



Marine
Management
Organisation

**South Marine Plan
Sustainability Appraisal Report
Sustainability Appraisal Report Part 2
Draft for consultation
November 2016**



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1 INTRODUCTION AND PURPOSE OF THIS REPORT

1.1 Introduction

1. The Marine Management Organisation (MMO) is currently preparing draft marine plans for England's South inshore and offshore areas. These will set out how the UK Marine Policy Statement (MPS) will be implemented in the plan areas.
2. The marine plans for the South inshore and offshore areas will be the third and fourth marine plans to be produced under the Marine and Coastal Access Act 2009 and will seek to take account of social, economic and environmental factors that affect the South marine areas and the communities that are dependent on or have an interest in the marine area.
3. Marine plans, and their reflection of the MPS, contribute to a plan-led regulatory system for marine activities. They provide greater coherence in policy and a forward-looking, proactive and spatial planning approach to the management of the marine area, its resources, and the activities and interactions that take place within it. Once prepared the plans will cover a 20 year period and will be reviewed regularly throughout this time.
4. The South Marine Plans have been subject to an integrated Sustainability Appraisal (SA) and Strategic Environmental Assessment (SEA) (hereafter referred to as SA) in line with the requirements of Statutory Instrument 2004 No. 1633: The Environmental Assessment of Plans and Programmes Regulations 2004.
5. This report is Part 2 of the SA report. It presents the scoping information that has been used to define the scope and level of detail of the SA and the information that has been used to help judge the effects of the plan. This report is drawn from the information provided in the Scoping Report that was published in March 2015.

1.2 Purpose and structure of this report

6. The SEA Regulations require that an assessment is carried out on a draft version of the Plan and a statutory environmental report (an SA report under the English planning system) is produced and consulted on. This SA report should set out the results of the SA process, outline why alternatives were selected or rejected, report on the assessment of the draft plan and outline a programme for monitoring the effects of the plan.
7. This report forms part of the statutory SA report and it reports on the assessment of the South Marine Plans. This SA report has been produced alongside the production of the Plans and will be published at the same time, thus providing respondents with appropriate information on the sustainability implications of the Plans on which to base their representation.
8. For the sake of clarity the SA report is split into a number of parts. This is Part 2 of the SA report: Scoping Information. The other parts of the report are:
 - Part 1: Introduction and Methodology; and
 - Part 3: Results of the Assessment.
9. The format of this part of the SA report is slightly different than the other parts of the report because it is based on the SA Scoping Report mentioned above. The report begins with an explanation of the coverage of the scoping information but the main detail of the report is contained in a number of annexes, which set out the required information for each topic area.

10. All reports are available at the following weblink: <https://www.gov.uk/topic/planning-development/marine-planning>

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2 COVERAGE OF THE SA

2.1 Introduction

11. The baseline comprises information on those relevant aspects of the environment, economy and society that could be affected (positively or negatively) by the implementation of the plans. As such it is critical to identify the relevant characteristics of the baseline as part of the scope of the SA. This should be done in a focussed and effective manner to ensure that the SA concentrates on significant issues only. The sections below identify the baseline topics that have been identified and the more detailed sub-topics that will be used in the appraisal.

2.2 Appraisal Topics

12. The scope of the SA will reflect potential environmental, social and economic effects of the draft South marine plans and the characteristics of the environment likely to be affected.
13. The 2005 UK Sustainable Development Strategy defines the goal of sustainable development as “to enable all people throughout the world to satisfy their basic needs and enjoy a better quality of life, without compromising the quality of life of future generations”. It sets out the following five guiding principles to achieve it:
 - Living within environmental limits;
 - Ensuring a strong, healthy and just society;
 - Achieving a sustainable economy;
 - Promoting good governance; and
 - Using sound science responsibly.
14. Further, the publication of the National Planning Policy Framework (and the National Planning Practice Guidance (NPPG)) go some way to helping to define what is ‘sustainable development’ in the terrestrial environment.
15. The topics to be addressed in the SA have been developed with these principles in mind while considering the requirements of the SEA Regulations, which lists a number of issues that might be included as part of any appraisal¹. We have also drawn from the experiences of the SA of the East marine plans and from information suggested at an SA Advisory Group workshop held in February 2014 to help define the scope.
16. It should be noted that no single strand of sustainable development is considered more or less important than any another and the topics considered as part of the SA will be afforded equal weight in the appraisal process.
17. Table 2-1 identifies the topics that will be covered in the SA and their relationship with the topics listed in Schedule I of the SEA Regulations.

¹ Schedule 2 (6): (a) biodiversity; (b) population; (c) human health; (d) fauna; (e) flora; (f) soil; (g) water; (h) air; (i) climatic factors; (j) material assets; (k) cultural heritage, including architectural and archaeological heritage; (l) landscape; and (m) the inter-relationship between the issues referred to in sub-paragraphs (a) to (l).

Table 2-1 Topics to be covered in the SA and relevant SEA Regulations topics

Topics to be covered in the SA	Relevant topics listed in Schedule I of the SEA Regulations
Communities, Health and Wellbeing	Population; human health
Cultural Heritage	Cultural heritage including architectural and archaeological heritage
Marine Ecology	Biodiversity; flora; fauna
Economy	Population; material assets
Geology, Geomorphology and Coastal Processes	Soil
Landscape and Seascape	Landscape
Water Environment	Water

18. Many of the SA topics overlap and are interrelated - an effect with respect to one topic may also result in a direct or indirect effect in relation to other topics. The marine environment is particularly sensitive in this respect and attention will be paid to the inter-relationships between these topics throughout the SA.
19. Note that a separate topic for ‘**air quality**’ has not been included. This is because for the SA of the East Marine Plan it was considered that the plans could not have a meaningful positive or negative effect on air quality and that overall it was not a significant issue to be addressed through SA. Initial work in the South plan area indicates that this is likely to be the case for the South plans. This issue was discussed with members of the SA Advisory Group in February 2014, who indicated that they agreed with this not being included as a separate topic.
20. ‘**Climate Change**’ or ‘**Climatic Factors**’ has not been included as a separate topic within the SA, despite it being a suggested topic and an issue of significance that marine plans should; be aware of, help adapt to and not exacerbate. Rather than be included as a separate topic, the issues of climate change mitigation and adaptation relevant to topics and subtopics are included within the text of the applicable topics. The impacts and effects of climate induced change have been integrated into the text in all seven topics, with the single exception of ‘Landscape and Seascape’. The impacts of climate change are considered, where appropriate, within the body of text for each topic, under the most appropriate sub heading(s).
21. Schedule I also requires an assessment of transboundary effects, i.e. effects upon other EU member states. This is discussed further in Section 4.5.

2.2.1 Appraisal Sub-topics

22. In order to provide a ‘finer grain’ of analysis in the SA, the SA topics identified above have been further sub-divided into sub-topics. It is these sub-topics that will form the basis of the appraisal.
23. The sub-topics have been developed with a view to help focus the SA on significant issues only. Their development has drawn from:
 - An understanding of the issues and problems within the marine plan areas;
 - An understanding of what the plans can and can’t achieve;
 - Input from the SA Advisory Group workshop in February 2014;
 - Experience from the SA of the East marine plans;
 - Professional judgement; and
 - Proposed criteria of Good Ecological Status referred to by the Marine Strategy Framework Directive (MSFD) – where appropriate.

24. It should be noted that the development of topics/sub-topics and the gathering of baseline evidence is an iterative process i.e. evidence may change/be updated as the SA process progresses. The sub-topics proposed are presented in Table 2-2.

Table 2-2 SA sub-topics proposed

Overarching SA topic	Proposed SA sub-topic
Communities, health and wellbeing	Health and wider determinants of health Coastal communities Fishing communities Tourism-focused communities
Cultural heritage	Coastal assets (indirect) Marine assets
Marine ecology	Plankton Seabed habitats/benthos Fish and shellfish Cephalopods Birds Marine mammals Conservation sites
Economy	Economic activity and GVA ...Ports and shipping ...Fisheries ...Leisure ...Tourism ...Marine industry Other marine activities ...Aggregates ...Oil and gas ...Renewables ...Carbon capture and storage ...Nuclear ...Subsea communications Coastal typologies
Geology, geomorphology and coastal processes	Seabed substrates and hydrography Coastal features and processes
Landscape and seascape	Statutory and non-statutory landscape designations Wider landscape and seascape character
Water environment	Tides and currents Water temperature and salinity Pollution and water quality Eutrophication Contaminants Marine litter

2.2.2 Context and establishing the baseline

25. For all topics included within the SA, it will be necessary to understand how the draft South marine plans and the SA fit into the existing hierarchy of plans, programmes, strategies and

environmental protection. It will also be necessary to consider how the draft South marine plans will interact with the broader framework of Government policies and objectives aimed at achieving a sustainable economy. This understanding provides the 'context' for the appraisal.

26. It will also be important to understand the existing conditions (known as baseline conditions) and key issues and opportunities that should be considered as part of the appraisal process.
27. Further information relating to the scope of each of the SA topics and background information which will be used to support the appraisal is presented in Annexes A – G. Many documents were reviewed ranging from the outcomes of the World Summit on Climate Change through to relevant European Directives (e.g. the MSFD, the Water Framework Directive (WFD)) and local Shoreline Management Plans (SMPs). The information contained within these Annexes will be used to inform the SA. Each Annex includes information required by the SEA Directive and each is structured around the following headings:
 - **What is the policy context?** Summary of relevant plans, initiatives and environmental protection objectives which are relevant to the plans in relation to each topic. This is an SEA Regulations requirement.
 - **What is the current situation?** Summary of baseline characteristics of the marine plan areas for that topic. This is an SEA Regulations requirement.
 - **What would the situation be without the South marine plans?** Evolution of the baseline that is anticipated in the absence of the draft South marine plans. This is an SEA Regulations requirement.
 - **What are the key issues?** Key issues and opportunities for marine planning with regard to that topic. This is an SEA Regulations requirement.
 - **Are there any data gaps?** This is an SEA Regulations requirement (because of the requirement to document any problems encountered etc.).

Annex A

Communities, Health and Wellbeing

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Annex A - Communities, health and wellbeing

Introduction

28. The scope of the SA considers how the South marine plans may impact on communities living along the coastline and in inland areas corresponding to the South inshore and offshore marine plan areas. The SA also includes consideration of the potential health and wellbeing impacts of the marine plans for people living in affected communities. The Health and Social Care Act (2012) places specific duties on public bodies to have regard to the need to reduce health inequalities. The Government believes that the wider determinants of health can be more easily addressed at the local level; which affords the South marine plans a significant opportunity to reduce health inequalities.
29. This chapter aims to identify the most important issues to local communities and health and wellbeing along the coast, including specific locations that are more sensitive to change or are in need of improvement, investment or protection.

What is the link between marine planning and this topic?

30. Community impacts refer generally to impacts on people as individuals and as collective communities. They include impacts on community cohesion, deprivation, health, equality and social regeneration opportunity.
31. These various dimensions are closely inter-related. For example, areas lacking in community cohesion have been identified as typically also experiencing economic inequality; variable access to high quality services; and incidences of poor mental health².
32. Health status is certainly known to be influenced by a range of physical, social and economic factors. These can include employment status, housing conditions, racism and other forms of discrimination, and neighbourhood economic conditions. Health tends to deteriorate in poor quality environments resulting in premature mortality and increased morbidity³. Furthermore, there is a social gradient in health, with worse social position leading on average to worse health, and associated costs.
33. It is also important to recognise that equality and health issues are closely related to employment and economic investment. Nationally, rates of unemployment are highest among those with no or few qualifications/skills, people with disabilities and mental ill health, those with caring responsibilities, lone parents, those from some ethnic minority groups, older workers and, in particular, young people⁴. Where regeneration initiatives are underway, the marine plans have the potential to support these and in doing so contribute to addressing existing inequalities and deprivation.

² Social capital and its relationship with measures of health status: evidence from the Health Survey for England 2003, abstract (online), <http://onlinelibrary.wiley.com/doi/10.1002/hec.1242/abstract>, accessed 28 September 2011

³ Coventry university (unknown) *Community cohesion is an important contributor to health* (online) available at: <http://www.cohesioninstitute.org.uk/Resources/Toolkits/Health/HealthAndCommunityCohesion/AContributorToHealth>, Accessed 09/04/2014

⁴ Marmot, M (chair) (2010) *Fair Society, Health Lives. The Marmot Review* (online) available at: http://www.instituteofhealthequity.org/projects/fair-society-healthy-lives-the-marmot-review/fair-society-healthy-lives-full-report?bcsi_scan_AB11CAA0E2721250=/COZNoEPc2GHDXRzoR8ST2oxAyZFAQAAwgDwOA==. Accessed 09/04/2014

What is the policy context?

34. There is a wide array of social and economic policy and legislation which shapes community issues, whilst the wider economic context is also important. Table A1 summarises the key elements of relevant policy and guidance, from which it becomes possible to gain a better understanding of communities, health and equalities' issues. Following the table is a short discussion that seeks to highlight some of the most pertinent messages.

Table A1: Relevant plans, initiatives and environmental protection objectives

Europe
Together for Health: A Strategic Approach for the EU 2008-2013 The European Environment and Health Action Plan 2004-2010 Draft Directive on Equal Treatment (2008) EU Sustainable Development Strategy (EU SDS) First issued 2001, Revised 2006
National
UK Marine Policy Statement (MPS) (2010) Marine and Coastal Access Act (2009) The national flood and coastal erosion risk management strategy for England (2011) Mental health and well-being (2011) Draft Rural White Paper Action Plan: Consultation (2011) Equality Act 2010 The National Planning Policy Framework (2012) Sustainable Development: The key to tackling health inequalities (2010) Strategic Review of Health Inequalities in England Post-2010 (The Marmot Review) NHS Choice Agenda (2009) Healthy weight, healthy lives: a cross government strategy for England (2008) Health Effects of Climate Change in the UK (2008) Securing Good Health for the Whole Population Report to the Treasury (2004) Sustainable Communities: building for the future (2003) Tackling Health Inequalities: A programme for Action (2003) Saving Lives: Our Healthier Nation White Paper (July 1999) National Planning Policy Framework (NPPF) National Planning Practice Guidance (NPPG)
Local
Rural Development Programme for England (2011) Rural Development Programme for England (2011) Local Plans Health and Wellbeing Strategies Joint Strategic Needs Assessments (JSNAs)

35. The social role of the planning system is defined in the NPPF as 'supporting vibrant and healthy communities', with a 'core planning principle' being to 'take account of and support local strategies to improve health, social and cultural wellbeing for all'. The NPPF states that the planning system 'can play an important role in facilitating social interaction and creating healthy, inclusive communities'. The need to 'take account of and support local strategies to improve health, social and cultural wellbeing for all' is a core planning principle.

36. Planning policies and decisions should ensure that new development is appropriate for its location and the effects of pollution on health, the natural environment or general amenity should be taken into account.
37. Planning policies should plan positively for the provision and use of shared space, community facilities (such as local shops, meeting places, sports venues, cultural buildings, public houses and places of worship) and other local services to enhance the sustainability of communities and residential environments.
38. The NPPF also states that access to high quality open spaces and opportunities for sport and recreation can make an important contribution to the health and well-being of communities. Planning policies should be based on robust and up-to-date assessments of the needs for open space, sports and recreation facilities and opportunities for new provision.
39. Planning policies should protect and enhance public rights of way and access. Local authorities should seek opportunities to provide better facilities for users, for example by adding links to existing rights of way networks including National Trails.
40. The NPPG states that planning authorities should ensure that health and wellbeing and health infrastructure are considered in plan making and decision-making. Plan-making should support strong and healthy communities and living environments which make physical activity easy to do; supports the reduction of health inequalities; considers the local health and wellbeing strategy; and encourages healthy lifestyles including opportunities for sport and recreation.
41. Fair Society, Healthy Lives 2010 (the Marmot Review), highlighted the need to reduce health inequalities as a matter of fairness and social justice. It concluded that action on health inequalities requires action across all the social determinants of health. It identifies the creation of healthy, sustainable communities as one of a priority set of objectives for improving health, the promotion of which is via measures which also help tackle climate change and achieve sustainability objectives.
42. High Quality Care for All, the 2008 Darzi review of the National Health Service, supported services to promote health including combating obesity, consumption of healthy food, increased levels of physical activity, and encouragement to companies to invest more in the health of their workforce.
43. The Sustainable Development Commission's 2010 report 'A key to tackling health inequalities' concludes that measures such as active travel, promoting green spaces and healthy eating will yield co-benefits for both health and carbon emissions and requires that opportunities for healthy, low-carbon living should be distributed in ways that favour people with low incomes and so help to reduce their vulnerability to ill-health.
44. The Equality Act 2010 covers nine protected characteristics - age, disability, gender reassignment, pregnancy and maternity, race, religion or belief, sex, sexual orientation, marriage and civil partnership (applicable only to the need to eliminate unlawful discrimination) - which cannot be used, either directly or indirectly, as a basis for unequal treatment. A new equality duty, set out in Section 149 of the Equality Act requires public bodies to give due regard to the need to:
 - Promote equality of opportunity;
 - To tackle unfair discrimination; and
 - To promote good relations between different groups.
45. The MPS sets out to 'ensure a strong, healthy and just society' whereby the use of the marine environment is benefitting society as a whole and contributing to cohesive communities and physical and mental wellbeing. The MPS aims to ensure equitable access to the coast and seas and recognises that the marine area provides national

social and economic benefits and contributes to the well-being and quality of life of coastal communities. It states that marine planning should contribute to securing sustainable economic growth in regeneration areas and areas that already benefit from strong local economies.

46. Joint Strategic Needs Assessments are statutorily required for upper-tier local authorities. They analyse the health needs of populations to inform and guide commissioning of health, well-being and social care services within local authority areas. The main goal of a JSNA is to accurately assess the health needs of a local population in order to improve the physical and mental health and well-being of individuals and communities⁵. JSNAs underpin the Health and Wellbeing Strategies, a new statutory requirement and commissioning plans that will set the priorities for collective action. Together they provide the local evidence base for decision-making on health.
47. The majority of local authorities adjacent to the South inshore plan area recognise the importance of recreation and this is reflected in their Local Plans. 34 local authorities have policies in their core strategies relating to tourism and recreation (most referencing the marine and coastal environment) which generally focus on (but are not limited to)⁶:
- Development (i.e. harbour or marina) and regeneration of the seafront to attract visitors and create new jobs and income for the local communities;
 - Encouragement of opportunities to diversify (in terms of the activities or the season) the visitor economy, but not at the detriment of existing opportunities;
 - The importance of access to the coastline and the sea, this includes both access to coastal areas and physical access to the sea through the provision of slipways, footpaths, moorings;
 - The balance between increasing the visitor economy (and recognising the significant contribution it makes to the economy and local communities) while managing the impacts of tourism and recreation on the coastline, especially designated areas which are often the reason people choose to visit an area;
 - The management of recreational activity and the reduction of any disturbance it causes to the natural environment, this is expressed in the policies of area of outstanding natural beauty (AONB) management plans; and
 - Eight local authorities specifically mention sailing/boating in their policies with regards to making suitable provision and ensuring this activity can continue sustainably.

Implications for the sustainability appraisal and the marine plan

48. The marine plans would be used by the MMO and other public bodies when considering the potential impacts of development applications, some of which may require to be assessed with regards to their impact on communities and health. It would be important in the drafting of the marine plans, and at the project level, to account for a degree of change in communities and health. Given the future trajectory for certain industries, the potential future cumulative impacts could also be a consideration of the plans.

⁵ NHS Confederation (2011) *The Joint Strategic Needs Assessment* (online) available at: <http://www.nhsconfed.org/Publications/briefings/Pages/joint-strategic-needs-assessment.aspx> Accessed 18/03/2014

⁶ MMO (2013) South Inshore and South Offshore Marine Plan Areas: South Plans Analytical Report

What is the current situation?

Introduction

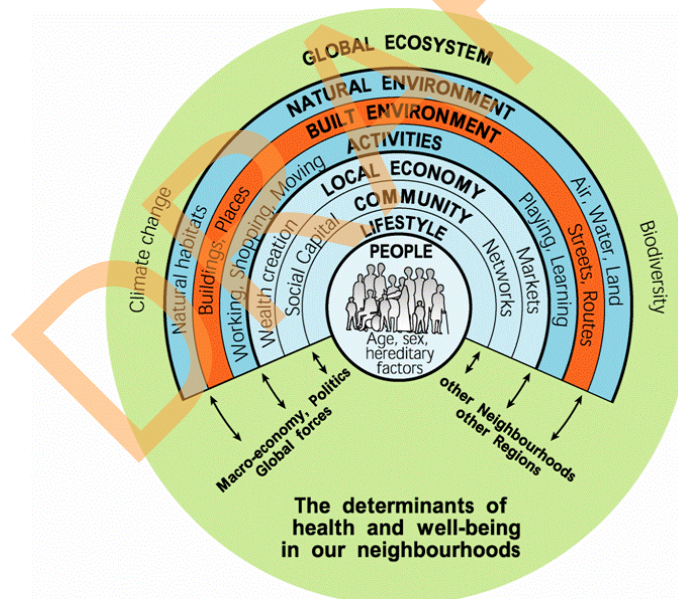
49. The baseline data is presented under a number of sub-topics. The data is given at the South plan area scale however, where possible, more detailed spatial data is given, for example, where it is relevant to a particular sub-area, city or port. This allows a more fine-grained consideration of community and health issues in the South plan area. The sub-topics are as follows:

- Health and wider determinants of health;
- Coastal communities;
- Fishing communities; and
- Tourism-focused communities.

Health and wider determinants of health

50. The World Health Organisation (WHO) defines health as 'state of complete physical, mental and social well-being and not merely the absence of disease or infirmity'⁷.

Figure A1: Determinants of health and well-being (Barton & Grant, 2006)



51. As Figure A1 illustrates, a number of the other topic areas have implications for human health as they address the global ecosystem and natural environment determinants of health at global and macro-level. These include air quality, climate change, the marine economy, the water environment including water quality and coastal processes including flood risk.

⁷ MMO (2013) *South Inshore and South Offshore Marine Plan Areas: South Plans Analytical Report* (online) available from: http://www.marinemangement.org.uk/marineplanning/areas/documents/south_draftspar.pdf?bcsi_scan_AB11CAA0E2721250=0&bcsi_scan_filename=south_draftspar.pdf. Accessed 09/04/2014

52. Nationally comparable indicators of health include rates of limiting long term illness, self-reported 'not good health' and life expectancy rates for males and females. However, throughout much of England, percentages of residents with long-term limiting illness or self-assessed 'not good health' are higher in coastal areas compared to inland. However, these figures are likely to reflect other patterns in demographics such as age structure, as a number of coastal settlements have large populations of elderly people. Similarly, a number of coastal settlements exhibit high levels of deprivation.
53. Table A2 shows the health deprivation ranking for all of the lower level authorities in the South plan area. This shows that Hastings is the most deprived authority (in the 5% most deprived, followed by Weymouth and Portland, Brighton and Hove and Eastbourne (all in the 20% most deprived. The least deprived are Fareham (in the 1% least deprived, followed by East Dorset (in the 10% least deprived), then Horsham, Winchester, Test Valley, Eastleigh, East Hampshire, Mid Sussex and New Forest (all in the 20% least deprived).

Table A2: Health deprivation by Local Authority in the South marine plan area⁸

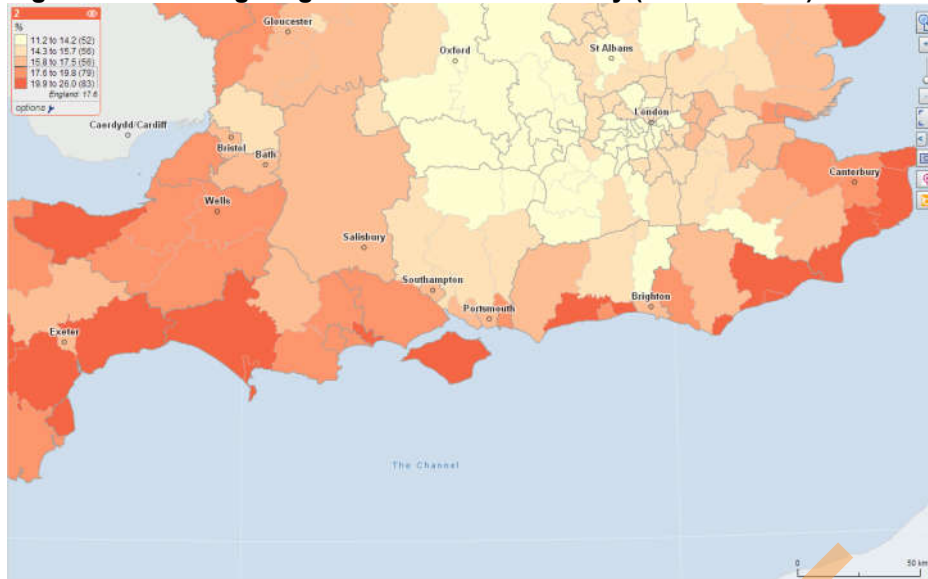
South Marine Plans Area District	Index of Multiple Deprivation Ranking (1 = most deprived, 326 = least deprived)
Hastings	15
Weymouth and Portland	39
Brighton and Hove	41
Eastbourne	58
Torbay	82
Worthing	86
Shepway	89
Bournemouth	95
Southampton	98
Adur	100
Isle of Wight	102
Portsmouth	120
Rother	121
Arun	130
Poole	144
West Dorset	147
Lewes	148
Gosport	169
Havant	178
Purbeck	180
North Dorset	184
Teignbridge	185

⁸ Open Data Communities (2013) *Indices of Deprivation 2010 Health and disability domain, Local Authority District Rank of Average Rank* [online] available at: <http://opendatacommunities.org/data/societal-wellbeing/deprivation/imd-health-rank-la-2010> Accessed 18/03/2014)

South Marine Plans Area District	Index of Multiple Deprivation Ranking (1 = most deprived, 326 = least deprived)
South Hams	224
Chichester	227
Christchurch	232
Wealden	252
East Devon	254
New Forest	268
Mid Sussex	278
East Hampshire	279
Eastleigh	281
Test Valley	285
Winchester	287
Horsham	290
East Dorset	304
Fareham	322

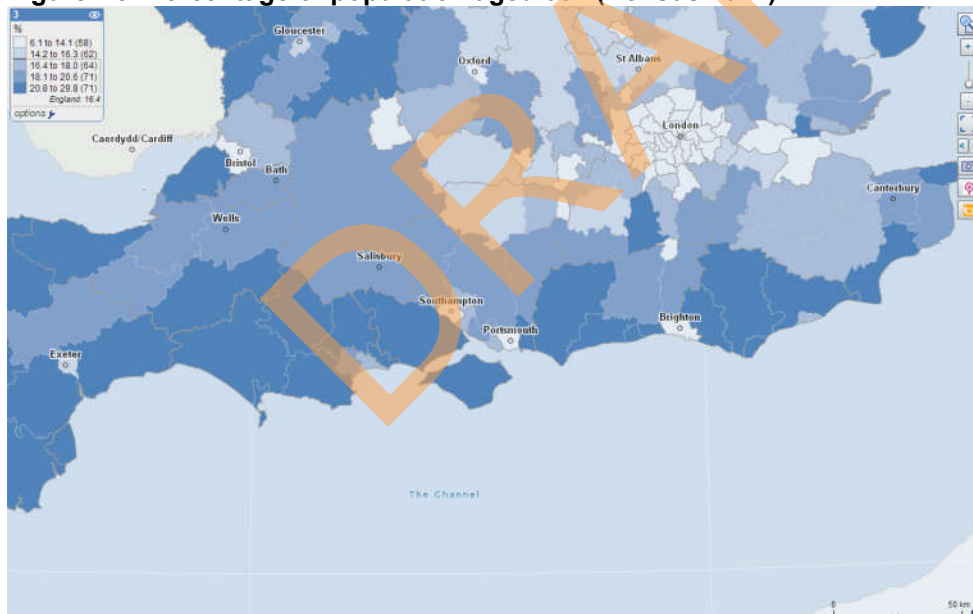
54. Figure A2 shows the percentage of residents with limiting long term illness or disability. There is a general trend towards greater levels of long-term illness or disability in the more rural areas, most notably those in the west of the plan area (shown by the darker shading). This is perhaps indicative of the elderly population in these areas as demonstrated in Figure A3.

Figure A2: Limiting long-term illness of disability (Census 2011)⁹



55. The area generally has a greater proportion of elderly people than the national average; with notable exceptions in the key employment and education centres of Exeter, Southampton, Portsmouth and Brighton. Hastings and Bournemouth have slightly older populations however the remainder of the plan area is considerably more elderly.

Figure A3: Percentage of population aged 65+ (Census 2011)¹⁰



56. A larger proportion of people rated their health as 'bad or very bad' in the South Plan area than areas immediately inland, as shown in Figure A4. The worst rates of self-rated health were in Torbay, on the Isle of Wight and in the east of the plan area around

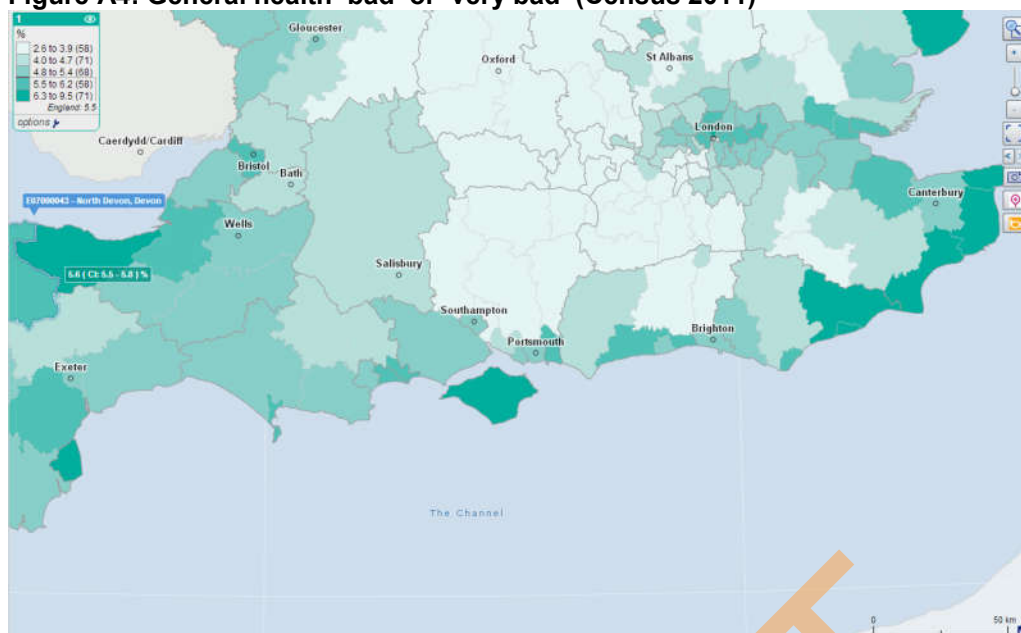
⁹ Public Health England (2014) *Local Health – Limiting long-term illness or disability (Census 2011) by Lower Level Local Authority* (online) available at: <http://www.localhealth.org.uk/#=en;v=map9> Accessed 18/03/2014

¹⁰ Public Health England (2014) *Local Health – Percentage of population aged 65+ (Census 2011) by Lower Level Local Authority* (online) available at: <http://www.localhealth.org.uk/#=en;v=map9> Accessed 18/03/2014

Rother, Hastings and Shepway. Fareham and Test Valley had the best self-rated health rates in the plan area.

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Figure A4: General health 'bad' or 'very bad' (Census 2011)¹¹



57. Life expectancy at birth for men and women for all authorities along the south coast authorities (plus the south west, south east and England average) is shown in Table A3. This shows that across the plan area life expectancy is generally higher than the England average with a few notable exceptions. Hastings has the lowest life expectancy of all authorities for both men and women. For men, only Brighton and Hove, Portsmouth, Worthing, Torbay and Bournemouth have lower life expectancy than the national average; whilst for women this is Gosport, Torbay and Weymouth (with Portsmouth matching the national average). Authorities with the best life expectancy for men and women in the plan area are East Dorset, Christchurch, Lewes, Fareham and North Dorset.

Table A3: Life expectancy at birth in the South marine plan area (by Local Authority)¹²

Area	Life expectancy at birth - males	Life expectancy at birth - females
England	78.3	82.3
South West	79.2	83.3
South East	79.4	83.3
South Hams	79.9	83.6
Torbay	78	82
Teignbridge	80.1	83.5
East Devon	80.7	84
West Dorset	79.4	84.2
Weymouth and Portland	78.3	82.1
North Dorset	81.2	84.6

¹¹ Public Health England (2014) *Local Health – Percentage of population with general health 'bad' or 'very bad' (Census 2011) by Lower Level Local Authority* [online] available at: <http://www.localhealth.org.uk/#l=en.v=map9> Accessed 18/03/2014

¹² ONS (2011) *Life Expectancy at Birth* (online) available at: www.neighbourhood.statistics.gov.uk Accessed 18/03/2014

Area	Life expectancy at birth - males	Life expectancy at birth - females
Purbeck	80.8	84.3
East Dorset	81.4	85.4
Poole	79.4	83.5
Bournemouth	78	82.6
Christchurch	81	85
New Forest	81	84.7
Test Valley	79.6	84.1
Isle of Wight	79.1	83.2
Southampton	78.4	82.4
Winchester	80.5	83.3
Eastleigh	79.9	83.6
Fareham	81.4	84.3
Gosport	78.9	81.2
Portsmouth	77.5	82.3
Havant	79.3	83
East Hampshire	80.1	82.9
Chichester	79.2	83.5
Arun	78.8	83.3
Worthing	77.8	82.6
Adur	78.5	82.5
Horsham	80.5	83.6
Brighton and Hove	77.1	82.5
Mid Sussex	80.2	83.2
Lewes	80.9	84.8
Wealden	80.8	84.1
Eastbourne	78.7	83.4
Rother	79.5	83.4
Hastings	76.6	80.8
Shepway	78.6	83.2

58. There is a close relationship between health and deprivation. In terms of the national average, the South plan area has relatively good health with the exception of a few urban pockets of deprivation and low life expectancy. The close link between deprivation and health is depicted in Figures A5 and A6 below.

Figure A5: Life expectancy and disability-free life expectancy at birth, persons by neighbourhood income level, England, 1999-2003¹³

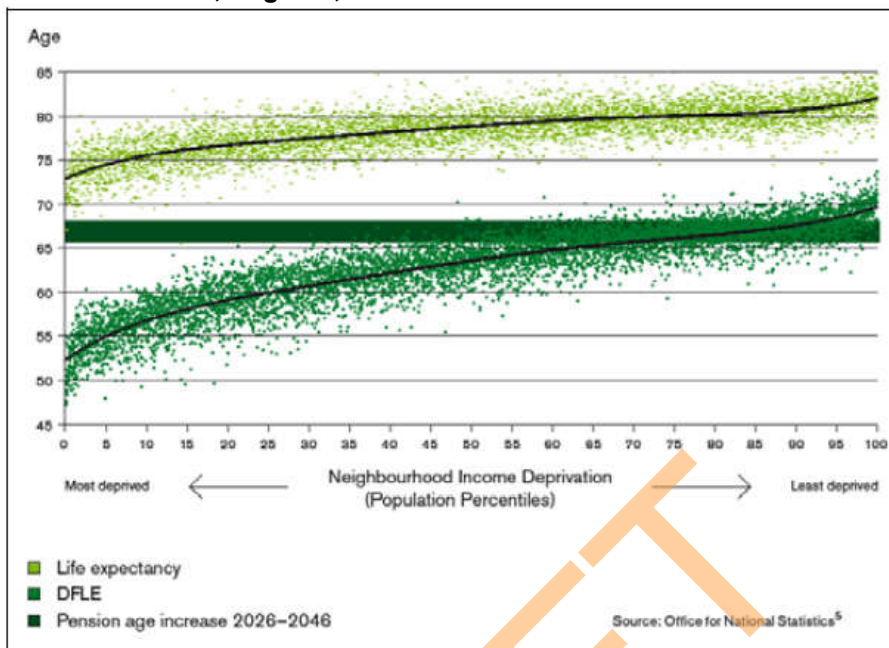
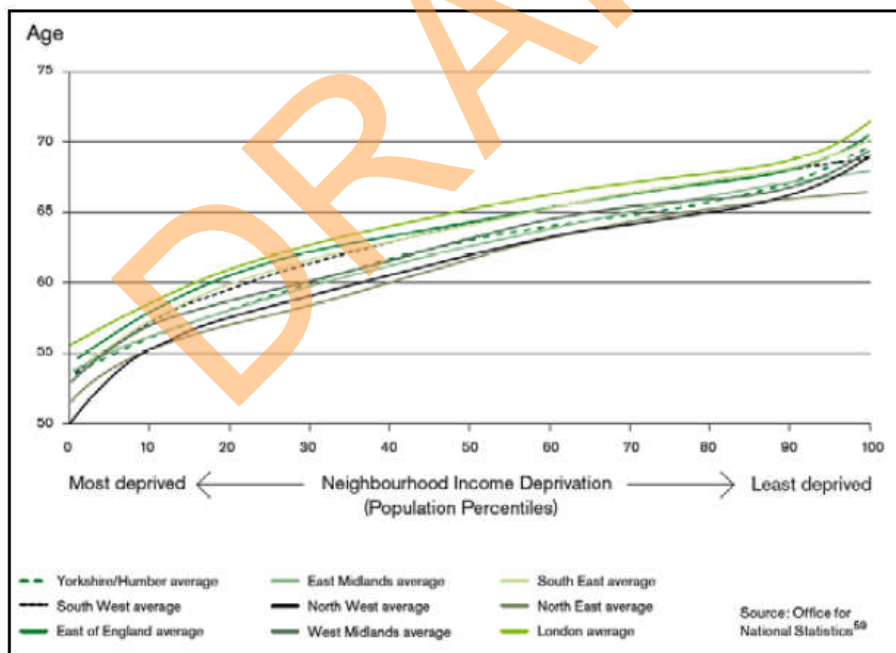


Figure A6: Disability-free life expectancy at birth, persons: regional averages at each neighbourhood income level, England, 1999-2003¹⁴



¹³ Marmot, M (chair) (2010) *Fair Society, Health Lives. The Marmot Review* [online] available at: http://www.instituteofhealthequity.org/projects/fair-society-healthy-lives-the-marmot-review/fair-society-healthy-lives-full-report?bcsi_scan_AB11CAA0E2721250=/COZNoEPc2GHDXRzoR8ST2oxAyZFAQAawgDwOA==. Accessed 09/04/2014

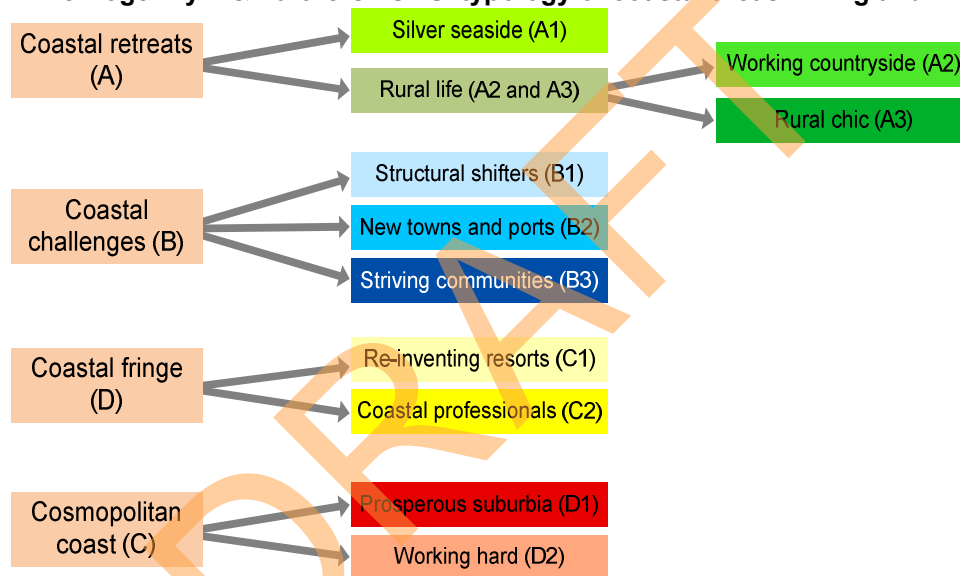
¹⁴ IBID

59. The marine environment provides a range of recreational opportunities which creates employment, generates income for the economy, and benefits health and wellbeing. The South plan areas have a high recreational value in particular for pleasure boating, sailing, recreational diving, sea angling, kayaking, surfing and windsurfing¹⁵. The popularity of water sports and related industries has grown dramatically over the period 2000 to 2010¹⁶.
60. There is evidence that health and wellbeing can be improved through living on the coast¹⁷ which is thought to be through increased opportunity for physical activity; however it may be through the in-migration of healthy and affluent residents.

Coastal communities

61. A separate report by Roger Tym & Partners / OCSI (2011)¹⁸ categorises all coastal areas adjacent to the South inshore plan area using a nationally developed¹⁹ typology (see Figure A7, Table A4 and Figure A8), before then undertaking analysis to better understand the prevalence of each area 'type' along the coastline of the South plan area.

Figure A7: The Roger Tym & Partners / OCSI typology of coastal areas in England²⁰



¹⁵ Water sports participation study (2011). *British Marine Federation*.

¹⁶ United Kingdom Marine Monitoring and Assessment Strategy (UKMMAS) (2010). *Charting Progress 2 Feeder Report Productive Seas*. Defra on behalf of UKMMAS. 472pp.

¹⁷ Wheeler, B. W., M. White, et al. (2012) *Does living by the coast improve health and wellbeing?*, *Health & Place* 18(5): 1198-1201.

¹⁸ Roger Tym & Partners / OCSI (2011). *The East Marine Plan area: maximising the socio-economic benefits of marine planning* [online] available at

<http://webarchive.nationalarchives.gov.uk/20140507202222/http://www.marinemanagement.org.uk/marineplanning/key/se.htm> Accessed 10/11

¹⁹ i.e. this typology was developed to capture the characteristics of all coastal areas nationally, it was not developed specifically to reflect the range of coastal areas within along the coastline of the East Plan area.

