : Support activities for petroleum and natural gas extraction	
	09900 : Support activities for other mining and quarrying	
	71.12/2 Engineering related scientific and technical consulting activities	
	19100 : Manufacture of coke oven products	
	19201 : Mineral oil refining	
	19209 : Other treatment of petroleum products (excluding mineral oil refining, petrochemicals manufacture)	
	20110 : Manufacture of industrial gases	
Ports & Shipping	*30110 : Building of ships and floating structure*	52 : Warehousing and support activities for transportation
	30120 : Building of pleasure and sporting boats	
	33150 : Repair and maintenance of ships and boats	
	50100 : Sea and coastal passenger water transport	
	50200 : Sea and coastal freight water transport (missing for North East, North West, South West)	
	50300 : Inland passenger water transport	
	50400 : Inland freight water transport (missing for North East, South West)	
	52101 : Operation of warehousing and storage facilities for water transport activities of division 50	
	52220 : Service activities incidental to water transportation	
	52241 : Cargo handling for water transport activities of division 50	
	77341 : Renting and leasing of passenger water transport equipment	
	77342 : Renting and leasing of freight water transport equipment	
Telecoms	*61200 : Wireless telecommunications activities*	None
	61900 : Other telecommunications activities (5%	

Broad Sector	SIC Codes and Apportionments, where applicable (Unavailable Italicised)	Supplementary SICs
	apportionment)	
	42220 : Construction of utility projects for electricity and telecommunications	

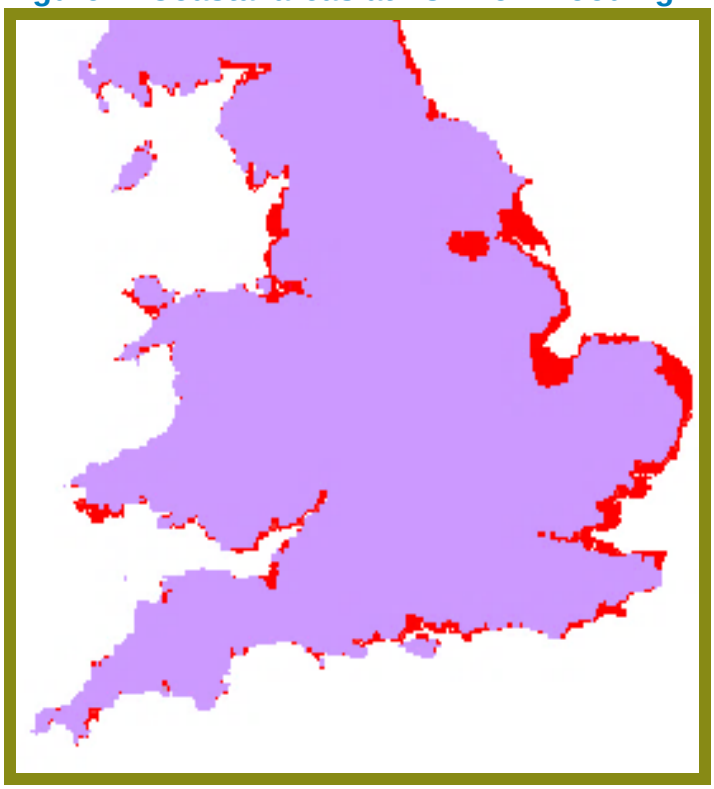
A2. Maps

Figure 3: Aquaculture Sites in England and Wales



Source: Centre for Environment, Fisheries and Aquaculture Science © Available at: https://www.gov.uk/Government/uploads/system/uploads/attachment_data/file/405469/Aquaculture_Statistics_UK_2012.pdf

Figure 4: Coastal areas at risk from flooding in England.