²⁰ Roger Tym & Partners / OCSI (2011). *The East Marine Plan area: maximising the socio-economic benefits of marine planning* [online] available at:

<http://webarchive.nationalarchives.gov.uk/20140507202222/http://www.marinemanagement.org.uk/marineplanning/key/se.htm>

. Accessed 10/11

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Table A4: Explanation of the Roger Tym & Partners / OCSI typology of coastal areas²¹

Typology category	Overview	Above the coastal average	Below the coastal average
A1 Coastal retreats: Silver seaside	Retirement areas primarily located in smaller, less developed resorts	<ul style="list-style-type: none"> ▪ People of pensionable age ▪ Part-time employment ▪ Home working ▪ Self employment ▪ People employed in tourism 	<ul style="list-style-type: none"> ▪ People receiving Jobseekers Allowance ▪ People receiving incapacity benefits ▪ ID 2010 Crime domain
A2 Coastal retreats: Working countryside	Largely rural areas, low population density or in smaller settlements, with people employed in lower skill occupations	<ul style="list-style-type: none"> ▪ Travel time to key amenities ▪ People working from home ▪ Second homes 	<ul style="list-style-type: none"> ▪ Population density ▪ People qualified to degree level ▪ People living in flats ▪ Jobseekers Allowance claimants ▪ Attendance Allowance claimants
A3 Coastal retreats: Rural chic	Largely rural areas, low population density or in smaller settlements, with a well qualified population	<ul style="list-style-type: none"> ▪ Travel time to key amenities ▪ People qualified to degree level ▪ Dwellings with 8 or more rooms ▪ % of dwellings in council tax band E to I ▪ Jobs growth ▪ Self employment 	<ul style="list-style-type: none"> ▪ Population density ▪ Households with no car or van ▪ ID 2010 Crime domain ▪ Child and pensioner poverty
B1 Coastal challenges: Structural shifters	Towns and cities which have lost their primary markets, and are facing the challenge to find new ones. This group includes a range of single industry coastal towns, including seaside resorts, mining areas, industrial heartlands and former agricultural centres	<ul style="list-style-type: none"> ▪ People working in manufacturing ▪ Jobseekers Allowance claimants ▪ Incapacity Benefit claimants ▪ Disability Living Allowance claimants ▪ All people with a limiting long-term illness aged 0-64 	<ul style="list-style-type: none"> ▪ People qualified to degree level ▪ Overall employment rate ▪ Jobs Growth ▪ People living in flats
B2 Coastal challenges: New towns and ports	Challenges relating to poor skills and high levels of worklessness, but counterbalanced by relatively strong economy and often located close to	<ul style="list-style-type: none"> ▪ Jobs growth ▪ Child and pensioner poverty ▪ Jobseekers Allowance claimants 	<ul style="list-style-type: none"> ▪ People qualified to degree level

²¹ IBID

Typology category	Overview	Above the coastal average	Below the coastal average
	areas of economic growth	<ul style="list-style-type: none"> Incapacity Benefit claimants 	
B3 Coastal challenges: Striving communities	High levels of deprivation across all indicators, and a very high proportion of people living in social rented accommodation	<ul style="list-style-type: none"> Social housing Jobseekers Allowance claimants Incapacity Benefit claimants Disability Living Allowance claimants Child and pensioner poverty People providing intensive unpaid care People working in wholesale, retail and motor vehicle repair 	<ul style="list-style-type: none"> People qualified to degree level Overall employment rate Jobs Growth
C1 Cosmopolitan coast: Reinventing resorts	Primarily tourist economies with high levels of deprivation, but diversifying to attract a more highly skilled population	<ul style="list-style-type: none"> Private rented housing People working in tourism Jobseekers Allowance claimants Incapacity Benefit claimants People qualified to degree level People moving in and out of the area Full-time students aged 16-74 Seasonal Unemployment Household vacancy rate People travelling more than 40km to work People living in flats ID 2010 Crime domain 	<ul style="list-style-type: none"> People living in houses Owner occupied Overall employment rate Part time employees
C2 Cosmopolitan coast: Coastal professionals	City and market town service centres with highly skilled populations and dynamic economies	<ul style="list-style-type: none"> People qualified to degree level Full-time students aged 16-74 People who have moved address in the last year People travelling more than 40km to work Private rented housing ID 2010 Crime domain People living in flats 	<ul style="list-style-type: none"> People of pensionable age Part time employees People living in houses

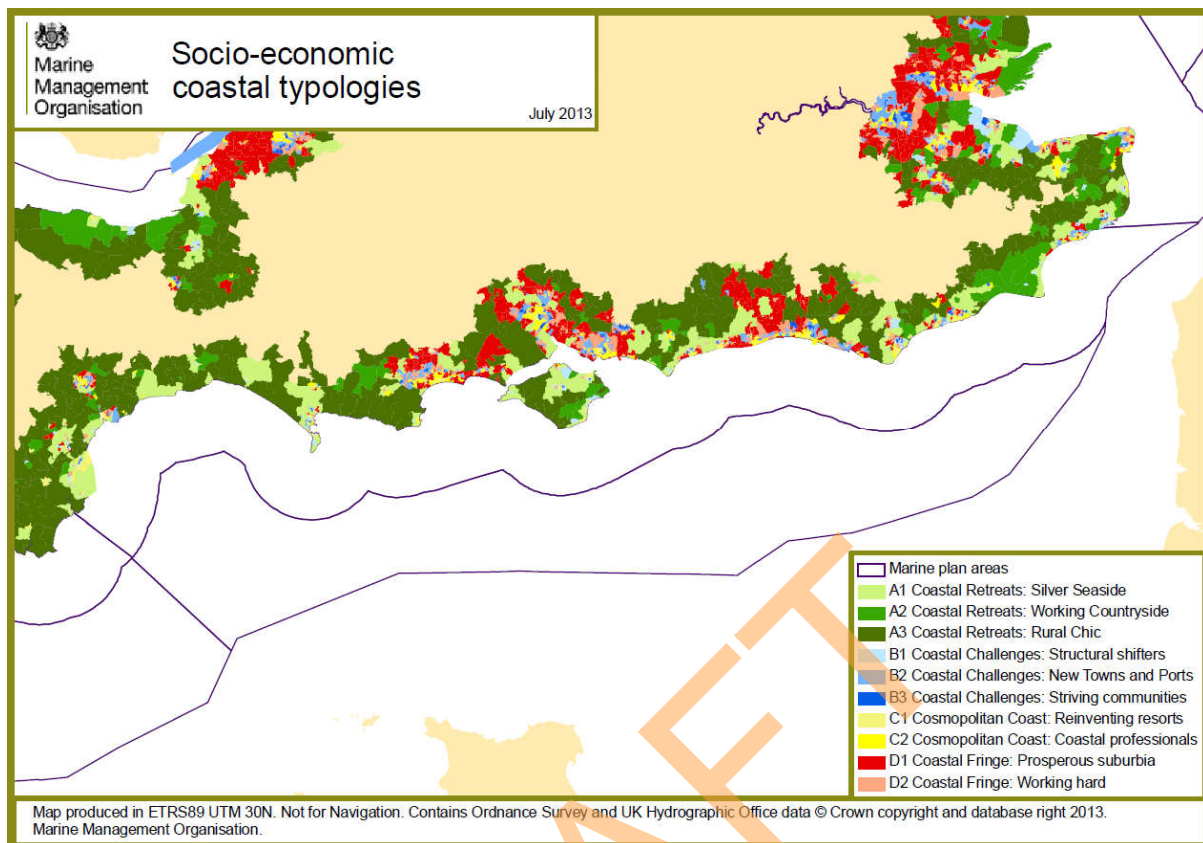
Typology category	Overview	Above the coastal average	Below the coastal average
D1 Coastal fringe: Prosperous suburbia	Affluent areas predominantly on the edge of towns and in satellite towns around larger coastal cities	<ul style="list-style-type: none"> ▪ People qualified to degree level ▪ Overall employment rate ▪ Owner-occupied households ▪ Pupil attainment: average point score at GCSE ▪ Dwelling with eight rooms or more 	<ul style="list-style-type: none"> ▪ Jobseekers Allowance claimants (unemployment benefit) ▪ People receiving workless benefits due to poor health ▪ Child and pensioner poverty ▪ Households with no car or van
D2 Coastal fringe: Working hard	Towns characterised by high levels of employment typically in industrial sectors, and a stable population	<ul style="list-style-type: none"> ▪ Overall employment rate ▪ People working in manufacturing ▪ Owner-occupied households 	<ul style="list-style-type: none"> ▪ People qualified to degree level ▪ People who have moved address in the last year ▪ Jobseekers Allowance claimants (unemployment benefit) ▪ People receiving workless benefits due to poor health ▪ Self-employed people ▪ Social rented housing

62. The South marine plan areas have the highest percentage of 'coastal professionals' (C2 – as shown in Figure A8) than any plan area (not including London); including areas in and around Brighton, Portsmouth, Southampton and Worthing, and historic county towns such as Lewes, Chichester and Exeter²². People here are highly qualified and working in high-skilled sectors in the knowledge-based economy, real estate, business activities and education²³. Many people live in private rented accommodation and deprivation levels are generally lower than the coastal average.

²² MMO (2011) *Maximising the socio-economic benefits of marine planning for English coastal communities* (online) available at: http://www.marinemangement.org.uk/marineplanning/key/documents/se_national.pdf Accessed 17/03/2014

²³ MMO (2013) *South Inshore and South Offshore Marine Plan Areas: South Plans Analytical Report* [online] available from: http://www.marinemangement.org.uk/marineplanning/areas/documents/south_draftspar.pdf?bcsi_scan_AB11CAA0E2721250=0&bcsi_scan_filename=south_draftspar.pdf. Accessed 09/04/2014

Figure A8: Socio-economic coastal typologies²⁴



63. The south also has some of the highest level of 'silver seaside' (A1) communities; which are primarily retirement areas in smaller, less-developed resorts such as Torbay, Selsey, Sidmouth, Seaton, New Romney, Emsworth, Southborne and the Isle of Wight. These areas are typically sparsely populated and with a high proportion of people of pensionable age.
64. The south has the largest number of affluent areas under the 'prosperous suburbia' typology (D1). These are located on the edge of towns and in satellite suburban towns, such as Wimborne Minster/Oakley and Ferndown/Three Legged Cross (Greater Bournemouth); Locks Heath/Bursledon/Whiteley and Botley/Hedge End (Southampton); Poole; Portsmouth and Worthing²⁵. These areas are characterised by low deprivation, high quality housing and high rates of owner-occupation. These areas enjoy better health than the England and coastal average with residents largely concentrated in the service sector, finance and real estate.
65. The plan area has the second largest number of communities classed as 'working hard' (D2) including towns such as Peacehaven and Fareham/Portchester²⁶. These areas have a strong economy and high employment rate, generally concentrated in industrial sectors such as manufacturing and port activities.
66. The south has highest number of 'rural chic' (A3) communities in England, which are mainly rural areas in the eastern hinterland of the plan area and on the coast in the west.

²⁴ IBID

²⁵ IBID

²⁶ IBID

These are settlements of less than 1,500 people that are prosperous with high skilled workers and jobs, below average levels of deprivation and good health.

67. The south has the highest number of 'new towns and ports' (B2) including Havant, Gosport and Exmouth. These areas have poor skills and high levels of worklessness; however they also have a relatively strong economy and are located close to areas of economic growth. Residents tend to work in manufacturing and construction jobs and fewer people have degree level qualifications.
68. The South plan area has a higher number of 'reinventing resorts' (C1) than the other marine plan areas; however this represents only a small number of areas including (but not limited to) Torbay, Totnes and Ryde. These are economies that are based on tourism and have high levels of deprivation; however they are diversifying towards becoming a higher-skilled population. These areas have relatively high levels of deprivation in the South area however they remain higher skilled than the average coastal areas. Hastings is the second-most deprived seaside town in England with low incomes, few employment opportunities, poor health and low educational attainment²⁷.
69. In order to address such changing socio-economic circumstances communities need to take action to adjust and find new directions for their place and its resources. The European Fisheries Fund has previously helped in the South through funding a number of projects in the South in 2012-13 including development of social enterprise, home industry start-ups and green infrastructure in Torbay; Europe's first National Coastal Tourism Academy in Bournemouth; a restaurant and training centre in Hastings Pier Gateway; and reinstatement of the Swanage to Wareham railway²⁸.
70. A national-scale study into Smaller Seaside Towns²⁹ (under 10,000 people) found that these towns tend to have a higher proportion of people of pensionable age (34%), higher than larger seaside towns (25%); rural areas (23%) and England as a whole (19%)³⁰. They also contain a higher share of benefits claimants, in particular incapacity benefits claimants³¹. Seasonal unemployment affects tourist locations however it disproportionately affects smaller towns³². 41% of jobs in smaller seaside towns are in distribution, hotels and restaurants, compared to 29% in larger seaside towns³³. Twenty-two of the 37 smaller seaside towns in England have an overall level of deprivation greater than the English average³⁴. On the overall Index of Deprivation, and for each of the indices; smaller seaside towns display a slightly lower level of deprivation than larger seaside towns³⁵.
71. Generally, smaller seaside towns are on average more disadvantaged than England as a whole, but a little less disadvantaged than larger seaside towns³⁶. Smaller seaside towns tend to be more reliant on tourism and as a result low wages, seasonal unemployment and a large number of small businesses are more common. Some of the

²⁷ IBID

²⁸ IBID

²⁹ Beatty, C., Fothergill, S. & Wilson, I (2011) *England's Smaller Seaside Towns: a benchmarking study* (online) available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6296/1858214.pdf. Accessed 09/04/2014

³⁰ IBID

³¹ IBID

³² IBID

³³ IBID

³⁴ IBID

³⁵ IBID

³⁶ IBID

smaller seaside towns that display few signs of socio-economic disadvantage are essentially middle-class residential settlements for commuters to nearby urban centres of for retirees; in contrast to 'classic' resorts that are remote from commuting and employment opportunities.

72. Smaller Seaside Towns in the study in the South plan area include Budleigh Salterton, Seaton, Lyme Regis, East Wittering and Dymchurch/St Mary's Bay. In terms of economic deprivation, Budleigh Salterton is among the ten least disadvantaged smaller seaside towns nationally; whilst Dymchurch/St Mary's Bay is among the ten most deprived³⁷.

Fishing communities

73. Fishing and interaction with the marine environment provides more than an economic role; it provides fishers with specialist skills, identity, solidarity and status which spill over into fisher families and communities by creating distinct characteristics, culture and values³⁸. The South plan area lands more fish than any other plan area, with the five highest being Brixham, Shoreham, Portsmouth, Weymouth and Poole; with Brixham accounting for more than the other four combined³⁹.
74. There is a general decline in the fisheries sector, which could affect communities with significant fishing industries such as Brixham, Shoreham, Southampton, Poole, Weymouth, Portsmouth and Selsey⁴⁰. The fishing industry and supporting businesses account for 23% and 13% of jobs in the settlements of Brixham and Radipole (Weymouth) respectively⁴¹. Dependency on fishing is highest in the South West, which is in the west of the South plan area. Fishing is an important activity in Weymouth, Poole, Portsmouth, Selsey, Shoreham and most significantly Brixham. Tourism to Brixham is partly due to the fact that visitors enjoy the character of a working fishing village and would pay to preserve it as an activity⁴².
75. These communities and fisheries in general could be affected by declining fish stocks, rising costs, climate change and potential offshore wind development. Crew members are now more likely to come from settlements distributed over a wider geographical area making social networks weaker and more dispersed⁴³.
76. Fishing is a way of life that goes beyond being a livelihood and influences and creates an identity and sense of place in coastal towns; which contributes towards the identity and

³⁷ IBID

³⁸ MMO (2013) *Social impacts of fisheries, aquaculture, recreation, tourism and marine protected areas in marine plan areas in England* (online) available at <http://webarchive.nationalarchives.gov.uk/20140108121958/http://www.marinemanagement.org.uk/evidence/1035.htm> Accessed 09/04/2014

³⁹ MMO (2013) *South Inshore and South Offshore Marine Plan Areas: South Plans Analytical Report* (online) available from: http://www.marinemanagement.org.uk/marineplanning/areas/documents/south_draftspar.pdf?bcsi_scan_AB11CAA0E2721250=0&bcsi_scan_filename=south_draftspar.pdf. Accessed 09/04/2014

⁴⁰ IBID

⁴¹ IBID

⁴² MMO (2013) *Social impacts of fisheries, aquaculture, recreation, tourism and marine protected areas in marine plan areas in England* (online) available at: <http://webarchive.nationalarchives.gov.uk/20140108121958/http://www.marinemanagement.org.uk/evidence/1035.htm>. Accessed 09/04/2014

⁴³ Symes, D, and J Phillipson (2009) *Whatever Became of Social Objectives in Fisheries Policy?*, Fisheries Research 95, no.1: 1-5

character of towns and appeal for tourists. Tourists then bring additional income into the town; however an influx of 'out-of-towners' can erode this identity⁴⁴.

77. Aquaculture is a growing sector that is dominated by micro businesses and small and medium enterprises which particularly affects peripheral towns and communities⁴⁵. Aquaculture can contribute to the conservation of habitat, with biodiversity benefits, and has the potential to increase employment in these peripheral towns and communities which generally suffer from seasonal unemployment and deprivation⁴⁶ [reference to 'small towns' report]. This in turn can help to maintain the traditions and cultures of coastal communities by reducing emigration, particularly in rural areas⁴⁷.

Tourism focussed communities

78. Tourism is considered to cover the travel of visitors away from their usual place of residence for pleasure⁴⁸. Tourism can offer a number of benefits and costs to individuals and local communities specifically in terms of development, town characteristics and well-being effects.
79. Tourism is an important part of the South plan area's economy and is a large employer of lower skilled people which is important for addressing deprivation. The marine environment and the opportunities for outdoor activities it provides such as coastal walks and sailing benefits health and wellbeing through encouraging physical activity. Tourism can lead to direct and indirect job opportunities; however this employment is often seasonal. Tourism and family holidays have a benefit in terms of family bonding.
80. The volume of tourists may have negative effects on culture, traditions and way of life in coastal towns. Overcrowding and increased stress may be inflicted on the local population. The Isle of Wight, Brighton and Hove, Bournemouth and Torquay receive the largest numbers of tourist overnight stays in the South area.
81. There are benefits for the local community and visitors in participating in leisure activities such as angling, bait collection, beach pastimes, beach sports, coastering, diving / snorkelling, paddle based sport, power boating, sailing, surf boarding, swimming, water skiing, wind surfing and yachting. As little as 4 hours of activity a week can help reduce weight and blood pressure and by carrying out these activities in nature further contributes to the reduction of stress, increased physical activity and stronger

⁴⁴ Urquhart, J. and T. Acott (2013). Constructing 'The Stade': Fishers' and non-fishers' identity and place attachment in Hastings, south-east England. *Marine Policy* 37(0): 45-54.

⁴⁵ MMO (2013) *Social impacts of fisheries, aquaculture, recreation, tourism and marine protected areas in marine plan areas in England* (online) available at:

<http://webarchive.nationalarchives.gov.uk/20140108121958/http://www.marinemanagement.org.uk/evidence/1035.htm>

Accessed 09/04/2014

⁴⁶ Beatty, C., Fothergill, S. & Wilson, I (2011) *England's Smaller Seaside Towns: a benchmarking study* [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6296/1858214.pdf.

Accessed 09/04/2014

⁴⁷ MMO (2013) *Social impacts of fisheries, aquaculture, recreation, tourism and marine protected areas in marine plan areas in England* (online) available at

<http://webarchive.nationalarchives.gov.uk/20140108121958/http://www.marinemanagement.org.uk/evidence/1035.htm>

. Accessed 09/04/2014

⁴⁸ MMO (2013) *Compilation of Information on Tourism Relevant to Marine Planning in the South Inshore and Offshore Marine Plan Areas* (online) available at:

<http://webarchive.nationalarchives.gov.uk/20140108121958/http://www.marinemanagement.org.uk/evidence/documents/1038.pdf>

Accessed 09/04/2014

communities⁴⁹. Good health is most prevalent along the coast due to opportunities to reduce stress and partake in physical exercise; however it is likely that healthy and wealthy people move to the coast which distorts the figures⁵⁰.

82. Recreational activity can contribute to mental health improvements by reducing depression, managing stress, contributing to self-esteem and personal growth; and activities undertaken as part of a group or as a family enhances social benefits by strengthening communities, improving social bonds and supporting youth.
83. Overcrowding of recreational facilities can cause conflict between users and reduce the positive benefits of leisure. The quality of the environment and water is important for leisure users, in particular for anglers as it affects the quality of fish that they can catch.

Key issues for major settlements and urban areas in the South Marine Plan areas:

- Fishing is a significant employer and plays a key role in the community at Brixham, Weymouth, Poole, Portsmouth, Selsey and Shoreham;
- Tourism growth will likely be most significant at Southampton, Brighton and Bournemouth; however it is important to the local economy in Torbay; and
- Health deprivation and low life expectancy is an issue at Hastings, Torbay, Portsmouth, Brighton and Hove and Worthing. Dymchurch/St Mary's Bay is among the ten most deprived in terms of economic deprivation.

What would the situation be without the marine plan?

84. Fishing communities such as Brixham, Weymouth, Poole, Portsmouth, Selsey and Shoreham could be affected by declining fish stocks in the short to medium term, rising costs, climate change and potential offshore wind development. Crew members are now more likely to come from settlements distributed over a wider geographical area making social networks weaker and more dispersed⁵¹.
85. Potential drivers of change to fishing and the fishing community include the modernisation of equipment and economies of scale, dispersal of crew members across a wider geographical area; the rising cost of entry into the industry turning younger people away from fishing; declining fish stocks, quotas and environmental policy affecting viability of fishing; and offshore renewable developments reducing the size of fishing grounds⁵². Other factors that could include competing uses or uses that affect the conditions for fishing e.g. dredging and aggregate extraction. In terms of aquaculture, climate change and disease may lead to a loss of farm stock; although new species may be able to be introduced.
86. Climate change impacts such as longer hotter summers and rising sea temperatures may lead to an increase in the numbers of visitors to coastal destinations, longer tourism

⁴⁹ Depledge, M. H. and W. J. Bird (2009). "The Blue Gym: Health and wellbeing from our coasts." Marine Pollution Bulletin 58(7): 947-948.

⁵⁰ Wheeler, B. W., M. White, et al. (2012). "Does living by the coast improve health and wellbeing?" Health and Place 18(5): 1198-1201.

⁵¹ Symes, D, and J Phillipson (2009) *Whatever Became of Social Objectives in Fisheries Policy?*, Fisheries Research 95, no.1: 1-5

⁵² MMO (2013) *South Inshore and South Offshore Marine Plan Areas: South Plans Analytical Report* (online) available from:

http://www.marinemangement.org.uk/marineplanning/areas/documents/south_draftspar.pdf?bcsi_scan_AB11CAA0E2721250=0&bcsi_scan_filename=south_draftspar.pdf. Accessed 09/04/2014

seasons, an increase in infrastructure and range of facilities and increased demand on the environment.

87. The future of tourism is uncertain due to the impact of climate change and changing consumer demands; however the likelihood is that tourism will increase due to warmer and longer summer seasons and investment in tourist infrastructure, particularly in Southampton, Brighton and Bournemouth⁵³. The changing nature of the tourism market might mean that communities will need to adapt to diversify into non-tourist alternatives. This is particularly the case for reducing the seasonality of employment in coastal towns.
88. In terms of leisure and recreation, climate change may affect species distribution and abundance for angling. Improved coastal access would increase the ability to participate in marine leisure and could improve health and wellbeing in coastal locations. Improved quality of environment would create a more attractive environment for leisure and recreation which could further attract people. Conversely, population growth and density of recreational use could have negative effects on leisure use through overcrowding and conflict between users. Furthermore, increased storminess and damage to coastal facilities may have negative impacts on recreational boaters.

What are the key issues?

- Health deprivation and low life expectancy is lowest in the urban areas in the South plan area, particularly Hastings, Torbay, Portsmouth, Brighton and Hove and Worthing.
- There is a high proportion of elderly people in the plan area which is likely to increase pressure on health infrastructure and affect the coastal economy
- There is a need to support the fishing industry, in particular smaller 'artisan' fishing and in locations where there are significant fishing communities such as Brixham.
- There is a need to diversify fishing communities in order to increase resilience to future uncertainties in the industry.
- Aquaculture provides an opportunity to provide year-round employment for peripheral and rural areas, and areas where fisheries have declined.
- Tourism is an important industry to the South area, however its seasonal nature results in seasonal unemployment and also negative effects on the local community in terms of overcrowding and change in culture
- Diversification is necessary in tourist locations in order to achieve year-round employment opportunities, and also to increase resilience to potential changes in tourism demand. This is particularly true for smaller coastal towns which are disproportionately affected by seasonal unemployment as they are dependent on tourist income.
- Leisure and recreation are important means of improving health and wellbeing for residents and visitors. Access to such facilities should be improved and enhanced where possible. The relative absence of seasonality in recreational boating means that it is an important source of revenue and employment.
- Due to the large elderly population there is a need to increase 'low intensity' leisure opportunities such as coastal walks and nature watching.
- There is a need to increase leisure participation across all age groups, in particular in the 16-34 year old age group which has been declining over the last decade.
- Population growth is likely to lead to overcrowding and increase conflict between recreational users of the marine area. There will be a need to manage activities to prevent such conflicts.

⁵³ MMO (2013) South Marine Plan Futures Analysis

Cross cutting issues

Tourism can play an important role in conserving the historic environment through providing funding for repair and upkeep of historic buildings. Likewise, maintenance of the fishing industry is likely to help keep historic working fishing ports functioning and preserve the cultural heritage of fishing communities.

Fishing and increased aquaculture may have implications in terms of marine ecology through altering the ecological environment, affecting fish stocks, water quality or introducing diseases. Tourism and fishing are key sectors in the economy of the South plan area, which has a profound effect on addressing deprivation and improving the quality of life for residents and visitors.

Increased tourism and leisure pressure could adversely affect the character the area, with potential knock-on effects in terms of the economy, particularly in overcrowded or popular areas. Increased tourism could also adversely affect marine ecology through disturbance of wildlife. Fishing, tourism, leisure and recreation are all dependent on a high quality water environment.

Opportunities

Are there any data gaps?

- There are data gaps relating to the need for further research on the non-monetary benefits of fisheries and fishing communities.
- Data and research on the social value of aquaculture is sparse. Further research into the positive and negative aspects of aquaculture is required to address this.

Cultural Heritage

DRAFT

Annex B - Cultural heritage

Introduction

89. The Marine Policy Statement (MPS) states that,

"The historic environment includes the aspects of the environment resulting from the interaction between people and places through time, including all surviving physical remains of past human activity, whether visible, buried or submerged. Those elements of the historic environment – buildings, monuments, sites or landscapes – that have been positively identified as holding a degree of significance⁵⁴ meriting consideration are called 'heritage assets'⁵⁵."

90. As an island nation, the history of the lands now comprising the UK is inextricably linked with the sea, comprising a range of maritime (such as seafaring) remains and those associated with coastal settlement, as well as remains of former terrestrial landscapes and their inhabitants, submerged following historic sea-level rise. Discovery of archaeological remains improves knowledge and understanding of human and societal development, and of the palaeo-environmental conditions prevailing before, during and after settlement of the British Isles. The South marine plans area have a long history of maritime trade, seafaring and defence.
91. The marine heritage resource is relatively unknown by comparison with the terrestrial record, but is equally threatened by natural and anthropogenic influences. Development in coastal areas, offshore energy projects, pipelines, dredging and fishing may all have a detrimental impact on the marine and coastal heritage resource.
92. The principal focus of maritime archaeology in the UK has in the past been that of shipwreck, however the archaeological resource in UK territorial waters and the wider continental shelf is much more diverse and includes submerged landscapes, settlements of past cultures and military aircraft⁵⁶. The current legislation regarding the protection of archaeological remains comprises of international and national law.
93. English Heritage is the body responsible for archaeology and the built environment which extends to offshore areas within the 12 nautical mile territorial limit, outside of which UK jurisdiction applies. English Heritage may maintain an interest in, or be asked to offer advice concerning, any matters outside the 12 nautical mile limit.
94. Cultural heritage is not restricted to physical features but also applies to socio-cultural associations with particular areas that contribute to a sense of place. This can be important for coastal communities which have strong historical connections with, for example, industrial heritage such as fishing, defence and trade. These connections can be important for promoting tourism or for attracting new investment by capitalising on local knowledge and traditions. This topic is also linked to the population, economy, human health, and landscape and seascape topics. Whilst some consideration is given to Heritage Coast in this section, its implications for landscape and seascape are dealt with in Annex F.

⁵⁴ Significance is the value of a heritage asset to this and future generations because of its heritage interests.

⁵⁵ Defra (2011). UK Marine Policy Statement.

⁵⁶ Roberts P & Trow S (2002). Taking to the Water: English Heritage's Initial Policy for the Management of Maritime Archaeology in England. English Heritage, London, 27pp.

What is the link between marine planning and this topic?

95. The activities covered in the South marine plans may have both direct and indirect effects upon marine cultural heritage. For example, direct effects may include direct loss or disturbance of features through activities such as dredging for example or indirectly through marine development that may affect the setting of coastal heritage features. The South marine plans would be drafted in accordance with the provisions of the MPS with regard to the protection of heritage assets. Management of such sites is related to their importance regardless of designated status.

What is the policy context?

96. Table B1 summarises the key elements of the marine cultural heritage context, from which it becomes possible to gain a better understanding of the issues. Following the table is a short discussion that seeks to highlight some of the most pertinent messages.

Table B1: Relevant plans, initiatives and environmental protection objectives

International
UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage (1972) UNESCO Convention on the Protection of Underwater Cultural Heritage 2001 UNCLOS United Nations Convention on the Law of the Sea 1982
Europe
European Convention on the Protection of the Archaeological Heritage 1992 Council of Europe European Landscape Convention 2000
National
<p>Legal instruments</p> <p>Protection of Wrecks Act 1973 Ancient Monuments and Archaeological Areas Act 1979 Protection of Military Remains Act 1986 Treasure Act 1996 Planning (Listed Buildings and Conservation Areas) Act 1990 National Heritage Act of May 2002 UK Marine and Coastal Access Act 2009</p> <p>Policy and guidance</p> <p>The Government's Statement On The Historic Environment For England 2010 Marine Policy Statement (Defra 2011) National Policy Statements on Energy 1-5 and Nuclear Power Generation EN-6 (DECC, 2011) English Heritage: National Heritage Protection Plan 2011-2015 English Heritage: Climate Change and the Historic Environment (2008) English Heritage: Conservation Principles, Policies and Guidance for Sustainable Management of the Historic Environment (2008) English Heritage Coastal Estate Risk Assessment 2011 Planning Circular 07/09: Protection of World Heritage Sites Maritime and Marine Historic Environment Research Framework Scheduled Monuments: Identifying, protecting, conserving and investigating nationally important archaeological sites under the Ancient Monuments and Archaeological Areas Act 1979 (2010) English Heritage Guidance on Setting 2010 The National Planning Policy Framework (NPPF) (2012)</p>

Military Aircraft Crash Sites (English Heritage 2002)
 Coastal Defence and the Historic Environment (English Heritage 2003)
 Ports: the impact of development on the maritime historic environment (English Heritage 2006)
 Shoreline Management Plan review and the historic environment (English Heritage 2006)
 Regeneration in Coastal Towns (English Heritage 2007)
 Strategic Environmental Assessment, Sustainability Appraisal and the Historic Environment (English Heritage 2010)
 Seeing History in the View (English Heritage 2011)
 The Setting of Historic Assets (English Heritage 2011)
 Historic Environment Guidance for Wave and Tidal Energy (English Heritage 2013)
 National Policy Statement for Ports (Department for Transport)
 Government and Devolved Administrations High Level Marine Objectives
 UK Marine Science Strategy (2010 – 2025)
 Ports and the Historic Environment published by English Heritage 2014

Local

National Mapping Programme for South Downs Park Beach Head-Lewes
 National Mapping Programme for SE Rapid Coastal Zone Assessment Survey
 National Mapping Programme for Isle of Wight
 National Mapping Programme for South Dorset Ridgeway
 National Mapping Programme for Kent
 National Mapping Programme for Hampshire
 National Mapping Programme for South Downs

97. The European Convention on the Protection of the Archaeological Heritage, or Valetta Convention, came into force in 2001 and seeks to protect archaeological heritage which includes, "structures, constructions, groups of buildings, developed sites, moveable objects, monuments of other kinds as well as their context, whether situated on land or under water". In addition, an integrated approach to planning policies is required to ensure that archaeological concerns are raised during development planning and in environmental impact assessment (Article 5). The convention also introduces themes of methodical scientific study and information dissemination amongst others.
98. The North Sea Prehistory Research and Management Framework (NSPRMF) 2009, is the first transnational framework designed to instigate large-scale study of the archaeology which lies beneath the southern North Sea. It is intended to facilitate information gathering and where possible preservation of the marine heritage in the area.
99. Unless the UN Convention is properly ratified, the protection of shipwrecks in UK territorial waters will continue to be covered by the Protection of Wrecks Act (PWA) 1973 although this only has remit within territorial waters, administered in England by English Heritage. Wrecks or wreck sites may be considered to merit designation if they contribute to the understanding of the past on account of their historical, archaeological or artistic importance. Restricted areas may include part of the surrounding seabed deemed necessary to secure protection of the wreck. Designation of wrecks and submerged prehistoric sites is also possible under the Ancient Monuments and Archaeological Areas Act 1979. The Marine and Coastal Access Act 2009 provides for consideration of the social consequences of Marine Conservation Zone (MCZ) designation with 'social consequences' defined as inclusive of any sites in that area which are of historic or archaeological interest. The Marine Policy Statement 2011 identifies that many coastal heritage assets are not afforded statutory protection. However, it states, "*The absence of designation for such assets does not necessarily indicate lower significance and the marine plan authority should consider them subject to the same policy principles as*

designated heritage assets (including those outlined) based on information and advice from the relevant regulator and advisors".

100. Submerged military sites on or in the seabed may be protected by the Protection of Military Remains Act (1986). The act seeks to designate any vessel or aircraft (as a protected place or designated control area) which appears to have become sunk or stranded while in military service whether before or after the passing of the act. Vessel designations are restricted to those sunk after 4 August 1914, while controlled sites have a maximum age of 200 years. A designation of protected place can be given to any named vessel even if its geographical location is not known. This act has the principal concern of protecting the sanctity of military vessels and aircraft which are military maritime graves. Note, such vessels do not have to be historic *per se*.
101. In England, the National Heritage Act of May 2002 has given English Heritage responsibility for maritime archaeology out to the extent of the 12 nautical mile territorial limit. However, for the area of UK Controlled Waters adjacent to England, not subject to the responsibility of any Devolved Administration, English Heritage, when requested, provides advice to competent authorities under EU Directives on SEA (2001/42/EC) and Environmental Impact Assessment (85/337/EEC, as amended) both of which require assessment of 'cultural heritage'. In reference to non SEA and EIA developments or other projects, English Heritage through the National Heritage Act 1983 (as amended by the National Heritage Act 2002), may offer advice about 'foreign monuments', with the term 'monument' described as per the Ancient Monument and Archaeological Areas Act 1979. Any advice English Heritage offers, including any marine development licensing procedures (as provided for under the Marine and Coastal Access Act 2009) is spatially limited to the area of UK Controlled Waters adjacent to England.'
102. English Heritage's National Heritage Protection Plan 2011-2015, is focussed on understanding and articulating the significance of the historic environment, as the key to its informed and effective protection and management. The plan will identify an integrated and holistic suite of activities, which English Heritage hope will enable joined-up and co-ordinated work across the sector in a way that has not been done before.
103. The NPPF seeks to greatly simplify the current guidance on planning policy. At its heart is a presumption in favour of sustainable development. The Government's objective for planning for the historic environment⁵⁷ is to:

"Conserve heritage assets in a manner appropriate to their significance, so that they can be enjoyed for their contribution to the quality of life of this and future generations."
104. All of the documents have the overarching objective of protecting, conserving and enhancing the archaeological and cultural heritage resources throughout the UK. The series of European Conventions highlight the importance of protecting such resources for reasons of collective memory but also for historical and scientific study. Across the UK, legislation, planning guidance and more specific heritage-related guidance has been prepared which seeks to ensure that issues related to the protection of the historic environment are appropriately considered in the planning system.

Implications for the sustainability appraisal and the marine plan

105. The marine plan will be used when considering the potential impacts of development applications, many of which would require to be assessed with regards to their impact on

⁵⁷ The principles and policies set out in this section apply to the heritage-related consent regimes for which planning authorities are responsible under the Planning (Listed Buildings and Conservation Areas) Act 1990, as well as to plan-making and development management decisions.

heritage assets. It would be important in the drafting of the marine plan, and at the project level, to account for the degree of change in heritage assets that certain developments may represent. Given the future trajectory for certain industries, the potential for future cumulative impacts could also be a consideration of the plan.

What is the current situation?

General Context

106. The English Channel has over the years been subject to marine aggregate extraction. This has been undertaken to the west of the Solent and within the wider channel area. Faunal remains have been found along with lithic scatters, however, none could be linked to the Lower Palaeolithic. Research shows that due to the terrestrial site typology for secondarily derived Palaeolithic deposits, which are dominated by floodplain sediments associated with the now extinct Channel River outflows of the Thames, River Solent, Somme, Rhine, Seine and Arun may hold a large store of archaeological material.
107. The north of the now extinct Channel River would have drained the Avon, Test and Itchen catchments along the north of the Isle of Wight (separated from the mainland only in the Late Pleistocene) and south to the main Channel River. Its' position in the lee of the Isle of Wight puts it in a good taphonomic position. The terrestrial areas of the Solent and Avon have the highest concentration of Palaeolithic sites in Britain. When combined with coastal erosion it can be assumed that previous coastal archaeology on the Isle of Wight and south coast has been lost to the seafloor – a current issue that continues today which is also exacerbated by a rise in the sea level. Lithic deposits of the Pleistocene age were thought to be recovered by fishing activity in the Solent, however, they were more likely from the Mesolithic and/or Neolithic periods, and finds at -11m OD off Bouldnor Cliff indicate a high likelihood of further prehistoric finds.
108. Along with objects finding their way to the seabed via coastal retreat, a sea level rise in the early Holocene means there is substantial scope for a large amount of recoverable seafaring objects relating to cross-channel navigation and trade. Shipwrecks in the form of, hide covered and dugout vessels and later wooden ships are likely to be located in the surficial sediment. In addition to wreck and associated artefacts, fishing implements and sailing accessories such as oars may also be recovered.
109. The South marine plans area contain a unique and diverse historic environment both along the coastline and beneath the sea. The environment has been impacted extensively by past human activities ranging from early human occupation stretching back some 80,000 years to more modern military, commercial and cargo wreck sites of the twentieth century. Strong historic associations to iconic landscapes such as the white cliffs of Dover form part of the national identity when leaving and returning to England by sea. To the west of the plan areas the Jurassic Coast covers 95 miles of coastline from East Devon to Dorset, with rocks recording 185 million years of the earth's history⁵⁸.

Terrestrial and Coastal Heritage Assets

110. Table B2 presents details from a local perspective of historic features within the South marine plans area that are considered to be terrestrial and coastal assets. Heritage Assets are also presented on Figure B1.

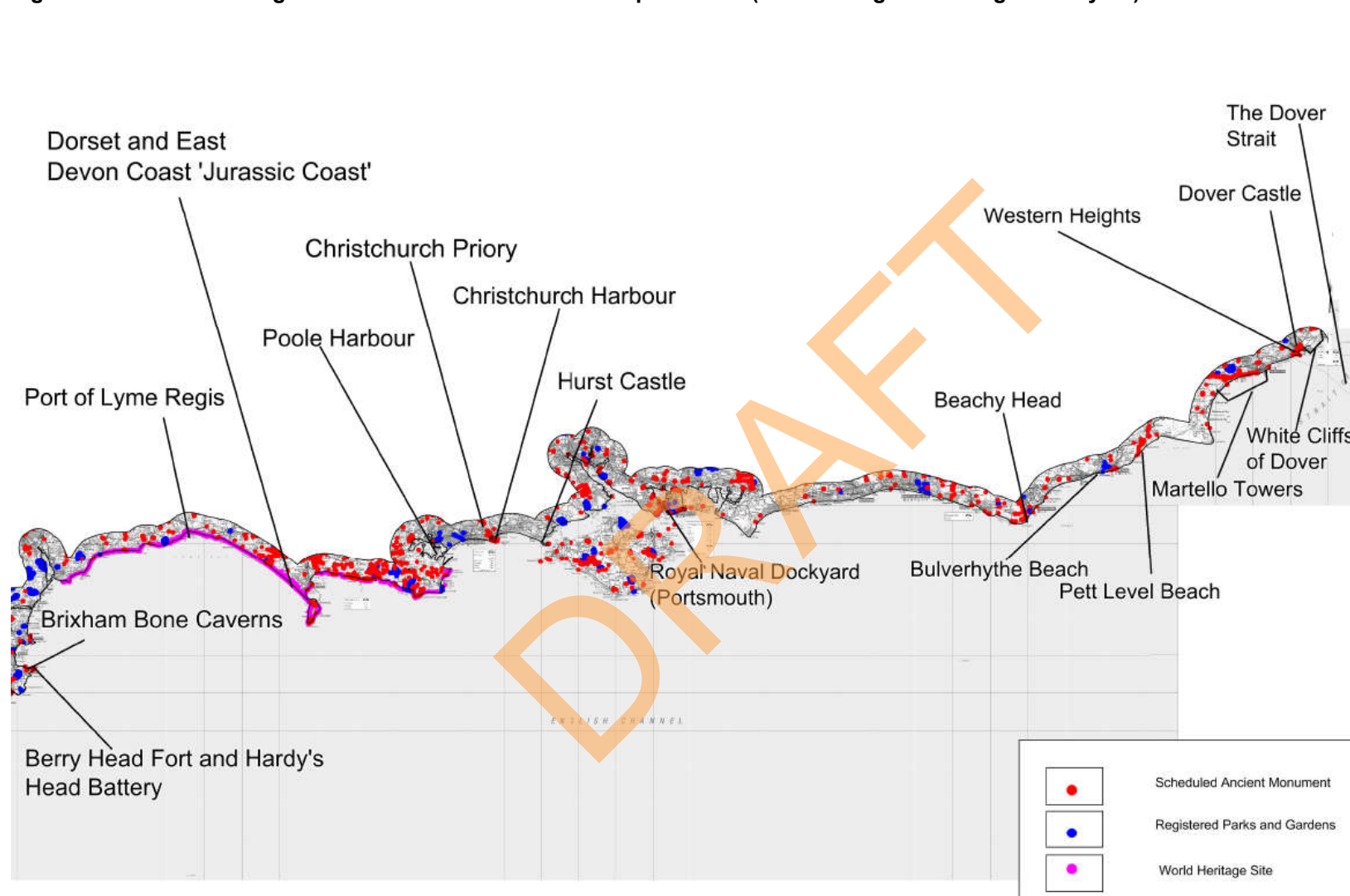
⁵⁸ MMO (2013) South Inshore and South Offshore Marine Plans Analytical Report (SPAR)

Table B2: Key Historic Characteristics of the Terrestrial and Coastal South marine plans Area

Area	Key Characteristics
Lyme Bay	<p>Nationally important Berry Head fort and Hardy's Head Battery occupying a prominent position above Tor Bay as part of a strong assemblage of defensive structures along the wider coastline.</p> <p>Defensive coast with strong associations with the Napoleonic and Second World Wars, including D-Day landing practices. German bombers and submarine casualties litter the seabed.</p> <p>Strong historic associations with international trade and smuggling linked to the wider English Channel and the MCS's historic ports – including the ship building port of Lyme Regis.</p> <p>Favourable climatic conditions enabling people to thrive in this part of the world for thousands of years. Evidence of Palaeolithic man found in the 'Brixham Bone Caverns' dating back 31,000 years.</p>
Portland Bill to Christchurch	<p>Long history of maritime trade associated with the historic port of Poole and Christchurch Harbour (latter linking to the Avon and Stour Rivers); strategic location exploited by the Romans and earlier settlers.</p> <p>Christchurch Priory, with origins from the 11th century, forming a prominent navigational feature in views from across Christchurch Bay.</p>
The Solent and Isle of Wight	<p>Long history of maritime trade, seafaring and defence, with relics including Henry VIII's Hurst Castle and the 19th century Palmerston Forts guarding the eastern entry to the Solent. The Royal Naval Dockyard is based at Portsmouth.</p> <p>Evidence for human occupation stretching back some 80,000 years, before the island was created. Bronze Age round barrows on the chalk ridge are visible from the coast and surrounding seas.</p>
Selsey Bill to Beachy Head	<p>Historic features illustrate the strategic defensive role of this coastline. The last in the series of Martello Towers is located at Seaford and forts survive at Newhaven, Littlehampton and Shoreham.</p>
Beachy Head to Dungeness	<p>Historic coastal landscape displayed in the prehistoric petrified forest at the beaches of Pett Level and Bulverhythe. Land was dry during the Neolithic period, before the end of the last glaciation.</p>
Dungeness to Dover	<p>Nationally important 19th century Martello Towers linked to Napoleonic history, spread along the length of the coast from Dymchurch to Folkestone, also acting as navigation marks when viewed from the sea.</p> <p>The Dover Strait as a whole has played a key role in the defence of Britain and formed the location for successive invasions and defence – the cliffs being the first defence for invasion by Julius Caesar in 55BC.</p> <p>Particular reference to World War II, including the Battle of Britain memorial and the fortifications and wartime tunnels at Dover Castle and Western Heights.</p> <p>Skyline dominated by Dover Castle – long forming an important land and navigation mark, the site of a Roman lighthouse and symbolic of the defence of the British Isles.</p> <p>Iconic seascape- with the white cliffs of Dover forming part of England's national identity – a visual reference for leaving and returning to England by sea.</p>

Source: MMO (2013), SPAR

Figure B1: Coastal heritage assets within the South marine plans area (source: English Heritage GIS layers)



111. Relatively little is known about the prehistoric archaeology from Romney Marsh to Selsey Bill. However, it is known that submerged forests are located between Hooe Level and Rye. Radiocarbon dating of a site at Hastings showed it to be of a Neolithic date.
112. Coastal erosion over the years has revealed bronze hoards and research has shown that retreating cliffs have destroyed many prehistoric (mainly Iron Age) sites. Research also shows that the area around the Solent holds more Palaeolithic sites than anywhere else in Britain, and occupation took place in the Lower Palaeolithic (ca. 400-300kya) and maybe earlier given the proximity of Boxgrove (dated to ca. 500kya). 15,000 Palaeolithic artefacts are known to relate to the Solent, 8,500 of which are hand-axes (Wenban-Smith 2001), and a particular concentration of these has been found in and around the Bournemouth area, with locations such as Warsash near Southampton being particularly rich in finds. The Isle of Wight holds records for a Lower and Middle Palaeolithic occupation, the largest sites being at Priory Bay and Bleak Down, both producing large hand-axe finds. There are also less abundant finds to the east at Bembridge. Research in Hampshire and West Sussex revealed worked flint of (potentially) Neolithic and later Bronze Age settlements – lithic scatters of Mesolithic and early Neolithic peoples are also present from Wooton Quarr. This location also has the only definitive Neolithic timber structures and wooden structures from the Late Bronze Age. Briquetage from the Middle Iron Age onwards is found scattered all along the coast (e.g. at Chidham in Chichester Harbour, Poole Harbour) which is indicative of salt production.
113. Roman and Iron Age coins have been found at a number of locations along the coast, comprising both gold and silver. Erosion at Selsey Bill has also revealed substantial finds of high value and late Iron Age coins indicative of an *oppidum* (a late-Iron Age settlement with some urban qualities). Iron Age pottery and ‘floors’ have also been identified in this area, with the latter reportedly destroyed. A ‘quarry’ at Mixon Shoal lies below the intertidal zone and could indicate the severity of erosion at Selsey Bill since Roman times.
114. The Solent has comparatively few Iron Age and Roman finds. However, there is the *civitas* capital at Chichester and the late Roman forts at Portchester and Bitterne. There is also a villa at Gurnard, Isle of Wight which has been eroding into the intertidal zone. Limestone quarries at Wooton Quarr are responsible for a number of Roman structures on the Isle of Wight and mainland (e.g. the Roman fort at Portchester). First and second century pottery was found offshore at Binstead and tile making is evidenced at Dell Quay, Chichester. Along the coast at Hengistbury head, substantial erosion has depleted the coastal resource (and presumably added to the submerged scatter of artefacts), and the harbour was important for Iron Age cross channel trade. Poole Harbour is an important location for Iron Age/Roman archaeology, with substantial pottery.
115. On the southern coast there is relatively little inter-tidal evidence for the post-Roman period. In Suffolk, an eroded Saxon fort, possible monastery and medieval castle are located at Walton. Harbours, quays and other coastal infrastructure from the historic period are accounted for in the HMR. More recently, the southern coast has a substantial array of defensive structures ranging from Napoleonic (1790-1815) to Second World War (1939-1945). A search of the National Monuments Record for England reveals that most of the defensive structures in the counties of East and West Sussex, Hampshire and Dorset (2230 of 2986, or ca. 75%; [EH pastscape website]) are modern (i.e. post-1900), primarily consisting of pillboxes, tank traps and batteries.