Source: National Oceanography Centre. © Available at: http://noc.ac.uk/science-technology/marine-hazards/coastal-erosion

Figure 5: Offshore Renewable Energy Areas

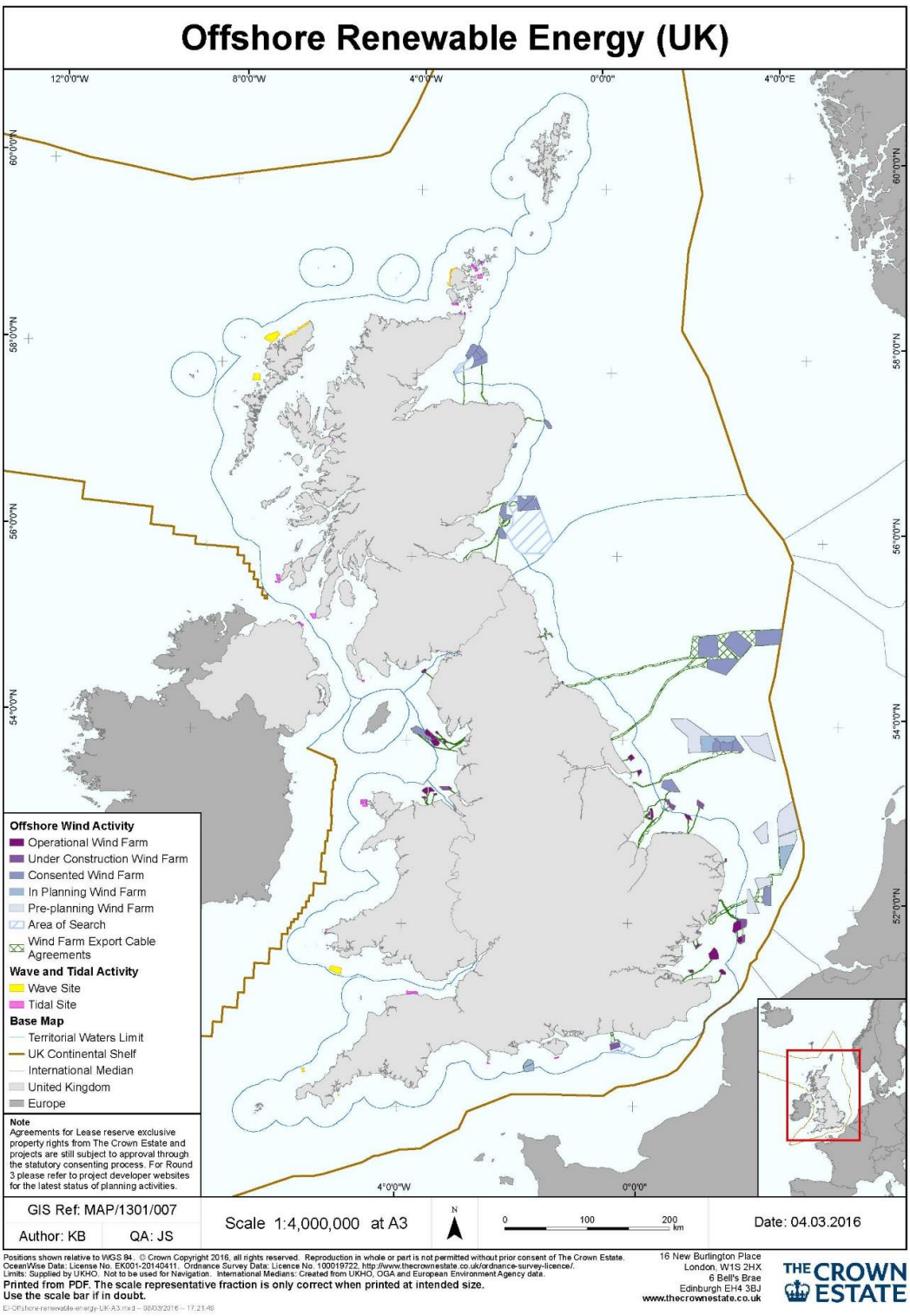


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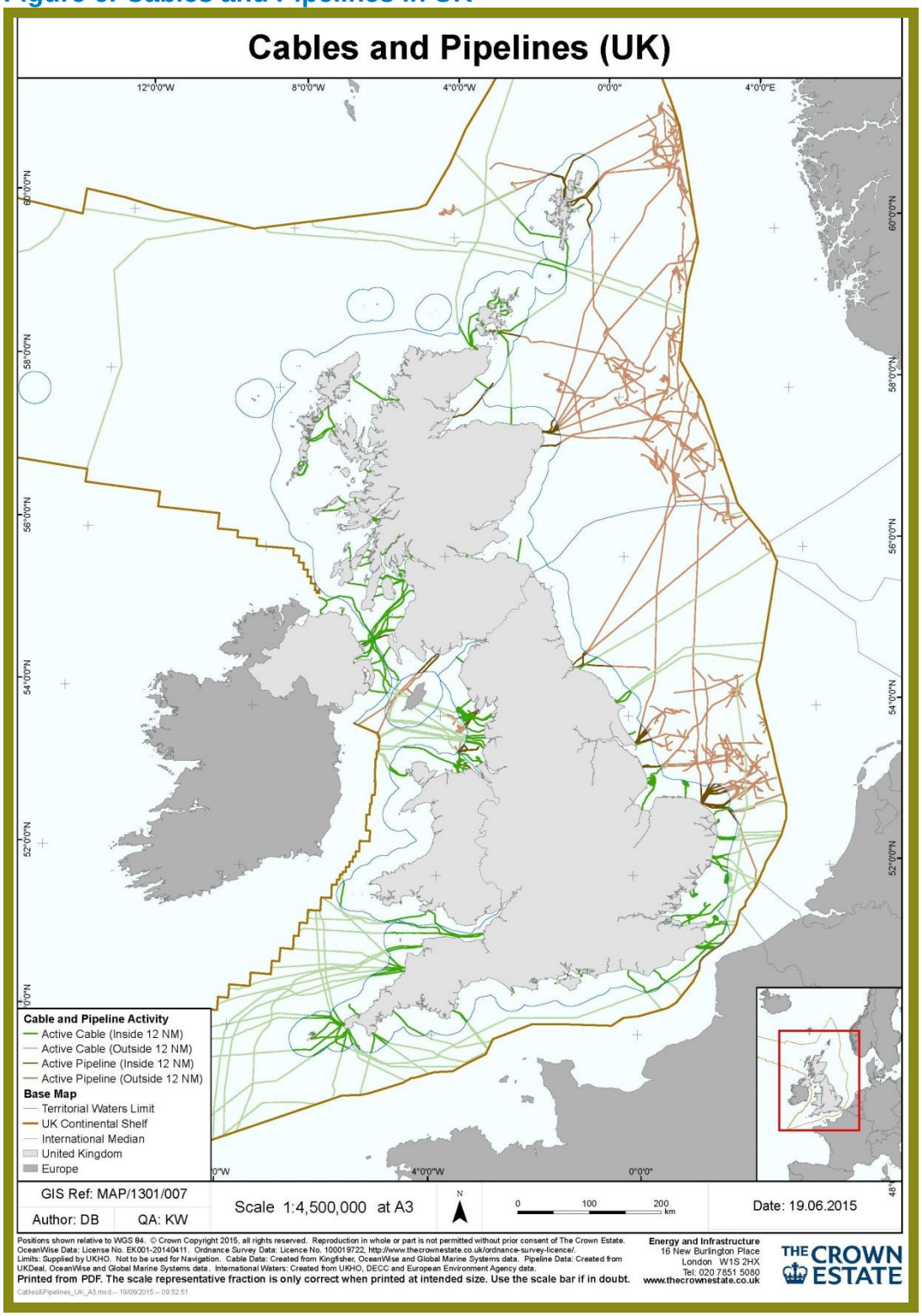
Figure 6: Cables and Pipelines in UK



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A3. Confidence Criteria

Table 82: Confidence criteria for data[163]

Rating	Confidence	Definition	Potential Considerations
0	Unable to quantify	Insufficient detail is available to assess our confidence in the data.	The data will not be used as the basis for decision making.
1	Low	Low confidence in the data. The decision maker must be aware that there are limitations to the use. Further investigation will be required.	• The techniques and methods used may not be the accepted, best practice method • Incomplete or no metadata • Lack of clarity as to whether the data is measured, modelled, predicted or estimated • Lack of clarity as to when the data was recorded, and over what period • More up to date versions may be available that result in a low confidence in this set • Data may not be accurate to the geographical boundaries of the Marine Plan areas • Dataset may not encompass all activities within the sector • Data source is over five years old.
2	Moderate	Good quality data but may lack internal quality assurance, full documentation of methods, and have inaccuracies.	• Research methodology published but we are unable to determine if this followed “best practice” or was considered “standard” by professionals in that field • Data is modelled, predicted or estimated with details of such procedures provided • Data is measured but precision is low or unclear