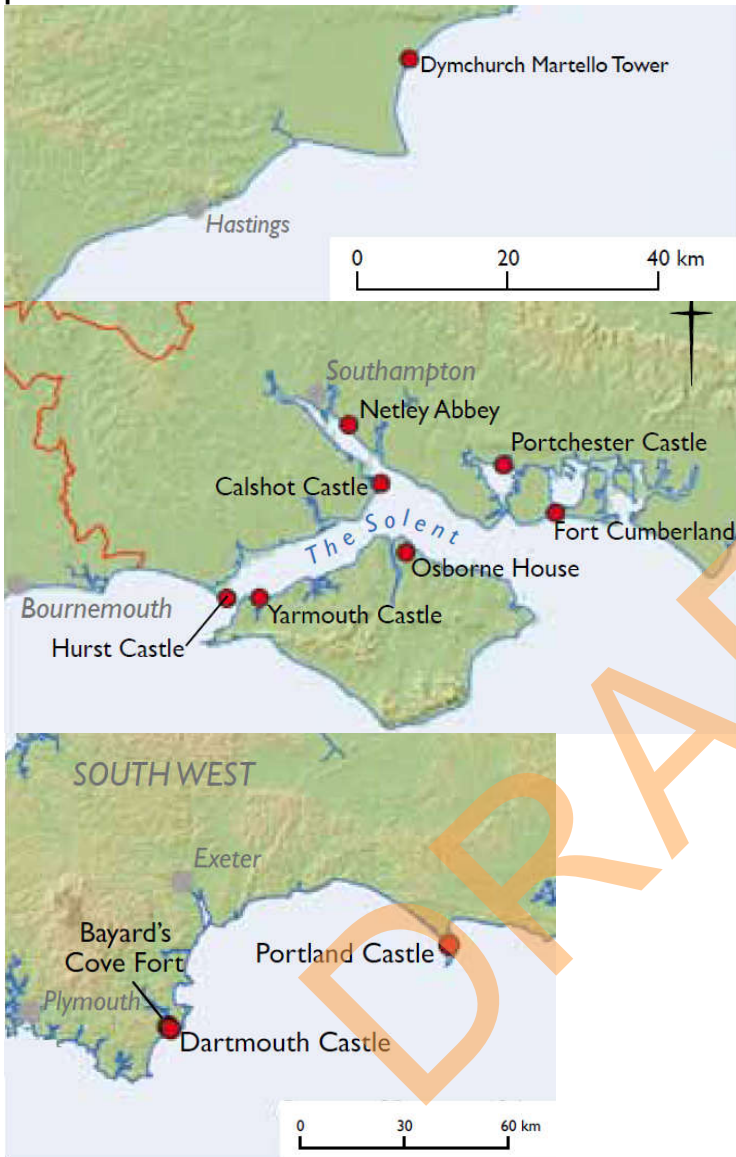
Historic sites

116. The coastal zone contains a large number of statutory heritage features including listed structures, scheduled monuments and registered historic parks and gardens. These may include, for example lighthouses, quaysides, piers or ancient remains. While not all strictly below the mean high water mark, these features may be indirectly affected by activities at sea. Other sites may have benefited from a coastal location but cannot be described as specifically coastal in nature. These features are presented on Figure B1.
117. The English Heritage Coastal Estate Risk Assessment⁵⁹ identifies ten properties within the in the care of English Heritage within the South marine plans area. A number of the sites at risk

⁵⁹ English Heritage (2011) Coastal Estate Risk Assessment

from tidal flooding are located in exposed, coastal positions, often in a low-lying situation, which makes them more susceptible to potential flood events. Reculver Roman Fort and Reculver Towers, has suffered from erosion over many centuries and considered to be at high risk from further coastal erosion. Coastal properties are presented on Figure B2.

Figure B2: Properties in the coastal zone in the care of English Heritage within the South marine plans area



Source: English Heritage Coastal Estate Risk Assessment

Offshore heritage assets

118. Table B3 presents details from a local perspective of historic features within the South marine plans area that are considered to be offshore assets. Offshore heritage assets are presented on Figure B3. *Please note: There is some repetition between Table B3 and Table B5.*

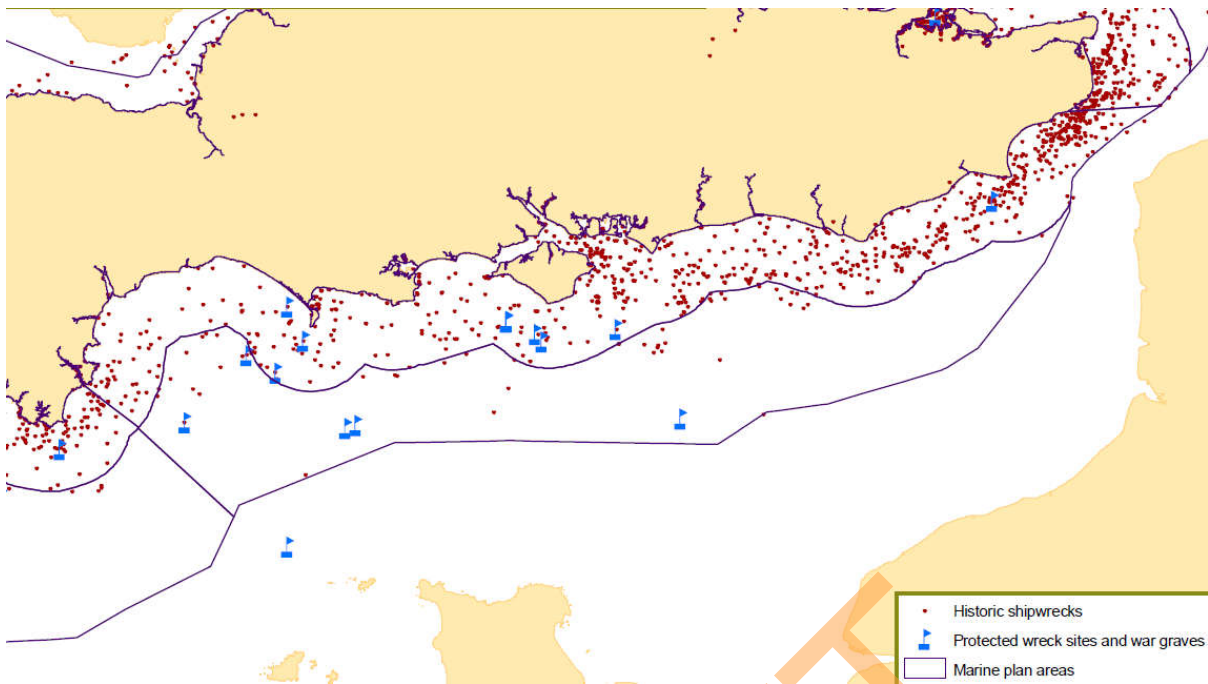
Table B3: Protected Historic Shipwreck Sites

Area	Key Characteristics
Portland Bill to Christchurch	<ul style="list-style-type: none"> - Wreck site of HMS Golden Sunset which foundered off the Shambles in 1918. - Protected Wreck Sites – Cargo Vessels, the Studland Bay and the Swash Channel.
The Solent and Isle of Wight	<ul style="list-style-type: none"> - Large number of historic shipwrecks particularly off the Needles and the eastern entrance of the Solent, including Henry VIII's flagship the Mary Rose.
Selsey Bill to Beachy Head	<ul style="list-style-type: none"> - A large number of wreck sites indicate the history of trade, transport and military activity in the area and are popular diving sites. The protected wreck 'The Black Cat Wreck' at Brighton Marina is thought to be one of the oldest shipwrecks known in England. - Offshore at Beachy Head many boats and sea going vessels have fallen foul of the difficult water conditions. Wrecks include the Polynesia, a German sailing ship that ran aground in 1890 which is sometimes visible at low tide at Cuckmere Haven.
Beachy Head to Dungeness	<ul style="list-style-type: none"> - Protected wreck sites illustrating the historic use of the seas for global trade and war from the 16th centuries, including two visible on the beaches of Bulverhythe and Pett Level at very low tide.
Dungeness to Dover	<ul style="list-style-type: none"> - Large number of wreck sites recorded around Dover and Folkestone including submarines, cargo vessels and steamships. - The protected wreck of the Langdon Bay (English Heritage), located on the edge of Dover Harbour, thought to be the remains of a Bronze Age vessel carrying a scrap metal cargo from France to Britain, indicating cross-channel trade in the Middle Bronze Age.
South Offshore Marine Plan Area	<ul style="list-style-type: none"> - Contains a large part of the English Channel Outburst Flood Feature providing evidence of the flood which created the channel separating England from the mainland. - Remains of B17 Flying Fortress aircraft and German submarines from World War I around the Dover Strait. - The Channel's turbulent past reflected in the wrecks of cargo and military vessels including the First and Second World Wars. Concentrations of ship wrecks of international origin litter the seabed. - Direct legacy of the wider Channel in the defence of Britain and the location for successive invasions – Romans, Norman Conquest, Napoleonic and the two World Wars.

Source: MMO (2013), SPAR

There are also a number of war graves within the South marine plans area. These are presented on figure B3.

Figure B3: Offshore heritage assets



Source: MMO (2013), SPAR

Marine palaeo-landscapes

119. Marine palaeo-landscapes are submerged Holocene palaeo-environmental deposits recognised as having the potential to contain preserved evidence of past human settlement. These landscapes may contain organic features such as peat deposits, submerged river systems, lakes or forests and may have the potential to contain evidence of human activity such as animal remains, hunting weapons or logboats.
120. Recent years have seen advances in our understanding of these features, primarily as a result of work funded by the Marine Aggregate Levy Sustainability Fund.
121. The following images (Figures B4 and B5) illustrate the potential for marine palaeo-landscapes to occur around the UK's seas and also their sensitivity to development⁶⁰.

⁶⁰ ABPmer (2010) Waterlands: Developing Management Indicators for Submerged Palaeo-environmental Landscapes Project Report

Figure B4: Potential for marine palaeo-landscapes

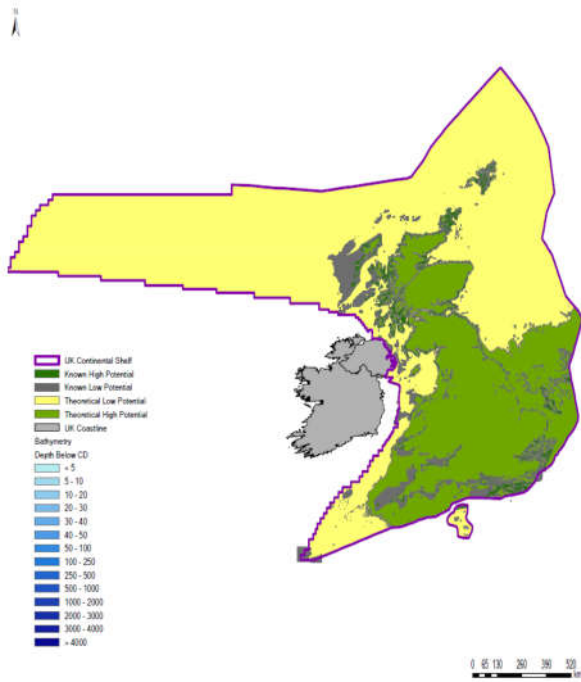
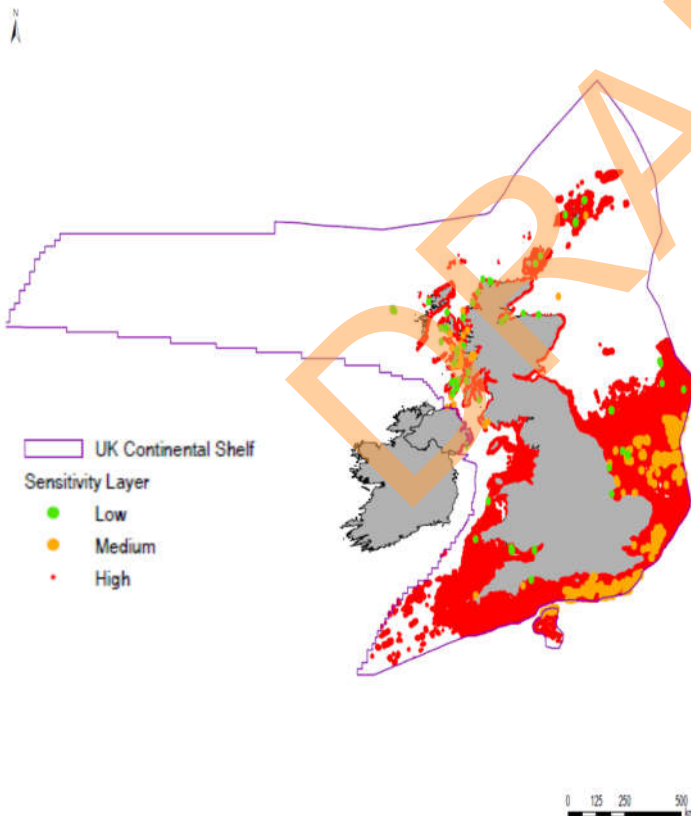


Figure B5: Sensitivity of marine palaeo-landscapes



Source: DECC (2009) UK Offshore Energy Strategic Environmental Assessment (OESEA): Environmental Report / ABPmer 2010

Wrecks

122. The strategic importance of the sea, a long history of fishing for food, the importance of maritime trade routes and the nature of many inshore waters, has led to a large number of shipwrecks in UK waters, although information on the number, type and location of these is limited. The UK Hydrographic Office maintains a register of wreck locations (the Wrecks Database), containing

some 70,000 records, of which approximately 20,000 are named vessels. Few of these sites have had their condition or archaeological provenance assessed. The record for wreck sites is biased towards those from the post-Medieval and later periods, presumably a function of greater traffic and increased reporting associated with the introduction of marine insurance and the Lloyds of London shipping list of casualties in 1741. Information regarding some wrecks may also be related to their historical importance for navigational safety.

123. It must also be considered that there is the potential for substantial aircraft remains (primarily World War II) to be found on the seabed both within and outside the 12 nautical mile limit (that is within both the South inshore and South offshore areas). Although the overwhelming concentration of losses is in the period between 1939 and 1945, aircraft losses at sea span the entire period of aviation history from the early 20th century to very recent losses. The south coast of England was also scene to World War II coastal defence activity. Whilst many features have long-since been removed, important remnants remain within the coastal zone such as pill boxes and anti-tank defences. A breakdown of known maritime sites for each county is provided in Table B4.

Table B4: Maritime archaeological records categorised as wreck for English counties bordering the South marine plans area

County	Number of sites recorded as wrecks	Summary
East Sussex	1,228	The earliest finds include a single prehistoric vessel at Hooe (though this is a terrestrial site), and a later Roman tile find off Hove. The number of records increase in the Medieval and later periods, peaking in Georgian (413) and Victorian (393) times. Modern wrecks account for 288 records.
West Sussex	504	Wreck ranges from Bronze Age and Iron Age logboats, though these are associated with terrestrial waterways. There are no pre-Medieval marine records, and it is only for Georgian (105) and Victorian (169) wrecks that records substantially increase, with modern vessels making up 36% (181) of the total shipwreck assemblage.
Hampshire	373	The record here starts in the Roman period with a single record for a find at Southampton. The number of records substantially increase for the Medieval and post-Medieval periods, peaking with Georgian losses (154).
Dorset	1,071	The earliest record is for a Palaeolithic craft, though this is located in the River Frome rather than in an intertidal or submarine area. The next earliest record is for the Iron-Age, with few Roman (2) and later finds up until the Medieval period (15). Characteristically, Georgian (345), Victorian (332) and Modern (301) records dominate the database.
Kent	5,460	The earliest remains are considered Bronze Age (2) at Dover and Langdon Bay. There are few records for the periods leaving up to the Medieval (75), and like in most other counties, the post-Medieval period, particularly Georgian (1643) and Victorian (1423) times, have the most abundant record. Modern wrecks account for 1453 of the total number of records.
Devon	2,774	The earliest finds are Bronze Age and are relatively few (3), located in Devon. The number of wrecks increases from the Medieval period, peaking in Georgian and Victorian times. Modern (post 1900) wrecks also feature widely.

Source: DECC Offshore Energy SEA 2009 and the NMR Record

124. There are 26 historic, protected wrecks in the South marine plans area (refer to Table B5 and Figure B1).

Table B5: Protected wrecks within the South marine plans area

Wreck name	Date of sinking	Location	Protection status	Other information
Langdon Bay Wreck	12th century BC	51° 07' 36"N 01° 20' 48"E	PWA	500m seaward of white cliffs, east of Dover Harbour, Kent, 150m exclusion zone
Studland Bay Wreck	ca. 1520	50° 39' 39"N 01° 54' 47.4"W	PWA	Studland, Poole Bay, Dorset, 50m exclusion zone
Mary Rose	1545	50° 45' 48"N 01° 06' 10"W	PWA	Off Spithead, Portsmouth, Solent
West Bay	1627-1750	50° 42.244'N 02° 46.708'W	PWA	Outer Pollock Reef, West Bay, Dorset, 50m exclusion zone
Anne	1678-1690	50° 53' 22"N 00° 41' 46"E	PWA	Pett Level, near Cliff End, Rye Bay, East Sussex, 75m exclusion zone
Brighton Marina Wreck	16th century/possibly late 15th century	50° 48' 36.5"N 00° 06' 29"W	PWA	100m east of marina wall, Brighton
Swash Channel Wreck	Early 17th century	See right	PWA	Swash Channel, Poole Bay, Dorset. Wreck lies in the area encompassed by the four points: 50° 39.8971'N, 001° 55.5905'W; 50° 39.9201'N, 001° 55.5137'W; 50° 39.8225'N, 001° 55.4414'W; 50° 39.7994'N, 001° 55.5182'W
Yarmouth Roads Wreck	Post-Medieval	50° 42' 31.2"N 01° 29' 35.8"W	PWA	Yarmouth, Isle of Wight, 50m exclusion zone
Norman's Bay Wreck (~ HMS Resolution)	~ 1703	50° 48.1767'N 00° 24.6380'E	PWA	Norman's Bay, West Sussex, 100m exclusion zone
Hazardous	1706	50° 45' 6"N 00° 51' 28.2"W	PWA	Bracklesham Bay, West Sussex, 75m exclusion zone
Assurance/Pomone	1738/1811	50° 39' 42"N 01° 35' 27"W	PWA	The Needles, Isle of Wight, 75m exclusion zone
Amsterdam	1749	50° 50' 42"N 00° 31' 39"E	PWA	Bulverhythe, near Hastings, 100m exclusion zone
Invincible	1758	50° 44' 20"N 001° 02' 13"W	PWA	Horse Tail Sand, Hampshire, 100m exclusion zone

Wreck name	Date of sinking	Location	Protection status	Other information
HM Submarine A1	1911	50° 44' 31.2"N 00° 55' 11.4"E	PWA	Bracklesham Bay, West Sussex, 300m exclusion zone
Holland V Submarine	1912	50° 41.649' N 00° 30.867' E	PWA	Royal Sovereign Bank, English Channel, 200m exclusion zone
HMS M2	1932	-	PMRA‡	Off Portland, Dorset
HMS Swordfish	1940	-	PMRA‡	Off St Catherine's Point, Isle of Wight
HMS Boadicea	1944	-	PMRA‡	Off Portland, Dorset
Salcombe Cannon Site	Mid 17 th century	50° 12' 41.76"N 03° 44' 40.74"E	PWA	Prawle Point Salcombe, Devon, 300m exclusion zone
Moor Sand	Middle Bronze Age	50° 12' 42"N 03° 44' 20"W	PWA	Off Prawle Point, South Coast of Devon, 300m exclusion zone
Church Rocks	Late 16th/early 17 th century	50° 32' 55"N 03° 29' 10"W	PWA	East of Teignmouth, Devon
Admiral Gardner	1809	51° 12' 00" N, 01° 30' 33.6" E	PWA	Goodwin Sands, Kent. 150m exclusion zone
Northumberland	1703	51° 15.481' N, 01° 30.016' E	PWA	Goodwin Sands, Kent. 50m exclusion zone
Stirling Castle	1703	51° 16.4561' N, 01° 30.4121' E	PWA	
Restoration	1703	51° 15.6302' N, 01° 30.0262' E	PWA	
Rooswijk	ca. 18th century	51° 16.443' N, 01° 34.537' E	PWA	Goodwin Sands, Kent

Source: English Heritage pastscape website

Notes: PWA=Protection of Wrecks Act 1973; PMRA= Protection of Military Remains Act 1986; ‡=designated as a 'protected site' under the PMRA 1986 – no specific coordinate data.

What would the situation be without the marine plan?

125. In the absence of actions to protect archaeological resources in the coastal and offshore zones it can be assumed that, in areas other than those experiencing net sediment accretion, they will experience deterioration over time through the action of weather, waves, tides, currents and biological activities. Accidental disturbance to, or destruction of, individual sites from human activities is also likely to occur on a sporadic basis despite legislative controls and guidance. However once effectively buried material can survive in situ for a considerable period of time. Pressures on our coasts and seas are increasing rapidly in number and scale, from coastal sea defences, port expansion, new shipping channels, extraction of aggregates, oil and gas, and wind-farm construction amongst many others. These activities contribute to, but also impact on, the historic marine environment.
126. Remains close to the coast and those comprised of fragile materials are those most likely to be lost but are also those offered statutory protection of some form under the present regime. Statutory designations cover a relatively small proportion of remains, with most sites not benefitting from formal protection. There are 21 protected wrecks in and adjacent to the South marine plans area, which is due to historic shipping activity in the channel.
127. The greatest risk to coastal sites is erosion in the form of cliff retreat or erosion of soft sediments which may result in a significant redistribution of historic artefacts on the seafloor. Cliff lines comprised of loose and unconsolidated deposits may erode at several metres per year. These tend to be situated on the eastern and southern coasts of the UK mainland, also the location of the highest density of archaeological remains in the coastal zone. Erosion, marine aggregates extraction and coastal developments may expose archaeological resources for subsequent examination, but the majority may be lost to the sea. There are also risks associated with coastal regeneration, in that heritage features may be lost through this process.
128. The NPPF seeks to conserve and enhance the historic environment along with protecting heritage assets considered to be most at risk through neglect, decay or other threats. The NPPF is designed to improve the planning decision-making with regard to heritage issues. However, broader socio-cultural issues associated with coastal communities and their relationship to the marine environment remains less well defined and therefore more easily overlooked. It is therefore likely that environmental, economic and social pressures will continue to force unmanaged change to the historic associations within many coastal communities.

What are the key issues?

129. The following key issues and opportunities have been identified:
- Knowledge of offshore archaeology is limited by the practical and economic problems involved in searching large areas of the sea floor.
 - Developments in the offshore zone have the potential to uncover, disturb or destroy archaeological remains lying on or under the sea bed and any impacts should be taken into account in decision making as informed by SEA and EIA procedures. Of particular concern are major infrastructure developments such as the construction of oil and gas installations, commercial ports and offshore wind farms. Indirect impacts are not always fully appreciated. They include changes to local current patterns, sediment movements and scour from cables and structures.
 - Indirect impacts of offshore developments are not always fully appreciated. They include changes to local current patterns, sediment movements and scour from cables and structures.
 - The cumulative effects of marine activities upon heritage assets are of particular concern.
 - Dredging (including aggregate extraction) and benthic fishing methods may disturb the sea bed and damage exposed sites. Developments requiring an EIA have developed working practices that ensure attention is directed at the historic environment but incidental impacts can still occur as a result of developments not subject to EIA.
 - Whilst artificial coastal defence works can help to retain the stability of fast-eroding sections of coastline, they can have adverse impacts downdrift and offshore as sediment movement

becomes disrupted. Increased rates of scour may expose or erode deposits of potential archaeological value. The resulting situation is one which requires continual surveying of coastal sites or surveying at a suitable frequency so that the condition of sites might be monitored and any important artefacts recovered.

- The visual impacts of developments on the landscape / seascape⁶¹ have the potential to affect the setting of historical features and potential loss of interest and therefore reduced local revenue associated with historic features is also a consideration. These may arise from both offshore developments and their coastal-based infrastructure. Changes may be significant from a heritage perspective, but also affect the potential for income from tourist-related activities – this is discussed further in Annex F – Landscape and Seascape.
- South marine plans area has high value landscapes that could be affected by development including the Jurassic Coast World Heritage Site and the Iconic White Cliffs of Dover – this is discussed further in Annex F – Landscape and Seascape.
- Commercial salvage and attrition as a result of recreational diving are localised threats to the shipwreck resource, and it is not clear how much has been salvaged from wrecks on the UK continental shelf, though it is likely that it is under reported⁶².
- An erosion of 'way of life' associated with declining fishing communities in which historic connections and family ties with the fishing industry may be diminishing. The same may be true of other industries where pressures to reduce manpower or reform working practices would have an adverse impact on cultural associations.
- The co-location of other activities and developments with sites and areas of archaeological interest requires attention to optimise spatial planning and thereby support access and long-term conservation.
- The South marine plans area is home to a high density of heritage assets along the coast and wrecks (including war graves), this is reflective of the area's long history of maritime trade, seafaring and defence.

Cross cutting issues

Historic assets in the South marine plans offshore and inshore areas are linked to the wider landscape / seascape with some assets forming part of the seascape character such as the 'Jurassic Coast' and the iconic White Cliffs of Dover. There are also clear links between heritage assets and tourism, with some assets being visitor attractions themselves.

Opportunities

- The South marine plans provide an opportunity to improve the protection of heritage resources in the South marine plans area.
- Opportunities to gain a greater insight into the marine archaeological resource may be possible if measures are adopted that place new information in the public realm and support access.
- Potential advantages to heritage tourism if coastal sites are protected, discovered or enhanced through appropriate management.
- Opportunities should be sought to use the NPPF terminology to address marine planning objectives.

⁶¹ Wessex Archaeology (2007). Historical Environment Guidance for the Offshore Renewable Energy Sector. Published by COWRIE Ltd, UK, 52pp.

⁶² Wessex Archaeology (2008). Wessex Archaeology website <http://news.wessexarch.co.uk/2008/03/09/evidence-of-ice-age-hunters-found-below-northsea/>

Are there any data gaps?

130. The following key data gaps have been identified:

- Lack of spatial detail regarding underwater archaeological sites.
- Due to the nature of maritime heritage largely being submerged, there is considerable uncertainty regarding the extent and detail of undiscovered remains.

DRAFT

Annex C

Marine Ecology

DRAFT

Annex C - Marine Ecology

Introduction

131. This section provides an overview of the main ecological elements of the coast and sea within the South inshore and South offshore marine plan areas. In line with the required SEA topics, marine ecology (that is biodiversity, flora and fauna) is a consideration of this SA. To provide context, and to address Annex I (a) of the SEA Directive, that is to consider, "...the contents, main objectives of the plan or programme and relationship with other relevant plans and programmes", a summary table of relevant initiatives (which includes plans, programmes, policy and other relevant items) is shown below. The key objectives and targets of the principal initiatives, as well as their implications for the marine plan are considered.
132. The following description draws on reports which have recently characterised the broadscale features of the UK coasts and seas (such as Charting Progress 2⁶³, the UK Offshore Energy Strategic Environmental Assessment 2⁶⁴, OSPAR Quality Status Report⁶⁵), and relevant updates to the baseline since the publication of these.

What is the link between marine planning and this topic?

133. The activities covered in the South marine plans may have both direct and indirect effects upon marine ecology. For example, direct effects may include loss or disturbance of habitats through activities such as dredging and disposal. Indirectly, noise or pollution generated from marine developments both inshore and offshore may impact upon marine ecology; for example, noise and vibration from construction may disturb bird and marine mammal populations. The South marine plans will be drafted in accordance with the provisions of the MPS with regard to the protection of marine ecology. What is the policy context?
134. Article 3 of the Habitats Directive 92/43/EEC (as amended) provides for the creation of a coherent ecological network of European sites (Natura 2000) made up of Special Areas of Conservation (SACs), established to conserve those habitats listed in Annex I and species listed in Annex II; and those sites designated as Special Protection Areas (SPAs) for bird species under Annex I (rare or vulnerable) and II (migratory) of the Wild Birds Directive 2009/147/EC. Table C1 provides the policy context for this Annex.

Table C1: Relevant plans, initiatives and environmental protection objectives

International
Convention on International Trade in Endangered Species of Wild Fauna and Flora (1973)
Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat (1971, 1982)
United Nations Convention on Biodiversity (the Rio Convention, 1992)
Convention on the Conservation of Migratory Species of Wild Animals (the Bonn Convention, 1979)
The International Council for the Exploration of the Sea (ICES) Code of Practice for the Introduction

⁶³ Defra (2010). Charting Progress 2: An assessment of the state of UK seas. Published by the Department for Environment Food and Rural Affairs on behalf of the UK Marine Monitoring and Assessment Strategy community, London, 194pp.

⁶⁴ DECC (2011). OESEA2 Environmental Report. Future leasing/licensing for offshore renewable energy, offshore oil & gas, hydrocarbon gas and carbon dioxide storage and associated infrastructure. UK Offshore Energy Strategic Environmental Assessment. Report to the Department of Energy and Climate Change.

⁶⁵ OSPAR (2010). Quality Status Report 2010. OSPAR Commission. London. 176pp.

and Transfer of Marine Organisms

International Convention for the control of ships ballast waters and sediments (adopted 2004, still to enter into force)

Strategic Plan for Biodiversity 2011-2020 (UNEP/CBD/COP/DEC/X/2) and the Aichi Biodiversity Targets (UNEP/CBD/COP/10/9)

United Nations Law of the Sea Convention (1982)

Regional

Convention for the Protection of the Marine Environment of the North East Atlantic (the OSPAR convention, 1992)

OSPAR Recommendation 2003/3 on a Network of Marine Protected Areas

OSPAR Agreement 2005/6 on the Agreement on Background Concentrations for Contaminants in Seawater, Biota and Sediment

OSPAR List of Threatened and/or Declining Species and Habitats

Convention on the Conservation of European Wildlife and Natural Habitats (the Bern Convention, 1979)

Agreement of the Conservation of Small Cetaceans of the Baltic North East Atlantic, Irish and North Seas (1994)

Convention for the Conservation of Salmon in the North Atlantic Ocean (1983)

Council of Europe Strategy on Invasive Alien Species (2003)

OSPAR Quality Status Report 2010

OSPAR Recommendation 2010/2 on amending Recommendation 2003/3 on a Network of Marine Protected Areas

Ten-E Regulation EU347/2013

Integrated Coastal Zone Management

Europe

Directive 92/43/EEC, on the Conservation of Natural Habitats and of Wild Fauna and Flora

Directive 2004/35/EC on environmental liability

Water Framework Directive (2000/60/EC)

Marine Strategy Framework Directive 2008/56/EC

Council of Europe Strategy on Invasive Alien Species (2003)

EU Biodiversity Communication (2006)

The Seventh Environment Action Programme of the European Community 2012-2020

Action Plan: halting the loss of biodiversity by 2010 and beyond (2006)

Directive 2009/147/EC, on the Conservation of Wild Birds

EC Council Regulation 1100/2007 on establishing measures for the recovery of the stock of European eel

Proposal for the seventh EU Environment Action Programme to 2020, "Living well, within the limits of our planet". (adopted)

Our life insurance, our natural capital: an EU biodiversity strategy to 2020 (2011)

EU Nitrates Directive (91/676/EEC)

The Urban Waste Water Directive 91/271/EEC

Common Fisheries Policy EU 1380/2013

EU Regulation on the Prevention and Management of the Introduction and Spread of Invasive Alien Species (1124/2014)

EU Floods Directive (2007/60/EC)

EU Action Plan for reducing incidental catches of seabirds in fishing gears

National

Marine and Coastal Access Act (2009)
Our Seas – a shared resource. High Level Marine Objectives (2009)
Marine Policy Statement (2011)
Defra’s MCZ designation programme under the Marine and Coastal Access Act (2009)
National Policy Statements for Energy (2011)
National Planning Policy Framework (2012)
Working with the grain of nature: a biodiversity strategy for England (2002)
Marine Strategy Part 1: UK Initial Assessment and Good Environmental Status (2012)
Conservation of Habitats and Species Regulations (2010)
Habitats Directive Implementation Review (2012-2013)
Mainstreaming sustainable development: The Government’s vision and what this means in practice (2011)
Other relevant initiatives
Biodiversity: UK Action Plan (1995, 2005)
UK Government Sustainable Development Strategy: Securing the Future (2005)
Safeguarding our Seas: A Strategy for the conservation and sustainable development of our marine environment (2002)
Invasive non-native species framework strategy for Great Britain
Review of Marine Nature Conservation (DEFRA 1999 onwards) and response, Safeguarding Sea Life (2005)
Charting Progress 2 – An Assessment of the State of UK Seas (2010)
NERC Marine Environmental Mapping Programme (MAREMAP)
Biodiversity 2020: A strategy for England’s wildlife and ecosystem services
UK National Ecosystem Assessment (2011)
The Natural Environment White Paper (2011)
Wildlife and Countryside Act (1981) as amended
Countryside and Rights of Way Act (2000)
Defra’s Revised Approach to Managing Commercial Fisheries within European Marine Sites in England (2013)
Planning Act (2008)
Salmon Act (1986)
The Environmental Damage (Prevention and Remediation) Regulations (2009)
The Offshore Petroleum Activities (Conservation of Habitats) Regulations (2001)

Local

Shoreline management plans

Durlston Head to Rame Head
Hurst Spit to Durlston Head (Poole & Christchurch Bay SMP)
Selsey Bill to Hurst Spit (North Solent)
Isle of Wight
Beachy Head to Selsey Bill
South Foreland to Beachy Head
Marine Aggregate Levy Sustainability Fund (MALSF) Regional Environmental Characterisations, including the South Coast and Eastern English Channel studies
The C-SCOPE Marine Plan

Local biodiversity action plans

Kent
Hampshire

Eastleigh Borough
Isle of Wight
Dorset Biodiversity Strategy
EA South Wessex Area
Purbeck
Teignbridge
The Nature of Devon: A Biodiversity Action Plan
Torbay

135. Three pieces of legislation together provide for the designation and protection of European sites and the protection of European Species in the UK and UK waters. These are the Conservation of Species and Habitats Regulations (2010), The Wildlife and Countryside Act (1981), and The Offshore Marine Conservation Regulations (2007). The JNCC identifies, monitors and advises on how protected areas are run in the offshore area.
136. The Conservation of Species and Habitats Regulations 2010 consolidates the Conservation (Natural Habitats, &c.) Regulations 1994 and also implements relevant aspects of the Marine and Coastal Access Act 2009, principally the transfer of certain licensing functions from Natural England to the Marine Management Organisation (MMO), and the recognition of marine enforcement officers to enforce offences under the Habitats Regulations. Under the Conservation of Species and Habitats Regulations 2010, Regulation 35 (formerly 33 in the 1994 Regulations) there is a requirement that Natural England produce advice for relevant authorities on the conservation objectives and activities likely to cause deterioration or disturbance to habitats and/or species associated with Natura 2000 and Ramsar sites.
137. The Offshore Marine Conservation (Natural Habitats and Countryside) Regulations 2007 (as amended) applies to both the Habitats Directive and the Wild Birds Directive beyond territorial waters (beyond 12nm).
138. Following the publication of the Natural Environment White Paper, *The Natural Choice: securing the value of nature* (2011), a review of the implementation of the Habitats and Wild Birds Directives, identified four areas for change: facilitating nationally significant infrastructure projects, improving implementation processes and streamlining guidance, improving the quality, quantity and sharing of data, and improving the customer experience. A summary of measures to achieve this is on page 4 of the Habitats and Wild Birds Directives Implementation Review report. The white paper and review, like the National Planning Policy Framework, are consistent with the UK Government's approach to Sustainable Development.
139. Directive 2004/35/EC on environmental liability with regard to the prevention and remedying of environmental damage (transposed through the Environmental Damage (Prevention and Remediation) Regulations 2009) applies to environmental damage caused to *inter alia* species and habitats protected at the community level, i.e. those covered under the Birds and Habitats Directives.
140. The Wildlife and Countryside Act 1981 (as amended) (WCA) is one of the principal pieces of legislation relating to nature conservation in Great Britain (such as implementing the Wild Birds Directive). Although protection under the WCA generally includes adjacent territorial waters (12 nautical miles), for certain species, protection is limited to 6nm from coastal baselines due to the interaction with the Common Fisheries Policy and for the designation of marine nature reserves out to 3 nautical miles. The WCA is supplemented by various other pieces of legislation including the Countryside and Rights of Way (CRoW) Act 2000. This legislation provides for the protection of species and the designation of nationally important Sites of Special Scientific Interest (SSSI). Many SSSIs are also designated as European Sites. SSSIs have until present

extended only to mean low water (such as intertidal areas), though the Marine and Coastal Access Act 2009 has allowed for the all new SSSIs to extend below this line. The Marine Strategy Framework Directive (transposed by The Marine Strategy Regulations 2010) establishes a framework within which Member States must take measures to achieve or maintain good environmental status (GES) in the marine environment by 2020. There is an overlap in the geographical scope of the WFD and MSFD, as WFD coastal waters extend to 1nm offshore, and MSFD water bodies include the area up to the coast. The MSFD explicitly includes a provision for this overlap (MSFD, paragraph 12), whereby GES should only include biodiversity aspects not already covered by the WFD (e.g. litter, noise, and some aspects of biodiversity). However, ongoing initiatives through WFD and related Directives (e.g. the Nitrates Directive and Urban Waste Water Treatment Directive) should help to achieve GES relating to contaminants, eutrophication and hydrographic processes (MSFD Descriptors 5, 7 and 8) within 1nm.

141. As part of the implementation of the MSFD, the UK Government released the, Marine Strategy Part 1: UK Initial Assessment and Good Environmental Status (2012). The strategy includes an initial assessment of UK seas, primarily derived from work undertaken for Charting Progress 2, and an outline of the characteristics of good environmental status (GES) for each MSFD descriptor, and targets and indicators which may be used to achieve and monitor progress towards GES. This assessment concluded that for species, GES is not being achieved at this time. A draft of the UK Marine Monitoring Programmes proposed to measure progress towards achieving GES was consulted upon in February 2014, which were established in July 2014 and are to be operational by 2016. Included in MSFD measures to achieve GES is the establishment of a well-managed cohesive network of Marine Protected Areas (MPAs) which is intended to build on the areas already protected as European marine sites under the Wild Birds and Habitats Directives. The Marine and Coastal Access Act 2009 will aid the completion of such a network of MPAs, which is also a requirement of similar commitments regarding MPAs under international conventions such as the Convention on Biological Diversity. These sites, Marine Conservation Zones (MCZs) in England and Wales and Marine Protected Areas (MPAs) in Scotland, are administered at the local level in each UK constituent country.
142. The MCZ project in England and in Welsh offshore waters (i.e. outside 12nm) was delivered through four regional projects, with the Balanced Seas and Finding Sanctuary projects covering the South inshore and South offshore plan areas. Recommended MCZs were selected based on their diversity of nationally rare or threatened habitats and/or species, habitats and/or species that are representative of the biodiversity of UK seas, and geological and geomorphological features. Formal advice on the recommended sites was submitted to Defra in 2011 from the Statutory Nature Conservation Bodies, with impact assessments and project recommendations submitted in 2012. 127 recommended MCZs (rMCZs), including reference areas, were submitted. Public consultation on 31 rMCZs considered for designation took place in December 2012. This first tranche saw the designation of 27 sites in November 2013. The sites and their features are shown in Figure C6 and Table C4. A list of 37 candidate rMCZs selected for the second tranche was released in February 2014 and is due for public consultation early 2015 (see Table C4). Following this there will be a third and final tranche of designation in 2016 and the intention is to have a network of sites (protected under European and National legislation) by 2020. To date the vast majority of designated conservation sites in the UK have been terrestrial or terrestrial with marine components, with just twenty being entirely marine. However, a number of offshore sites have been notified as candidate Special Areas of Conservation (cSACs) and accepted by the European Commission as Sites of Community Importance (SCI). All offshore sites are in the process of being designated. Work is underway to identify and extend a number of marine SPAs with the aim of affording additional protection such as the inclusion of bird foraging ranges. These sites, and those sites to arise from the designation of MCZs, are a key step in extending the network of national and European sites into offshore waters and the creation of an ecologically coherent network of marine protected areas.

143. More generally, the high level marine objectives agreed by the UK Government and devolved administrations set out an approach to the sustainable use of UK seas, including the recognition that healthy marine habitats and ecosystems, species and biodiversity should be maintained and where appropriate recovered. The Marine Policy Statement (MPS) builds upon these principles, stating, "As a general principle, development should aim to avoid harm to marine ecology, biodiversity and geological conservation interests (including geological and morphological features), including through location, mitigation and consideration of reasonable alternatives. Where significant harm cannot be avoided, then appropriate compensatory measures should be sought."⁶⁶ The MPS also recognises the importance of statutory designations, and the legal protection afforded to such sites. The MPS, published in March 2011, is wide reaching and provides a policy steer for marine decision makers (primarily the MMO but also those involved in NSIPs, see below) in relation to most marine activities. More widely and in relation to all marine activities, high level environmental considerations are provided by reaffirming the conservation responsibilities of the UK Government which are to be taken account of in the preparation of marine plans.
144. Although the UK Biodiversity Action Plan (UK BAP) has been succeeded by the UK Post-2010 Biodiversity Framework the list of priority habitats and species remains a useful reference for local authority decision-makers. A number of species (1,150) and habitats (65) have been identified as priorities for conservation action in the UK; 28 BAP habitats are marine. Though the plans for these species and habitats have no statutory status, they are given some legal basis in the Countryside and Rights of Way Act 2000 and the Natural Environment and Rural Communities Act 2006 (e.g. list of species of principal importance under Sections 41 and 42 of the Act).
145. In 2010 the EU published guidance on the development of wind farms in accordance with EU nature legislation, specifically Natura 2000 aimed at (among others) planners, developers and consultants. In addition to planning guidance and policy background, the document identifies potential impacts arising from both onshore and offshore wind farms on birds, bats and aquatic species (such as cetaceans), and how strategic planning can help to avoid or minimise environmental conflicts. National Policy Statements (NPSs) are aimed at providing a policy steer for nationally significant infrastructure projects (NSIPs) as detailed in the Planning Act 2008. Those which are of close relevance to marine planning are:
- Overarching National Policy Statement for Energy (EN-1);
 - National Policy Statement for Renewable Energy Infrastructure (EN-3);
 - National Policy Statement for Gas Supply Infrastructure and Gas and Pipelines (EN-4); and
 - National Policy Statement for Ports.
146. Each NPS was subject to an Appraisal of Sustainability (AoS) incorporating Strategic Environmental Assessment (SEA) and Habitats Regulations assessment (HRA). The Overarching National Policy Statement for Energy (EN-1) addresses policy in relation to, amongst other considerations, generic biodiversity impacts, whereas the energy specific policy statements contain more detailed considerations, although still at a high policy level. Each NPS contains considerations relevant to potential impacts on the natural environment, including that within the remit of the draft plan/programme, such as birds, marine mammals, fish and intertidal habitats. Decisions made by the relevant authority with regards to NSIPs must also be taken with regard to the MPS and any relevant Marine Plan. The population status of a number of commercial fish species (fish stocks) is a nature conservation and fisheries concern. An indicator of the proportion of finfish

⁶⁶ Defra (2011). Marine Policy Statement, pg 18

stocks around the UK at full reproductive capacity (see HM Government 2005⁶⁷) has been calculated for 20 fin-fish stocks for which the International Council for the Exploration of the Sea (ICES) provide quantitative advice on sustainability⁶⁸, the ICES website⁶⁹ includes the 2014 advice. These include demersal groundfish (cod, haddock, saithe, hake), flatfish (sole, plaice), and pelagic (mackerel, herring) fisheries. The status of a further 23 finfish stocks harvested in UK waters has not been calculated due to inadequate data and modelling, or new data requiring developmental work. From 2008, ICES have provided advice on elasmobranchs (sharks and rays) for the Northeast Atlantic⁷⁰. The MMO has an online archive covering statistics of the state of the principal UK stocks from 1866-2011. The last published report is UK Sea Fisheries Statistics 2012⁷¹.

147. Commercial fisheries are managed under the Common Fisheries Policy (CFP), with total allowable catches (TAC) forming a key part of the policy in relation to fish stock management. These are agreed by member states, and based on the ICES advice referred to above. In December 2013 a deal to reform the CFP was agreed by the EU Parliament became law on 1st January 2014. Reforms include a ban on discards, a legally binding commitment to fishing at sustainable levels, and decentralised decision making, allowing Member States to agree the measures appropriate to their fisheries. Reformation of the CFP should contribute to sustainable fisheries management, and also nature conservation – for instance achieving good environmental status under the MSFD (such that all commercially exploited fish and shellfish populations are within safe biological limits, exhibiting a population age and size distribution indicative of a healthy stock).
148. The revised approach to the management of commercial fisheries in European Marine Sites (EMS) was introduced by the Department for Environment, Food and Rural Affairs (Defra) in English inshore and offshore waters⁷² in August 2012. This approach is being implemented using an evidence based, risk-prioritised, and phased basis. Risk prioritisation is informed by using a matrix of the generic sensitivity of the sub-features of EMS to a suite of fishing activities as a decision making tool. These sub-feature-activity combinations have been categorised according to specific definitions, as red, amber, green or blue⁷³.
149. Activity/feature interactions identified within the matrix as red risk were identified as highest priority, with implementation of management measures being required by the end of 2013. Activity/feature interactions identified within the matrix as amber risk require a site-level assessment to determine whether management of an activity is required to conserve site features. Activity/feature interactions identified within the matrix as green also require a site level assessment if there are “in combination effects” with other plans or projects. If assessments highlight that additional management measures are required to prevent deterioration of features, these need to be in place by the end of 2016. Site

⁶⁷ HM Government (2005). Securing the Future. The UK Government Sustainable Development Strategy. Cm 6467, March 2005. 186pp.

⁶⁸ MMO (2011). UK Sea Fisheries Statistics 2010. Marine Management Organisation.

⁶⁹ ICES website (accessed: 13th March 2014). <http://www.ices.dk/community/advisory-process/Pages/Latest-Advice.aspx>

⁷⁰ Defra (2010). Charting Progress 2: An assessment of the state of UK seas. Published by the Department for Environment Food and Rural Affairs on behalf of the UK Marine Monitoring and Assessment Strategy community, London, 194pp.

⁷¹ MMO website(accessed: 13th March 2014)<http://www.marinemangement.org.uk/fisheries/statistics/annual.htm>

⁷² Overarching Policy and Delivery paper: <https://www.gov.uk/government/publications/revised-approach-to-the-management-of-commercial-fisheries-in-european-marine-sites-overarching-policy-and-delivery>

⁷³ <https://www.gov.uk/government/publications/fisheries-in-european-marine-sites-matrix>

level assessments are being carried out in a manner that is consistent with the provisions of Article 6 of the Habitats Directive to determine whether fishing activities are having an adverse effect on the integrity of the site.

150. The first phase of the approach ('red risk') has been completed by the Inshore Fisheries and Conservation Authorities (IFCAs) who predominantly manage fisheries in the 0–6nm limit and Marine Management Organisation (MMO) who manage the 6–12nm limit, and support Defra in managing the 12–200nm limit. The 10 IFCAs have introduced 13 new byelaws and MMO have introduced four byelaws⁷⁴ to predominantly protect sensitive habitats and species from bottom-towed gears. For offshore sites (12–200nm) Defra will submit proposals to the European Commission in accordance with the common fisheries policy for agreement with other member states to ensure that appropriate management measures are implemented. The MMO is assisting Defra in this process and in discussions with other member states regarding the management of offshore MPAs.
151. The MMO has jurisdiction to manage recreational activities in the 0-12nm limit however IFCAs may also introduce byelaws in their districts as required for activities such as recreational angling. The IFCAs and the Environment Agency have responsibilities for freshwater and diadromous species out to 6nm⁷⁵.
152. In addition to threats posed from marine development and climate change, the marine environment has been subject to a number of introduced species which have led to localised changes in community composition. The introduction of alien non-native species is a substantial threat to biodiversity and may be accentuated by predicted climate change. A number of national and international initiatives aim to recommend and introduce safeguards to limit the transport of invasive species, including the GloBallast Partnership Programme and the Invasive Non-native Species Strategy for Great Britain.

What is the current situation?

Plankton

153. The plankton community may be broadly divided into plant (phytoplankton) and animal (zooplankton) components. Zooplankton abundance increases in response to greater phytoplankton abundance. However, the time-lag between phytoplankton bloom and peak zooplankton abundance is dependent on both the species composition and oceanographic conditions. Plankton are key producers and primary consumers in marine ecosystems and so population changes will have impacts on organisms at higher trophic levels, with important environmental and economic consequences.
154. The plankton community in the eastern English Channel is distinct from that further west. The eastern Channel waters are relatively shallow and well mixed due to strong tidal streams⁷⁶ and have a lower biomass of plankton than further west. As a result of low overall plankton biomass, harmful algal blooms are not very common in the English Channel. The most abundant plankton species include; the diatoms *Thalassiosira*, *Rhizosolenia* and *Chaetoceros* (*Hyalochaete* and *Phaeoceros*) and the dinoflagellate species *Ceratium fusus* and *Ceratium tripos*⁷⁷. Dinoflagellates are dominant in January and August with peak abundances in July and August. However it is the diatoms which are dominant for the majority of the year with abundance peaking in April and May. The

⁷⁴ <https://www.gov.uk/planning-development/protected-sites-species>

⁷⁵ Section 153 MaCAA: http://www.legislation.gov.uk/ukpga/2009/23/pdfs/ukpga_20090023_en.pdf

⁷⁶ JNCC (2004). Developing regional seas for UK waters using biogeographic principles. Report by Joint Nature Conservation Committee to the Department for Environment, Food and Rural Affairs (DEFRA), 12pp.

⁷⁷ Johns D (2008). Plankton report for Strategic Environment Assessment Area 8. Report to the Department of Trade and Industry. The Sir Alister Hardy Foundation for Ocean Science (SAHFOS), 44pp.

zooplankton community comprises of the large copepods *Calanus helgolandicus* and *Calanus finmarchicus* as well as *Paracalanus* spp., *Pseudocalanus* spp., *Acartia* spp., *Temora* spp. and cladocerans such as *Evadne* spp. The large copepod species have seen a change in abundance throughout the north east Atlantic with *C. finmarchicus* experiencing a long period of decline while *C. helgolandicus* has simultaneously increased, correlating with warming of waters⁷⁸.

Benthos

155. Benthos refers to the animals (fauna) and plants (flora) that live on, in or near the seabed. The benthic zone is a fundamental part of the marine ecosystem, critical to nutrient cycling and of major importance as a food resource for humans, fish, birds and other animals. The benthic zone provides an area for spawning, foraging and refuge for various fish species, including several commercially important species. It is the ultimate sink for discharged and spilled materials and benthic habitats can function in the removal of contaminants from the water. Benthic flora, whether algal or macrophyte (sea grasses) also have an important influence on the productivity and structure of some habitats and communities, for example through sediment stabilisation in the case of sea grass beds, or spatial complexity and provision of cryptic habitats in the case of kelp forests. Although confined to relatively shallow water depths (because of light attenuation), benthic flora are a major source of the organic detritus, a key energy source for benthic faunal communities from the intertidal to abyssal depths.
156. The English Channel is of geologically recent origins and has been a fully marine environment for about 5000 years. Benthic fauna have colonised and developed within the Channel from Arctic to the current temperate boreal conditions⁷⁹. There is a marked difference in the oceanographic characteristics of the eastern and western Channel with a transitional area in the region around 2°-3°W. The Western Channel is characterised by deeper waters that stratify in the summer months, creating a thermocline and encouraging primary production. In the autumn when the thermocline breaks down there is an input of carbon and nutrients to the benthos. The eastern Channel is shallower and so remains well mixed throughout the year, which means it also appears less productive than the west. Tidal flows within the Channel influence the physical characteristics of the seabed. A divergence in net tidal flow towards the east and west creates a bed-load parting zone between the Isle of Wight and Contentin Peninsula (France). Continual sorting of sediments has left coarse-grain deposits in the parting zone itself and progressively finer sediments to the east and west. These characteristics influence the benthic communities present, which also differ between east and west, with a central transitional zone (see Annex E). The Channel can also be considered a biogeographical transition zone for many benthic species, forming a boundary between north and south biogeographical provinces.
157. Quantitative studies of the benthos and seabed in the English Channel have been undertaken over the last 100 years. Initially these studies focused on fisheries ecology and biogeographical patterns of species distribution. More recently studies have been undertaken to meet requirements for periodic, sea-wide assessments of quality status to meet international obligations, such as those under OSPAR, ICES and EU auspices. Broadscale characterisation of seabed habitats and their biological communities within several UK regions has been funded through the Marine Aggregate Levy Sustainability Fund (MALSF) and published as a series of Regional Environmental Characterisations (RECs)⁸⁰. The South Coast REC focused on the central English Channel and provides

⁷⁸ ICES (2013). ICES Zooplankton Status Report. ICES Cooperative Research Report No.318 Special issue.

⁷⁹ James JWC, Coggan RA, Blyth-Skyrme VJ, Morando A, Birchenough SNR, Bee E, Limpenny DS, Verling E, Vanstaen K, Pearce B, Johnston CM, Rocks KF, Philpott SL and Rees HL (2007). The Eastern English Channel Marine Habitat Map. Science Series Technical Report no.139. Cefas Lowestoft. 191pp

⁸⁰ James JWC, Pearce B, Coggan RA, Arnott SHL, Clark R, Plim JF, Pinnion J, Barrio Frójan C, Gardiner JP, Morando A, Baggaley PA, Scott G, Bigourdan N (2010). The South Coast Regional Environmental Characterisation. British Geological Survey Open Report OR/09/51. 249pp

integrated broadscale seabed maps in order to assist the management of offshore resources and activities. The basis of the maps was a regional assessment of the physical, biological and archaeological environment. Figure E1 in Annex E illustrates the distribution of broadscale seabed habitats across the South marine plan areas at levels two and three of the European Nature Information System. This map is at a relatively coarse scale, the levels are a hierarchical system where level 1 contains very broad descriptions of physical habitats moving to level 5, which describes detailed biotopes (physical habitat and associated biological community)⁸¹. Figure E1 in Annex E illustrates the distribution of broadscale seabed habitats across the South marine plan areas at level three of the European Nature Information System (EuNIS) marine habitat classification. This map is at a relatively coarse scale, the levels are a hierarchical system where level 1 contains very broad descriptions of physical habitats moving to level 6, which describes biotopes (physical habitats and associated biological community). Figure E1 displays data from JNCC's UK SeaMap 2010⁸² along with data from local habitat surveys⁸³ collated by JNCC and published on the EMODnet Seabed Habitats portal (formerly the 'Mapping European Seabed Habitats' (MESH) portal), areas in white indicate data gaps⁸⁴.

158. More detailed data exists for inshore rather than offshore faunal communities. Nearshore sediments are generally mixed, formed from variable amounts of sand, gravel and cobble mixed with broken shell. In some areas the mixed sediment can be stable (particularly during summer months), allowing colonisation by a rich variety of plant and animal life, such as the native oyster (*Ostrea edulis*), blue mussel (*Mytilus edulis*), short-snouted seahorse (*Hippocampus hippocampus*) and long-snouted seahorse (*Hippocampus guttulatus*). These species are given protection by the recent designation of MCZs in the South inshore plan area (see Table C4 for a full list of MCZ and qualifying features). The areas of the South marine plan area furthest offshore are largely featureless plains of bimodal sandy gravel and broken shell which support diverse marine infauna and mobile and sessile epifauna.
159. The benthic communities present are primarily defined by the underlying substrate⁸⁵. Therefore below is a general description of the substrate types and associated habitats and communities running from the western end of the plan area (beginning at Dartmouth) to the east of the plan area (terminating at Folkestone). This description follows the broadscale seabed habitat classification in Figure E1 (Annex E)

Dartmouth to Bournemouth

160. The inshore area off Dartmouth is predominantly sublittoral mud, moving further offshore is an area of sublittoral mixed sediments. This area also has patches of infralittoral rock of moderate energy (suitable for macro algal growth). Moving east, Lyme Bay contains rocky reefs which have highly diverse benthic communities, with erect sponges, soft corals and bryozoans⁸⁶. Of the benthic species found on the reefs two are of special

⁸¹ It should be noted that there are many different schemes under which habitats and biotopes can be categorised and mapped (eg Habitats Directive, OSPAR, FOCI, Wildlife and Countryside Act), also that there are important habitats at different scales (eg sea grass beds and biogenic reef), many which are not shown in Figure FX.

⁸² UK SeaMap 2010 predicted the presence and extent of physical habitats in UK marine waters by overlaying physical data layers and translating the physical descriptions to EUNIS habitats. The physical layers used were: substrate, biological zones, (made up of bathymetry, light penetration and depth to wave base), kinetic energy (made up of tidal current and wave-generated kinetic energy), bio geographic zone (derived from bathymetry layer) and salinity.

⁸³ An overview of this process can be found here: www.searchmesh.net/Default.aspx?page=1921.

⁸⁴ MMO (2014) South Inshore and South Offshore Marine Plan Areas: South Plan Analytical Report (SPAR) (online) available from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/358893/south_spar.pdf (Accessed 13/11/14)

⁸⁵ James JWC, Pearce B, Coggan RA, Arnott SHL, Clark R, Plim JF, Pinnion J, Barrio Frójan C, Gardiner JP, Morando A, Baggaley PA, Scott G, Bigourdan N (2010). The South Coast Regional Environmental Characterisation. British Geological Survey Open Report OR/09/51. 249pp

importance for their rarity within UK waters: the pink sea fan (*Eunicella verrucosa*) and sunset corals (*Leptopsammia pruvoti*). The pink seafan is the only species of gorgonian found in English waters and is found across the reefs, on stable boulders and bedrock deeper than 20 metres. It is not known beyond 12nm. One of the best UK populations of sunset corals (*Leptopsammia pruvoti*) is found on the Saw-tooth Ledges. This species is rare within British waters, confined to southern and western locations.

161. Past Lyme Bay to Bournemouth the inshore plan area is a mixture of sublittoral coarse sediments and mixed sediments, with the inshore area around Poole Bay being sublittoral sand. In areas where these mixed sediments are stable, a rich variety of plant and animal species occur⁸⁷. Outcrops of hard rock and boulder reef structures also occur, such as at the Purbeck coast where the reef (an Annex I feature) has been given an SCI designation. The site contains limestone reef structures of many forms, supporting diverse sponge and sea fan communities as well as dense brittlestar (*Ophiothrix fragilis*) beds.
162. The South offshore plan area in this section is predominantly coarse gravel and mixed sediments. Generally these are more sheltered habitats and therefore support diverse benthic communities both on the surface and within the sediment

Isle of Wight to Selsey Bill

163. The Solent is a relative deep, sheltered, inshore area where the sediments are muddy and silty. Sheltered, muddy gravels are extensive in the Solent, but are rare in the UK as a whole and are a UK BAP habitat. The muds of the Solent are dominated by polychaete worms and molluscs. Large areas of the benthic habitat in the Solent have been dramatically modified by the non-native, invasive slipper limpet (*Crepidula fornicata*). The Solent is also one of the few known British strongholds of the nationally scarce mantis shrimp, which lives in pipe-shaped burrows in fine and sandy mud. In areas with strong currents, gravel beds exist, which are amongst the UK's most diverse marine habitats. This habitat provides a wide range of microhabitats for both sessile and mobile species because of the large particle size. In shallow water, gravel provides a substrate for the attachment of algae, while in deeper waters a dense and diverse attached fauna of sponges, sea squirts, anemones, sea-mats, hydroids and polychaetes can be found. In addition to these habitats the Solent is one of the few sites in the UK where all three species of eelgrass (*Zostera marina*, *Z. noltii* and *Z. angustifolia*) have been recorded. Of these *Z. marina* is the species that is predominantly found in the sublittoral zone. There are major concentrations of eelgrass around the coastline of the Isle of Wight, although this is not fully mapped at present. This habitat is also found in the Eastern harbours of the Solent (Langstone Harbour, Portsmouth Harbour and Chichester Harbour), two of which (Langstone and Chichester Harbours) are within the Solent Maritime SAC.
164. The remaining sediment type in this area is sublittoral coarse sediment, or sands and gravels. This is the most common subtidal habitat around the coast of the UK and covers extensive subtidal and offshore areas of the eastern English Channel¹. The diversity of flora and fauna within these habitats depends upon the level of environmental stress to which they are exposed⁸⁸. Of note within this central part of the inshore South plan area

⁸⁶ Mangi, SC, Gall SC, Hattam C, Rees S, Rodwell L.D. 2011. Lyme Bay – a case-study: measuring recovery of benthic species; assessing potential “spillover” effects and socio-economic changes; 2 years after the closure. Assessing the socio-economic impacts resulting from the closure restrictions in Lyme Bay. Final Report 2. June 2011. Report to the Department of Environment, Food and Rural Affairs from the University of Plymouth-led consortium. Plymouth: University of Plymouth Enterprise Ltd. 119 pages.

⁸⁷ James JWC, Pearce B, Coggan RA, Arnott SHL, Clark R, Plim JF, Pinnion J, Barrio Frójan C, Gardiner JP, Morando A, Baggaley PA, Scott G, Bigourdan N (2010). The South Coast Regional Environmental Characterisation. British Geological Survey Open Report OR/09/51. 249pp

⁸⁸ James JWC, Pearce B, Coggan RA, Arnott SHL, Clark R, Plim JF, Pinnion J, Barrio Frójan C, Gardiner JP, Morando A, Baggaley PA, Scott G, Bigourdan N (2010). The South Coast Regional Environmental Characterisation. British Geological Survey Open Report OR/09/51. 249pp

is the east side of Chichester Harbour, where a 25m sand 'cliff', cemented together by *Sabellaria spinulosa* reef (a UK BAP Habitat) is located.

165. South of the Isle of Wight there is an extensive area of high energy circalittoral rock covering an area of approximately 1100km². This benthic habitat qualified for designation as SAC with Annex I feature reef habitats (see Table C4), with two areas designated, one within the inshore plan area and one within the offshore plan area. The South Wight Maritime SAC encompasses the south coast of the Isle of Wight and was designated on account of its variety of reef types and associated benthic communities, including limestone, chalk and sandstone reefs. The Wight-Barfleur Reef SAC is a 65km long and 26km wide area designated within the South offshore plan area. The large area of bedrock reef within this SAC is characterised by a series of well-defined exposed bedrock ridges (up to 4m high). The bedrock and stony reef areas support a diverse range of reef fauna, with many types of sponges (both encrusting and larger branching types), tube worms, anemones and tunicates present. The faunal communities present are characteristic of high and moderate energy circalittoral rock and the only known example in offshore waters within the English Channel. It is thought that further areas of rocky reef exist outside of this site boundary, however no ground-truthing has yet been carried out to confirm this. More detailed information about the benthic communities present within this SAC is available within the SAC Assessment Document published by JNCC⁸⁹.

Selsey Bill to Folkestone (Eastern English Channel)

166. From Selsey Bill to Folkestone the South inshore plan area is predominantly rocky substrate, with areas of sublittoral sand and gravel sediments. There are also several areas of sublittoral biogenic reef habitat. James *et al.* (2010) mapped the habitats of the eastern Channel from Selsey Bill to Dungeness using a combination of grab samples, beam trawl and video stations. Seabed substrate type was the principal physical/environmental factor controlling the nature and composition of benthic communities. Much of the seabed was found to be of gravelly sand interspersed with areas of gravel and pebble which support colonial and encrusting fauna such as the bryozoans and hydroids; these in turn support diverse communities of species such as *Ophiura albida*, *Asterias rubens*, barnacles, hermit crabs and *Aequipecten opercularis* (queen scallop). Crustacean and polychaete species in these gravelly sand regions are diverse and abundant, as are small fish species. Further east, gravel gives way to a visually barren region of shelly, gravelly sand and sand with species such as the small sea urchin *Echinocyamus pusillus*, the bivalve *Abra prismatica* and occasionally on large particles the tube worm *Pomatoceros* spp.
167. The sediment composition of the South offshore plan area in this region is predominantly coarse sediment and sand, with outcrops of low energy rock. Benthic faunal communities here will be subject to less natural disturbance than inshore areas. Therefore a greater diversity of marine fauna should exist, which may include a wide range of anemones, polychaete worms, bivalves, amphipods and both mobile and sessile epifauna⁹⁰.

Fish and shellfish

Fish

168. A number of recent studies have surveyed and defined fish assemblages in the English Channel which, unlike the North Sea, did not have regular and systematic surveys of fish

⁸⁹ Offshore Special Area of Conservation: Wight-Barfleur Reef. SAC Selection Assessment Document. Version 7.0. JNCC, 2012. Available from:

http://jncc.defra.gov.uk/PDF/WightBarfleur_SelectionAssessmentDocument_V7_0.pdf (Last Accessed 30/10/14)

⁹⁰ James JWC, Coggan RA, Blyth-Skyrme VJ, Morando A, Birchenough SNR, Bee E, Limpenny DS, Verling E, Vanstaen K, Pearce B, Johnston CM, Rocks KF, Philpott SL and Rees HL (2007). The Eastern English Channel Marine Habitat Map. Science Series Technical Report no.139. Cefas Lowestoft. 191pp

communities until the 1980s. However, Rogers and Ellis⁹¹ provide a comparison of data with populations in 1901/1902 for Start Bay (Devon), and the Marine Biological Association has been monitoring fish populations around Plymouth (west of the South marine plan areas) annually since 1913⁹².

169. The fish community in the eastern English Channel is similar to that of the southern North Sea, with some species migrating between the two regions. The Channel supports a highly diverse species of invertebrates which are prey for small gadoid species such as bib (*Trisopterus luscus*) and poor cod (*Trisopterus minutus*), along with other demersal species such as thickback sole (*Microchirus variegatus*) and red gurnard (*Aspitrigla cuculus*)⁹³. In general, the region's fish assemblages are spatially structured with lower temperatures and salinities in coastal waters favouring benthic-demersal species, while in offshore waters the assemblage is dominated by pelagic and demersal species⁹⁴. Key demersal species are whiting (*Merlangius merlangus*) and cod (*Gadus morhua*), with ling (*Molva molva*) and pollack (*Pollachius pollachius*) often found around reefs and rocky outcrops. Of the flatfishes, plaice (*Pleuronectes platessa*) and dab (*Limanda limanda*) are the most abundant in the region with important winter spawning taking place in the centre of the Channel. Pelagic species, mackerel (*Scomber scombrus*) are summer visitors to the region as they move east through to nursery and feeding grounds in the southern North Sea, although Ellis *et al.*¹⁰¹ suggest low intensity spawning occurs towards the south of the Channel. Herring (*Clupea harengus*) is abundant in the region and move closer inshore during summer and spring to reach feeding grounds. Horse mackerel (*Trachurus trachurus*) are abundant further offshore and sprat (*Sprattus sprattus*) are common in winter particularly in Lyme Bay and between Portland Bill and the Isle of Wight. Outcrops of rock such as at Kingmere Rocks and Worthing Lumps (in the Kingmere MCZ, see Figure C1) are spawning sites for black seabream (*Spondyliosoma cantharus*), which migrate into the Channel as water temperature rises in spring.
170. Demersal fish communities show a positive trend or no discernible change, climate change and the introduction of non-native species are examples of pressures that are increasing or projected to increase.
171. Charting Progress 2 identifies the English Channel as a discard 'hotspot'. Discard levels of beam trawlers were found to be highest during winter months (November-February) due to large catches of lesser-spotted dogfish (*Scyliorhinus canicula*), gurnards, dab and bib. The rate of discard by otter trawlers was highest in summer (May-July) due to large catches of a range of low-value species being discarded.
172. Charting Progress 2 concluded that fish communities in the eastern English Channel have changed little when compared to the late 1980s and early 1990s. Some bottom-living species such as spurdog and other large, slow-growing taxa now appear to be locally extinct in many regions, possibly as a result of over-fishing and other human pressures or changes in climate. In addition, assemblages appear to be changing in average length and length-at-maturity of individuals, suggesting a switch toward a community dominated by species that mature faster and breed at a smaller size. While

⁹¹ Rogers SI, and Ellis JP (2000). Changes in the demersal fish assemblages of British coastal waters during the 20th century. *ICES Journal of Marine Science* **57**: 866-881.

⁹² Southward AJ, Langmead O, Hardman-Mountford NJ, Aiken J, Boalch GT, Dando PR, Genner MJ, Joint I, Kendall MA, Halliday NC, Harris RP, Leaper R, Mieszkowska N, Pingree RD, Richardson AJ, Sims DW, Smith T, Walne AW and Hawkins SJ (2005). Long-term oceanographic and ecological research in the western English Channel. *Advances in Marine Biology* **47**: 1-105.

⁹³ Defra (2005). Charting progress: Marine habitats and species – An integrated assessment of the state of UK seas. A joint report published by the Department for Environment, Food and Rural Affairs, London, 168pp.

⁹⁴ Vaz F, Carpentier A & Coppin F (2007). Eastern English Channel fish assemblages: measuring the structuring effect of habitats on distinct sub-communities. *ICES Journal of Marine Science* **64**: 271-287.

fishing appears to a major causal factor, changes in demersal fish may also be in part a consequence of regional fluctuations in climate.

173. There are a number of aquaculture initiatives taking place in the South Marine Plan Areas. There are various spatial concentrations of aquaculture production in, for example, the Solent, Poole, the Exe, Torbay and Sidmouth with mussels, oysters, clams, cockles and scallops all being cultivated. The Mussel Farm in Lyme Bay represents the largest equipment-based aquaculture development yet seen in the UK and has an annual production of approximately 5,000 tonnes.

Elasmobranchs

174. The thornback ray (*Raja clavata*), undulate ray (*Raja undulata*) and lesser and greater spotted dogfish (*Scyliorhinus canicula* and *S. stellaris*) are present in the eastern English Channel. Large, open water species including blue sharks (*Prionace glauca*), thresher sharks (*Alopias vulpinus*) and porbeagle sharks (*Lamna nasus*) are occasionally reported. The basking shark (*Cetorhinus maximus*) is not common in this region, although occasionally sighted in waters around the Isle of Wight⁹⁵.

Diadromous species

175. Diadromous species are those which migrate between marine and freshwater as part of their lifecycle. There are no major salmon rivers in the region, although the rivers Ouse and Rother are important for sea trout. The allis and twaite shad (*Alosa alosa* and *A. fallax*) are extremely rare in this region with few individuals recorded^{96,97}.
176. Eels (*Anguilla anguilla*) are relatively abundant in the rivers of the south east of England, although sea lampreys are not abundant⁹⁵. The status of UK eel populations is a major concern and the decline in the European eel population is a matter of international concern. The Environment Agency developed a National Eel Management Strategy in 2001, and has introduced a national package of eel fishing byelaws, with the latest byelaws passed in 2010. The National Eel Management Strategy has since been replaced by 15 Eel Management Plans for each of the river basin districts (two of which encompass the South inshore area^{98,99}) in England, Wales, Scotland and Northern Ireland; these were approved by the European Commission in 2010. The Eels (England and Wales) Regulations 2009 implement the measures set out in the management plans. The regulation of eel fisheries was addressed by the Marine and Coastal Access Act 2009. The use of eel nets is authorised by the Environment Agency (previously licensed), a process that also extends to smelt, lamprey, non-native crayfish and mitten crab fisheries.

Spawning and nursery grounds

⁹⁵ Swaby SE & Potts GW (1998). Chapter 5.9. Fish: other species. In: JH Barne, CF Robson, SS Kaznowska, JP Doody, NC Davidson & AL Buck Eds. Coasts and seas of the United Kingdom.

Region 8 Sussex: Rye Bay to Chichester Harbour (Coastal Directory Series). Joint Nature Conservation Committee, Peterborough pp. 101-102.

⁹⁶ Potts GW & Swaby SE (1996). Chapter 5.9 Fish: other species. In: Coasts and seas of the United Kingdom. Region 9 Southern England: Hayling Island to Lyme Regis, ed. by J.H. Barne, C.F. Robson, S.S. Kaznowska, J.P. Doody & N.C. Davidson, 61-64. Peterborough, Joint Nature Conservation Committee. (Coastal Directories Series).

⁹⁷ Swaby SE & Potts GW (1997). Chapter 5.9 Fish: other species. In: Coasts and seas of the United Kingdom. Region 8 Sussex: Rye Bay to Chichester Harbour, ed. by J.H. Barne, C.F. Robson, S.S. Kaznowska, J.P. Doody, N.C. Davidson & A.L. Buck, 53-56. Peterborough, Joint Nature Conservation Committee. (Coastal Directories Series).

⁹⁸ Defra (2010). Eel Management plans for the United Kingdom: South East River Basin District. 30pp

⁹⁹ Defra (2010). Eel Management plans for the United Kingdom: South West River Basin District. 37pp

177. At spawning and nursery grounds, fish aggregate in large numbers and therefore are particularly vulnerable to disturbance. Spawning may take place in well-defined locations and at specific times around the UK and throughout the year. Maps, displaying approximate spawning and nursery grounds for key species in UK waters were produced by Coull *et al.*¹⁰⁰, and more recently were updated and augmented by Ellis *et al.*¹⁰¹. The timing of spawning for selected relevant species is shown in Table C3. In addition to those species shown in Table C3, Ellis *et al.* identified the South inshore and offshore marine plan areas as a low intensity nursery ground for the elasmobranch species tope (*Galeorhinus galeus*), spurdog, thornback ray, spotted ray (*Raja montagui*) and undulate ray (*Raja undulata*). While data was insufficient to determine spawning grounds of these species, it is likely that these overlap with nursery grounds.
178. Additionally, a list of 35 fish species found in the Channel (not definitive) and timing of their spawning is given in a report commissioned by the MMO¹⁰², which spatially modelled fish habitat in the South inshore and offshore marine plan areas. The report used predictive modelling¹⁰³ based on survey data to establish which areas were of higher ecological value¹⁰⁴ for selected fish species. Termed Essential Fish Habitats (EFH), these are habitats which are necessary for spawning, feeding or growth to maturity (nursery grounds). The areas with the highest frequency of EFHs were shown to be in the eastern and western extents of the South Coast marine plan areas, in front of the coasts of Devon, and of East Sussex and Kent (see areas circled in Figure C1). A higher model confidence was associated with the eastern “hotspot” area, and lower confidence in the western hotspots is likely the result of gaps in the model predictions. Some caution should therefore be placed when interpreting the model results and in considering the ecological value of the area as EFH. The western hotspot off the coast of Devon is attributed to the higher levels of adult fish foraging grounds and nursery grounds (particularly for red gurnard, thickback sole, sole (*Solea solea*) and plaice). The eastern hotspot of the South marine plan areas was primarily in the inshore area, although relatively valuable areas also occur offshore from Dungeness. These inshore and offshore areas were predicted to be of importance as foraging grounds for adult fish and for nursery of juveniles (particularly for plaice, red gurnard, thickback sole and thornback ray). Potential herring spawning in the offshore area also contributed to the ecological value of the eastern hotspot.

Table C3: Spawning periods of selected species and groups¹⁰⁵

Group	J	F	M	A	M	J	J	A	S	O	N	D
Plaice												
Sole												
Lemon sole												
Haddock												

¹⁰⁰ Coull KA, Johnstone R & Rogers SI (1998). Fisheries sensitivity maps in British waters. Report to United Kingdom Offshore Operators Association, Aberdeen.

¹⁰¹ Ellis JR, Milligan SP, Readdy L, Taylor N. & Brown MJ (2012). Spawning and nursery grounds of selected fish species in UK waters. Science Series Technical Report, Cefas Lowestoft, **147**: 56pp.

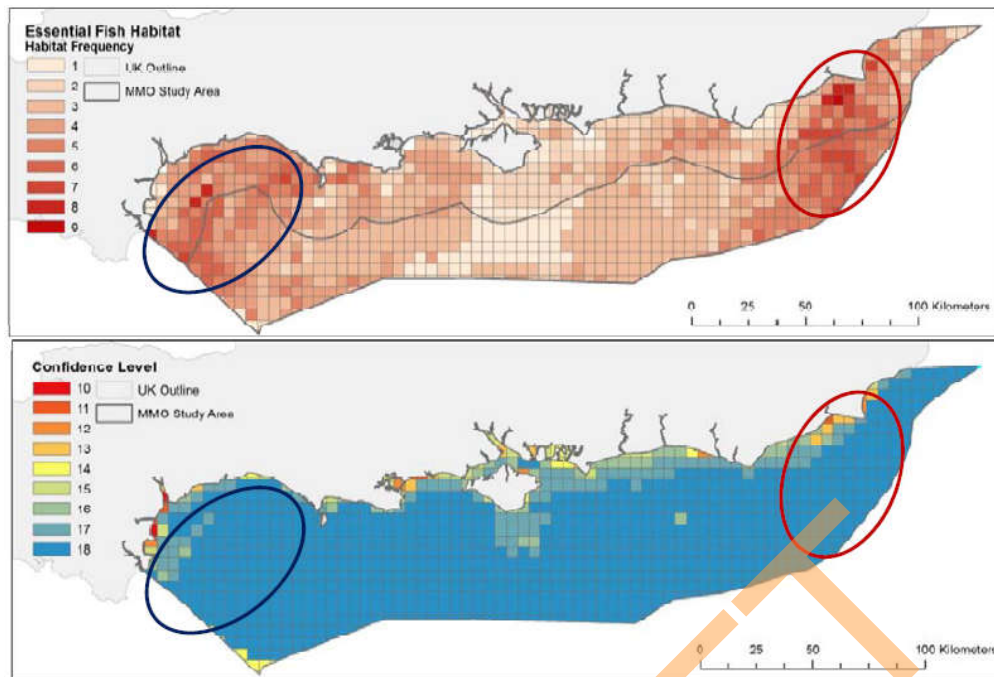
¹⁰² MMO (2013). Spatial models of Essential Fish Habitat (South Coast Inshore and Offshore Marine Plan Areas). A report produced for the Marine Management Organisation by the Institute of Estuarine and Coastal Studies, 73pp. MMO Project No: 1044. ISBN: 978-1-909452-21-3.

¹⁰³ Note that the report highlighted a number of gaps and limitations relating to species range, spatial coverage of fish survey data, fish occurrence vs. abundance, environmental inputs, confidence issues and temporal limitations, though recommendations are made to build on the study.

¹⁰⁴ MMO (2013) considered both the ecological value of the habitats in terms of providing fish habitat, maintaining the viability of fish populations and their contribution to wider ecosystem functioning, as well as socio-economic value (i.e. ecosystems goods and services). The “value” allocated to any particular area is non-monetary.

¹⁰⁵ Table derived from information in Coull *et al.* (1998) and Ellis *et al.* (2012).

Figure C1: Overall ecological value of marine areas, their associated confidence and ecological hotspots (circled).



(Source: MMO 2013)

Shellfish

179. Substantial scallop grounds are found along the coast of the South inshore plan area¹⁰⁶. Cockles, mussels, periwinkles and whelks are all present at shorelines. Crabs and lobsters are abundant on rocky ground in the region, with brown crabs typically found further offshore than lobsters. The Solent native oyster fishery is currently closed due to low numbers, with the aim of restoring stocks to healthy population levels.

Cephalopods

180. Cephalopod molluscs include squid, octopus, cuttlefish and bobtail squid (sepiolids). Among the most abundant species in the English Channel are the long-tailed squids; *Alloteuthis subulata*, *Alloteuthis media*, *Loligo forbesii*, *Loligo vulgaris*, the short-tailed squid *Todarodes sagittatus*, and the cuttlefish *Sepia officinalis* and *Sepia elegans*.
181. The common cuttlefish (*S. officinalis*) is the most important cephalopod fishery resource in UK waters and the majority of the catch is from the English Channel¹⁰⁷. The cuttlefish congregate at spawning grounds along the south coast in spring. Juveniles migrate westwards to the deeper waters of the Atlantic in autumn. The long-tailed squid *A. subulata* and *A. media* are also particularly abundant in this region and, unlike in other UK regions, they are present all year round with spawning taking place in spring, summer and autumn¹⁰⁸. *L. forbesii* also breed in the Channel during summer months. Juveniles hatch in the western English Channel and migrate eastwards through the Channel and as far as the southern North Sea, before returning to the western

¹⁰⁶ Mason J (1983). *Scallop and queen fisheries in the British Isles*. Fishing News Books Ltd, Farnham, 144pp.

¹⁰⁷ Pierce G, Young I & Wang J (2002). An overview of cephalopods relevant to the SEA 2 and SEA 3 areas. Report to the Department of Trade and Industry. Department of Zoology, University of Aberdeen, 42pp.

¹⁰⁸ Rodhouse PG, Swinfen RC & Murray AWA (1988). Lifecycle, demography and reproductive investment in the myopsid squid *Alloteuthis subulata*. *Marine Ecology Progress Series* **45**: 245-253.

approaches to spawn and die in December and January¹⁰⁹. *L. vulgaris* is more commonly caught during winter months and is more abundant in the Channel than elsewhere around the UK.

Birds

182. The South inshore plan area has a range of habitats including hard and soft cliff and estuaries, and supports a wide range of bird species, including some in nationally and internationally important numbers. The area has some suitable habitat for nesting seabirds and estuarine and soft coastal areas are notable for breeding, wintering and passage bird species. Of the 25 known UK breeding seabird species, 12 breed throughout the area in varying numbers¹¹⁰. The Mediterranean gull (*Larus melanocephalus*) has established a breeding presence along the south coast with many of its breeding sites afforded SPA designation (see Table C4). Other gulls breeding along this coastline are the herring gull (*Larus argentatus*), lesser black-backed gull (*Larus fuscus*), black-headed gull (*Chroicocephalus ridibundus*) and great black-backed gull (*Larus marinus*). Cormorants (*Phalacrocorax carbo*) and shags (*Phalacrocorax aristotelis*) also breed along the coast. Breeding seabirds, kittiwakes (*Rissa tridactyla*) and guillemots (*Uria aalge*) breed in some numbers and regularly commute offshore to feed. Kittiwakes are widely distributed in the Channel throughout the year. In winter, several thousand guillemots and puffins are present in the Channel, with concentrations increasing towards the eastern Channel. Razorbills (*Alca torda*) are also widespread, particularly in the Dover Strait and eastern Channel during winter months. Common tern (*Sterna hirundo*), little tern (*Sternula albifrons*), sandwich tern (*Thalasseus sandvicensis*) and roseate tern (*Sterna dougallii*) all breed along the coast with many colonies classified as SPAs. Table C4 is a list of relevant SPA sites and their qualifying species/assemblages.
183. Seabird numbers in coastal waters in the South offshore area are relatively low. Most breeding seabird species feed in estuaries, on exposed intertidal areas or in other shallow, inshore waters¹¹¹. However, the area is significant to a number of species, particularly for passage and wintering. It should also be noted that the area is well used by locally breeding gulls for foraging. Fulmars (*Fulmarus glacialis*) are widely distributed in the eastern Channel from November through to July. The area is internationally important for gannets (*Morus bassanus*) and great skuas (*Stercorarius skua*)¹¹² who move from the North Sea to the Channel in winter and are present during summer months. The Balearic shearwater, which is listed as critically endangered by IUCN uses the South offshore area as an immature staging area as well as being present post breeding. The Channel is a major migration route for large numbers of other species, migrating to and from breeding sites in the UK and elsewhere and wintering sites in Europe and Africa.
184. There are several notable breeding assemblages of bird species in the region. Low lying wetlands such as Pagham Harbour, Poole Harbour and Rye and Chichester Harbour support high densities of waterbirds such as garganey (*Anas querquedula*), shoveler (*Anas clypeata*), and gadwall (*Anas strepera*). Further west numerous coastal sites are

¹⁰⁹ Holme NA (1974). The biology of *Loligo forbesi* Steenstrup (Mollusca: Cephalopoda) in the Plymouth area. *Journal of the Marine Biological Association of the United Kingdom* **54**: 481-503.

¹¹⁰ Mitchell PI, Newton SF, Ratcliffe N & Dunn TE (2004). *Seabird populations of Britain and Ireland. Results of the Seabird 2000 Census (1998-2002)*. T&AD Poyser, London.

¹¹¹ Tasker ML (1998). Seabirds. In: JH Barne, CF Robson, SS Kaznowska, JP Doody & NC Davidson

Eds. *Coasts and seas of the United Kingdom. Region 6 Eastern England: Flamborough Head to Great Yarmouth*. Joint Nature Conservation Committee, Peterborough.

¹¹² Kober K, Webb A, Win I, Lewis M, O'Brien S, et al. (2010) *An analysis of the numbers and distribution of seabirds within the British Fishery Limit aimed at identifying areas that qualify as possible marine SPAs*. Joint Nature Conservation Committee Report No 431. 96p.

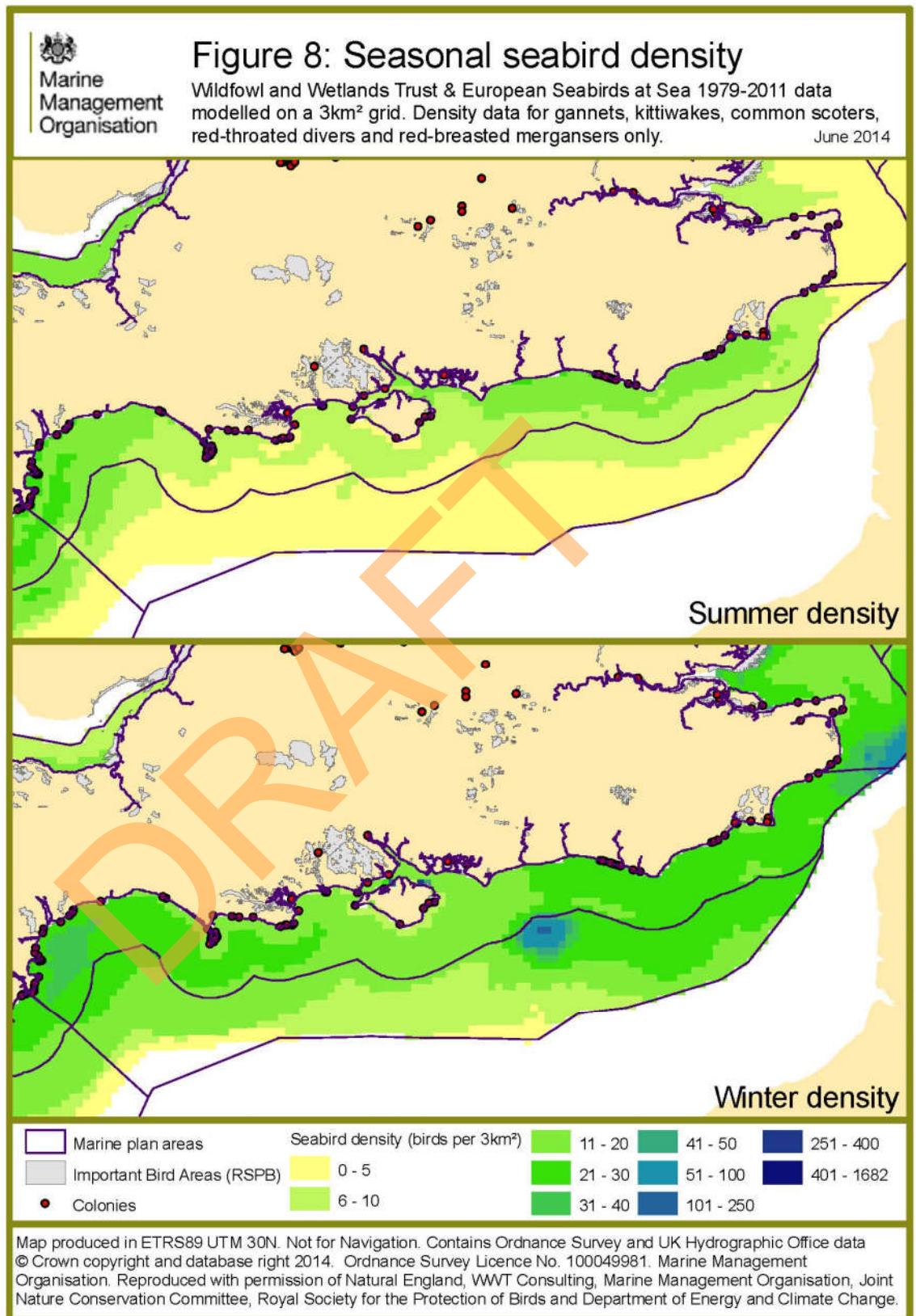
important for breeding birds, notably the redshank (*Tringa totanus*), lapwing (*Vanellus vanellus*), and oystercatcher (*Haematopus ostralegus*). The highest densities of breeding waders are on the Newtown and Beaulieu estuary, while the Solent and Isle of Wight area is a stronghold for ringed plover (*Charadrius hiaticula*) in the region.

185. On the western side of the South inshore plan area, between Bognor and the Exe, much of the coastline is estuarine or soft coast. This habitat is important for wintering and passage birds and there are many sites given SPA designation (see Table C4). The estuarine shores attract species including dark-bellied brent goose (*Branta bernicla*), dunlin (*Calidris alpina*), widgeon (*Anas Penelope*), avocet (*Recurvirostra avosetta*) grey plover (*Pluvialis squatarola*), golden plover (*Pluvialis apricaria*), knot (*Calidris canuta*), sanderling (*Calidris alba*), pintail (*Anas acuta*) and black-tailed godwit (*Limosa limosa islandica*).
186. Charting Progress 2 indicated that seabird populations have experienced declines, linked to a combination of factors including summer storms. Tern breeding numbers in particular in the eastern Channel have declined, likely due to increased predation and storms. **Figure C2: Map showing seasonal Seabird density.**

The figure below uses seabird density data gathered through a report commissioned by Natural England and further information on this data is available

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in the text published in the PLoS One journal¹¹³.



¹¹³ <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0106366>

Marine mammals - cetaceans

187. The eastern English Channel has a relatively low density and diversity of marine mammals. The most comprehensive study of cetacean distribution and abundance is the SCANS and SCANS-II programmes (Small Cetacean Abundance in the European Atlantic and North Sea) from the summers 1994 and 2005 respectively¹¹⁴. These surveys were a combination of ship-based (sightings and acoustic data) and aerial surveys. Other monitoring surveys conducted in UK waters are the Cetacean Offshore Distribution and Abundance in the European Atlantic survey (CODA) in July 2007, UK Cetaceans Strandings Investigation Programme (UK CSIP) (an obligation under ASCOBANS¹¹⁵). The South inshore and offshore areas overlap with the SCANS-II survey stratum B; estimated summer 2005 abundances of surveyed species in the combined southern North Sea and Channel were: 40,927 harbour porpoise (*Phocoena phocoena*); 395 bottlenose dolphins (*Tursiops truncatus*); 14,349 common dolphins (*Delphinus delphis*); and 1,202 minke whales (*Balaenoptera acutorostrata*). The most commonly sighted cetacean in the Channel coastal waters is the bottlenose dolphin, followed by harbour porpoise - which are difficult to observe and are rarely sighted. Further west, long-finned pilot whales and common dolphin are sighted in offshore waters; sightings are highest during autumn and early spring. An analysis of sightings from 1996-2006 suggested that winter occurrence of common dolphins in the English Channel increased slightly although the trend was not regarded as significant. A recent report by ASCOBANS¹¹⁶ identified Lyme Bay as a local 'hotspot' for white-beaked dolphins (*Lagenorhynchus albirostris*), estimating in excess of 200 animals used the bay between 2007 and 2011. This conflicts with most published assessments that the species is rare/absent in the Channel and would qualify Lyme Bay as being nationally important for the white-beaked dolphin.
188. Cucknell *et al.*¹¹⁷ identified that little was known about the presence and distribution of harbour porpoise in the Channel and over the summer of 2011 carried out a visual and acoustic survey. A total of 40 encounters with cetaceans occurred during the survey (16 visual and 24 acoustic), the majority were harbour porpoise single animals or groups (13 visual and 21 acoustic). The distribution of harbour porpoises in the Channel appeared to be linked to depth, with the majority of encounters occurring in depths of 50-100m. In addition, most of the harbour porpoise encountered occurred in the western area of the Channel, away from the major shipping lanes and shallow uniform topography of the eastern Channel.
189. Charting Progress 2 assessed the overall status of the eastern Channel as poor. There are relatively few cetaceans in this region, but it may once have been important area for harbour porpoise. The area has one of the highest densities of shipping in the world and a high density of fixed nets on its margins and these factors may have led to the decline of cetaceans.

Marine mammals - pinnipeds

¹¹⁴ SCANS-II (2008). Small cetaceans in the European Atlantic and North Sea. Final Report to the European Commission under project LIFE04NAT/GB/000245. Sea Mammal Research Unit, University of St. Andrews, 54pp

¹¹⁵ Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas.