[163] Taken from MMO 1050

			• Some date information is provided but may be incomplete • Some quality control information published at the point of data collection and/or during data processing • 3Data is reasonably accurate to the geographical boundaries of the Marine Plan areas • Data encompasses the majority of activities within the sector • Data source is within the last two years
3	High	High quality data, internally quality assessed, high confidence in methodology.	• Detailed research methodology published and using known “best practice” or is considered “standard” by professionals in that field • Data is measured; precision is high and explicitly stated • Full date and update information is provided • Detailed quality control procedures published at the point of data collection and/or during data processing • Data is accurate to the geographical boundaries of the Marine Plan areas • Data encompassess all activities within the sector • Data source is within the last year.

A4. Private and Government data comparison

Table 83 below summarises the size of each of the sectors and our confidence in the private data estimates for the North West Marine Plan area. This provides an illustration of the key differences and underlying reasons. The analysis is consistent with confidence criteria developed for MMO 1050 which we provide in Appendix A3. Since the private data is from the same source and date, and was collected using identical methodology and techniques, the confidence rating considers the applicability of the activities covered by the data to the activities defined for each sector and consistency with the Government data.

The data purchased for this project from Intelligent Data Group covers 2 million live businesses. Details of businesses are checked and validated through an internal data team and business data is matched against other business information. The data collated for this analysis was updated on a 12 month cycle (most privately data is updated between 12-24 months).

The comparison was undertaken with the caveat that analysis of the private data employment data which focuses upon direct employment and the analysis of economic activity focused on turnover rather GVA.

Differences between this industry data and Government data can be explained by:

Source of data – Intelligent Data Group is a data provider and owner of data similar to the Office for National Statistics. The ONS figures are based on Government data from internal Government administrative sources. The Government identifies and maintain the business structures. It is often commented that ONS Enterprise Counts and IDBR also has better coverage of public sector organisations compared with private data sources. The Intelligent Data Group data is captured from a number of sources including: Companies House data; Thomson Directories; and Yell Data. As a result it has a better coverage of the smallest establishments compared with the ONS estimates and is up to date and considered to be accurate.

Definitions – A feature of both private data and public data is that business data is often organised into Standard Industrial Classifications. Private and public data do this in a number of ways based on a number of parameters including directly speaking to businesses and asking what they do as well as capturing other information (including how they record themselves to companies house). This means that businesses can be in different sectors depending on the data purchased. This is further complicated by businesses that work across a number of sectors, or their 'sectors' do not exist within SIC codes. For example, Atkins reports to Companies House that it can be classified into the following SICs within Government national statistics;

- 70229 - Management consultancy activities other than financial management
- 71112 - Urban planning and landscape architectural activities
- 71129 - Other engineering activities
- 82990 - Other business support service activities not elsewhere classified

However, this does not capture its activities in Transport or Energy as well as other activities. As such private data can often be more accurate in recording what businesses do, as well as under reporting certain codes which are not core lines of business or difficult to verify.

There are other metrics within private data which can support moving beyond applying a static proportion to SICs and to assess business activities in more detail. This has been the case in renewables, where private data providers have been instrumental in assessing the size of the renewables industry (DBIS 2015).

Purpose - Data providers collate information across all businesses. However, the main use of this data is in Business to Business Marketing. As such, businesses where it is difficult to verify information (those without websites or landlines) and businesses in smaller sectors are not always targeted from business information. The data provided for this report required further manipulation so that it could be analysed.

Economic Geography – The economic geography of the UK can impact on how data is presented. The head office, 'back office' (e.g. administrative, human resources, etc) and holding company functions of businesses are often based in larger cities, with many in London and the South East. This can impact upon reported figures for industries where head offices (often in London) report financial and employment figures. The case of Oil and Gas and Renewables sectors demonstrates this. Figures on employment in these sectors often show large employment based in London and South East despite little natural resource of direct sector activity (physical or material) occurring locally.

Despite these differences we believe that in certain instances private data can be of use to marine planning exercises. We outline this in the Summary and Conclusions section.