¹¹⁶ Brereton T, Lewis K & Macleod C (2013). Lyme Bay: A recently discovered hotspot for white-beaked dolphins in the English Channel. 20th ASCOBANS Advisory Committee Meeting, Warsaw, Poland, 27-29 March 2013. AC20/Doc.4.1.c, 39-58pp

¹¹⁷ Cucknell A-C, Boisseau O, McLanaghan R & Moscrop A (2012). A final report on the presence and distribution of harbour porpoises (*Phocoena phocoena*) from visual and acoustic survey in French and British waters of the English Channel in May and June 2011. 19th ASCOBANS Advisory Committee Meeting, Galway, Ireland, 20-22 March 2012. AC19/Doc.5-02, 16pp.

190. Two species of seals live and breed around the UK, the grey seal (*Halichoerus grypus*) and the harbour seal (*Phoca vitulina*). The eastern English Channel is not a particularly important area for seals, with no major colonies of either present. Small grey and harbour seal colonies are present on the east Kent coast and seals from these colonies can be expected to be present in the South inshore and offshore areas. Reviews of seal distribution, ecology and sensitivities are undertaken by the Sea Mammal Research Unit (SMRU), University of St. Andrews and formal advice to government is given annually via the Special Committee on Seals (SCOS). The latest advice paper was published in 2012. SCOS estimates the pup production of grey seals in south west England at 250 in 2010 compared to a UK total of 50,174.
191. There is a known harbour seal haul-out site within Poole Harbour SCOS estimates a population of just 20 harbour seals in south and west England of a total population of 29,167 in Great Britain and Ireland. Analysis of telemetry data from 2001-2006¹¹⁸ showed that harbour seals frequently transited between regions. Regional differences were noted whereby trip distance and duration between haul-out sites and foraging areas were further and longer for seals on the east coast, than from the Northern Isles, west coast and the Thames. In this study an animal tagged in the Thames travelled south across the English Channel to haul-out in Saint-Valery-sur-Somme, France. Goodman¹¹⁹ identified, via genetic analyses, that during the breeding season however, there is very little movement of seals between distinct haul-out site regions.

Conservation sites

192. As described earlier, the principal European conservation designations in the east marine plan areas are Special Protection Areas (SPAs) and Special Areas of Conservation (SACs), collectively forming Natura 2000 sites. Additionally, Ramsar sites, wetlands of international importance designated under the Ramsar Convention are also present and are largely geographically coincident with SPA and SAC sites. There are a number of designated or recommended Marine Conservation Zones (MCZs) within the marine plan area (Figure C2). Nine of the 37 rMCZs are in the South inshore and offshore marine plan area. The main features of the sites with marine components are described in Table C4.

¹¹⁸ Sharples RJ, Moss SE, Patterson TA & Hammond PS (2012). Spatial variation in foraging behaviour of a marine top predator (*Phoca vitulina*) determined by a large-scale satellite tagging program. *PLoS ONE* 7: 1-14. doi:10.1371/journal.pone.0037216.

¹¹⁹ Goodman SJ (1998). Patterns of extensive genetic differentiation and variation among European harbour seals (*Phoca vitulina vitulina*) revealed using microsatellite DNA polymorphisms. *Molecular Biology and Evolution* 15: 104-118.

Figure C2: Designated and proposed conservation sites in the South plan areas

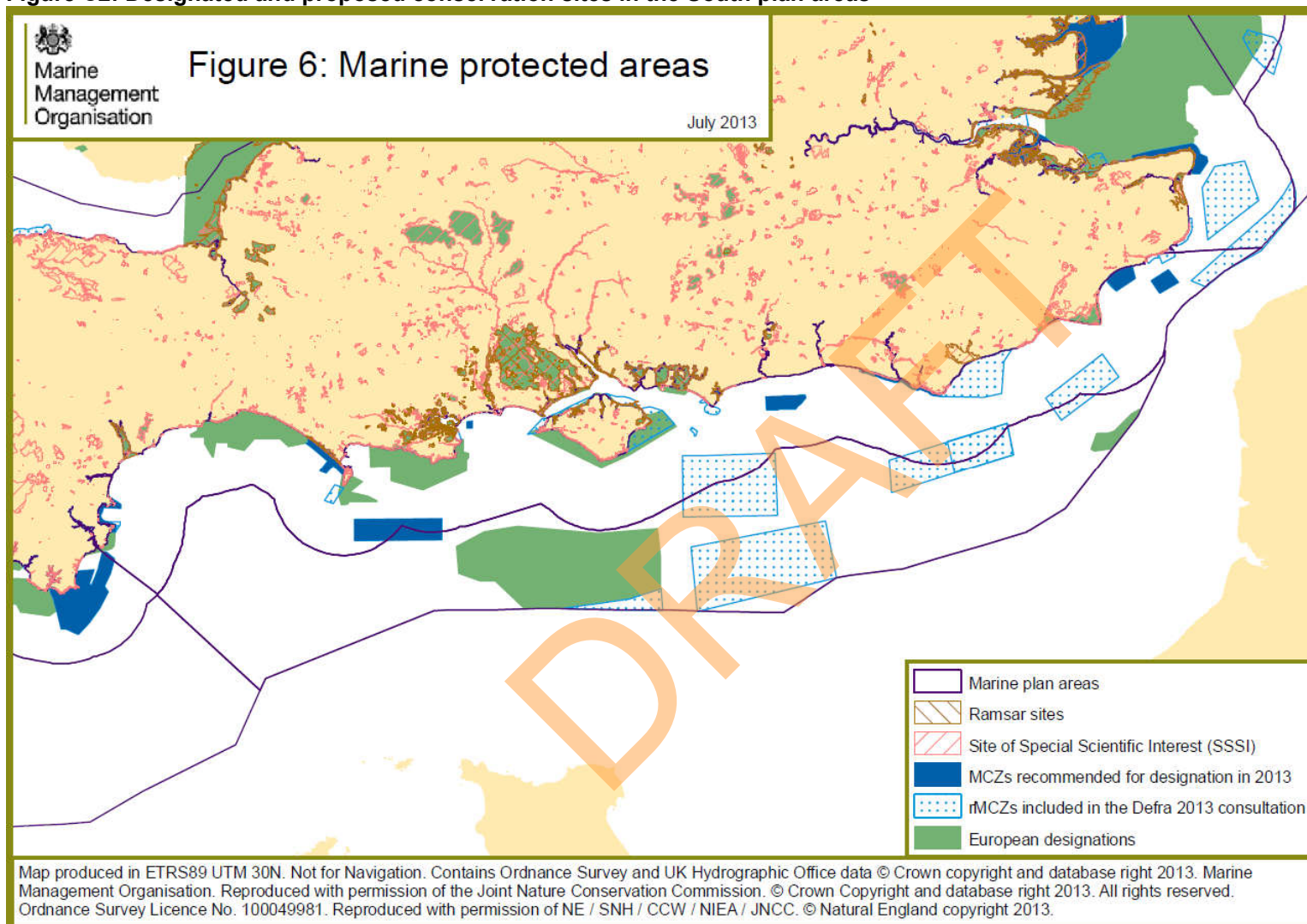


Table C4: Marine Protected Areas within the South marine plan areas

Site	Primary reason(s) for selection of site
European Protected Sites	
Chesil and the Fleet SAC	Annex I habitats: Coastal lagoons; Annual vegetation of drift lines; Perennial vegetation of stony banks; Mediterranean and thermo-Atlantic halophilous scrubs (<i>Sarcocornetea fruticosi</i>).
Dungeness SAC	Annex I habitats: Annual vegetation of drift lines; Perennial vegetation of stony banks. Annex II species: Great Crested Newt (<i>Triturus cristatus</i>).
Isle of Portland and Studland Cliffs SAC	Annex I habitats: Vegetated sea cliffs of the Atlantic and Baltic Coasts; Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Fesuco-Brometalia</i>) (*important orchid sites). Annex II species: Early gentian (<i>Gentianella anglica</i>).
Sidmouth to West Bay SAC	Annex I habitats: Vegetated sea cliffs of the Atlantic and Baltic Coasts; <i>Tilio-Acerion</i> forests of slopes, screes and ravines.
Solent and Isle of Wight Lagoons SAC	Annex I habitats: Coastal lagoons.
Solent Maritime SAC	Annex I habitats: Estuaries; <i>Spartina</i> swards (<i>Spartinion maritimae</i>); Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>).
South Wight Maritime SAC	Annex I habitats: Reefs; Vegetated sea cliffs of the Atlantic and Baltic Coasts; Submerged or partially submerged sea caves.
Bassurelle Sandbank SCI	Annex I habitats: Sandbanks which are slightly covered by sea water all the time.
Lyme Bay and Torbay SCI	Annex I habitats: Reefs; Submerged or partially submerged sea caves.
Studland to Portland SCI	Annex I habitats: Reefs.
Wight-Barfleur Reef SCI	Annex I habitats: Reefs.
Chesil Beach and The Fleet SPA	Article 4.2: Supporting overwintering and on passage populations of brent goose (<i>Branta bernicla</i>).
Chichester and Langstone Harbours SPA	Article 4.1: Supporting breeding populations of common tern, little tern and sandwich tern, overwintering bar-tailed godwit (<i>Limosa lapponica</i>). Article 4.2: Supporting overwintering populations of pintail, shoveler, common teal (<i>Anas crecca</i>), wigeon (<i>Anas penelope</i>), ruddy turnstone (<i>Arenaria interpres</i>), brent goose, sanderling, dunlin, ringed plover, red-breasted merganser (<i>Mergus serrator</i>), curlew (<i>Numenius arquata</i>), grey plover, common shelduck (<i>Tadorna tadorna</i>), and redshank. Supports an internationally important assemblage of waterfowl in the non-breeding season.
Dungeness to Pett Level SPA	Article 4.1: Supporting breeding populations of Mediterranean gull common tern and little tern, overwintering Bewick's swan (<i>Cygnus columbianus</i>). Article 4.2: Supporting overwintering populations of shoveler.
Exe Estuary SPA	Article 4.1: Supporting breeding populations of Slavonian grebe

Site	Primary reason(s) for selection of site
	<p>(<i>Podiceps auritus</i>) and pied avocet.</p> <p>Article 4.2: Supporting overwintering and on passage populations of brent goose, dunlin, oystercatcher, black-tailed godwit and grey plover. Supports an internationally important assemblage of waterfowl in the non-breeding season.</p>
Pagham Harbour SPA	<p>Article 4.1: Supporting breeding populations of common and little tern, overwintering ruff (<i>Philomachus pugnax</i>).</p> <p>Article 4.2: Supporting overwintering populations of brent goose.</p>
Poole Harbour SPA	<p>Article 4.1: Supporting breeding populations of Mediterranean gull and common tern, overwintering pied avocet (<i>Recurvirostra avosetta</i>).</p> <p>Article 4.2: Supporting overwintering and on passage populations of black-tailed godwit and common shelduck. Supports an internationally important assemblage of waterfowl in the non-breeding season.</p>
Solent and Southampton Water SPA	<p>Article 4.1: Supporting breeding populations of Mediterranean gull, little tern, roseate tern, common tern and sandwich tern, overwintering bar-tailed godwit.</p> <p>Article 4.2: Supporting overwintering populations of common teal, brent goose, ringed plover and black-tailed godwit. Supports an internationally important assemblage of waterfowl in the non-breeding season.</p>
Marine Conservation Zones	
Beachy Head West MCZ	<p>Features: Intertidal coarse sediment; Subtidal mixed sediments; subtidal mud; Subtidal sand; Infralittoral muddy sand; infralittoral sandy mud; low energy infralittoral rock and thin sandy sediment; Blue mussel beds; Subtidal chalk; Littoral chalk communities; Native oyster; Short-snouted seahorse.</p>
Chesil Beach and Stennis Ledges MCZ	<p>Features: Intertidal coarse sediment; High energy intertidal rock; Native oyster; Pink sea-fan (<i>Eunicella verrucosa</i>).</p>
Folkestone Pomerania MCZ	<p>Features: Subtidal coarse sediment; Subtidal sand; High energy circalittoral rock; Fragile sponge & anthozoan communities on subtidal rocky habitats; Honeycomb worm (<i>Sabellaria alveolata</i>) reefs; Ross worm (<i>Sabellaria spinulosa</i>) reefs.</p>
Kingmere MCZ	<p>Features: Subtidal chalk; Moderate energy infralittoral rock and thin mixed sediments; Black seabream.</p>
Pagham Harbour MCZ	<p>Features: Seagrass beds; Defolin's lagoon snail (<i>Caecum armoricum</i>); Lagoon sand shrimp (<i>Gammarus insensibilis</i>).</p>
Poole Rocks MCZ	<p>Features: Subtidal mixed sediments; moderate energy circalittoral rock; Couch's goby (<i>Gobius couchi</i>); Native oyster.</p>
South Dorset MCZ	<p>Features: Subtidal coarse sediment; Subtidal chalk.</p>
Torbay MCZ	<p>Features: Intertidal coarse sediment; Intertidal mixed sediments; Intertidal mud; Intertidal sand and muddy sand; Subtidal mud; low energy intertidal rock; Moderate energy intertidal rock; Intertidal underboulder communities; Seagrass beds; Long-snouted seahorse; Native Oyster.</p>

Site	Primary reason(s) for selection of site
Skerries Bank and Surrounds MCZ	Features: Intertidal coarse sediment; Intertidal mixed sediments; Intertidal sand and muddy sand; Subtidal coarse sediment; Subtidal mud; Subtidal sand; Moderate energy intertidal rock; Moderate energy infralittoral rock; Moderate energy circalittoral rock; High energy intertidal rock; High energy infralittoral rock; Pink sea-fan; Spiny lobster (<i>Palinurus elephas</i>).
Candidate Tranche 2 Marine Conservation Zones	
Bembridge rMCZ ¹	Features identified or recommended by Regional projects for designation: Subtidal sand; Subtidal mud ² ; Subtidal mixed sediments; Maerl beds (<i>Phymatolithon calcareum</i>); Mud habitats in deep water; Native oyster beds; Rossworm reef; Seagrass beds; Seapens and burrowing megafauna ² ; Tentacled lagoon worm (<i>Alkmaria romijni</i>); Lagoon sand shrimp (<i>Gammarus insensibilis</i>) ² ; Kaleidoscope stalked jellyfish (<i>Haliclystus auricula</i>); Long snouted seahorse; Short snouted seahorse; Starlet sea anemone (<i>Nematostella vectensis</i>) ² ; Native oyster; Peacock's tail (<i>Padina pavonica</i>); Sea snail (<i>Paludinella littorina</i>).
Dover to Folkestone rMCZ ¹	Features identified or recommended by Regional projects for designation: Moderate energy intertidal rock ² ; Intertidal coarse sediment ² ; High energy infralittoral rock; Moderate energy infralittoral rock ² ; Subtidal coarse sediment ² ; Blue mussel beds ² ; Intertidal underboulder communities; Littoral chalk communities; Peat and clay exposures; Rossworm reef ² ; Subtidal chalk ² ; Subtidal sands and gravels ² ; Short-snouted seahorse; Native Oyster; Folkestone Warren (geology).
Norris to Ryde rMCZ ¹	Features identified or recommended by Regional projects for designation: Subtidal mud; Seagrass Beds; Tentacled lagoon worm ² .
Offshore Brighton rMCZ ¹	Features identified or recommended by Regional projects for designation: High energy circalittoral rock ² ; Moderate energy circalittoral rock ² ; Subtidal mixed sediments; Rossworm reef ² ; Subtidal sands and gravels ² .
Offshore Overfalls rMCZ ¹	Features identified or recommended by Regional projects for designation: Subtidal coarse sediments ² ; Subtidal sand; Subtidal mixed sediments; Rossworm reef; Subtidal sands and gravels; Undulate ray (<i>Raja undulata</i>) ² ; English Channel outburst flood features (geology).
Studland Bay rMCZ ¹	Features identified or recommended by Regional projects for designation: Subtidal mixed sediments; Subtidal sand ² ; Intertidal mud ² ; Intertidal sand and muddy sand ² ; Seagrass beds; Short-snouted seahorse; Native oyster ² ; Undulate ray ² .
The Needles rMCZ ¹	Features identified or recommended by Regional projects for designation: Subtidal mixed sediment; Seagrass beds; Stalked jellyfish (<i>Lucernariopsis campanulata</i>) ² ; Peacock's tail.
Utopia rMCZ ¹	Features identified or recommended by Regional projects for designation: Fragile sponge and anthozoan communities ² .
Yarmouth to Cowes rMCZ ¹	Features identified or recommended by Regional projects for designation: Intertidal coarse sediment; Low energy intertidal rock; Moderate energy infralittoral rock; Subtidal coarse sediment; Estuarine rocky habitats ² ; Intertidal underboulder

Site	Primary reason(s) for selection of site
	communities; Native oyster beds; Peat and clay exposures; Rossworm reef; Seagrass beds; Lagoon sand shrimp ² ; Native oyster.
Other Recommended Marine Conservation Zones	
Axe Estuary rMCZ	Features identified or recommended by Regional projects for designation: Subtidal mixed sediments ² ; Intertidal mixed sediments ² ; Coastal saltmarshes and saline reedbeds; Intertidal coarse sediment ² ; Intertidal mud ² ; European eel ² .
Beachy Head East rMCZ	Features identified or recommended by Regional projects for designation: High energy intertidal rock; Infralittoral rock and thin mixed sediment ² ; Infralittoral rock and thin sandy sediment; Circalittoral rock and thin mixed sediment ² ; Intertidal coarse sediment; Intertidal mixed sediments; Blue mussel beds ² ; Littoral chalk communities; Peat and clay exposures; Ross worm reef; Subtidal chalk; Short-snouted seahorse; Native oyster; European eel ² .
Broad beach to Kimmerbridge Bay rMCZ	Features identified or recommended by Regional projects for designation: Intertidal coarse Sediment; Moderate energy intertidal rock; Peacock's tail seaweed ² .
Dart Estuary rMCZ	Features identified or recommended by Regional projects for designation: Subtidal mud; Intertidal mud; Low energy intertidal rock; Coastal saltmarsh and saline reedbed ² ; Estuarine rocky habitat; Intertidal under boulder communities ² ; Tentacled lagoon worm ² ; European eel.
Fareham Creek rMCZ	Features identified or recommended by Regional projects for designation: Native oyster beds ² ; Sheltered muddy gravels; Native oyster ² .
Inner Bank rMCZ	Features identified or recommended by Regional projects for designation: Subtidal coarse sediment ² ; Moderate energy infralittoral rock ² ; Moderate energy circalittoral rock ² ; Subtidal sand ² ; Native oyster ² .
Offshore Foreland rMCZ	Features identified or recommended by Regional projects for designation: High energy infralittoral rock ² ; High energy circalittoral rock ² ; Moderate energy circalittoral rock ² ; Subtidal coarse sediment ² ; Subtidal sand ² ; Eastern English Channel outburst flood features (geology).
Otter Estuary rMCZ	Features identified or recommended by Regional projects for designation: Subtidal sand ² ; High energy infralittoral rock ² ; Coastal saltmarshes and saline Reedbeds; Intertidal coarse sediment ² ; Intertidal mud ² ; European eel.
Selsey Bill and the Hounds rMCZ	Features identified or recommended by Regional projects for designation: High energy infralittoral rock ² ; Infralittoral rock and thin mixed sediment ² ; Infralittoral rock and thin sandy sediment ² ; Peat and clay exposures; Short-snouted seahorse ² ; Bracklesham Bay (geology) ² .
South of Portland rMCZ	Features identified or recommended by Regional projects for designation: High energy circalittoral rock ² ; Moderate energy circalittoral rock ² ; Subtidal coarse sediment ² ; Subtidal mixed

Site	Primary reason(s) for selection of site
	sediment ² ; Subtidal sand ² ; Portland Deep (geology).
East Meridian (eastern section) rMCZ	Currently on hold.
Hythe Bay rMCZ	Currently on hold.

¹ selected for consideration in the second tranche of designation in early 2015

² recommended features which do not have acceptable data certainty and will require further work prior to their possible designation

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What would the situation be without the marine plan?

193. Development activities continue to put pressure on marine ecology. In the absence of marine plans, Marine Protected Areas afford protection to habitats and species within designated areas. Existing regulatory regimes, such as Marine Licensing, apply to activities within and outside of MPAs and require developers to avoid or mitigate against negative impacts on marine ecology caused by their activities. The effects of climate change such as rising sea temperatures, decreasing salinity and rising sea levels pose a challenge to habitats and species in the marine environment causing some species to decline whilst benefitting others. The Marine Strategy Framework Directive¹²⁰ sets out a number of key indicators of Good Environmental Status (GES) that each member state must work towards achieving by 2020.

What are the key issues?

194. The trajectory of individual receptors covered by the biodiversity, habitats, flora and fauna topic has been outlined in Charting Progress 2¹²¹. A number of key environmental issues which affect these receptors, and which are also of particular relevance to the South inshore and South offshore marine plan areas are:
195. Climate change¹²²: rising global air and sea temperatures and associated sea-level rise has implications for all receptors considered in the marine ecology chapter, for instance the loss of intertidal habitat (such as used by foraging bird species through coastal squeeze. More direct changes include a change in the plankton growing season and the distribution of certain fish species which may also be prey species for other animals such as seals. Ocean acidification, through the uptake of CO₂ from the atmosphere, is predicted to have negative impacts on calcifying organisms, including numerous plankton taxa, molluscs and echinoderms, which will resonate at higher trophic levels. The potential for increased storminess connected with climate change¹²³ could have implications for certain populations, for instance greater number of seabird “wrecks”¹²⁴.
196. Habitat (and species) loss and disturbance: fishing impacts include the potential depletion of commercial fish stocks, impacts on benthic habitats and bycatch of non-target fish species, seabirds, marine reptiles and cetaceans. Habitat damage resulting from the harvesting of shellfish (such as scallop dredging) can also cause changes to marine ecosystems, for instance leading to mortality of benthic organisms and the reduction in food availability for seabirds or marine mammals. On a smaller scale, direct impacts on benthic habitats arise from aggregate extraction, wind farm installation and other offshore subsea installations. Species disturbance may also arise from recreation activities, and barrier and collision risk associated with offshore development.
197. Marine litter: ingestion of or entanglement in marine litter by fish, mammals, reptiles and birds can result in mortality.

¹²⁰ EC Marine Strategy Framework Directive: http://ec.europa.eu/environment/marine/eu-coast-and-marine-policy/marine-strategy-framework-directive/index_en.htm

¹²¹ Defra (2010). Charting Progress 2: An assessment of the state of UK seas. Published by the Department for Environment Food and Rural Affairs on behalf of the UK Marine Monitoring and Assessment Strategy community, London, 194pp.

¹²² See IPCC (2013). Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.

¹²³ See: Woolf D and Wolf J (2010) Storms and Waves in MCCIP Annual Report Card 2010-11, MCCIP Science Review, 15pp, Horsburgh K. and Lowe J (2010) Mean Sea Level and Sea Level Extremes in MCCIP. Annual Report Card 2010-11, MCCIP Science Review, 10pp. www.mccip.org.uk/arc, also see Met Office & CEH (2014). The recent storms and Floods in the UK, 27pp.

¹²⁴ <http://jncc.defra.gov.uk/page-5406>

198. Marine noise: there are many anthropogenic activities in the South inshore and South offshore areas which will generate marine noise. Shipping is a major source, with the area having one of the highest densities of marine traffic in the world. Other sources marine noise include oil and gas exploration and production (which may include the acquisition of seismic data) and wind farm installation (presently largely reliant on pile driving). Marine mammals are of principal concern, though fish and cephalopods may also be subject to disturbance by noise.
199. Pollution: estuarine fish species are still subject to pressure from inputs of pollutants and coastal developments, though a number of initiatives (including those associated with the Water Framework Directive) are helping to improve the physical and chemical quality of rivers and estuaries.
200. Non-native species: the spread of non-native species may be accentuated by climate change (above). Their appearance in a number of habitats around the UK, including intertidal and shallow subtidal environments, is being addressed through a number of national and international initiatives aiming to recommend and introduce safeguards to limit the transport of invasive species, including the GloBallast Partnership Programme and the Invasive Non-native Species Strategy for Great Britain. There is the potential for the introduction of hard substrates from offshore activities to act as “stepping stones” in the migration of non-native species.

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Cross cutting issues

The seabed substrates present in the South marine plans areas (see Annex F, Geology, geomorphology and coastal processes) are a key control on the habitat type and related species composition of the area. Certain species of fish and shellfish are of commercial interest (see Annex D, Economy), but are also subject to potential future changes in type and range as a result of anthropogenically augmented climate change (primarily in the form of alterations in sea-surface temperatures).

Climate change is also contributing to sea-level rise above that naturally occurring in the South plan areas, which may result in reduced intertidal areas that are features of designated conservation sites recognised as internationally important for waterbird species, however there may be the opportunity to offset such changes through alterations to present sea defence and other adaptive coastal management (see Annex F).

The habitat implications of maintaining or amending coastal defences should be considered. The condition of the natural environment to which the above issues relate, is also a key aspect of the tourism offer in the region (see Annex D) which is important to some coastal communities, and is also a contributor to the character of the south plan areas (see Annex F Landscape and Seascape).

Opportunities

201. The marine planning process also raises a number of opportunities for the topic of marine ecology, which include:
 - The marine plans should contribute to the achievement of targets associated with, for instance, the implementation of the MSFD in the UK, however, the nature of this contribution is presently unknown¹²⁵.
 - The MMO should maximise the opportunities for integrating policy outcomes when drafting the marine plans (such as developments building-in beneficial features for marine ecology as part of good design), and considering an ecosystems based approach.
 - The marine plans provide the opportunity to set in regional policy how MCZs should be regarded in applications and consenting decisions once MCZs in the areas have been fully established.

¹²⁵ See: HM Government (2012). Marine Strategy Part One: UK Initial Assessment and Good Environmental Status, 163pp, and the draft East Marine Plans, paragraph 151.

Are there any data gaps?

202. OESEA2¹²⁶ and Charting Progress 2¹²⁷ have identified a number of data gaps with respect to marine ecology some of which are relevant to marine planning:

- Recent information on the distribution of fish eggs and larvae, and variability in space and time.
- There is a lack of information on the potential effects of climate change and ocean acidification on fish.
- More information is required on the causes of declines in diadromous species.
- There is a general lack of modern data on seabirds in offshore areas. Adequate data on seabird distribution and abundance is a prerequisite to effective environmental management of activities, for example, in timing of operations to avoid periods of particular sensitivity.
- Detail of bird migration patterns, and variability in space and time, including flight heights in different weather conditions.
- Further understanding of foraging areas for breeding seabirds, and also what they are eating.
- Further understanding of the marine areas routinely used by breeding birds for foraging, in particular those adjacent to or supporting colony SPAs.
- Better understanding of the impacts of pressures on waterbirds and seabirds, including, for example, litter, underwater noise and the introduction of microbial pathogens.
- Knowledge on the behavioural effects of developments on cetaceans and birds.
- Better understanding of the ecology of most marine mammal species and in particular important areas for breeding, foraging and resting (and temporal variability).
- Improved understanding of variations in ambient noise, and other anthropogenic noise sources, to allow assessment of likely effects of additional noise.
- Data are required on the spatial scale at which marine mammals and their prey respond to well characterised noise sources, and whether this varies according to individual characteristics, behavioural state or other environmental variables.
- Greater knowledge is required concerning the potential impact of future climate change (including ocean acidification),
- Improved understanding of the risks posed by introduced and potentially invasive species, as well as the possibility of developments acting as 'stepping stones' for their establishment in UK waters.
- Further studies into the consequences of "new" pressures such as offshore wind farms, which look set to expand dramatically in the next few years.
- More detailed benthic habitat maps are required.

¹²⁶ DECC (2011). UK Offshore Energy Strategic Environmental Assessment 2. Department of Energy and Climate Change.

¹²⁷ Defra (2010). Charting Progress 2: An assessment of the state of UK seas. Published by the Department for Environment Food and Rural Affairs on behalf of the UK Marine Monitoring and Assessment Strategy community, London.

Economy

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Annex D – Economy

Introduction

203. The SA considers how the South marine plans may impact upon the economy of the region, key settlements along the coastline and important sectors such as Fishing, Shipping and Ports and Tourism. The marine environment in the South plans area is extremely busy and plays a major role in the economy of the region. The management of competing uses of the marine area will be necessary to maintain strong economic performance and ensure the sustainable use of the water.
204. This chapter seeks to understand those issues that should be a focus of prioritisation from an 'economic sustainability' perspective; identify growth opportunities in other sectors that are currently underrepresented in the South marine plans area; and future pressures or threats that may affect economic activity in the future.

What is the link between marine planning and this topic?

205. The South marine plans would prioritise between marine activities and hence have the potential to influence local economies. The marine plans have a crucial interface with the terrestrial environment that needs to be understood before the economic effects of the plan on those areas can be appraised. Equally, it is important that the drivers and pressures of coastal growth are understood in order for the plan to identify synergies and constraints and act proactively to address these. This Annex seeks to understand those issues that should be a focus of prioritisation, from an 'economic sustainability' perspective with a view to maximising economic growth, addressing existing poor economic performance and seeking to ensure that sustainable economic development as defined in the National Planning Policy Framework (NPPF) is considered.

What is the policy context?

206. This section draws out key messages from the policy context with a view to better understanding those issues that should be a focus of the appraisal. This section considers:
- Policy established at European level;
 - Priorities for the national economy established by Central Government that are of relevance for the South marine plans;
 - The potential for each of the marine activities identified within the UK Marine Policy Statement to result in economic benefits;
 - The potential for increased local economic output as identified by a recent study commissioned by the MMO; and
 - Relevant economic priorities identified at the local level along the South marine plans coastline area.
207. An overview of the policy context is presented in Table D1.

Table D1: Relevant plans, initiatives and environmental protection objectives

European
European Commission (2010) Europe 2020: A strategy for smart, sustainable and inclusive growth
European Commission (2013) Proposed Maritime Spatial Planning and Integrated Coastal Management Directive

National
<p>The UK Plan for Growth (2011)</p> <p>Local Growth: Realising Every Place's Potential (2010)</p> <p>National Planning Policy Framework</p> <p>National Planning Practice Guidance</p> <p>Marine Policy Statement</p> <p>Climate Change Act (2008)</p> <p>The Planning Act (2008)</p>
Sub-Regional
<p>Local Enterprise Partnership (LEP) Strategies</p> <p>The Solent Waterfront Strategy</p> <p>Partnership for Urban South Hampshire</p>
Local
<p>Local Plans/Core Strategies</p> <p>Local Port Master Plans</p>

208. In 2010, the European Union published its strategy for achieving growth up until 2020 'Europe 2020: A strategy for smart, sustainable and inclusive growth'¹²⁸. This strategy focuses on smart growth, through the development of knowledge and innovation; sustainable growth, based on a greener, more resource efficient and more competitive economy; and inclusive growth, aimed at strengthening employment, and social and territorial cohesion.
209. In July 2014, the European Commission agreed upon the Maritime Spatial Planning Directive (2014/89/EU) which requires Member States to draw up marine spatial plans in order to manage the marine environment to secure sustainable growth. The Directive has the intention of:
- Reducing conflicts between sectors and creating synergies between different activities.
 - Encouraging investment – by instilling predictability, transparency and clearer rules to help boost the development of renewable energy sources and grids, establish Marine Protected Areas, and facilitate investment in oil and gas.
 - Increasing coordination – between administrations in each country, through the use of a single instrument to balance the development of a range of maritime activities.
 - Increasing cross-border cooperation – between EU countries, on cables, pipelines, shipping lanes, wind installations, etc.
 - Protecting the environment – through early identification of impact and opportunities for multiple use of space.
210. Of the 16 'ambitions and measurable benchmarks' for the UK set out within 'The Plan for Growth'¹²⁹, it is suggested that the following are particularly relevant to marine planning:
- To encourage investment and exports as a route to a more balanced economy.

¹²⁸ European Commission (2010) *Europe 2020: A strategy for smart, sustainable and inclusive growth* (online) available at: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:2020:FIN:EN:PDF> Accessed 11/12

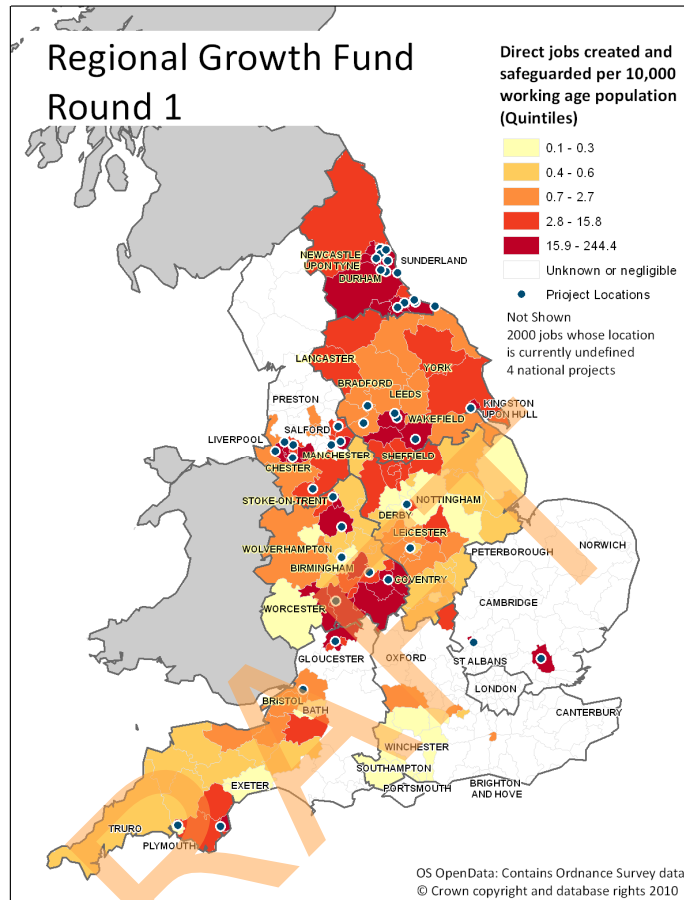
¹²⁹ HMT, BIS (2011) *The Plan for Growth* [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/31584/2011budget_growth.pdf. Accessed 19/04/2014

- Ensure the UK remains one of the top destinations for foreign direct investment.
 - Increase exports to key target markets.
 - Increase private sector employment in regions outside London and the south east.
 - Increase investment in low carbon technologies.
 - Support more apprenticeships.
211. Local Growth: Realising Every Place's Potential¹³⁰ sets out that government interventions should support investment that will have a long term impact on growth, working with markets rather than seeking to create artificial and unsustainable growth. In some cases this means focusing investment at areas with long term growth challenges so that these areas can undergo transition to an economy that responds to a local demand. Places that are currently successful may also wish to prioritise activity to maximise further growth by removing barriers, such as infrastructure constraints. However, the white paper also emphasises that:
- "This does not mean that every place will grow at the same rate or that everywhere will, or will want to, become an economic powerhouse. Long term economic trends make differences in economic performance inevitable and these can and do change over time."*
212. Specific examples of areas where it makes sense for government intervention to tackle market failures include:
- Investment in infrastructure;
 - Tackling barriers such as transport congestion and poor connections;
 - Other support to areas facing long term growth challenges where this can help them manage their transition to growth industries;
 - Strategic intervention where it can stimulate private sector investment in new green technology in strategic locations; and
 - Encouraging foreign investment and indigenous companies to export, especially where we have a comparative advantage.
213. Finally, the Local Growth White Paper identifies that economic policy should be judged on the degree to which it delivers strong, sustainable and balanced growth of income and employment over the long-term. More specifically, growth should be: broad-based industrially and geographically, ensuring everyone has access, including future generations, to the opportunities that growth brings; whilst also focussed on businesses that compete with the best internationally.
214. The Local Growth White Paper also introduced the Regional Growth Fund (RGF), as a new mechanism for 'levering' private sector investment, creating private sector jobs and rebalancing economies in places currently over-reliant upon the public sector. Figure D1 shows the location of projects allocated funding through the first round of the Regional Growth Fund and the area over which the projects are expected to have an impact.
215. There have been four further rounds of Regional Growth Fund. The focus is very much on directing funds to the Midlands and North of England; however there is a notable concentration in the south West around Torbay and East Devon. Despite not having any

¹³⁰ Department for Business, Innovation and Skills (2010) *Local Growth: Realising Every Place's Potential* (online) available at <http://www.bis.gov.uk/policies/economic-development/local-growth-white-paper> Accessed 10/11

projects locally in the area in Round 1, the Solent was expected to benefit from investment in other regions.

Figure D1: Regional Growth Fund, Round 1 project locations and predicted employment impact¹³¹



216. Under the RGF, the 2014-2020 Assisted Areas map recently went out for consultation (Stage 2 closed on February 7th 2014). Assisted Area status allows small businesses and large enterprises in less economically advantaged locations to benefit from additional financial support under EU Regional Aid Guidelines; in order to encourage business in these communities to grow, innovate and thrive and rebalance the economy¹³².

217. Wards in the north coast of the Isle of Wight and wards around Torbay; Teignbridge District and the South Hams are proposed to be an Assisted Area and supported for creation of sustainable jobs. Special dispensation is required from the European Commission, evidencing 'major structural change or serious relative decline' for Assisted

¹³¹ Employment impact is based on the numbers of direct created and safeguarded jobs given by applicants in proportion to the areas where they said these impacts would be felt. Figures have been given in relation to the size of the working age population (per 10,000 head of working age population). Resulting values have been grouped by quintile for local authorities where some employment impact would be felt. This has the advantage of representing the entire distribution evenly and minimising the effect of outliers. However, it does mean that the category sizes are not equal.

¹³² BIS (2013) 2014-2020 Assisted Areas Map Consultation Stage 2 Draft Assisted Areas Map [online] available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/267159/bis-13-962-2014-to-2020-assisted-areas-map-consultation-stage-2-draft-assisted-areas-map-and-government-response-to-stage-1.pdf Accessed 19/03/2014

Area status in Brighton and Hove; West Sussex; Portsmouth; Southampton and Hampshire. The remainder of the plan area is not proposed to be designated.

218. The NPPF highlights the contribution the planning system can make to building a strong, responsive economy by 'ensuring that sufficient land of the right type is available in the right places and at the right time to support growth and innovation; and by identifying and coordinating development requirements, including the provision of infrastructure'. There is an emphasis on capitalising on 'inherent strengths', and to meeting the 'twin challenges of global competition and of a low carbon future'. There is a need to support new and emerging business sectors, including positively planning for 'clusters or networks of knowledge driven, creative or high technology industries'. Furthermore, the NPPF states that local plans should support the sustainable growth and expansion of all types of business and enterprise in rural areas and promote the development and diversification of agricultural and other land-based rural businesses. Indeed, the NPPF places sustainable economic development at the core of plan-making by including it as a core planning principal (paragraph 17) and as a core element of delivering sustainable development (paragraph 19) in that the planning systems should do "*everything it can to support sustainable economic growth*".
219. In coastal areas the National Planning Practice Guidance (NPPG) requires, under the Duty to Cooperate, local planning authorities to collaborate with the Marine Management Organisation to ensure that plans and policies across the land/sea boundary are coordinated.
220. The NPPG requires Local Planning Authorities to 'plan positively to support town centres to generate local employment, promote beneficial competition within and between town centres, and create attractive diverse places where people want to live, visit and work'¹³³. In terms of tourism, the NPPG requires Local Planning Authorities to:
- Consider the specific needs of the tourist industry, including particular locational or operational requirements;
 - Engage with representatives of the tourism industry;
 - Examine the broader social, economic, and environmental impacts of tourism;
 - Analyse the opportunities for tourism to support local services, vibrancy and enhance the built environment; and
 - Have regard to non-planning guidance produced by other Government Departments.

¹³³ DCLG (2014) Ensuring the vitality of town centres [online] available at: <http://planningguidance.planningportal.gov.uk/blog/guidance/ensuring-the-vitality-of-town-centres/ensuring-the-vitality-of-town-centres-guidance/> Accessed 18/03/2014)

221. Mineral Planning Authorities are required, through the Managed Aggregate Supply System, 'to ensure a steady and adequate supply of aggregate mineral' and to 'make an appropriate contribution to national as well as local supply, while making due allowance for the need to control any environmental damage to an acceptable level'. Mineral Planning Authorities should consider all aggregate supply options including the need for marine aggregates in their Local Aggregate Assessments¹³⁴. Marine Mineral Guidance 1 provides a statement on the government's policies on the extraction of marine sand and gravel and other minerals from the English seabed¹³⁵ although discussions are underway to replace this.
222. The NPPG requires planning authorities to consider the local potential for renewable and low carbon energy generation, including the range of technology, their costs and impacts, in order to secure the UK's energy supply, reduce greenhouse gas emissions to slow down climate change and stimulate investment in new jobs and businesses.
223. Box 1 of the MPS¹³⁶ presents 'High Level Marine Objectives'. One of the five headline objectives is the need to 'achieve a sustainable marine economy'. Underneath this sits the following five detailed objectives:
- Infrastructure is in place to support and promote safe, profitable and efficient marine businesses.
 - The marine environment and its resources are used to maximise sustainable activity, prosperity and opportunities for all, now and in the future.
 - Marine businesses are taking long-term strategic decisions and managing risks effectively.
 - They are competitive and operating efficiently.
 - Marine businesses are acting in a way which respects environmental limits and is socially responsible. This is rewarded in the marketplace.

¹³⁴ Local Aggregate Assessments are an annual assessment of supply and demand of aggregates in a mineral planning authority's area.

¹³⁵ Marine Mineral Guidance 1 (online) available at:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/7735/156357.pdf

¹³⁶ HM Government (2011). *UK Marine Policy Statement* [online] available at

<http://www.defra.gov.uk/publications/files/pb3654-marine-policy-statement-110316.pdf> Accessed 10/11

Perhaps the most relevant messages come from the first two bullets, i.e. there is a need for marine plans to support business and enterprise; and there is a need to ensure that decisions taken enable 'prosperity and opportunities for all, now and in the future'. The point made by the second bullet is reinforced by Para 2.5.5, which identifies the need for marine planning to contribute to securing sustainable economic growth both 'in regeneration areas and areas that already benefit from strong local economies', promoting 'economic growth and [sustaining] local jobs'.

224. Section 2.5 of the MPS lists some key marine industries. It differentiates between long established industries (such as fishing; marine transport; port related storage and processing; oil and gas production) and new and developing industries such as the renewable energy sector and associated offshore electricity transmission.
225. Chapter 3 sets out policy objectives for key industries and activities. From this Chapter it is possible to understand more about those activities that should be a priority from an economic perspective, and why.

Energy production and infrastructure development

226. In general, there must be a focus on '*oil and gas sectors which supply the major part of our current energy needs, and a growing contribution from renewable energy and from other forms of low carbon energy supply*'.
227. In terms of oil and gas, the MPS emphasises that economic development is significant in terms of national prosperity, and that:
 - Oil and gas can only be exploited where they are found, and that it usually should be exploited where it is found 'to achieve the objective of maximum economic recovery';
 - Looking ahead, the recovery of remaining oil and gas reserves will require additional investment in both money and expertise; and
 - A range of offshore infrastructure is required to increase the UK's gas storage capacity.
228. In terms of renewable and low carbon energy supply, the MPS similarly emphasises that renewable energy resources can only be developed where the resource exists and where economically feasible. Decisions should recognise:

"The potential impact of inward investment in offshore wind, wave, tidal stream and tidal range energy related manufacturing and deployment activity; as well as the impact of associated employment opportunities on the regeneration of local and national economies... [in particular] Expansion of the offshore wind supply is likely to require significant investment in new high-value manufacturing capability with potential to regenerate local and national economies and provide employment."
229. In addition, in terms of energy production and infrastructure development, the MPS emphasises that:
 - It has been estimated that the Carbon Capture and Storage (CCS) sector could be worth up to £3bn a year by 2030, sustaining up to 100,000 jobs,¹³⁷ but currently CCS is not

¹³⁷ DECC (2010) *Clean Coal: an industrial strategy for the development of carbon capture and storage across the UK* [online] available at: https://ukccsrc.ac.uk/system/files/publications/ccs-reports/DECC_Coal_154.pdf. Accessed 09/04/2014

commercially proven and the UK Government's intention is to support commercial scale demonstration projects¹³⁸.

- There will be a need to ensure the development of any necessary on-shore infrastructure, including: Sub-stations, new gas and electricity import infrastructure, appropriately developed and placed ports and harbours.
- There are obvious economic benefits from increasing the capacity of offshore electricity networks, most notably through facilitation of offshore renewable energy. The UK Government has established a new offshore transmission regime to help ensure that the substantial investment required to connect offshore generation projects to the onshore grid is delivered in a cost effective manner.

Ports and shipping

230. Ports and shipping are an essential part of the UK economy, providing the major conduit for the country's imports and exports. Ports are also very important for local economies. Despite continuing advances in efficiency, ports remain substantial employers and they facilitate geographically dispersed economic activity in trade-related sectors. In addition, they are essential to support emerging industries such as renewable energy development. The operation of ports and marinas is enabled through the creation, maintenance and development of channels, berths and docks. Shipping is also an essential and valuable economic activity for the UK. Water transport is supported by a diverse range of ancillary activities including shipbuilding and repair, the construction of ports and marinas and activities associated with navigation including dredging.
231. The importance of ports to the national economy and local economies is a message that comes through clearly in the recently published National Planning Policy Statement for Ports - see Table D2.

Table D2: Key messages from the National Policy Statement for Ports¹³⁹

The UK ports sector is the largest in Europe, in terms of tonnage handled. The private sector operates 15 of the largest 20 ports by tonnage and around two-thirds of the UK's port traffic. Much of the tonnage handled is concentrated in a small number of ports, with the top 15 ports accounting for almost 80% of the UK's total traffic.

Recent consents for container developments have been in or near deepwater ports in the main coastal estuarial locations. But it is not possible to anticipate future commercial opportunities. New shipping routes and technologies may emerge. The needs of trading partners may change as their economic circumstances develop. So capacity needs to be provided at a wide range of facilities and locations, to provide the flexibility to match the changing demands of the market, possibly with traffic moving from existing ports to new facilities generating surplus capacity.

The Government believes that there is a compelling need for substantial additional port capacity over the next 20–30 years, to be met by a combination of development already consented and development for which applications have yet to be received. Excluding the possibility of providing additional capacity for the movement of goods and commodities through new port development would be to accept limits on economic growth and on the price, choice and availability of goods imported into the UK and available to consumers. It would also limit the local and regional economic benefits that new developments might bring. Such an outcome would be strongly against the public interest.

At regional and local level, economic benefits from port developments include regeneration and

¹³⁸ On 12 March 2010, the Government awarded funding to both E.ON UK and the ScottishPower CCS Consortium to carry out Front-End Engineering and Design (FEED) studies as part of the procurement process for the UK's first commercial-scale Carbon Capture and Storage (CCS) demonstration project. It has recently been announced that a deal could not be reached on the ScottishPower CCS Consortium project at Longannet. Government state that 'a selection process for further CCS projects will be published as soon as possible.'

¹³⁹ DfT (2011) *National Policy Statement for Ports* (online) available at <http://www.dft.gov.uk/publications/national-policy-statement-for-ports> Accessed 11/11

employment opportunities. As commercial developments, ports can also generate agglomeration effects by bringing together businesses, with varying degrees of mutual interaction, and producing economic benefits over and above those reflected in the value of transactions among those businesses. Ports can contribute to the enhancement of people's skills and of technology, as embodied in equipment used by ports and port-related activities, with wider longer-term benefits to the economy.

Ports and energy

Ports have a vital role in the import and export of energy supplies, including oil, liquefied natural gas and biomass, in the construction and servicing of offshore energy installations and in supporting terminals for oil and gas pipelines. Port handling needs for energy can be expected to change as the mix of our energy supplies changes and particularly as renewables play an increasingly important part as an energy source. Because of the Government's renewables targets and in light of the policies set out in the Renewable Energy NPS, there is a strong public interest in enabling ports to service these developments.

The UK Renewable Energy Roadmap (2011) indicates that, in its central scenario, up to 18 GW of new offshore wind capacity could be deployed by 2020, with a high potential for further deployment by 2030. The manufacturing and assembly of large-scale equipment to serve the offshore energy sector within port sites in the UK is set to see significant increase in demand as a result. This is in addition to port capacity needed to provide installation, operation and maintenance facilities for this scale of deployment. To some extent, capacity provided for by container terminal consents may help to contribute, on an interim basis, to meeting demand.

Tourism

232. To quote directly from the MPS:

"The UK Administrations' aim for tourism is to take steps to improve the competitiveness of the tourism industry, recognising the important part that it plays in the national economy and to encourage growth within environmental limits. Tourism is one of the top three growth sectors of the economy and supports 1.5 million jobs and contributed nearly £90bn to the economy in 2009¹⁴⁰. Seaside tourism makes an important contribution. It supports some 21,000 jobs and contributes £3.6bn to the economy. The economic, social and environmental factors relating to tourism therefore need to be carefully considered in developing marine plans. A similar picture exists for recreation where, for example, the estimated economic contribution of recreational boating to the UK economy was £1.042 billion in 2009/10 and employed nearly 35,000 in this sector¹⁴¹."

Other marine activities

233. Marine aggregates make a crucial contribution to meeting the nation's demand for construction aggregate materials, essential for the development of our built environment. Marine aggregates also contribute to energy security and economic development through provision of fill for major coastal infrastructure projects, for example ports, renewable energy and nuclear energy projects.
234. Submarine cables are part of the backbone of the world's power, information and international telecommunications infrastructure, and socially and economically crucial to the UK.
235. Fishing is important from a perspective of maintaining a prosperous and efficient fishing industry and provide social, cultural and economic benefits to often fragile coastal

¹⁴⁰ Tourism Contribution to the Economy & Tourism Employment (TSA). Employment figures are for 2008.

¹⁴¹ HM Government (2011) *UK Marine Policy Statement* [online] available at: <http://www.defra.gov.uk/publications/files/pb3654-marine-policy-statement-110316.pdf>. Accessed 10/11

communities. The dependence of jobs on fishing can be as high as 20% or more in some communities. Marine plan authorities should have regard to the economic impacts of displacement and whether it is possible for vessels to relocate to other fishing grounds.

236. Shellfish aquaculture is evenly spread throughout the UK, whereas finfish aquaculture is focussed overwhelmingly in Scotland. Shellfish farming is an expanding activity. In 2008 the estimated value of farmed shellfish was £33m, from just over 38.6 thousand tonnes; this is an increase of about 40% over the level of production in 2007.

The potential for marine activities to increase local economic output

237. The Roger Tym & Partners / OCSI report: Maximising the socio-economic benefits of marine planning for English coastal communities (2011)¹⁴² identifies that when considering the potential for an activity to improve the economic performance of an area there is a need to have a particular focus on the potential for the activity to increase:

- Labour quantity;
- Labour skills;
- Competition;
- Innovation;
- Investment; and
- Enterprise.

238. Broadly, the first two drivers are about increasing labour 'utilisation', whilst the second four relate to increasing labour 'productivity'. The Roger Tym & Partners / OCSI report looks at labour utilisation and labour productivity in turn, and considers how the benefits can be maximised through marine planning, given the particular activities that will be a focus. Set out below is a summary of some headline findings.

239. The potential for activities to affect labour utilisation:

- Geographical proximity to an energy production site will not guarantee benefits. Rather, effects on local labour utilisation depend on the extent to which support industries (e.g. construction, maintenance and operations industries) are able to establish.
- Ports and shipping activity can have high local effects as labour catchments tend to be relatively local, and there is demand for lower skilled labour, so creating jobs that are accessible for lower skilled workers who find themselves at increased risk of unemployment (although lower skilled jobs make a smaller contribution to productivity growth).
- Whilst the total number of individuals employed in fisheries has fallen in past decades, making this activity one of less economic significance in many local areas, it is the case that changes in levels of fisheries activity will still have significant impacts in some labour markets (particularly those which are more peripheral, and lack alternative occupations). On the positive side, this means that they are available to individuals who are at greater

¹⁴² Roger Tym and Partners / OSCI (2011) Maximising the socio-economic benefits of marine planning for English coastal communities [online] available at <http://webarchive.nationalarchives.gov.uk/20140507202222/http://www.marinemanagement.org.uk/marineplanning/key/se.htm>

Accessed 10/11

risk of unemployment, but lower skilled jobs make a smaller contribution to productivity growth.

- Jobs created in tourism are wide ranging in terms of skill levels required. Tourism jobs can be seasonal and part time, which is not good from a local productivity perspective and can have a destabilising effect on the local economy.
- Manufacture of telecommunications cabling is an example of an activity that will have minimal impact on labour utilisation. Manufacturing takes place at a small number of sites, and cable laying contractors are international. Jobs created are likely to be highly specialised and consequently inaccessible to deprived people.

240. The potential for activities to affect labour productivity:

- The renewables industry in particular will be the beneficiary of very high levels of capital investment over coming years, and as a result per capita output can be expected to be significantly higher than average.
- Round 3 windfarm licensing is one of the largest investment programmes undertaken in the UK, ever; but it is also footloose in a way that other big investment programmes (such as railways, or the conversion from coal gas to natural gas) have not been, given that manufacture and some maintenance and operations activities could locate abroad unless these industries find an accommodating home.
- Port activities can have major impacts on local infrastructure. In the largest projects, there can be positive connectivity spin-offs for local economies resulting from these impacts, as upgraded road infrastructure may be available to other business users, and so improve linkages to labour and product markets. Equally, many areas are looking to move port areas away from traditional port activity, and instead use waterfront areas to bolster urban environments.
- Fisheries pay is below average, with intermittently high wage being eroded by factors such as seasonality and weather. As with other primary/extractive industries, the fishing industry is not likely to drive forward local productivity (although it is important to note that there may be exceptions)
- It is important to note, though, that the presence of fisheries does tend to play a role in terms of supporting local distinctiveness, which in turn can boost productivity in the tourism industry. There is a difficulty in quantifying the extent of this influence.
- Tourism typically results in minimal benefits to local labour productivity, although there is evidence that speciality tourism and a refreshed tourist offer might work to raise productivity. Local connectivity may be enhanced by the travel demand created by tourism. Conversely, tourism may negatively affect local transport connectivity.

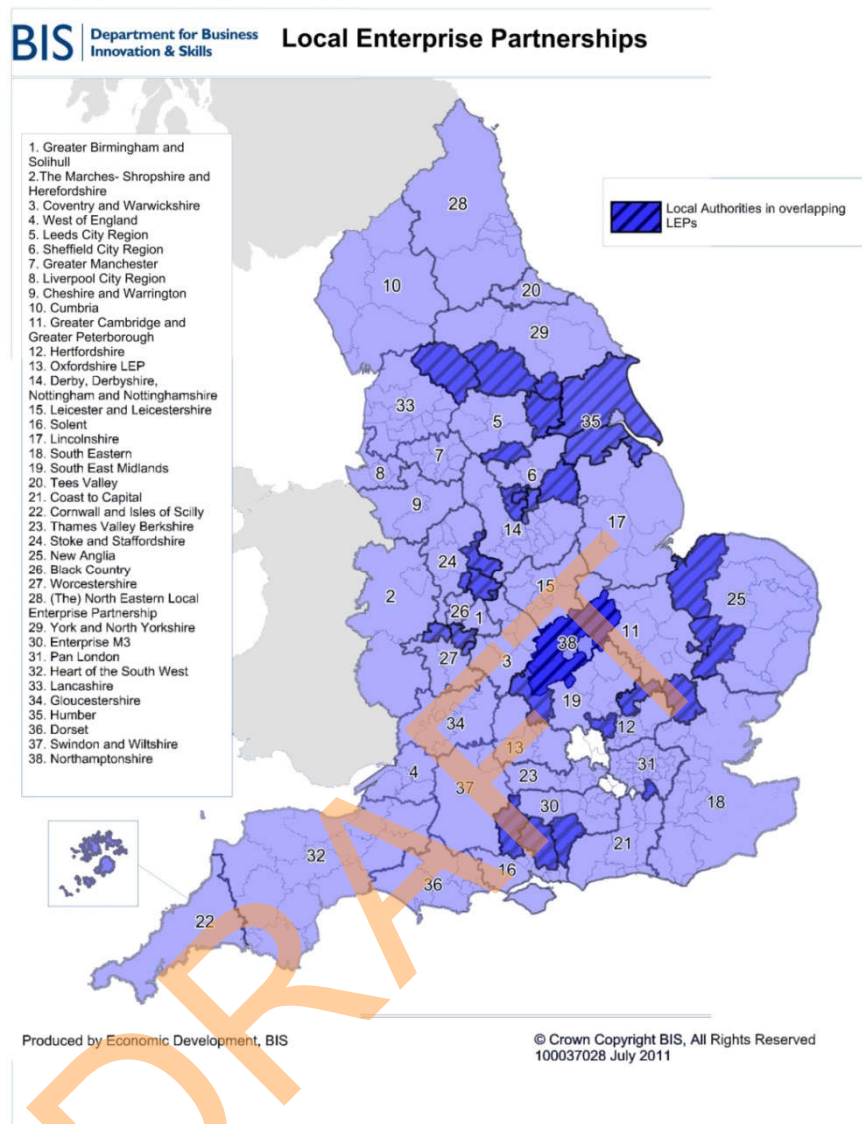
Priorities identified at the sub-regional level

Local Enterprise Partnership priorities

241. Local Enterprise Partnerships (LEPs) are joint local authority/business bodies that reflect genuine economic areas to promote local economic development - see Figure B. The Local Growth White Paper set out the diverse roles the local enterprise partnerships can play. These could include ensuring that planning and infrastructure investment support business needs, and working with Government to support enterprise, innovation, global trade and inward investment. LEP's are a key mechanism for achieving the Government's aim of achieving a more evenly balanced economy across the country and between industries, and one that is more driven by private sector growth.
242. The LEPs priorities can be summarised as maintaining and enhancing strategic ports, increasing trade and business, tourism, marine renewable energy and telecommunications (in particular high-speed broadband). There is the potential for synergies with the South marine plans as it can affect these sectors.

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Figure D2: Local Enterprise Partnerships in England¹⁴³



¹⁴³ SEMLEP (2014) *What Is An LEP?* (online) available at: <http://www.semlep.com/what-is-an-lep/> Accessed 19/03/2014

Heart of the South West LEP¹⁴⁴

243. The LEP aims to create more sustainable jobs by supporting and promoting their enterprises and capitalising upon the unique opportunities existing in the heart of the south west. They have set out their objectives to drive productivity and enterprise, attract new business and investment, maximise employment opportunities and promote infrastructure to connect with markets.
244. The Heart of the South West LEP wants to capitalise upon being a Gateway location for international markets by supporting the expansion of transport hubs and marine assets to create a wide range of new commercial opportunities. These include access to international ports and recognition of marine energy assets and they will also build their IT capacity to access world markets and enhance their international tourism opportunities.
245. The LEP has supported partners to secure access to over £30 million of Broadband Delivery UK (BDUK) investment to upgrade broadband connectivity to at least 85% of premises, the next stage will be to address the remaining 10 to 15% and maximise take up amongst businesses to increase productivity.
246. They also want to maximise the opportunity that BDUK investment in superfast broadband infrastructure brings which encourages ambitious aspirations for the roll out of future electronic communication technologies for the region. They will achieve this by working with the rural community to help realise the benefits of superfast broadband and encourage the adoption of it.

Dorset LEP¹⁴⁵

247. The Dorset LEP's overall aim is to deliver growth through business enterprise whilst safeguarding the environment. They intend to achieve this by improving digital and physical connectivity via high-speed broadband and they also plan to create the right conditions for enterprise by driving forward integrated spatial and infrastructure planning across the county. Dorset LEP has identified several priority actions to ensure their objectives are achieved such as creating a global hub for international trade and business, focusing on the Ports of Poole and Portland. Other priorities include, achieving excellent high-speed broadband, securing opportunities from offshore renewables and capturing the Olympic legacy across the entire LEP area.
248. In regards to high-speed broadband Dorset LEP are expecting an outcome of 95% Superfast Broadband coverage across Dorset by 2015 and 100% by 2020. They intend to research then lobby to influence mobile coverage and then improve mobile phone coverage in 'cold spots' of Dorset.

¹⁴⁴ Heart of the South West LEP (2014) *Enabling Growth and Prosperity: Business Plan* (online) available at: http://www.heartofswlep.co.uk/sites/default/files/business_plan-hotsw.pdf Accessed 18/03/2014

¹⁴⁵ Dorset LEP (2012) *Dorset LEP Framework 2012-2015* (Online) Available at: <http://www.dorsetlep.co.uk/assets/About-Us/Business-Plan/Dorset-LEP-Framework-May2012.pdf> Accessed 18/03/2014

Solent LEP¹⁴⁶

249. Solent LEPs aim is to create an environment that will bring about sustainable economic growth and private sector investment in the Solent area. The LEP will focus on infrastructure priorities including land assets, reducing flood risk and improving access to superfast broadband. They intend to develop strategic sectors and clusters of marine and engineering to establish a business gateway area creating a growth hub which will develop the enterprise zone.
250. In regards to the 'greener' parts of the Solent's LEP strategy, members and Partnership for Urban South Hampshire (PUSH) are drawing up an action plan to help work towards a low carbon economy for the Solent region.

Enterprise M3 LEP¹⁴⁷

251. Enterprise M3 LEP aims to focus on enterprise, productivity and the environment and aims to be a premier location in the country for enterprise and economic growth with an excellent environment and quality of life. The LEP intend to deliver this vision by using the Growing Places Fund to deliver infrastructure improvements such as universal access to superfast broadband which is a priority for the area and is the single biggest infrastructure improvement which is required by the LEP. Enterprise M3 intends to lobby for additional funding for high speed broadband infrastructure and pilot new approaches to bring this to rural areas and will identify areas where superfast broadband would unlock strategic developments.
252. Developing the visitor economy is a key priority for Enterprise M3, in particular business tourism. Key to achieving this will be to publish an overarching visitor economy strategy and action plan to generate a stronger recognition of the area's destinations and promote a better understanding of the opportunities for visitors to stay longer. The LEP will work with partners to initiate how they will accommodate tourism and how it can be sustainable. They will also identify locations to attract international conference venues. Enterprise M3 intends to explore opportunities to further develop rural tourism, ecotourism and cultural tourism.

Coast to Capital LEP¹⁴⁸

253. Coast to Capital's aim for its region is to create a high performing economy with a global outlook, where knowledge and creativity drives growth and prosperity for all. They intend to concentrate support for high growth businesses in those sectors where they have a clear competitive advantage. Coast to Capital has identified some key priorities around environmental technologies and low carbon services, tourism and high-speed broadband. In regards to environmental technologies, Coast to Capital agrees with the Government's statement that European Structural and Investment funding should be focussed on activities to improve energy efficiency and to create jobs and growth in low carbon technologies, rather than major infrastructure projects. For instance, South Downs National Park Authority has identified the low carbon energy sector as a key priority for the development of the rural economy. In addition, two colleges, Brinsbury and Plumpton, are National Academy Hubs for the renewable energy sector.
254. Supporting tourism activities in rural areas is a key priority for Coast to Capital because it is a major industry and one with further potential for growth due to the area's assets of

¹⁴⁶ Solent LEP (2014) Strategic Priorities (online) available at: http://solentlep.org.uk/strategic_priorities Accessed 18/03/2014

¹⁴⁷ Enterprise M3 (2013) *Strategy for Growth: Strategy and Action Plan* (Online) Available at: <http://www.enterprisem3.org.uk/uploads/3a8b730273d330f5cb578b8048d14a4ffcb102f9.pdf> Accessed 18/03/2014

¹⁴⁸ Coast to Capital (2014) *European Structural and Investment Funds (ESIF) Strategy 2014-2020*, (Online) Available at: http://www.coast2capital.org.uk/images/CtoC_ESIF_Strategy_Final_JAN14.pdf Accessed 18/03/2014

the countryside, coast, heritage, culture and leisure opportunities. The LEP intends support organisations to develop and implement sustainable tourism plans. In addition they have identified local sectors which will generate growth and jobs in tourism, particularly the South Downs National Park, the Coast, Brighton and fully exploiting the advantage conferred by Gatwick Airport.

255. Over the next 20 years, Coast to Capital will also need to make sure that further developments in business connectivity are given a high priority. The current focus is on broadband improvements, and businesses have told the LEP that getting next generation infrastructure in place as quickly as possible must be a top priority. They intend to do this by supporting implementation and roll-out across Coast to Capital and to support and promote ultra-fast implementation in Croydon and Brighton.

South East LEP¹⁴⁹

256. The South East Local Enterprise Partnership aims to create the most enterprising economy in the UK through creating 200,000 private sector jobs and 100,000 new homes by 2021 through a co-ordinated growth programme. New road and rail infrastructure will provide support to businesses to deliver this growth; in addition to the Thames Gateway – Europe's largest regeneration area.
257. The low carbon economy has been identified as one of their key priority sectors. They will support the development of the Kent & Medway Centre for Offshore Renewable Energy (CORE), work with the ORE Catapult, and through the MAS Offshore wind Supply chain Growth Programme (GROW: Offshore Wind), to provide tailored support to develop the supply chain, and increased investment in specialised skills will help to secure and sustain long-term business growth. They will also fund small scale renewable and broadband investments in rural areas and support tourism in rural areas.
258. South East LEP also recognise the roll out of superfast broadband as a key priority ensuring new businesses starting in rural locations in the LEP area have adequate services for their business.

Solent Waterfront Strategy¹⁵⁰

259. The Solent Waterfront Strategy recommends that authorities develop policies that secure the future prosperity of the marine sector in the Solent sub-region through supporting marine industry and related organisations and the need to boost skills and competitiveness in the area. Overcoming constraints to growth and ensuring continued prosperity of the marine industry (including ports and shipping, naval and defence and marine leisure activities) are key priorities to the prosperity of the sub-region. The Strategy highlights a need to 'develop spatial, economic and land-use planning policies that support the growth of the marine sector'. The key components of the Strategy are to:

- Achieve national and regional support for Solent marine industry;
- Promote innovation and growth and support the core marine clusters;
- Safeguard strategic marine sites;
- Address work force development;
- Redress the economic/environmental balance;
- Seek to provide affordable land and premises;

¹⁴⁹ South East LEP (January 2014) South east LEP European Structural and investment Fund Strategy (Online) Available at: <http://www.southeastlep.com/images/SE%20LEP%20SIF%20-%20January%20Submission.pdf> Accessed 18/03/2014

¹⁵⁰ Adams Hendry Consulting Ltd (2007) Solent Waterfront Strategy (Online) available at: <http://www.marinesoutheast.co.uk/docs/general/> Accessed 18/03/2014

- Respond to climate change and sea level rise;
- Simplify, strengthen and develop more proactive administration arrangements; and
- Consider long-term strategic planning arrangements for the Solent.

Partnership for Urban South Hampshire (PUSH) South Hampshire Strategy¹⁵¹

260. The South Hampshire Strategy seeks to coordinate economic growth and development in the south Hampshire sub-area¹⁵². In terms of economic development, the policies and proposals aim to maximise economic growth, bring about a renaissance of Portsmouth, Southampton and other urban areas, and ensure good quality jobs for residents. The Strategy specifically promotes marine, environmental technologies, transport and logistics development.

Local Plans

261. The majority of local authorities adjacent to the South inshore plan area recognise the importance of recreation to the economy and this is reflected in their Local Plans. 34 local authorities have policies in their core strategies relating to tourism and recreation (most referencing the marine and coastal environment) which generally focus on (but are not limited to)¹⁵³:

- Development (i.e. harbour or marina) and regeneration of the seafront to attract visitors and create new jobs and income for the local communities;
- Encouragement of opportunities to diversify (in terms of the activities or the season) the visitor economy, but not at the detriment of existing opportunities;
- The importance of access to the coastline and the sea, this includes both access to coastal areas and physical access to the sea through the provision of slipways, footpaths, moorings;
- The balance between increasing the visitor economy (and recognising the significant contribution it makes to the economy and local communities) while managing the impacts of tourism and recreation on the coastline, especially designated areas which are often the reason people choose to visit an area;
- The management of recreational activity and the reduction of any disturbance it causes to the natural environment, this is expressed in the policies of area of outstanding natural beauty (AONB) management plans; and
- Eight local authorities specifically mention sailing/boating in their policies with regards to making suitable provision and ensuring this activity can continue sustainably.

262. In addition, Arun district council¹⁵⁴, Eastleigh Borough Council¹⁵⁵ and West Dorset District Council¹⁵⁶ all have specific planning policies that mention or are explicit about

¹⁵¹ PUSH (2012) South Hampshire Strategy [online] available at: http://www.push.gov.uk/work/housing-and-planning/south_hampshire_strategy.htm Accessed 18/03/2014

¹⁵² Including East Hampshire District, Eastleigh Borough Council, Fareham Borough Council, Gosport Borough Council, Havant Borough Council, Portsmouth City Council, Southampton City Council, Test Valley Borough Council and Winchester City Council.

¹⁵³ MMO (2013) *South Inshore and South Offshore Marine Plan Areas: South Plans Analytical Report* [online] available from: http://www.marinemangement.org.uk/marineplanning/areas/documents/south_draftspar.pdf?bcsi_scan_AB11CAA0E2721250=0&bcsi_scan_filename=south_draftspar.pdf. Accessed 09/04/2014

¹⁵⁴ Arun District Council (2014) Publication Version of the Local Plan (policy DM4) [online] available at: http://www.arun.gov.uk/mediaFiles/downloads/87323194/February_Publication_Version_2014_Local_plan_FL_NAL.pdf. Accessed 09/04/2014

telecommunications cabling that can relate to that area between low and high water mean springs (overlap of marine and terrestrial plans).

Port Master Plans

263. Proposed port development (as specified in Port Master Plans) in the South marine plans area include¹⁵⁷:
- Torbay – introduction of a high speed, all weather ferry service to link Torquay, Paignton and Brixham;
 - Portland – construction of new berths and provision of more operational land to service these berths;
 - Poole – redevelopment of the existing Port of Poole Marina site including creation of a new 9m quay, deepening of existing quays and support for construction and maintenance of Navitus Bay wind park;
 - Southampton – expansion of the Port's container terminal; construction of a fifth passenger cruise terminal; construction of additional port facilities on the Dibden reclaim and deepening and widening navigation channels in the Solent;
 - Portsmouth – dredging to accommodate larger naval vessels;
 - Shoreham – increase in trade by 25% in the period to 2026; and
 - Newhaven – increase ferry traffic on the Newhaven to Dieppe route and increase the volume of international trade.

¹⁵⁵ Eastleigh Borough Council (2014) *Revised Pre-submission Eastleigh Local Plan 2011-2029 Policy DM8* [online] available at: http://www.eastleigh.gov.uk/PDF/PPI_RevPreSubLocalPlan_Feb2014.pdf Accessed 09/04/2014

¹⁵⁶ West Dorset Council (2006) *West Dorset District Local Plan Adopted Plan 2006 Policy IN7* [online] available at: www.dorsetforyou.com/media.jsp?mediaid=115502&filetype=pdf. Accessed 09/04/2014

¹⁵⁷ MMO (2013) *South Inshore and South Offshore Marine Plan Areas: South Plans Analytical Report* [online] available from: http://www.marinemangement.org.uk/marineplanning/areas/documents/south_draftspar.pdf?bcsi_scan_AB11CAA0E2721250=0&bcsi_scan_filename=south_draftspar.pdf. Accessed 09/04/2014

Implications for the sustainability appraisal and the marine plan

264. The marine plans would be used by the MMO when considering the potential impacts of development applications, many of which will require to be assessed with regards to their impact on the economy. It would be important in the drafting of the South marine plans, and at the project level, to account for the degree of risk to the economy that certain developments may represent. Where appropriate, and data permitting, such an assessment should include, projected risks associated with adaptation and mitigation measures or consequence related to developments. Given the future trajectory for certain industries, the potential future cumulative impacts could also be a consideration of the plan.

What is the current situation?

Introduction

265. The baseline data is presented under a number of sub-topics. The data is given at the South marine plans area scale however, where possible, spatial data is given – for example where it is relevant to a particular sub-area, city or port. The sub-topics are as follows:

- Economic activity and Gross Value Added (GVA);
- Key sectors;
 - Ports;
 - Fisheries;
 - Leisure;
 - Tourism;
 - Marine industry;
 - Other marine activities;
 - Aggregates;
 - Oil and gas;
 - Renewables;
 - Carbon capture and storage;
 - Nuclear;
 - Subsea communications; and
 - Coastal typologies.

Economic activity and GVA

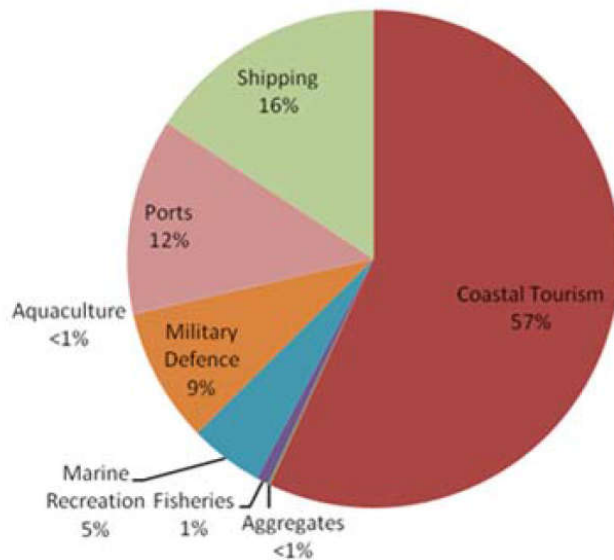
266. In 2013/14 the South marine plans area was estimated to support 330,000 jobs¹⁵⁸. The breakdown of this employment is shown in Figure D3; which shows that Coastal Tourism accounts for over half of these jobs¹⁵⁹.

¹⁵⁸ MMO (2011) *Maximising the socio-economic benefits of marine planning for coastal communities* [online] available at: http://www.marine-management.org.uk/marineplanning/key/documents/se_national.pdf. Accessed 09/04/2014

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¹⁵⁹ MMO (2013) *South Inshore and South Offshore Marine Plan Areas: South Plans Analytical Report* [online] available from: http://www.marinemangement.org.uk/marineplanning/areas/documents/south_draftspar.pdf?bcsi_scan_AB11CAA0E2721250=0&bcsi_scan_filename=south_draftspar.pdf. Accessed 09/04/2014

Figure D3: Breakdown of Jobs across the South marine plans area in 2013/14¹⁶⁰



267. Coastal Tourism and Ports and Shipping make up are key employers for low-skilled people which has a positive effect on deprivation. GVA is a measure of the economic contribution of an individual producer or sector of the economy. The proportion of GVA for each sector in 2013/14 is shown in Figure D4¹⁶¹. This shows that these three sectors account for most of the GVA in the South marine plans area. The key sectors contributing to the total GVA of all sectors include coastal tourism, which represents around 39% of the total GVA (£1,508 million), ports, which represents 30% of the total GVA (£1,157 million), and shipping, which represents approximately 21% of the total GVA (£825 million)¹⁶².

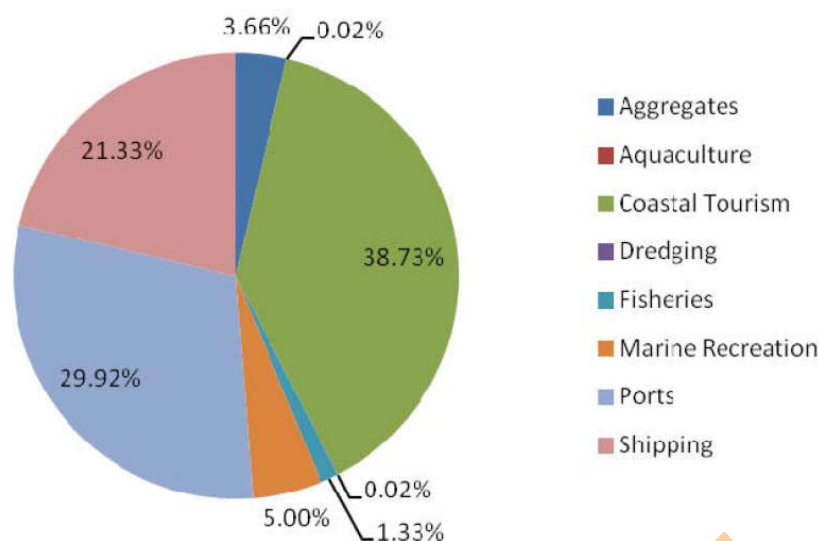
¹⁶⁰ IBID

¹⁶¹ Note: this does not include GVA data for coastal protection, military defence, and telecoms and communications due to lack of quantitative information despite there being significant economic activity within the sectors. For renewables, CCS and oil and gas comparatively little economic activity is believed to be currently taking place and therefore these sectors are also not quantified. In addition, expected growth rates have been set to 0% for fisheries, aquaculture, coastal tourism and marine recreation due to uncertainty over the direction of economic activity.

¹⁶² MMO (2013) *Economic baseline assessment of the South Coast* [online] available at: <http://webarchive.nationalarchives.gov.uk/20140108121958/http://www.marinemangement.org.uk/evidence/documents/1050.pdf>

Accessed 09/04/2014

Figure D4: Proportion of GVA for each sector in 2013/14¹⁶³



Ports and shipping

268. There are 47 ports and harbours in the South marine plans area¹⁶⁴. These ports host a variety of activities including cargo handling, freight transport, shipbuilding and repair, fishing and leisure activities. The English Channel is a very busy shipping lane with around 500 commercial vessels using the Dover Strait Traffic Separation Scheme daily¹⁶⁵. Ports include Southampton (the fourth largest port in the UK in terms of freight tonnage and leading passenger port), Teignmouth, Portland, Weymouth, Poole, Portsmouth, Shoreham, Newhaven, Folkestone, Dartmouth, Exmouth, Lyme Regis, Christchurch, Lymington, Hamble, Eastbourne and Chichester¹⁶⁶. These ports make up around 9.4% of all shipping traffic (by arrival) in the UK¹⁶⁷. The major focus of shipping and ports activity is in centre of the plan area around the Solent.
269. The ports sector directly supports an estimated 17,286 full time equivalent jobs and indirectly supports 24,601 jobs¹⁶⁸; with a GVA of £1,165m¹⁶⁹. The Port of Southampton

¹⁶³ IBID

¹⁶⁴ MMO (2013) *South Inshore and South Offshore Marine Plan Areas: South Plans Analytical Report* [online] available from: http://www.marinemangement.org.uk/marineplanning/areas/documents/south_draftspar.pdf?bcsi_scan_AB11CAA0E2721250=0&bcsi_scan_filename=south_draftspar.pdf. Accessed 09/04/2014

¹⁶⁵ BMT Isis (2009) *Reducing Risk in the English Channel / La Manche Traffic Separation Schemes* [online] available at: http://www.dft.gov.uk/mca/reducing_risk_in_the_english_channel_bmt_isis_final_report_v-3.pdf Accessed 12/03/2014

¹⁶⁶ MMO (2013) *South Inshore and South Offshore Marine Plan Areas: South Plans Analytical Report* [online] available from: http://www.marinemangement.org.uk/marineplanning/areas/documents/south_draftspar.pdf?bcsi_scan_AB11CAA0E2721250=0&bcsi_scan_filename=south_draftspar.pdf. Accessed 09/04/2014

¹⁶⁷ MMO (2013) *South Marine Plan Futures Analysis* [online] available at: <http://webarchive.nationalarchives.gov.uk/20140108121958/http://www.marinemangement.org.uk/evidence/1039.htm> Accessed 09/04/2014

¹⁶⁸ Oxford Economics (2013) *The Economic Impact of the UK Maritime Services Sector: Ports, A report for Maritime UK (including regional breakdown)* [online] available at: <http://www.oxfordeconomics.com/publication/open/239345>. Accessed 12/03/2014

¹⁶⁹ MMO (2013) *South Inshore and South Offshore Marine Plan Areas: South Plans Analytical Report* [online] available from:

plays a major role locally, supporting 8,300 direct jobs and 9,370 indirect jobs¹⁷⁰. Ports play an important role in providing large amounts of relatively low-skilled labour, which can help to reduce deprivation. Oil terminals and defence raise this to 14,640 jobs and cruise jobs add another 1,200; resulting in just under 17,000 jobs supported by the port in the Southampton area¹⁷¹. It is estimated that the naval base in Portsmouth injects £334million into the local economy¹⁷².

270. The Solent is nationally important and a world leader in terms of commercial port activity (Southampton); defence (the Navy at Portsmouth) and marine leisure and recreation (Lymington, The River Hamble, Cowes, Chichester and Portsmouth Harbour)¹⁷³. The Marine sector accounts for around 27% of the total Solent economy¹⁷⁴.
271. Trend over the past decade have shown a decline in ferry passengers; particularly in the international market; with around a 48% decline across Newhaven, Portsmouth, Southampton, Poole and Weymouth¹⁷⁵. Traffic volume handled by UK ports has remained fairly constant over the past decade. The volume of traffic along shipping lanes and ship movements from key ports in the south are shown in Figure D5.

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http://www.marinemangement.org.uk/marineplanning/areas/documents/south_draftspar.pdf?bcsi_scan_AB11CAA0E2721250=0&bcsi_scan_filename=south_draftspar.pdf. Accessed 09/04/2014

¹⁷⁰ Atkins (2011) *Economic Impact of the Port of Southampton* [online] available at: <http://www.marinesoutheast.co.uk/docs/research/>. Accessed 12/03/2014

¹⁷¹ MMO (2013) *South Inshore and South Offshore Marine Plan Areas: South Plans Analytical Report* [online] available from: http://www.marinemangement.org.uk/marineplanning/areas/documents/south_draftspar.pdf?bcsi_scan_AB11CAA0E2721250=0&bcsi_scan_filename=south_draftspar.pdf. Accessed 09/04/2014

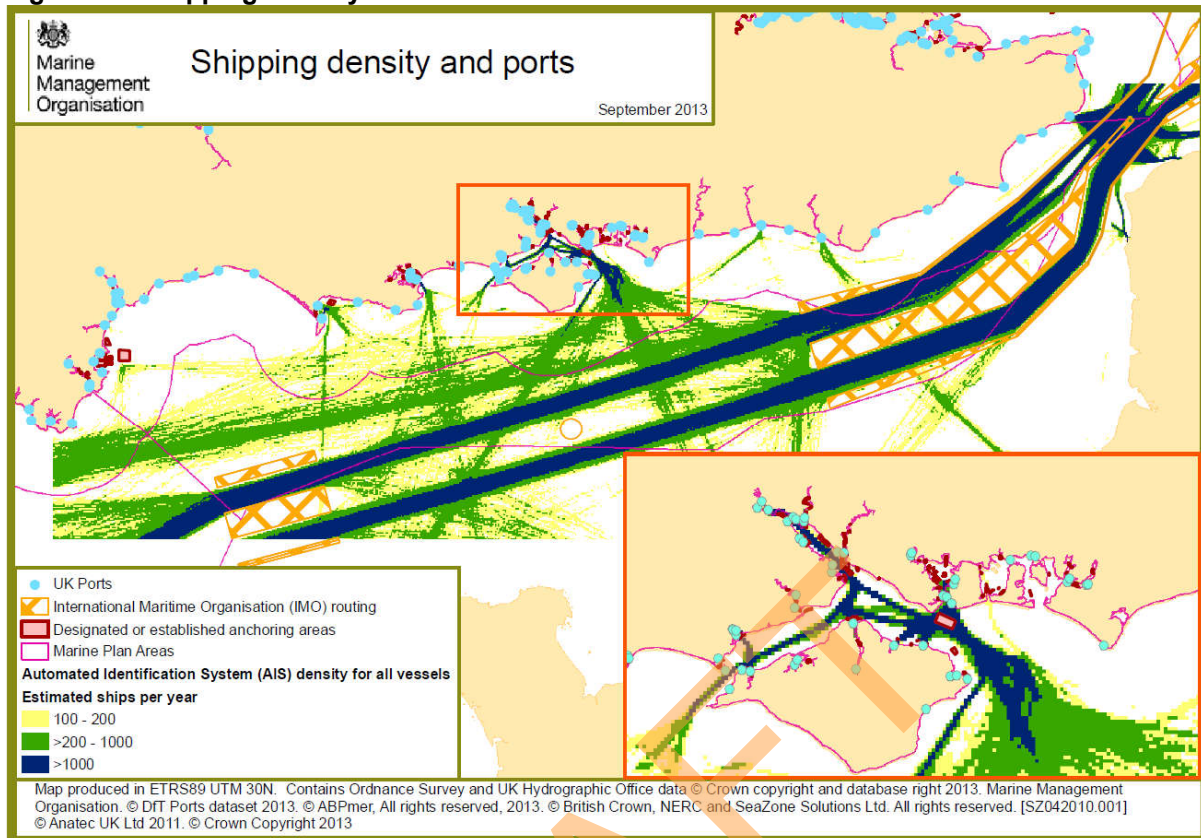
¹⁷² IBID

¹⁷³ Adams Hendry Consulting Ltd (2007) *Solent Waterfront Strategy* [online] available at: <http://www.marinesoutheast.co.uk/docs/general/>. Accessed 18/03/2014

¹⁷⁴ IBID

¹⁷⁵ DfT (2013) *Sea Passenger Statistics: 2012* [online] available at: <https://www.gov.uk/government/publications/sea-passenger-statistics-2012>. Accessed 09/04/2014

Figure D1: Shipping Density and Ports¹⁷⁶



272. The shipping industry plays a key part in the UK economy due to its ability to import and export goods. Shipping is a relatively low carbon transport mode and is capable of transporting vast volumes of freight and bulky items that other modes, such as rail and air, do not have the capacity to transport¹⁷⁷. Despite being low-carbon, shipping is a key contributor to sulphur dioxide emissions. EU Regulations will require higher quality fuels to be used to reduce sulphur emissions which may result in increased transport costs¹⁷⁸; with potential knock-on effects to the competitiveness of shipping. Other developments such as offshore wind can cause diversions for shipping routes which may further increase costs.
273. Ports require regular dredging and disposal of sediment in order to retain deep water channels to enable large ships to land. The major rivers and navigational channels that are dredged include the Solent, Poole Harbour, Southampton Water and Portsmouth Harbour. Port expansion and the requirement to accommodate larger vessels will likely require greater levels of capital dredging to deepen, widen and create new channels¹⁷⁹. Such dredging proposals are planned for the Port of Southampton¹⁸⁰ and major

¹⁷⁶ MMO (2013) *South Inshore and South Offshore Marine Plan Areas: South Plans Analytical Report* [online] available from: http://www.marinemangement.org.uk/marineplanning/areas/documents/south_draftspar.pdf?bcsi_scan_AB11CAA0E2721250=0&bcsi_scan_filename=south_draftspar.pdf. Accessed 09/04/2014

¹⁷⁷ IBID

¹⁷⁸ IBID

¹⁷⁹ IBID

¹⁸⁰ ABP (2013) *Southampton VTS Development Proposals at the Port of Southampton* [online] available at: www.southamptonvts.co.uk/Port_Information/Development_Projects/Approach_Channel_Dredge/. Accessed 13/03/2014

expansion is also planned at Portsmouth Naval Base¹⁸¹. Dredging and disposal has the potential to affect water quality and biodiversity through altering chemistry, turbidity, noise and disturbance and the release of contaminants¹⁸².

274. Portsmouth is one of the three main UK naval bases and is home to almost two-thirds of the Royal Navy's surface ships. It is a major element of the local economy and community and whilst it is vulnerable to government spending cuts¹⁸³, it is likely that Portsmouth will remain at the forefront of naval activity¹⁸⁴.

Fisheries

275. More fish is landed in the South marine plan area than any other marine plan area¹⁸⁵. The MMO are responsible for managing all quota stocks and non-quota stocks between 6-12nm; with non-quota stocks between 0 and 6 nm managed by the inshore fisheries and conservation authorities (IFCAs). The four IFCAs in the plan area are Kent and Essex; Sussex; Southern and Severn. The IFCAs are responsible for fisheries management at a local level, together with conservation activities to support EU Regulations.
276. In 2011 over 27,000 tonnes of fish were landed into ports in the south – the five highest being Brixham, Shoreham, Portsmouth, Weymouth and Poole. Brixham accounts for more fish landed than the other four ports combined, as shown in Figure D6¹⁸⁶. 86% of vessels whose 'home port' is in the plan area are less than 10m¹⁸⁷. Specialist inshore shellfish dredge fisheries exist for oysters and clams in the Solent and Poole Harbour¹⁸⁸.

¹⁸¹ MMO (2013) *South Marine Plan Futures Analysis* [online] available at: <http://webarchive.nationalarchives.gov.uk/20140108121958/http://www.marinemangement.org.uk/evidence/1039.htm>

. Accessed 09/04/2014

¹⁸² MMO (2013) *South Inshore and South Offshore Marine Plan Areas: South Plans Analytical Report* [online] available from: http://www.marinemangement.org.uk/marineplanning/areas/documents/south_draftspar.pdf?bcsi_scan_AB11CAA0E2721250=0&bcsi_scan_filename=south_draftspar.pdf. Accessed 09/04/2014

¹⁸³ IBID

¹⁸⁴ MMO (2013) *South Inshore and South Offshore Marine Plan Areas: South Plans Analytical Report* [online] available from: http://www.marinemangement.org.uk/marineplanning/areas/documents/south_draftspar.pdf?bcsi_scan_AB11CAA0E2721250=0&bcsi_scan_filename=south_draftspar.pdf. Accessed 09/04/2014

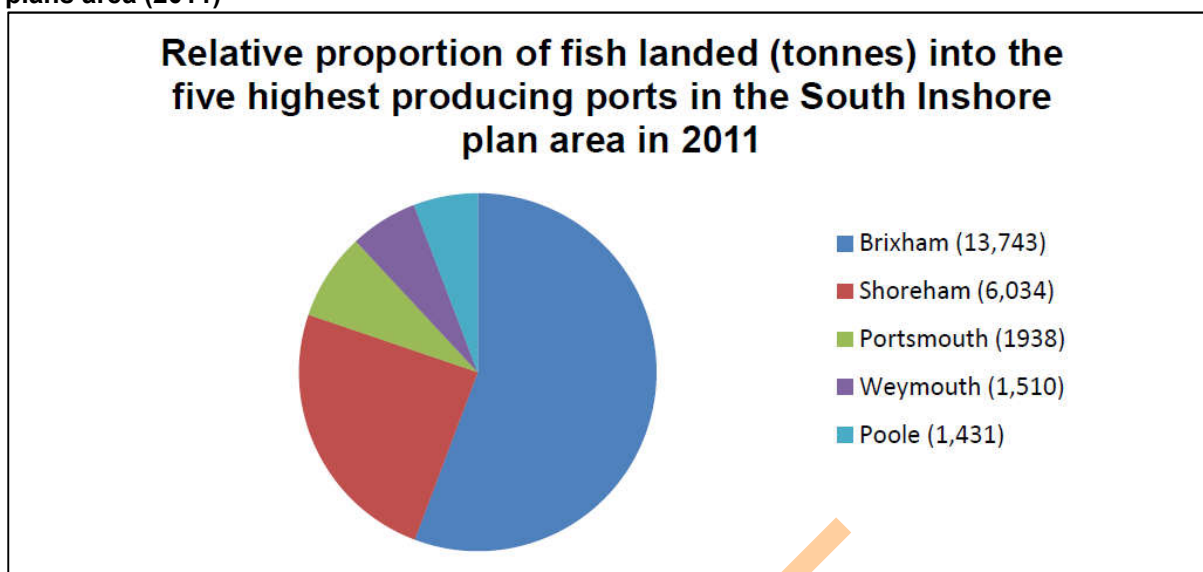
¹⁸⁵ IBID

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¹⁸⁸ UKMMAS (2010) *Charting Progress 2 Feeder Report: Productive Seas*, Defra on behalf of UKMMAS [online] available at: <http://chartingprogress.defra.gov.uk/feeder/PSEG-feeder.pdf>. Accessed 13/03/2014

Figure D6: Proportion of fish landed in the five highest producing ports in the South inshore plans area (2011)¹⁸⁹



277. The value of fish landed in the south in 2011 was just over £51m; directly supporting 698 fishermen and a further 1037 full time equivalent jobs in seafood processing. The fishing ports of Brixham and Radipole (Weymouth) are particularly dependent on fishing with 23% and 13% of the workforce respectively dependent on fishing¹⁹⁰. Fishing is not an activity that makes a large direct economic contribution however it does support a large number of supporting and processing jobs¹⁹¹. Key locations for fishing are shown in Figure D7¹⁹².