Table 83: Data Comparison for the North West

Broad Sector	Private Data			Government Data		
	Employment	Businesses	Turnover	Employment	Businesses	GVA
Aquaculture	30	10	£5,675,000	120	10	£6,663,000
	Confidence Rating 2 - One of two relevant SIC codes is missing from the private data, however, data exists for the wider fishing and aquaculture industry which can provide an indication of total aquaculture activity. Despite not all aquaculture activity being included in the data, estimates of economic activity in the North West are broadly similar to Government data. The area where the estimates do not correlate is in turnover/GVA. However, the estimates are consistent when the wider fishing and aquaculture sector's turnover of £26,480,000 is considered.					
Coastal Protection	160	20	£23,210,000	100	10	£19,448,000
	Confidence Rating 2 – Private data covers all activities defined for the sector. The private data captures slightly more employment and businesses than Government data, indicating that the private data is more detailed. At the same time, turnover is lower than expected when compared with GVA. This may be due to private data excluding indirect economic activities.					
Coastal Tourism	65,650	5,300	£5,881,726,000	57,970	1,890	£2,493,344,000
	Confidence Rating 3 – Private data is available for 12 of the 13 activities within this sector. The higher economic activity in terms of employment and businesses reported by private data indicates that this data has a greater level of detail. Analysis of this sector could be developed further through examining individual firms or clusters. The turnover and GVA estimates broadly correlate.					
Defence Activities	3,070	140	£252,230,000	10,130	30	£968,659,000
	Confidence Rating 1 – Private data is available for two out of four of the activities in this sector in the North West. Estimates from private data are significantly lower – likely to be due to missing and suppressed data. Government data is more useful in assessing this sector.					
Fisheries	40	10	£6,110,000	5,220	100	£342,631,000
	Confidence Rating 1 – Private data is available for two of the three activities within the fishery sector (Marine fishing and Processing and preserving of fish, crustaceans and molluscs) for the North West. Private data estimates are lower than Government data estimates, which can be linked to the missing data and a lower level of detail.					
Marine recreation	6,000	730	£693,437,000	5,540	370	£338,252,000

Broad Sector	Private Data			Government Data		
	Employment	Businesses	Turnover	Employment	Businesses	GVA
	Confidence Rating 3 – Private data provides slightly more detail for this sector. The estimates broadly correlate.					
Nuclear	4,100	270	£333,882,600	15,400	350	£12,260,758,000
	Confidence Rating 1 – Private data is available for four of the seven activities included in our definition of the nuclear sector for the North West. Estimates are significantly lower, due to missing data for some activities and the fact that private data does not cover indirect economic activity. Government data may therefore be of more use in assessing the size of this sector.					
Oil & Gas	8,800	440	£1,473,491,300	8,940	1,510	£3,821,436,000
	Confidence Rating 2 - Of the 15 activities included in this sector's definition, eight are covered in the private data for the North West. Those not covered include critical activities such as Extraction of natural gas. This may account for an estimate of turnover that is lower than expected given the GVA estimate. However, private data is available for the wider activity Extraction of crude petroleum and natural gas, as well as for other oil and gas related sectors, which can provide an indication of activity in the broad sector.					
Ports & Shipping	4,950	190	£653,855,700	10,870	280	£2,295,439,000
	Confidence Rating 1 - Of the 12 activities within the Ports and shipping sector, private data is available for six in the North West. It therefore understates economic activity in this sector. Data is not available on the Inland passenger water transport activity. The other key missing data is associated with warehousing, storage and cargo for water transport. In its place we have provided figures for wider warehousing and support activities for transportation. This is likely to overstate the level of activity because only a small proportion of transportation activities have marine linkages. However, it is still useful as a guide to the level of activity in the sector and, in particular, that with indirect marine linkages. Nevertheless, Government data likely provides more useful estimates for ports and shipping activity.					

Broad Sector	Private Data			Government Data		
	Employment	Businesses	Turnover	Employment	Businesses	GVA
Telecoms	630	30	£102,969,890	10,060	180	£1,611,680,000
	Confidence Rating 2 – Private data is only available for one of the three activities within the Telecoms sector and as such estimates of the levels of economic activity are lower. Nevertheless, private data may provide better estimates of marine activities in this sector as Government data includes activities which are not marine-based.					

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