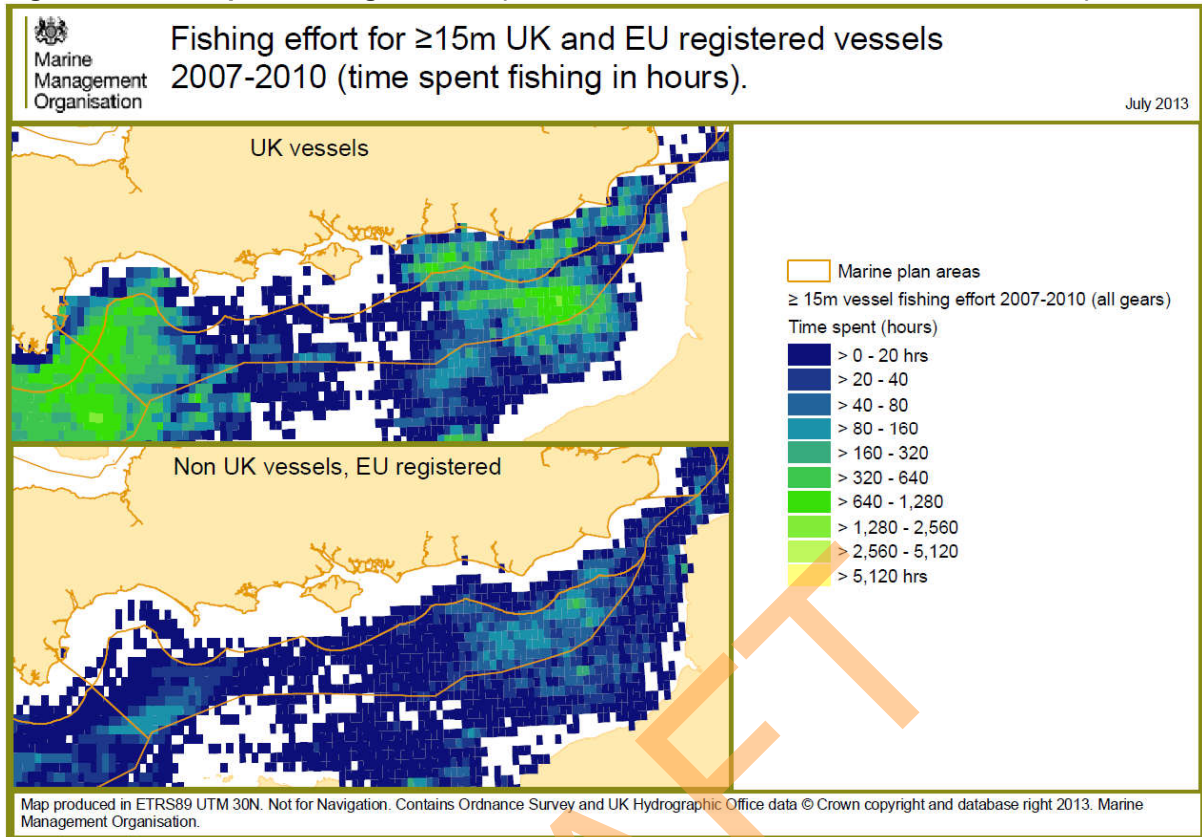
¹⁸⁹ MMO (2013) *South Inshore and South Offshore Marine Plan Areas: South Plans Analytical Report* [online] available from: http://www.marinemangement.org.uk/marineplanning/areas/documents/south_draftspar.pdf?bcsi_scan_AB11CAA0E2721250=0&bcsi_scan_filename=south_draftspar.pdf. Accessed 09/04/2014

¹⁹⁰ IBID

¹⁹¹ IBID

¹⁹² IBID

Figure D7: Time spent fishing in hours (UK and EU vessels 15m and above 2007-2010)¹⁹³



¹⁹³ IBID

Tourism and recreation

278. Tourists are drawn to the South marine plans area for its heritage coasts, coastal paths, recreational opportunities, seaside towns and visitor attractions. The eastern part of the plan area has easy access to London and the south east of England whilst the west of the plan area is part of the south west region which has the largest share of the domestic UK tourism market¹⁹⁴. The wildlife and natural landscapes of the south, including those assets further inland such as the South Downs National Park, attract many visitors to the plan area. Fourteen of a total of 41 principle seaside towns¹⁹⁵ are located in the South marine plans area.¹⁹⁶ The marine plans area contains six out of a total of 50 'smaller seaside towns'¹⁹⁷ and four out of 16 'other seaside towns'¹⁹⁸.
279. The GVA of coastal tourism in the South marine plan area has been estimated to be about £1.5 m – the plan area has, after Blackpool, the four next largest coastal seaside resorts in England and Wales (Greater Bournemouth, Greater Brighton, Torbay and the Isle of Wight)¹⁹⁹. The seaside locations of Torquay, Weymouth, Bournemouth, the Isle of Wight and Brighton and Hove have a higher combined holiday spend than any other marine plan area in England demonstrating its importance for tourism²⁰⁰.
280. Tourism is the largest component of Dorset's economy, providing over 40,000 jobs in the county²⁰¹ (of an estimated 77,287 FTEs and 108,202 indirect FTEs in the plans area). Tourism is a large employer of lower skilled people which is important for addressing deprivation.
281. Domestic tourism has declined over the last 15 years due to cheap foreign holidays and budget airlines; however since the economic downturn domestic holidays have increased by approximately 40%.
282. Recreational boating makes a significant contribution to the UK Economy, which the RYA estimates will amount to £1.3 billion per annum. The combined revenue for the South

¹⁹⁴ MMO (2013) *Compilation of information on tourism relevant to marine planning in the south inshore and offshore marine areas, final report*, [online] available at: <http://webarchive.nationalarchives.gov.uk/20140108121958/http://www.marinemangement.org.uk/evidence/documents/1038.pdf>
Accessed 09/04/2014

¹⁹⁵ That is, a population of at least 10,000 and where seaside tourism is a significant component of the local economy. These towns through a history of tourism share a number of distinct characteristics.

¹⁹⁶ MMO (2013) *Economic baseline assessment of the South Coast* [online] available at: <http://webarchive.nationalarchives.gov.uk/20140108121958/http://www.marinemangement.org.uk/evidence/documents/1050.pdf>
Accessed 09/04/2014

¹⁹⁷ Smaller seaside towns are described as coastal resorts with a population of less than 10,000.

¹⁹⁸ 'Other' seaside towns comprise a mixed group of places

¹⁹⁹ MMO (2013) *Economic baseline assessment of the South Coast* [online] available at: <http://webarchive.nationalarchives.gov.uk/20140108121958/http://www.marinemangement.org.uk/evidence/documents/1050.pdf>
Accessed 09/04/2014

²⁰⁰ MMO (2013) *South Inshore and South Offshore Marine Plan Areas: South Plans Analytical Report* [online] available from: http://www.marinemangement.org.uk/marineplanning/areas/documents/south_draftspar.pdf?bcsi_scan_AB11CAA0E2721250=0&bcsi_scan_filename=south_draftspar.pdf. Accessed 09/04/2014

²⁰¹ MMO (2013) *South Marine Plan Futures Analysis* [online] available at: <http://webarchive.nationalarchives.gov.uk/20140108121958/http://www.marinemangement.org.uk/evidence/1039.htm>
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East and the South West of England accounts for 60% of the overall UK industry revenue²⁰².

283. The effect of climate change on tourism is uncertain as milder weather and longer summers could increase visitor numbers; whilst wetter weather and storms may put visitors off²⁰³.

Table D3: Recent growth rates for the coastal tourism sector²⁰⁴.

Date	Total expenditure SE (£m)	Growth Rate (%)
2006	2,408	
2007	2,318	0.59
2008	2,326	-2.64
2009	2,590	12.89
2010	2,193	-13.79
2011	2,572	14.20

284. The marine environment provides a range of recreational opportunities which creates employment, generates income for the economy, and benefits health and wellbeing. It should be noted that coastal tourism is a major contribution to recreational activities and thus these two areas are more or less inseparable. Also, the recreation sector includes a number of supporting ancillary activities such as the construction and maintenance of marinas, moorings and slipways, building and maintenance of pleasure and sporting boats, manufacture of sports equipment, operation of sport, transport and beach facilities, and renting and selling of sports goods and equipment.²⁰⁵
285. The South marine plans area has a high recreational value in particular for pleasure boating, sailing, recreational diving, sea angling, kayaking, surfing and windsurfing²⁰⁶. The popularity of water sports and related industries has grown dramatically over the period 2000 to 2010²⁰⁷. The British Marine Federation (BMF) reported the total revenue of the UK leisure, super yacht and small commercial marine industry in 2012 to be up 1.7% from 2010-11, totalling £2.905 billion²⁰⁸. The BMF and RYA run a joint education initiative called The Green Blue, which provides best practice advice for Leisure Marine Developments. The South marine plan areas accounts for about 21% of the total UK leisure activity, leisure boating is the most popular and economically viable part of the marine sports industry.²⁰⁹ This activity is focussed around the Solent and Isle of Wight.

Other marine activities

Marine aggregates

286. The South marine plans area is the second busiest area in England for marine aggregate extraction, representing 48% of national extraction²¹⁰. In 2012 8.1Megatonne of aggregates were extracted in the South marine plans area of which 88.4% were used for

²⁰² RYA (2014) *Economic Contribution of the Recreational Boater* [online] available at: <http://rya.org.uk/aboutus/whatwedo/Pages/participationinwatersports.aspx>

²⁰³ MMO (2013) *South Marine Plan Futures Analysis* [online] available at: <http://webarchive.nationalarchives.gov.uk/20140108121958/http://www.marinemangement.org.uk/evidence/1039.htm>

Accessed 09/04/2014

²⁰⁴ MMO (2013) *South Inshore and South Offshore Marine Plan Areas: South Plans Analytical Report* [online] available from: http://www.marinemangement.org.uk/marineplanning/areas/documents/south_draftspar.pdf?bcsi_scan_AB11CAA0E2721250=0&bcsi_scan_filename=south_draftspar.pdf. Accessed 09/04/2014

construction and 11.6% were used for beach nourishment²¹¹. 38% of sand and gravel demand in the South marine plans area is met from marine extraction. Key ports for marine extraction are the Isle of Wight where 80% of aggregates landed are retained on the island, Shoreham harbour (1.05Mtpa landed) and Southampton (0.73Mtpa landed)²¹².

287. There are seven businesses active in marine aggregate extraction in the plan area which has a forecast Gross Value Added (GVA) of £143m, employing 178 full-time equivalent employees and supporting a further 924 jobs in construction and other supporting industries²¹³. Aggregates do not make a large economic contribution on their own however they are crucial to larger industries on land.
288. Marine aggregate extraction is set to increase in-line with increased construction activity and continued beach replenishment for coastal protection (such as at Shoreham), amenity beaches and tourist destinations along the coast²¹⁴. Dredging can have implications for nature conservation, the location of subsea cabling, fishing and wind farm zones.

Oil and Gas

289. Oil and gas extracted in the UK largely takes place in the offshore marine area from oil and gas wells. Oil and gas provides the UK with a significant proportion of its primary energy, contributing 73% in 2011²¹⁵. Within the South marine plans area there is

²⁰⁵ MMO (2013) *Economic baseline assessment of the South Coast* [online] available at: <http://webarchive.nationalarchives.gov.uk/20140108121958/http://www.marinemangement.org.uk/evidence/documents/1050.pdf>

Accessed 09/04/2014

²⁰⁶ British Marine Federation (2012). *Water sports participation study* [online] available at: http://www.dft.gov.uk/mca/watersports_participation_survey_2012_-_executive_summary.pdf. Accessed 09/04/2014.

²⁰⁷ UKMMAS (2010) *Charting Progress 2 Feeder Report: Productive Seas, Defra on behalf of UKMMAS* [online] available at: <http://chartingprogress.defra.gov.uk/feeder/PSEG-feeder.pdf>. Accessed 13/03/2014

²⁰⁸ British Marine Federation (unknown) *UK Leisure, Superyacht and Small Commercial Marine Industry, Key Performance Indicators (2012/13)* [online] available at: <http://www.britishmarine.co.uk/What-We-Do/Statistics-and-Market-Research/Current-Research/Key-Performance-Indicators>. Accessed 09/04/2014

²⁰⁹ MMO (2013) *Economic baseline assessment of the South Coast* [online] available at: <http://webarchive.nationalarchives.gov.uk/20140108121958/http://www.marinemangement.org.uk/evidence/documents/1050.pdf>
Accessed 09/04/2014

²¹⁰ MMO (2013) *South Inshore and South Offshore Marine Plan Areas: South Plans Analytical Report* [online] available from: http://www.marinemangement.org.uk/marineplanning/areas/documents/south_draftspar.pdf?bcsi_scan_AB11CAA0E2721250=0&bcsi_scan_filename=south_draftspar.pdf. Accessed 09/04/2014

²¹¹ IBID

²¹² IBID

²¹³ MMO (2013) *Economic baseline assessment of the South Coast* [online] available at: <http://webarchive.nationalarchives.gov.uk/20140108121958/http://www.marinemangement.org.uk/evidence/documents/1050.pdf>
Accessed 09/04/2014

²¹⁴ MMO (2013) *South Inshore and South Offshore Marine Plan Areas: South Plans Analytical Report* [online] available from: http://www.marinemangement.org.uk/marineplanning/areas/documents/south_draftspar.pdf?bcsi_scan_AB11CAA0E2721250=0&bcsi_scan_filename=south_draftspar.pdf. Accessed 09/04/2014

²¹⁵ IBID

currently no active oil or gas activity offshore; however within close proximity to the marine area there are land based oil extraction sites located in Wareham, Kimmeridge and Wytch Farm²¹⁶. Furthermore, associated secondary support activities exist such as the Esso (Exxon Mobil) refinery at Fawley, near Southampton, which is the largest in the UK, handling around 2,000 ship movements and 22 Mt of crude oil per annum²¹⁷.

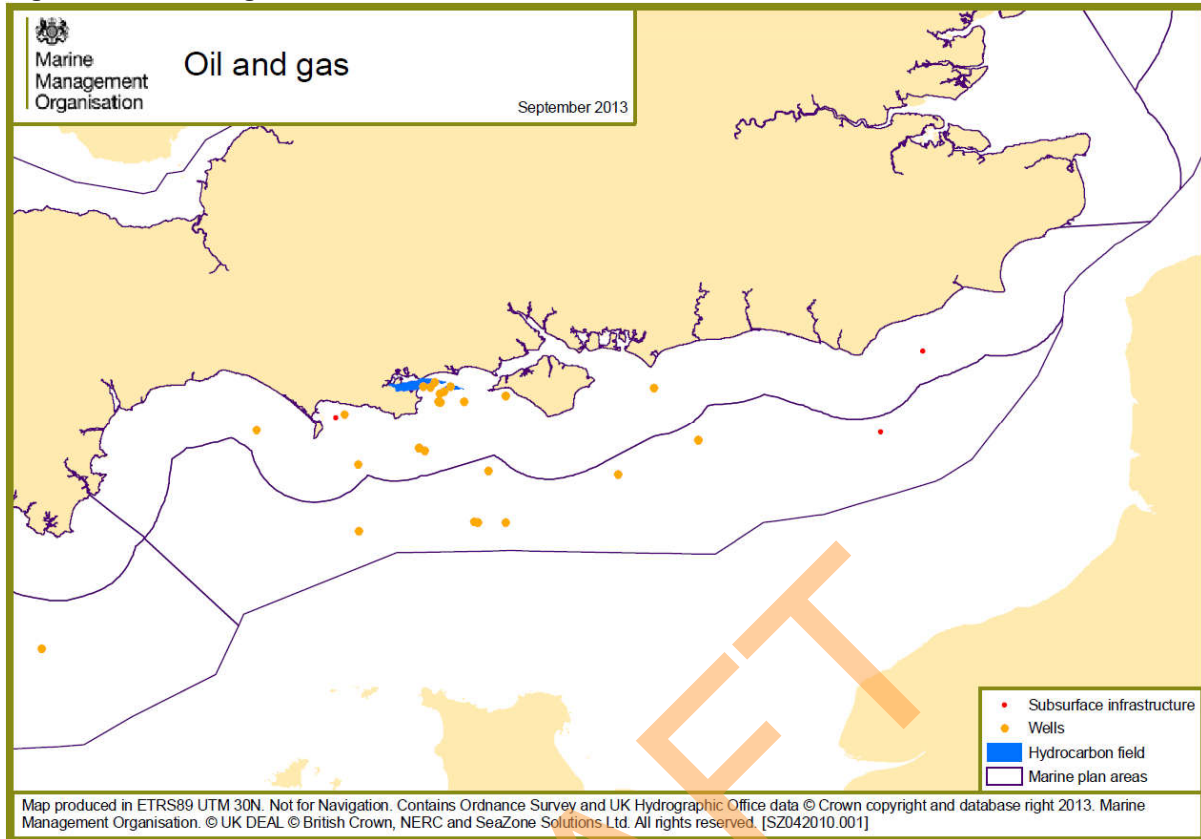
290. The majority of oil and gas-related activity is located within the centre of the South marine plans area; concentrated in the areas between Bridport in the west to Selsey Bill in the east. A particular area of activity is between the Isle of Wight and Poole; as shown in Figure D8.

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²¹⁷ ExxonMobil (2011) *Fawley Refinery and Petrochemical Plant* [online] available at: http://www.exxonmobil.co.uk/UK-English/files/Fawley_2011.pdf. Accessed 12/03/2014

Figure D8: Oil and gas²¹⁸



Renewable Energy

291. Offshore wind is the most established renewable technology in English waters with 3.8GW of capacity in operation or under construction and a further 32GW in the development pipeline which represents the largest deployment of offshore wind farms in the world²¹⁹. There are currently no wind farms in construction or operation in the South marine plans area but the Crown Estate's leasing programme has identified two zones at which developers can bring projects forward – Navitus Bay (off the Dorset and Hampshire coast) and Rampion (off the coast of Brighton)²²⁰.
292. The development of those two sites, if consented, has the potential to impact on the area and other activities that take place, for example affecting navigation of recreational and commercial shipping, fishing and visual impact. Both sites could be operational by 2020.
293. Tidal stream devices are another form of emerging renewable energy in the marine environment. Estimates are that the wave and tidal industry could be worth up to £6.1bn and provide 20,000 jobs by 2035²²¹. The Crown Estate has shown that harvesting wave

²¹⁸ MMO (2013) *South Inshore and South Offshore Marine Plan Areas: South Plans Analytical Report* [online] available from: http://www.marinemangement.org.uk/marineplanning/areas/documents/south_draftspar.pdf?bcsi_scan_AB11CAA0E2721250=0&bcsi_scan_filename=south_draftspar.pdf. Accessed 09/04/2014

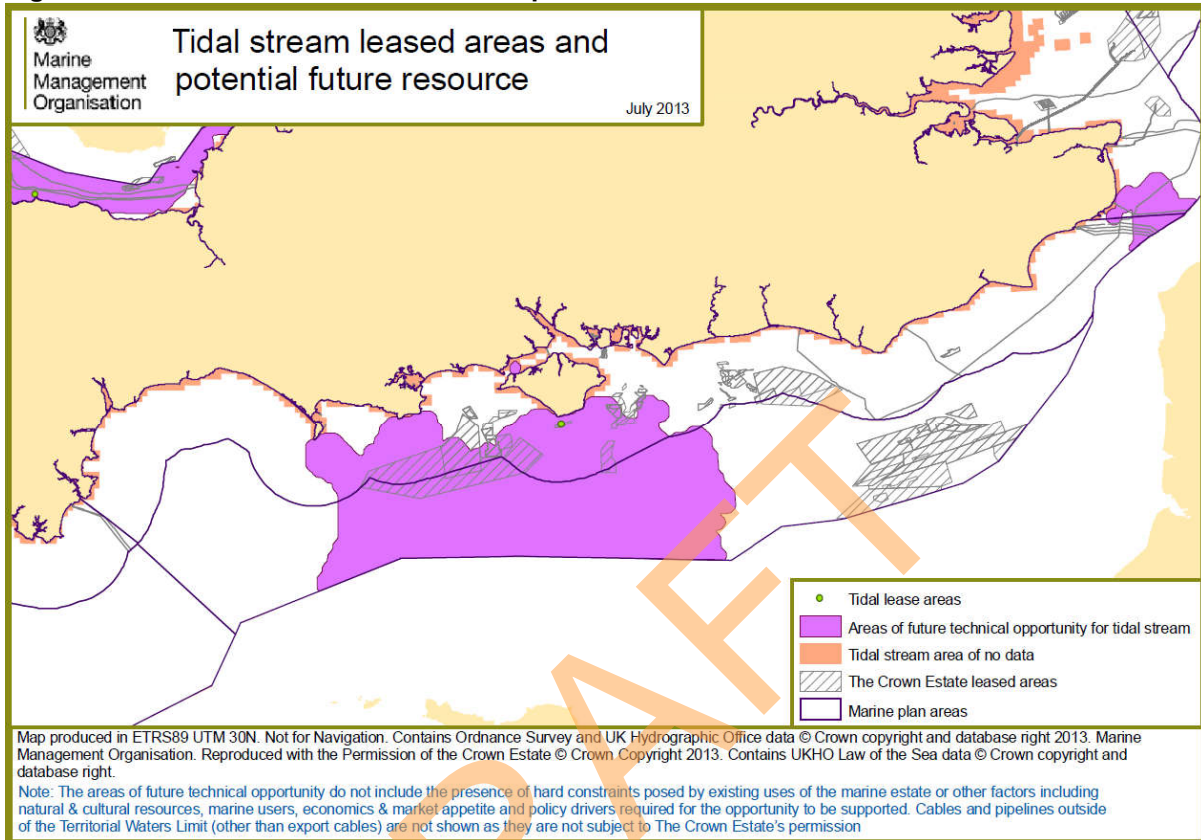
²¹⁹ IBID

²²⁰ The Crown Estate (2014) *Round 3 Offshore Wind* [online] available at: <http://www.thecrownestate.co.uk/media/5699/ei-round-3-offshore-wind.pdf> Accessed 12/03/2014

²²¹ Renewable UK (2013) *Wave and Tidal Energy in the UK: Conquering Challenges, Generating Growth, Available* [online] available at: <http://www.renewableuk.com/download.cfm/docid/40714D87-D50E-4265-B45EBD1E1E573624>. Accessed 12/03/2014

energy is unfeasible in the South marine plans area however tidal stream resources exist around the Isle of Wight and Portland Bill²²². A test site for this form of energy is being developed by the Isle of Wight Council at the Perpetuus Tidal Energy Centre (also known as the Solent Ocean Energy Centre)²²³. Future potential areas are shown in Figure D9.

Figure D9: Tidal stream leased areas and potential future resource²²⁴



Carbon capture and storage

294. Carbon Capture and Storage (CCS) is a developing technology that could contribute to climate change mitigation through reducing carbon dioxide in the atmosphere. The carbon dioxide would be separated at source when fossil fuels are burned at power stations and stored in applicable geological formations. In the marine area these are saline aquifers and depleted oil and gas fields.
295. There are currently no large-scale commercial CCS projects proposed or in development within the South marine plans area²²⁵. The Portland Gas Storage Project was granted consent in 2012 to store carbon dioxide in saline aquifers beneath Portland however an application for funding from the Department for Business, Energy, Industrial Strategy was unsuccessful. The project has stalled due to insufficient funding however CCS is technically feasible in the South marine plans area at Portland and at St Alban's Head in

²²² The Crown Estate (2012) *UK Wave and Tidal Key Resource Areas Project* [online] available at: <http://www.thecrownestate.co.uk/media/5678/ei-outlook-wave-and-tidal.pdf>
 Accessed 12/03/2015

²²³ MMO (2013) *South Inshore and South Offshore Marine Plan Areas: South Plans Analytical Report* [online] available from: http://www.marinemangement.org.uk/marineplanning/areas/documents/south_draftspar.pdf?bcsi_scan_AB11CAA0E2721250=0&bcsi_scan_filename=south_draftspar.pdf. Accessed 09/04/2014

²²⁴ IBID

Dorset²²⁶. CCS has the potential to create 100,000 jobs across the UK by 2030; contributing £6.5bn to the UK economy²²⁷.

Nuclear

296. There is one nuclear power station in the South marine plans area, at Dungeness B in Kent. The site has enough capacity (1,110 GW) to power over 1.5 million homes²²⁸. The nuclear sector makes a major contribution to both the national and local economy. Dungeness B supported 554 jobs in 2012 and contributed £29m to the local economy²²⁹. Decommissioning is underway at Dungeness A and Dungeness B will begin decommissioning in 2018. Over time the economic benefit will wane – it is estimated that around 260 jobs will be lost in the area between 2017 and 2019²³⁰.

Subsea communications

297. Subsea cables play a key role in telecommunications infrastructure, carrying over 95% of the world's international telephone, internet and data communications²³¹. Cables are also used for power, utilities and industrial purposes.
298. There are 14,575km of submarine cables around England with 1,357km in the South marine plans area; around 10% of the length and 31% of the number of cables in English waters²³². Key locations of cables and pipelines are shown in Figure D10.

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²²⁶ IBID

²²⁷ MMO (2013) *South Marine Plan Futures Analysis* [online] available at: <http://webarchive.nationalarchives.gov.uk/20140108121958/http://www.marinemangement.org.uk/evidence/1039.htm>

Accessed 09/04/2014

²²⁸ MMO (2013) *South Inshore and South Offshore Marine Plan Areas: South Plans Analytical Report* [online] available from: http://www.marinemangement.org.uk/marineplanning/areas/documents/south_draftspar.pdf?bcsi_scan_AB11CAA0E2721250=0&bcsi_scan_filename=south_draftspar.pdf. Accessed 09/04/2014

²²⁹ MMO (2013) *South Marine Plan Futures Analysis* [online] available at: <http://webarchive.nationalarchives.gov.uk/20140108121958/http://www.marinemangement.org.uk/evidence/1039.htm>

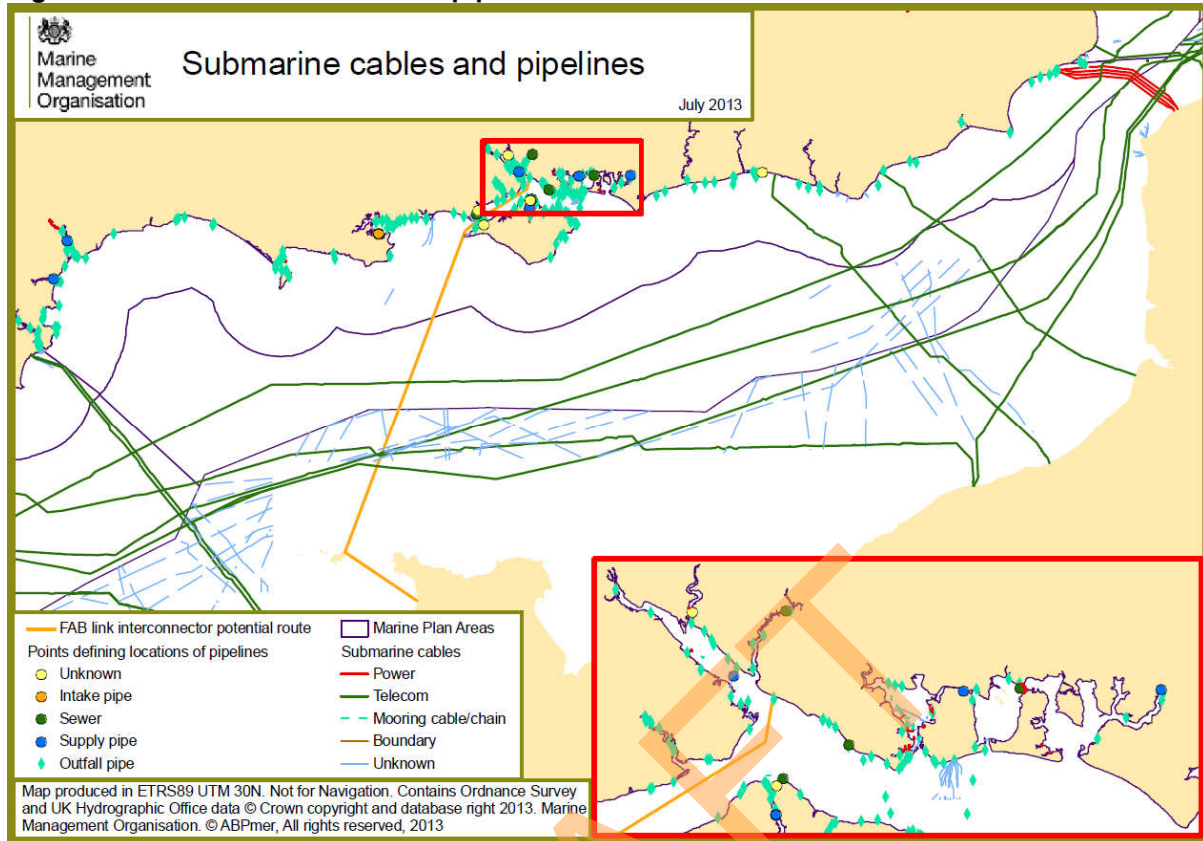
Accessed 09/04/2014

²³⁰ Regeneris (2011) *Romney Marsh Economic Impact Assessment and Socio-Economic Action Plan* [online] available at: http://www.shepway.gov.uk/UserFiles/File/pdf/local-plan/cs-submission/Romney%20Marsh%20Socio%20Economic%20Action%20Plan_FINAL.pdf. Accessed 12/03/2014

²³¹ MMO (2013) *South Inshore and South Offshore Marine Plan Areas: South Plans Analytical Report* [online] available from: http://www.marinemangement.org.uk/marineplanning/areas/documents/south_draftspar.pdf?bcsi_scan_AB11CAA0E2721250=0&bcsi_scan_filename=south_draftspar.pdf. Accessed 09/04/2014

²³² IBID

Figure D10: Submarine cables and pipelines²³³



Aquaculture

299. There are 34 designated shellfish waster in the South marine plans area, and aquaculture accounts for 5% marine area. This makes up 32% of national production and 43% of national oyster production. Aquaculture is particularly concentrated in the Solent²³⁴. The GVA of the aquaculture sector was estimated to be £2,980,000 which equated to £741,000 for the South marine plans area²³⁵. There are also 42 known direct employees with 104 people indirectly employed in supporting industries²³⁶. 855km² of the South marine plans area has been assessed to be suitable for aquaculture. The opportunities are shown in Table D3 Marine biomass (the cultivation of algae) is a potential growth area which can be produced for food, fertiliser and pharmaceuticals as

²³³ IBID

²³⁴ IBID

²³⁵ MMO (2013) *Economic baseline assessment of the South Coast* [online] available at:<http://webarchive.nationalarchives.gov.uk/20140108121958/http://www.marinemangement.org.uk/evidence/documents/1050.pdf>
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²³⁶ MMO (2013) *South Inshore and South Offshore Marine Plan Areas: South Plans Analytical Report* [online] available from:
http://www.marinemangement.org.uk/marineplanning/areas/documents/south_draftspar.pdf?bcsi_scan_AB11CAA0E2721250=0&bcsi_scan_filename=south_draftspar.pdf. Accessed 09/04/2014

well as biogas²³⁷. Aquaculture is a growing marine activity in the Exe estuary, Torbay and off the coast at Sidmouth²³⁸.

Table D3: Aquaculture opportunities in the South marine plan area²³⁹

Aquaculture type	Area (km ²)	% of total area
Bottom culture (clams)	4	<1
Rope grown (mussels)	172	20
Lobster restocking	601	70
Macro algae	188	22
Trestle bag bivalve	23	3
Fin fish	102	12
Bottom culture (oysters)	0.2	<1

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²³⁷ MMO (2013) *South Inshore and South Offshore Marine Plan Areas: South Plans Analytical Report* [online] available from: http://www.marinemangement.org.uk/marineplanning/areas/documents/south_draftspar.pdf?bcsi_scan_AB11CAA0E2721250=0&bcsi_scan_filename=south_draftspar.pdf. Accessed 09/04/2014

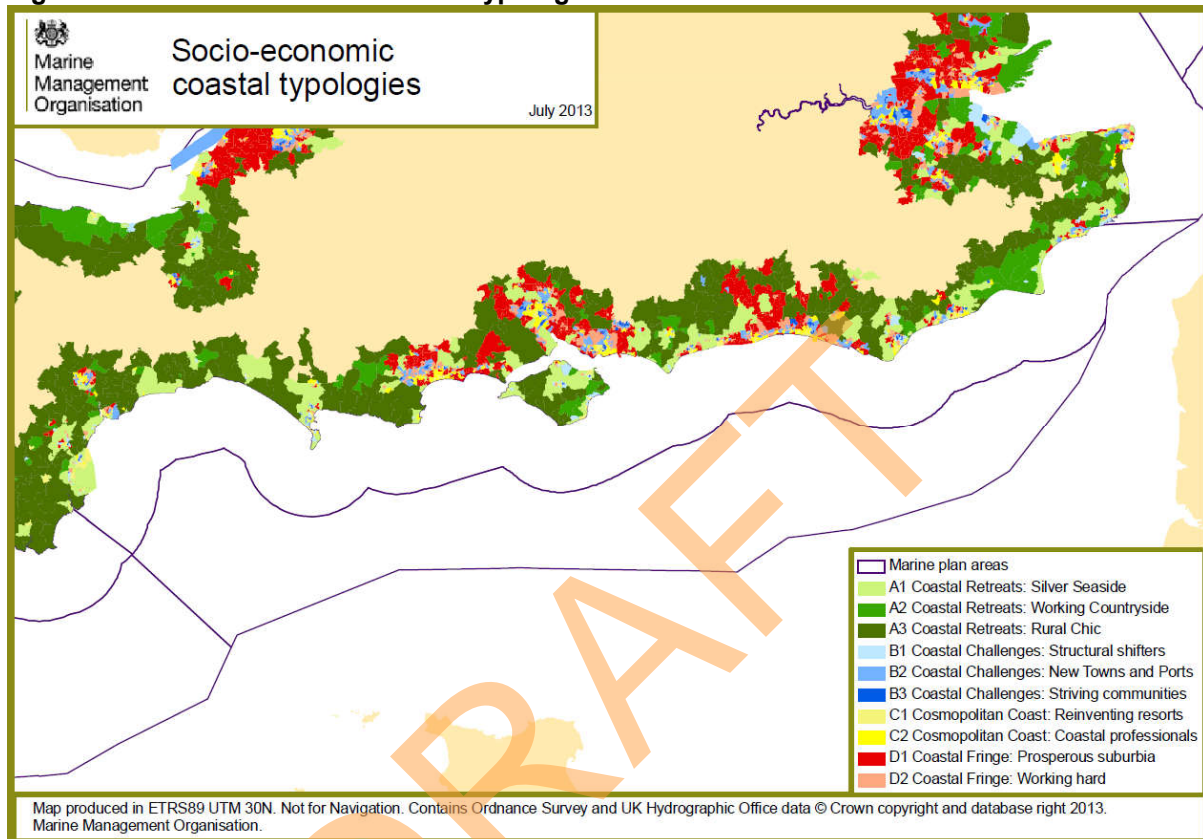
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²³⁹ IBID

Coastal typologies

300. Annex A (Communities and Health) goes into detail about the socio-economic coastal typologies in the South marine plans area. Figure D11 shows the distribution of these typologies.

Figure D11: Socio-economic coastal typologies²⁴⁰



301. The South marine plans area has the highest percentage of 'coastal professionals' (C2) than other marine plan areas (not including London). These are focussed in and around Brighton, Portsmouth, Southampton, Worthing, Lewes, Chichester and Exeter; and are typified by highly qualified and high-skilled people working in knowledge-based economy, real estate, business activities and education.
302. The south also has the largest number of affluent areas under the 'prosperous suburbia' category (D2); located on the edge of towns and in satellite towns around the main settlements listed above. These areas are generally populated by residents employed in the service sector, finance and real estate.
303. The plan area has the second largest number of communities classed as 'working hard' (D2), such as Peacehaven and Fareham/Portchester, that have a strong economy and high employment rate, mainly in manufacturing and port activities.
304. The south has the highest number of 'new towns and ports' (B2), such as Havant, Gosport and Exmouth. These areas generally have poor skills and high unemployment; however they also have a relatively strong economy and are located close to economic growth areas.
305. The south has the highest number of 'reinventing resorts' (C1) of any of the plan areas, which are deprived economies based on tourism (such as Torbay, Totnes and Ryde) that are diversifying towards becoming higher skilled.

Key issues for major settlements and urban areas in the South marine plans area:

- Port pressure at Southampton and Portsmouth. There is a need to maintain and enhance port activity in these areas as they play a key role in the wider Solent economy;
- Fishing is a key industry at Brixham and Hastings;
- The Solent is a focus of marine activity and also a prime asset in terms of tourism, leisure, ports and shipping. Water use and demand here will need to be carefully managed in order to maintain economic growth;
- International passenger ferries are due to decline; however there are opportunities to use space at ports for construction and maintenance of renewable energy schemes, such as at Poole;
- Dungeness B is due to begin decommissioning in 2018 which will affect economic activity in the east of the plan area; and
- Population growth at the larger settlements in the plan area will increase pressure on the marine environment for leisure purposes. This is likely to be the most acute around the Solent due to housing growth in the PUSH region.

What would the situation be without the marine plan?

306. Over the next six years the total GVA across all of the sectors is projected to increase, at an average growth rate each year of approximately 1.9%²⁴¹. Within this growth rate, a marked rise is expected to occur in 2017/18, when the construction of the Round 3 wind farms begins²⁴². In the longer term, beyond 2018/19, the rise in overall GVA is projected

²⁴¹ MMO (2013) *Economic baseline assessment of the South Coast* [online] available at: <http://webarchive.nationalarchives.gov.uk/20140108121958/http://www.marinemangement.org.uk/evidence/documents/1050.pdf>

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²⁴² IBID

to continue, with an average overall growth rate of approximately 0.8% between 2018/19 and 2032/33²⁴³.

307. The Marine Industry is set to grow in-line with the economic recovery and population growth, particularly in the Solent area. Southampton is set to remain a hub of ports and shipping-based activity and Torbay, Bournemouth, Portsmouth, Bognor Regis, Littlehampton, Brighton, Eastbourne and Hastings will all remain hubs of tourist activity²⁴⁴. Ports, shipping and coastal tourism are all forecast to experience significant growth, as shown in Figure D12²⁴⁵.

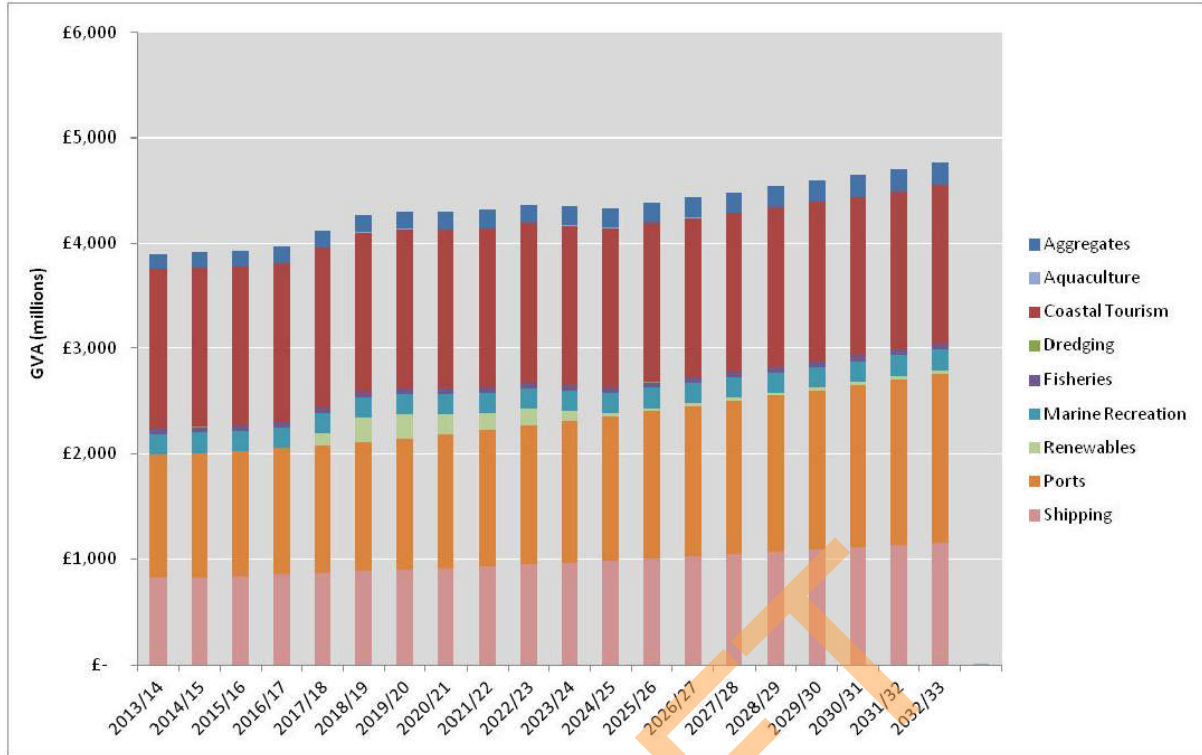
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Figure D12: Forecast GVA in the South marine plans area broken down by sector²⁴⁶



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²⁴⁶ IBID

Ports and shipping

308. The National Policy Statement for Ports states that there will be a substantial increase in port capacity in the UK over the next 20 to 30 years. Analysis suggests that this will increase tonnage from 38.83 tonnes in 2005 to 62.66 tonnes in 2030²⁴⁷. The Port of Southampton identifies future development at Dibden Bay. Several specific measures are being put in place by authorities bounding the South marine plans area seeking to enable the maintenance, development, diversification and growth of ports and harbours. It is expected that port developments will allow for larger vessels to be accommodated more frequently at the larger ports, while diversification of harbourside activities and facilities including those related to renewable energy will be reflected in an increase in the diversity of types of vessel operation²⁴⁸.
309. Ports are likely to see an increase in the proportion of large vessels transporting goods, with the Port of Southampton likely to increase in size as a result of increasing global trade and in competition with the Thames Gateway, Felixstowe and Rotterdam²⁴⁹. An increase in vessel size and port expansion is likely to require an increase in dredging which may have implications for biodiversity and marine conservation.
310. Ports with international passenger ferries are likely to lose out to cheap flights from regional airports; however the cruise sector is expected to expand, benefitting Southampton and to a lesser extent Poole and Portsmouth²⁵⁰.

Fisheries

311. Future trends for fishing are uncertain due to changes to the Common Fisheries Policy, marine conservation measures, renewable energy pressures, climate change, increased fuel costs, customer demand and changes in stock levels. In addition to economic and environmental impacts, changes to the fishing industry have the potential to lead to social impacts, particularly where fishing is important to the identity and character of a town, such as Hastings and Rye²⁵¹. Fishing has the greatest economic multiplier benefit to coastal communities; however, this is aligned to a growth in smaller “artisanal” operations rather than industrial-scale vessels²⁵². There is a need for the South marine plans to protect and enhance fisheries, particularly where they are integral to communities and their local economy. Evidence suggests that over the next 20 years, it is unlikely that nearshore or offshore finfish aquaculture would occur in the South marine plan areas.²⁵³ For shellfish, the evidence indicates that in the short term (six years) there

²⁴⁷ ABP (2009) *Port of Southampton Master Plan 2009-2030*. [online] available at: http://www.southamptonvts.co.uk/admin/content/files/PDF_Downloads/Master%20Plan/SMP.pdf. Accessed 09/04/2014

²⁴⁸ MMO (2013) *South Inshore and South Offshore Marine Plan Areas: South Plans Analytical Report* [online] available from: http://www.marinemangement.org.uk/marineplanning/areas/documents/south_draftspar.pdf?bcsi_scan_AB11CAA0E2721250=0&bcsi_scan_filename=south_draftspar.pdf. Accessed 09/04/2014

²⁴⁹ MMO (2013) *South Marine Plan Futures Analysis* [online] available at: <http://webarchive.nationalarchives.gov.uk/20140108121958/http://www.marinemangement.org.uk/evidence/1039.htm>
Accessed 09/04/2014

²⁵⁰ MMO (2013) *South Marine Plan Futures Analysis*

²⁵¹ MMO (2013) *South Inshore and South Offshore Marine Plan Areas: South Plans Analytical Report*

²⁵² MMO (2011) *Maximising the socio-economic benefits of marine planning for English coastal communities*

²⁵³ MMO (2013) *Future trends in fishing and aquaculture in the South Inshore and Offshore marine plan areas* [online] available at: <http://webarchive.nationalarchives.gov.uk/20140108121958/http://www.marinemangement.org.uk/evidence/1051.htm>

would be “*little or no expansion of the shellfish aquaculture sector in the inshore plan area*” and that in the long term (20 years) there is medium confidence that there would be a significant increase in production in offshore aquaculture through technological advances which would affect inshore producers²⁵⁴.

Tourism and recreation

312. The spatial distribution of tourism is likely to remain constant however planned investment in coastal development at principal resorts such as Brighton, Southampton and Bournemouth may redistribute tourists from other locations towards them²⁵⁵. Due to the somewhat erratic profile of the tourism sector, there is little evidence to provide confidence in an accurate prediction of future growth in the tourism sector. Saying this, the coastal tourism sector is “*particularly adaptive to changes in the wider economy*” and has a resilient employment profile²⁵⁶. We can conclude that the coastal tourism sector would likely grow overall (although likely to still remain erratic) and broadly in line with overall historic growth rates through the marine plan timescale.
313. Given that the recreation sector is tied to that of coastal tourism, the same conclusions, broadly speaking hold also i.e. we can conclude that the recreation sector would likely grow in the future in line with the recovery of the UK economy and population growth, and likely milder weather conditions (from climate change) extending the tourist season (although this is uncertain)²⁵⁷.
314. Climate change may have a number of effects, both positive and negative on tourism and recreation. For example, climate change may affect storminess and wave height, lead to harmful algal blooms and jellyfish, and change the distribution of fish (for angling) which could affect participation or location of recreation in the future. Conversely, milder sea and air temperatures may prolong the summer season, increasing the ‘tourism window’, increased storminess may be beneficial for some participants e.g. surfers.

Aggregates

315. The quantum of aggregates extracted from the marine area will increase in order to support population growth and economic growth in the South marine plans area and beyond (including Europe and London)²⁵⁸. The spatial distribution of extraction of marine aggregates is likely to remain the same, with production from the East English Channel Region becoming increasingly important compared to the South Coast Region (in the vicinity of the Isle of Wight)²⁵⁹.

Oil and gas

Accessed 09/04/2014

²⁵⁴ IBID

²⁵⁵ MMO (2013) South Marine Plan Futures Analysis

²⁵⁶ MMO (2013) *Economic baseline assessment of the South Coast* [online] available at:<http://webarchive.nationalarchives.gov.uk/20140108121958/http://www.marinemangement.org.uk/evidence/documents/1050.pdf>

Accessed 09/04/2014

²⁵⁷ MMO (2013) *South Marine Plan Futures Analysis* [online] available at:
<http://webarchive.nationalarchives.gov.uk/20140108121958/http://www.marinemangement.org.uk/evidence/1039.htm>

Accessed 09/04/2014

²⁵⁸ IBID

²⁵⁹ IBID

316. There is unlikely to be any significant oil and gas production activity in the South marine plans area in the short-term as there is currently no offshore extraction taking place. The closure of Fawley Power Station will see a reduction in energy production from oil and gas in the south²⁶⁰. Exploratory drilling will take place in the area between the Isle of Wight and Dorset which could develop into extraction sites should a viable resource be found²⁶¹.

Renewables

317. There is likely to be pressure for renewable energy development in the plan area, particularly around the Isle of Wight for tidal energy. Wind energy will also be a focus, and also an offshore electricity network to distribute the energy back to the mainland. Port development may be necessary to enable construction and maintenance facilities for renewable energy schemes.

Nuclear

318. Nuclear power is expected to decline post 2018 in-light of decommissioning at Dungeness B. There will continue to be employment associated with the decommissioning in this area however this will decline and new employment will need to be found to replace those high-skilled jobs lost in the east of the plan area. There will also be a need to replace the energy lost through other forms of energy development.

Subsea cables

319. An increase in subsea power cabling will be required by the installation of wind farms as well as future interconnectors and telecoms cables for the continuing development of internet access and broadband provision. The estimated lifetime of 15-25 years for cables may well require redevelopment in the near future²⁶². The spatial footprint of cabling is likely to remain constant, with increased demand initially being met by utilising spare capacity in the existing network, and later being incorporated as part of replacement and update works to the existing network²⁶³.
320. It is important to note that interconnector cables outside 12 nm are subject to the United Nations Law of the Sea Convention, to which the UK is a signatory (UNCLOS). Cables being laid within 12nm require a marine licence and any maintenance/removal to a cable laid after this point will be subject to the provisions of the marine licence as was originally awarded (as set out in Section 34 of The Marine Licensing (Exempted Activities) Order 2011). Section 81 of the MCAA 2009 outlines that cables laid outside 12nm are not subject to a marine licence. This is due to the provisions of the UN Convention on the Law of the Sea (UNCLOS) which allows states to freely lay cables in international waters.

²⁶⁰ IBID

²⁶¹ IBID

²⁶² MMO (2013) *Economic baseline assessment of the South Coast* [online] available at: <http://webarchive.nationalarchives.gov.uk/20140108121958/http://www.marinemangement.org.uk/evidence/documents/1050.pdf>
Accessed 09/04/2014

²⁶³ MMO (2013) *South Marine Plan Futures Analysis* [online] available at: <http://webarchive.nationalarchives.gov.uk/20140108121958/http://www.marinemangement.org.uk/evidence/1039.htm>
Accessed 09/04/2014

Coastal typologies

321. There will be a need to support diversification in smaller seaside towns in order to prevent seasonal unemployment and encourage year-round economic activity. This would also increase economic resilience should local tourism decline.

What are the key issues?

- Economic growth, development and population growth will increase spatial pressures throughout the South marine plans area, particularly in the Solent.
- Ports are expected to expand and adapt to accommodate larger vessels. This will mostly be felt in the Solent due to development at Southampton and Portsmouth.
- The plan will need to respond to a decline in passenger ferries in-light of international competition and increased fuel costs.
- There will be an increase in shipping and cruise traffic as the economic recovery continues.
- Fisheries will continue to be a key industry in the plan area; in particular for settlements such as Brixham, Rye and Hastings and supporting tourism.
- The future conditions for fishing are uncertain and depend on a number of wider natural, political and financial drivers.
- Fishing grounds may be impacted upon or displaced by energy production, aggregate extraction, ferry routes and new MPA management measures.
- Shellfish aquaculture in England has experienced a fluctuating trend in total production since 2007, along similar lines as the UK. It is not possible to identify the size of the sector in the South marine plan area due to confidentiality issues. There is no finfish aquaculture in the South marine plan area.
- There is uncertainty over climate change and the economic recovery for tourism however it is likely to increase given recent trends in domestic tourism and major development proposals at Brighton, Bournemouth and Southampton.
- There is a need to maintain and enhance leisure facilities, particularly marinas, clubs, slipways and moorings to facilitate growth within the marine recreational industry.
- Aggregates will continue to be extracted from the marine area, and demand is anticipated to rise to support the construction industry.
- Oil and gas development may be feasible towards the end of the plan period.
- Renewable energy schemes provide an opportunity to diversify ports for construction and maintenance activities.
- Increased uptake of renewables have the potential to adversely affect shipping in the English Channel and the Solent.
- The nuclear power station at Dungeness B will enter decommissioning in 2018 which will result in a steady decline in jobs over time.
- Subsea communications will need to be replaced, and renewables schemes will require electricity transmission infrastructure.
- There will be a need to support diversification in smaller seaside towns in order to prevent seasonal unemployment and encourage year-round economic activity.

Cross cutting issues

In terms of Communities and Health, increased use of the water for economic or energy purposes could result in less space for leisure and recreation, with potential health and wellbeing impacts. Economic growth should contribute towards reducing deprivation in the plan area.

There may Cultural Heritage impacts from dredging and port development and renewable energy schemes on shipwrecks and war graves.

Marine Ecology may also be affected through disturbance and loss of habitat, particularly around the Solent.

There may be Geology, Geomorphology and Coastal Processes effects from dredging and tidal energy schemes.

Landscape and Seascape may be affected by renewable energy schemes and port development; which may have negative effects on the economy as tourism is dependent on a high quality landscape and seascape.

Water quality and resources may be affected by dredging, potentially disturbing historic industrial pollution or changing water quality or chemical status.

Opportunities

Are there any data gaps?

322. The data presented tends to focus on the largest sectors and settlements; however little is presented for the economic contribution of rural areas.
323. There is a data gap regarding defence spending and future plans for defence in Portsmouth, although it looks likely that Portsmouth will remain the principal naval base.

Geology, Geomorphology and Coastal Processes

DRAFT

Annex E - Geology, Geomorphology and Coastal Processes

Introduction

324. The submarine landscape of the United Kingdom Continental Shelf (UKCS) and adjoining coast, and that of the South marine plans area, is a product of deep geological strata which define the principal topographic relief. Mobile and moribund bedforms of surficial sediments provide further topography, habitats for marine fauna and flora, and potentially useable economic resources. Notable marine habitats are being included in offshore and inshore conservation designations (see Annex C), often associated with qualifying geological or geomorphological features, and MCZs now provide a means of designating sites for purely geological or geomorphologic attributes below the low water mark. The coast of the English Channel is subject to relatively high levels of coastal erosion, and isostatic readjustment is an ongoing process which is augmented by projected sea-level rise related to anthropogenic climate change.
325. The hydrocarbon reservoirs of the UKCS have been a substantial source of oil and gas resources since their discovery in the 1960s, with the English Channel being predominantly an oil province, with production to date being entirely from land, and at a relatively small scale compared to wider UKCS offshore activities. In some areas sediments provide suitable grades of aggregate (see Section 4.5 of the MMO SPAR) which are extracted and used in construction and beach recharge, and more recently, marine renewables present a new spatial use of the seabed. All of these activities present potential impacts for geology, substrates and coastal processes, whether it is physical disturbance and associated habitat loss, contamination, or interference in sediment dynamics. Seabed sediments, like terrestrial soils, are also potential stores of cultural material (see Annex B).
326. Geology and geomorphology (including coastal processes) is a consideration of this SA, in line with those environmental topics listed in Annex I(x) of the SEA Directive, to be given consideration in any assessment. To provide context to the topic area, and to address section Annex I (a) of the SEA directive, i.e. to consider "the contents, main objectives of the plan or programme and relationship with other relevant plans and programmes", a summary table of relevant initiatives (which includes plans, programmes, policy and other relevant items), is in Table F1, following which there is a brief discussion of the key objectives and targets of the principal initiatives, as well as the implications of these with regards to the marine plans.

What is the policy context?

327. The South marine plans area have a geologically diverse coastline recognised by a number of Geological Conservation Review (GCR) and earth science SSSI sites (for instance Portland Bill GCR, Hastings Cliffs to Pett Beach SSSI) and the offshore area is similarly geomorphologically diverse, and has a number of commercially viable resources (such as aggregates, hydrocarbons). Policy context for this Annex is presented in Table E1.

Table E1: Relevant plans, initiatives and environmental protection objectives

International
The Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 (the London convention) and 1996 Protocol Thereto (amendment on the storage of CO ₂ in geological formations came into force 10 February 2007)
OSPAR recommendation 2003/3 on a Network of Marine Protected Areas
OSPAR Agreement 2005/6 on the Agreement on Background Concentrations for Contaminants in

Seawater, Biota and Sediment
OSPAR recommendation 2005/6 on a management regime for offshore cuttings piles
OSPAR Decision 2007/2 on the storage of Carbon Dioxide Streams in Geological Formations
UNESCO World Heritage Site: Jurassic Coast – Dorset to East Devon

Europe

Directive 2007/60/EC on the assessment and management of flood risks (2007)
EC Habitats Directive 92/43/EEC (1992)
Water Framework Directive (2000/60/EC)
The Floods Directive (2007/60/EC)
Marine Strategy Framework Directive 2008/56/EC
Communication from the Commission Report to the European Parliament and the Council: An evaluation of Integrated Coastal Zone Management (ICZM) in Europe 2007. COM (2007) 308 final
Directive 2009/31/EC for the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide.

National

Planning Policy Statements
Marine Policy Statement
NPPF (2012)
National Policy Statements for Energy (EN 1-6)
Other relevant initiatives
Geological Conservation Review (GCR)
Marine Conservation Zones
National Flood and Coastal Erosion Risk Management Strategy (FCERM)
Making Space for Water: National Coastal Erosion Risk Mapping Project
Cleaner Coasts healthier Seas, Working for a better marine environment, Our strategy for 2005-2011 (Environment Agency)
UK Climate Change Risk Assessment (2012)
A Strategy for Promoting an Integrated Approach to the Management of Coastal Areas in England
MCA Civil Hydrography Programme
National and regional guidelines for aggregates provision in England 2005-2020 (2009)

Local

Shoreline management plans

Durlston Head to Rame Head
Hurst Spit to Durlston Head (Poole & Christchurch Bay SMP)
Selsey Bill to Hurst Spit (North Solent)
Isle of Wight
Beachy Head to Selsey Bill
South Foreland to Beachy Head

River basin management plans

South East River Basin Management Plan
South West River Basin Management Plan
Catchment Flood Management Plans relevant to the south east and south west regions
National Flood and Coastal Erosion Risk Management Strategy

Other

Strategic Regional Coastal Monitoring Programmes for the south west and south east (Coastal Observatories)
Regionally important Geological and Geomorphological Sites (RIGS)

328. There are few inshore or offshore site designations for which geological or geomorphological features are qualifying features, though certain features are gaining protection through designations for which they are a qualifying habitat feature (such as SACs designated under the Conservation of Habitats and Species Regulations 2010 and Offshore Marine Conservation (Natural Habitats, &c.) (Amendment) Regulations 2010). These include sites such as the Wight-Barfleur Reef SCI, and coastal sites which include features such as sea caves (South Wight Maritime SAC, Lyme Bay and Torbay SAC) and sandbanks (Plymouth Sound and Estuaries SAC). The Marine and Coastal Access Act (MCAA) 2009 provides for the conservation of specific "features of geological and geomorphological interest" through the designation of MCZs. Seven MCZs in the South inshore and South offshore marine plan areas have been designated in part due to their geological characteristics, for instance Beachy Head West and Chesil Beach (see Annex C for more details). Additionally, a number of rMCZs due to be consulted on in 2015²⁶⁴ have been selected based on relevant seabed features including Offshore Brighton, Offshore Overfalls, Wight-Barfleur Extension and Beachy Head East.
329. In addition, the MCAA amends the Wildlife and Countryside Act 1981 in such a way that SSSI notifications can be made in England below the mean low water mark (MLWM). In the terrestrial environment, the Geological Conservation Review (GCR), launched in 1977, identifies the most important (nationally and internationally) terrestrial geological and geomorphological sites in Britain. GCR sites are chosen in such a way that they satisfy the legal requirements for notifications as SSSI designations for geology and physiography, or those which are awaiting notification. The coast of the South inshore marine plan area contains over 200 GCR sites relating to GCR "Blocks"²⁶⁵ including the Jurassic - Cretaceous Reptilia and the Coastal Geomorphology of England. Important sites are also locally recognised through the Regionally Important Geological and Geomorphological Sites (RIGS) programme, though only SSSI features have statutory protection.
330. At the coast, processes can lead to natural erosion, shoreline retreat and increased flood risk, which may be accentuated by projected climate and associated environmental change including increased storminess and sea-level rise (see below for more detail)²⁶⁶. It should be noted that in some areas net accretion can also occur. ICZM and appropriate planning policy aims to help manage and mitigate the problems associated with, amongst other things, coastal erosion and flood risk. The Flood and Water Management Act 2010 makes provisions for the creation of a National Flood and Coastal Erosion Risk Management (FCERM) Strategy, locally implemented through strategies such as the Exe Estuary and Poole and Wareham Flood and Coastal Erosion Risk Management Strategies. In addition to the above, planning policy (e.g. NPPF) and related guidance²⁶⁷ outlines how developers and authorities should manage flood risk

²⁶⁴ Defra (2014). Marine Conservation Zones: Update. February 2014, 5pp.

²⁶⁵ <http://jncc.defra.gov.uk/page-4171>

²⁶⁶ For instance see: Woolf D and Wolf J (2013) Storms and Waves in MCCIP Annual Report Card 2013, MCCIP Science Review, 15pp, Horsburgh K. and Lowe J (2013) Mean Sea Level and Sea Level Extremes in MCCIP. Annual Report Card 2013, MCCIP Science Review, 10pp. www.mccip.org.uk/arc, also see Met Office & CEH (2014). The recent storms and Floods in the UK, 27pp.

²⁶⁷ Note that the sea-level change projections referred to in this guidance are dated, though for the South marine plans area, 2.6.7.8. of the MPS states that, "Marine plan authorities should take account of the findings of the

and development at the coast. This includes considering impacts that may arise from a development (such as to whether it may enhance flood risk elsewhere), whether the development is flood resilient, whether it may be better located elsewhere, and whether it is sustainable in the long-term (e.g. in the face of rising sea-levels) – see paragraph 100 of the NPPF, and corresponding detail in section 2.6.8 of the MPS.

331. Climate change projections which extend through the plan life and beyond (e.g. UKCP09, , IPCC 5th AR), in combination with other plans (e.g. shoreline management plans - SMPs), allow an understanding of the possible outcomes for coastal areas, particularly from sea-level rise. The UK 2012 Climate Change Risk Assessment outlined the potential impacts of climate change for the UK, including coastal related issues such as flooding. The resultant National Adaptation Programme aligns climate change risks to actions (e.g. those already being delivered through the FCERM Strategy, above). The most recent IPCC AR5 reports indicate the principle coastal issues which may result from the most recent climate change projections (see WG1 and WG2 reports on the scientific basis and adaptation respectively).
332. In line with a consideration of future sea-level change, SMPs include a longer term view identifying sustainable management approaches for up to the next 100 years. Each SMP (or revised SMP2) provides policy recommendations for coastal areas which may advise holding the line (HTL) through the maintenance of present defences or provision of new defences, no active intervention (NAI), and managed realignment (MR) where defences are removed and/or moved inland to allow for natural coastal inundation. Policies are provided in each SMP over three time horizons, 2009 to 2025, 2025 to 2055 and 2055 to 2105.
333. During the life of the plan, the most recent SMPs covering the South inshore area support a course of “hold the line” for much existing defended frontages, for instance around Bournemouth, Portsmouth, Chichester, Bognor Regis, Brighton and Eastbourne. These areas, corresponding to where major infrastructure requires protection, are interspersed with policy units of managed realignment (e.g. sections at Selsey Bill) or no active intervention (e.g. much of the Isle of Wight, Beachy Head). The Environment Agency coastal erosion mapping tool seeks to collate the various coastal cell level policies to 2030 (i.e. SMP epoch 1), though there are presently some gaps in this mapping²⁶⁸.
334. The WFD seeks to achieve good ecological status (e.g. biological or chemical quality) or good ecological potential (e.g. for heavily modified water bodies) for coastal and estuarine water bodies. River basin management plans (RBMPs) now completed for England are one of the principal means by which the WFD has been implemented in the UK and will be used in combination with other plans including SMPs to achieve a fully integrated approach to coastal management (such as in relation to the improvement of morphological status (see key issues, below) and with regards to coastal flooding). RBMPs identify relevant morphological and hydrodynamic issues and the measures to manage these. Similarly, the Marine Strategy Framework Directive (MSFD) seeks to achieve good environmental status, which incorporates geological conditions, in the marine environment. There is an overlap in the geographical scope of the WFD and MSFD, as WFD coastal waters extend to 1nm offshore, and MSFD water bodies include the area up to the coast. The MSFD explicitly includes a provision for this overlap (MSFD, paragraph 12), whereby GES should only include those aspects not already covered by the WFD (e.g. litter, noise), however ongoing initiatives through WFD and related Directives (e.g. the Nitrates Directive and Urban Waste Water Treatment Directive) should help to achieve GES relating to contaminants, eutrophication and hydrographic processes (MSFD Descriptors 5, 7 and 8) within 1nm.

latest UK Climate Change Risk Assessment, relevant national adaptation programmes and the latest set of UK Climate Projections”

²⁶⁸See: [EA Coastal Erosion Map](#)

335. The Floods Directive seeks to manage the risks posed to human health, the environment, cultural heritage and economic activity by flooding. The programme included the production of a Preliminary Flood Risk Assessment showing the impact of historic flooding by 2011, and the generation of flood risk maps showing a range of hazard variables (water depth, extent and probability) by 2013²⁶⁹. By 2015, management plans will be produced, coordinated with river basin management plans. The Environment Agency has completed a number of Catchment Flood Management Plans (CFMPs) relevant to the South marine plan areas for the south east and south west regions covering 14 catchments in the plan areas. The CFMPs aim to understand the causes of flooding and recommend ways of managing it over the next 50 to 100 years for each catchment. The Environment Agency has published a National Flood Risk Assessment, indicating the ways in which flood risk should be reduced and mitigated, through physical or policy measures. A number of flood schemes are ongoing which relate to the coast of the South inshore area²⁷⁰.
336. Internationally, the 1972 London Convention and its 1996 protocol provide environmental law for the permanent storage of CO₂ in geological formations. The amendments to the 1996 protocol state that "carbon dioxide streams may only be considered for dumping, if: disposal is into a sub-seabed geological formation; they consist overwhelmingly of carbon dioxide (they may contain incidental associated substances derived from the source material and the capture and sequestration processes used); and no wastes or other matter are added for the purpose of disposing of them." OSPAR Decision 2007/02 on the Storage of Carbon Dioxide Streams in Geological Formations, requires that storage of CO₂ in geological formations needs authorisation or regulation from competent authorities, and indicates what any permit or approval should, at least, contain. Directive 2009/31/EC establishes a European level legal framework for the environmentally safe storage of CO₂ by member states in their Exclusive Economic Zone and Continental Shelf. The basis for this Directive is that CCS can provide a bridging technology whereby carbon emissions can be attenuated while renewable technologies and associated technologies provide a more sustainable energy source.

What is the current situation?

337. Though some aspects of the environmental baseline are exclusively covered by either the South inshore (such as coastal processes) or South offshore areas, in certain instances no reasonable division can be made, for instance viable substrates for aggregate extraction, and sediment types and bedforms may traverse plan boundaries.

Seabed substrates and topography

338. The present distribution of geological strata in the UKCS, including that of the marine plan areas is determined by past geological and geomorphological processes, including fluvio-glacial flooding. The present location of sediments and certain topographic features is a function of the underlying geology and millennia of aeolian, fluvial and periglacial activity both in the marine and terrestrial environment. The distribution of sediments is generally well characterised across the UKCS, particularly in areas of mature oil and gas production, whilst navigation and aggregates interests have contributed significantly to the knowledge of seabed substrates and topography in this area.
339. The bathymetry of the Channel is extensively controlled by a plain of Neogene age, interrupted at a maximum distance of 20km from the coast by the more recent palaeo-valley systems (Hamblin *et al.* 1992). Depths are generally shallow in the area, rarely

²⁶⁹ <http://www.environment-agency.gov.uk/homeandleisure/37837.aspx>

²⁷⁰ <https://www.gov.uk/government/collections/flood-risk-management-current-schemes-and-strategies>

exceed 60m. There are isolated deeps of 80-100m (e.g. the Northern Palaeovalley) and shallower deeps (60-70m) such as St Catherine's Deep to the south of the Isle of Wight. The area has many palaeo-channels of extinct rivers which dominated the English Channel region during glacial low-stands of the Pleistocene period. Some of these channels (excluding the Northern Palaeovalley and Lobourg Channel which are now infilled with sediments²⁷¹, are remnants of the former extension of the Seine, Somme, Solent and Arun rivers, and by the mid-Pleistocene with the opening of the Straits of Dover, the Rhine, Meuse and Thames^{272 273 274 275}). Quaternary deposits dominate the seafloor and are shaped by modern oceanic processes into bedforms including sandbanks and sandwaves.

340. British Geological Society (BGS) are presently working on a revised map of seabed sediments for the Channel and the wider UKCS based on data collected over the past 20 years. The following is based on current knowledge derived from the BGS regional report²⁷⁸, 272 and subsequent work including the South Coast REC²⁷⁹, the Eastern English Channel Marine Habitat Map²⁷⁶ and the Dorset Integrated Seabed Study (DORIS)²⁷⁷. The surficial seabed substrates of the English Channel (and related habitats, Figure E1 and also Annex C) consist principally of a thin (generally 0-5m, though often only up to 0.5m), coarse lag deposit which is relatively immobile (indicated by encrusted barnacles, serpulids and bryozoa) in modern oceanic conditions^{278, 279, 281} and Quaternary palaeovalley infill may reach ~30m depth in UK Channel waters. The lag deposit is derived from the underlying solid geology which is sometimes at or close to the seabed, and in this case comprises upper and middle Jurassic, upper and middle Cretaceous, and later Eocene and Palaeocene sediments²⁷⁸, which along with overlying sand and gravel have undergone some re-working by waves and currents²⁷⁹. The Channel lag deposit also contains isolated overlying arcuate dunes²⁷⁸. The dominance of coarse sediment has led to this area being prospective for marine aggregate extraction, and a number of option/application and licensed areas for extraction are present in the central Channel area (see Annex D Economy).
341. Less coarse sediments occur to the west and east of this deposit where it is overlain by deeper (5-10m) sands and gravelly sands which have developed into large, mobile sandbanks. Mobile substrates of Holocene age show a tendency to be fine towards the coast, with very fine sands present to the east and west of the Isle of Wight, off Selsey Bill, Beachy Head and the Dungeness foreland²⁷⁹. Holocene and modern sediment supply is largely derived from coastal erosion, with riverine inputs having declined from terrestrial sources since the early Holocene due to reduced weathering and the development of depositional estuaries²⁷⁸.

²⁷¹ Jones LA, Irving R, Cosgrove ARP, Coyle MD, Gilliland PM & Murray AR (2004). Eastern Channel Marine Natural Area Profile: A contribution to regional planning and management of the seas around England. English Nature, Peterborough, UK, 106pp.

²⁷² Evans CDR (1990). The Geology of the English Channel and its Western Approaches. United Kingdom Offshore Regional Report. HMSO for the British Geological Survey, London, UK, 93pp.

²⁷³ Gibbard PL & Lantieri P (2003). The Quaternary history of the English Channel: an introduction. *Journal of Quaternary Science* **18**: 195-199.

²⁷⁴ Reynaud J-Y, Tessier B, Auffret J-P, Berné S, Batist M, Marsset T & Walker P (2003). The offshore Quaternary sediment bodies of the English Channel and its Western Approaches. *Journal of Quaternary Science* **18**: 361-371.

²⁷⁵ Lericolais G, Auffret J-P & Bourillet J-F (2003). The Quaternary Channel River: seismic stratigraphy of its palaeo-valleys and deeps. *Journal of Quaternary Science* **18**: 245-260.

²⁷⁶ James JWC, Coggan RA, Blyth-Skyrme VJ, Morando A, Birchenough SNR, Bee E, Limpenny DS, Verling E, Vanstaen K, Pearce B, Johnston CM, Rocks KF, Philpott SL & Rees HL (2007). Eastern English Channel Marine Habitat Map. Sci. Ser. Tech Rep., Cefas Lowestoft, 139: 191pp.

²⁷⁷ <http://www.dorsetwildlifetrust.org.uk/page283.html>

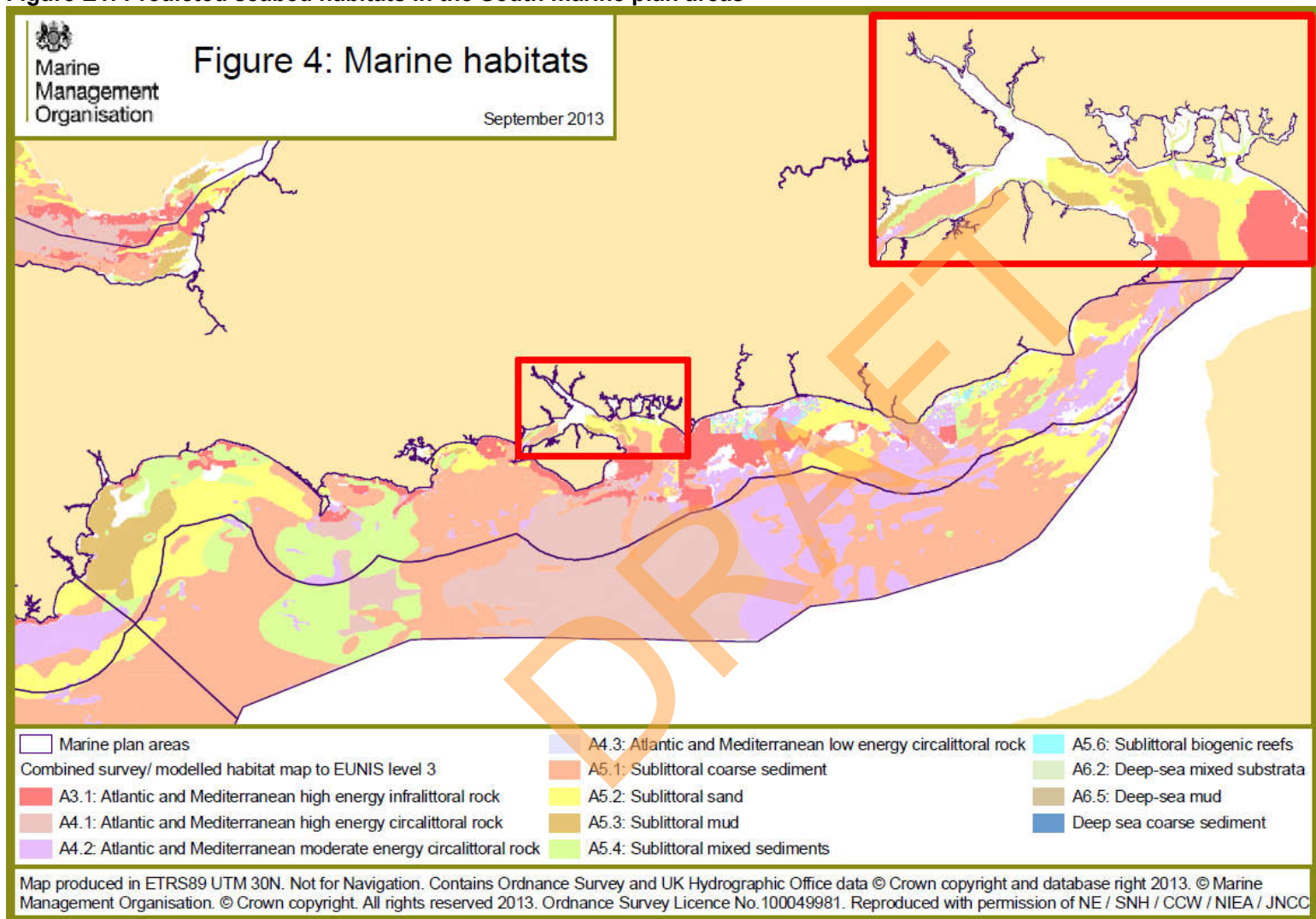
²⁷⁸ Hamblin RJO, Crosby A, Balson PS, Jones SM, Chadwick RA, Penn IE & Arthur MJ (1992). *The Geology of the English Channel. United Kingdom Offshore Regional Report*. HMSO for the British Geological Survey, London, 106pp.

342. High tidal current velocities in the central Channel (between the Isle of Wight and the Contentin Peninsula) decrease eastwards and westwards controlling broadscale net offshore sediment movement in these directions, with a bedload parting zone being present in the area of peak tidal bed stress²⁷⁹ in the central Channel. An area of low tidal velocity and bed stress, and interaction with ebb and flood tidal currents towards the Dover Strait create a bedload convergence zone resulting in the accumulation of sediment characterised by extensive tidal sand ridges (e.g. the Greater Bassurelle Sands) with overlying sand waves, some of the ridges are over 20km long, and with crests reaching <5m water depth at low tides^{279, 278}. Overlying sandwaves/megaripples can reach a vertical elevation of 2m and a wavelength of 10 to 20m²⁸⁰.
343. Large sand and gravel waves (approximately 2km long, 0.25 to 2m high, 5 to 18m wavelengths) are also found in the West Solent, with asymmetry indicating movement in different directions at either side of the channel. Smaller, irregular individual sandwaves are located within the eastern Solent. Sandbanks are associated with local transport paths and gyres which may be critical to their maintenance, though they may also owe their genesis in part to processes during the last marine transgression²⁷⁹.
344. In addition to the broadscale habitat the seabed substrate provides, as described above there are a number of conservation sites designated or selected for possible designation partly on the basis of marine components as qualifying features that are geological or geomorphological (also see Annex C).
345. The underlying deep geology of the English Channel provides both topographic relief and hydrocarbon resources at depth, though to date the resource successfully appraised and produced has been highly restricted spatially. Though primarily an oil province and mainly produced from Wytch Farm in Dorset, a gas discovery was made in offshore Block 98/11, however, this discovery dates to the mid-1980s and no production has been forthcoming. Low level exploration activities may be reasonably expected to take place in the English Channel in the future (a number of Blocks were applied for in the area in the 26th and 27th Licensing Rounds), though any production would be contingent on successful exploration and commercially viable appraisal results.

²⁷⁹ MALSF (2010). The South Coast Regional Environmental Characterisation. BGS Open Report 09/51, 250pp.

²⁸⁰ Idier M, Ehrhold A & Garlan T (2002). Morphodynamique d'une dune sous-marine du détroit du pas de Calais. *C. R. Geoscience* **334**: 1079-1085.

Figure E1: Predicted seabed habitats in the South marine plan areas



Coastal features and processes

346. The offshore and littoral sediment transport directions of the Eastern Channel have been described in the South Coast REC²⁷⁹, relevant JNCC coastal directories²⁸¹, and through the SCOPAC sediment transport study²⁸² which informed SMPs for the area between Lyme Regis and Shoreham-By-Sea (see Table E1). While these studies have characterised the dominant sediment transport directions and mechanisms for much of the South marine plans area, the quantification of these sediment movements is less certain (and are inherently difficult to measure²⁸³). The SCOPAC study also includes inputs from cliff or other coastal erosion (which are more easily quantified), and rates of erosion along the coast in the Channel are annually reported by through the south east and south west Strategic Coastal Monitoring Programmes²⁸⁴.
347. Coastal topography of the south coast is highly variable including cliffs ranging in elevation from between less than 5m to nearly 200m (e.g. at Golden Cap), to low lying and estuarine areas (e.g. Poole Harbour, Christchurch, Langstone Water) and beach fronted areas (e.g. Bournemouth). The modern coastline of the South inshore area is a culmination of its geological origins and subsequent geomorphological reworking by oceanographic (wave, current, tidal) and climatic influences (which include past glacial episodes)²⁸⁵. Geology controls coastal topography and the spatial variation (local and regional) in erosional resistance. Regionally in the UK, there is a tendency for rocks of greatest resistance to erosion (and age) to feature on the north and west and those of least resistance to feature on the south and east (e.g. soft rocked cliffs of chalk including Beachy Head and the Seven Sisters, and Eocene sandstones and clay overlain with Quaternary drift at Selsey Bill). Locally, variations in erosional resistance, the bedding and fault characteristics of hard-rock coasts and the dominant energy environment, may lead to beach, bay, stack and cave formations²⁸⁶, with the south coast displaying some notable examples such as Durdle Door, The Needles and Old Harry, and ongoing evolution of these features (e.g. the collapse of "Pom Pom Rock" on the Jurassic Coast in the winter storms of 2013/14). Sediment derived from coastal erosion and riverine inputs may be redistributed offshore and redeposited, contributing to shelf substrates, or be coastally redistributed where it may help to maintain beach systems in wave dominated environments or contribute to estuarine infilling, tidal flat and salt marsh in tidally dominated energy environments.
348. The dominance of coarse sediment which characterises offshore substrates is also evident at the coast, with the majority of barrier beaches (e.g. at Hastings, Eastbourne, and an almost continuous stretch between Brighton and Chichester Harbour) or spits (e.g. Hurst Spit and at Shoreham and Pagham Harbour) comprising a dominant shingle rather than sand sediment fraction (see Barne *et al.* 1996a, b, c – an exception being

²⁸¹ Barne JH, Robson CF, Kaznowska SS, Doody JP, Davidson NC, & Buck AL, eds. (1996). Coasts and seas of the United Kingdom. Region 10 South-west England: Seaton to the Roseland Peninsula. Peterborough, Joint Nature Conservation Committee. Barne JH, Robson CF, Kaznowska SS, Doody JP, Davidson NC, & Buck AL, eds. (1998). Coasts and seas of the United Kingdom. Region 8 Sussex: Rye Bay to Chichester Harbour. Peterborough, Joint Nature Conservation Committee. Barne JH, Robson CF, Kaznowska SS, Doody JP & Davidson NC ed. (1996). Coasts and seas of the United Kingdom. Region 9 Southern England: Hayling Island to Lyme Regis. Peterborough, Joint Nature Conservation Committee.

²⁸² SCOPAC (2004): www.scopac.org.uk

²⁸³ Woodroffe (2003). Coasts: form, process and evolution. Cambridge University Press, Cambridge, 623pp.

²⁸⁴ <http://www.channelcoast.org/>

²⁸⁵ see: Anthony EJ (2002). Long-term marine bedload segregation, and sandy versus gravelly Holocene shorelines in the eastern English Channel. *Marine Geology* **187**: 221-234.

²⁸⁶ May VJ & Hansom JD (2003). Coastal Geomorphology of Great Britain, Geological Conservation Review Series, No. 28. Joint Nature Conservation Committee.

Dawlish Warren). Notable shingle structures which are also recognised as GCR sites include Chesil Beach, formed during the marine transgression and now without a contemporary sediment source²⁸⁷ and Dungeness, a large cusped foreland with sediments likely derived from redistributed barrier beaches and containing a series of shingle ridges marking its evolution²⁸⁸.

349. Sediment flows, erosion rates and coastal landforms are greatly influenced by the tidal and wave environment. The waves in the South marine plans area are dominated by storm waves generated in the Atlantic and the English Channel together with Atlantic swell. The waves have a long fetch (annual mean wave height 0.75-1.0m in proximity to the coast²⁸⁹), and are variously attenuated by shallow depths and numerous headlands (e.g. Portland, Selsey Bill), sheltering areas including Lyme Bay, Weymouth Bay and Bournemouth Bay²⁸¹.
350. In areas with coastal erosion and flooding problems, coastal defences may be advantageous to the immediate coastline (with a high proportion of the South marine plans coast subject to coastal defence), though sedimentary coastlines in the longshore direction are likely to be affected. Sediment may be caught up in groyne fields, some of which can have a sediment trapping efficiency of close to 100 per cent²⁹⁰, and in some cases have aided the offshore movement of material which is then lost from the coastal system²⁹¹. Where coastal defences have been constructed, those coastal features which were formerly erosional and therefore providing littoral sediment inputs may have partly (e.g. in the case of groynes) or entirely (in the case of sea walls) been removed from the coastal system, reducing net littoral sediment input. As indicated above, the extent of coastal defence in the South marine plans area and the principal SMP policies²⁹³ are unlikely to result in this altering in the foreseeable future (see issues section below). The reduction in coastline adjustment is not solely related to soft-rocked cliffed coastlines. There are sections of estuarine areas for which coastal squeeze²⁹² presents an issue (e.g. Poole Harbour) and which will be exacerbated by sea-level rise. Reduction of intertidal areas affects geomorphological features, but also an area of important habitat (see Annex C), though in some work is being undertaken to identify these issues and areas where managed realignment could be used to maintain or create these habitats²⁹³.
351. The eastern area from Dartmouth to the Isle of Purbeck is characterised by the large embayment of Lyme Bay, and smaller headland confined bays, particularly south of Teignmouth²⁸². Like much of the south coast, landforms are predominantly cliffs and large clastic beaches, with soft sediment features largely confined to estuarine areas. The area includes the Jurassic Coast World Heritage Site noted for Triassic to Cretaceous rock cliffs, and substantial sediment inputs of both sand and larger material

²⁸⁷ May VJ (2003). Chesil Beach. Geological Conservation Review Volume 28: Coastal Geomorphology of Great Britain. Chapter 6: Gravel and 'shingle' beaches, 15pp.

²⁸⁸ May VJ (2003). Dungeness. Geological Conservation Review Volume 28: Coastal Geomorphology of Great Britain. Chapter 6: Gravel and 'shingle' beaches, 13pp.

²⁸⁹ The offshore wave climate for sections of the English Channel is characterised in annual reports for the Southeast and Southwest Strategic Coastal Monitoring Programmes, <http://www.channelcoast.org/>

²⁹⁰ Masselink G & Hughes M (2003). An Introduction to coastal processes and geomorphology. Hodder Education

²⁹¹ May VJ & Hansom JD (2003). Coastal Geomorphology of Great Britain, Geological Conservation Review Series, No. 28. Joint Nature Conservation Committee.

²⁹² Where landward migration is halted by natural or anthropogenic structures which may result in beach steepening, or in the case of sedimentary systems like sandflats and saltmarshes, a reduction in their area.

²⁹³ See: Poole Bay, Poole Harbour and Wareham Flood and Coastal Erosion Risk Management - Draft Strategy 2013, The Medmerry Managed Realignment Scheme, <http://www.environment-agency.gov.uk/homeandleisure/floods/109062.aspx>

from cliff erosion. Littoral sediment transport direction in this area is predominantly from the west to the east, though drift divergence and convergence is seen in proximity to river and estuary mouths (e.g. the Teign, Exe and Axe). Offshore sediment transport converges around the Isle of Portland, which has an almost symmetrical set of offshore sediment sandbanks and shoals (West Shoal and Portland Banks to the west and Shambles Bank and Adamant Shoal to the east)²⁹⁴. The Portland and Shambles Banks are comprised of mobile coarse sand in accumulations of up to 19m and 22m respectively, with sediment movement being largely clockwise and anti-clockwise around the banks respectively. The Banks and headland of Portland also play a role attenuating received wave energy in Weymouth Bay, where littoral drift direction is poorly understood.

352. Ringstead Bay to the east includes cliffs subject to landslides and a number of features derived from erosion of soft Wealden and chalk geology surrounding areas of Portland stone (e.g. Durdle Door and Lulworth Cove). Sediment transport is primarily from west to east, and cliff derived sediment input is dominated by fine sediments with occasional larger limestone derived clasts, and small quantities of chert and flint. A dominant south westerly sediment movement also supplies sediment to the Adamant and Shambles Banks. Similarly, offshore sediment transport in Poole Bay is to the southwest and south. Sediment input to the coast of Poole Bay is limited from coastal sources, and is dominated by estuarine inputs and wave driven inputs onshore, and sediment deficits have resulted in several phases of beach nourishment at Bournemouth. The coast between Studland and Hurst spit in the east is dominated by shingle and sand beaches backed by low cliffs, and sand dunes are a feature at the Studland and Godlinston Heaths SSSI in the west.
353. The area of the Solent includes a complex of drowned estuaries which are now harbours (Southampton and Portsmouth) and that are partially sheltered by the Isle of Wight. Sediment inputs to the Solent are largely trapped by coastal and flood defence works leading to a depleted sediment budget and an associated requirement to offset erosion in certain areas through nourishment works, for instance at Hurst Spit²⁹⁵. Littoral and tidal sediment transport in the Solent tends to be from west to east, with some wave driven sediment moving north and northwest into the east Solent and ebb tidal current recirculation in the West Solent, transports material to the Solent Bank.
354. The Isle of Wight coast has a varied geology including chalk (exposed at the Needles and Culver Cliff), softer Wealden sediments in the south east, and Bembridge limestone, which is more resistant to erosion and responsible for the majority of headlands²⁸². The coast is subject to erosion, particularly in the south where exposure is greatest. Sediment transport movement is variously influenced by estuaries, headlands and nearshore subtidal features (e.g. St. Catherine's Deep). The dominant littoral sediment transport direction is from west to east, with substantial erosional sediment inputs (in some cases >20,000m³/year) to the coastal system being made on the south west and south coasts of the island. In the north east, dominant transport is north east from Bembridge Point to Ryde, and transport convergence occurs at estuary mouths including the Yar. In the Solent, sediments reach sinks including Brambles Bank and Ryde Sands.
355. To the east of the Solent, the topography is controlled by underlying Tertiary clays and sandstones resulting in a low-lying coast. The shoreline between the entrances to Portsmouth, Langstone and Chichester Harbour, is comprised of gravel barrier beaches interrupted by the narrow harbour entrances with strong tidal currents, and sediment movement to offshore sinks including Horse and Dean Sand. The harbour entrances include large spits and are characterised by muddy sediments and saltmarsh which are qualifying features for designations and are valuable habitats for associated species (e.g. Chichester and Langstone Harbours SPA).

²⁹⁴ See mapping here: <http://www.dorsetwildlifetrust.org.uk/page283.html>

²⁹⁵ New Forest District Council (2010), North Solent Shoreline Management Plan.

356. The Tertiary rocks which make up Hayling Island continue to the low lying Selsey peninsula, which includes the well defined headland of Selsey Bill, which was formerly subject to high rates of erosion and now has extensive coastal defences (e.g. groyne fields, nearshore breakwaters). The headland separates two sediment transport cells, and sediment transport is influenced by a number of nearshore banks, shoals and reefs, for instance the Mixon, which has also influenced the formation of the triangular shape of Selsey Bill. To the east, Pagham Harbour is in an embayment enclosed by spits that have been stabilised and include tidal flats and saltmarsh providing habitat for waterfowl. Shingle beaches backed by the low lying West Sussex coastal plain continue eastwards to Brighton which are subject to erosion and extensive coastal defence structures (e.g. at Elmer). Littoral sediment transport to the east of this section is predominantly west to east resulting from the south westerly wave approach, with a local reversal in the lee of Dungeness.
357. To the east of Brighton exposures of chalk form cliffs including the Seven Sisters (a series of truncated, hanging dry valleys), and Beachy Head which reaches 163m in height. Erosion rates on this section of coast are relatively high (~0.5m/year), particularly in the area around Birling Gap. Beachy Head and its chalk foreshore are of particular geological interest, and continue subtidally to provide subtidal chalk ridges which form habitats occupied by, *inter alia*, blue mussel and native oyster (see Annex C). Shingle ridges form the predominant coastal landform between Eastbourne and Hastings, after which the wide shingle beach at Hastings is maintained by groynes. East of Hastings, the cliffs at Fairlight rise to approximately 150m, before reducing to the low lying Pett Levels.
358. The Dungeness foreland is the largest of its kind in Britain and is largely comprised of flint shingle likely derived from redistributed barrier beach sediments and containing a series of shingle ridges marking its evolution, and which are still prograding²⁸⁸. The low-lying foreland, and sand and shingle coast to the east, is backed by the Denge, Romney and Walland Marshes. The South marine plans area ends at Hythe, which has a shingle beach defended by several rock groyne structures.
359. Current sea-level and historic sea-level change has influenced the character of much of the UK coastline. During the last glacial maximum (some 20,000 years before present (BP)), global sea-levels were around 135m lower than present²⁹⁶, exposing much of the UK continental shelf. During the last marine transgression, sea-levels rose as ice retreated, with eustatic sea-levels reaching those roughly equivalent to today by 4,000 BP²⁹⁷. Relative sea-level is not only controlled by eustatic alterations (which have most recently been associated with climate change), but also regional isostatic change. In the UK such readjustment is the result of Holocene deglaciation, resulting in a generally negative adjustment in the South inshore area (see Figure F2) of between -0.3 to -0.4 mm a year^{298 299}.

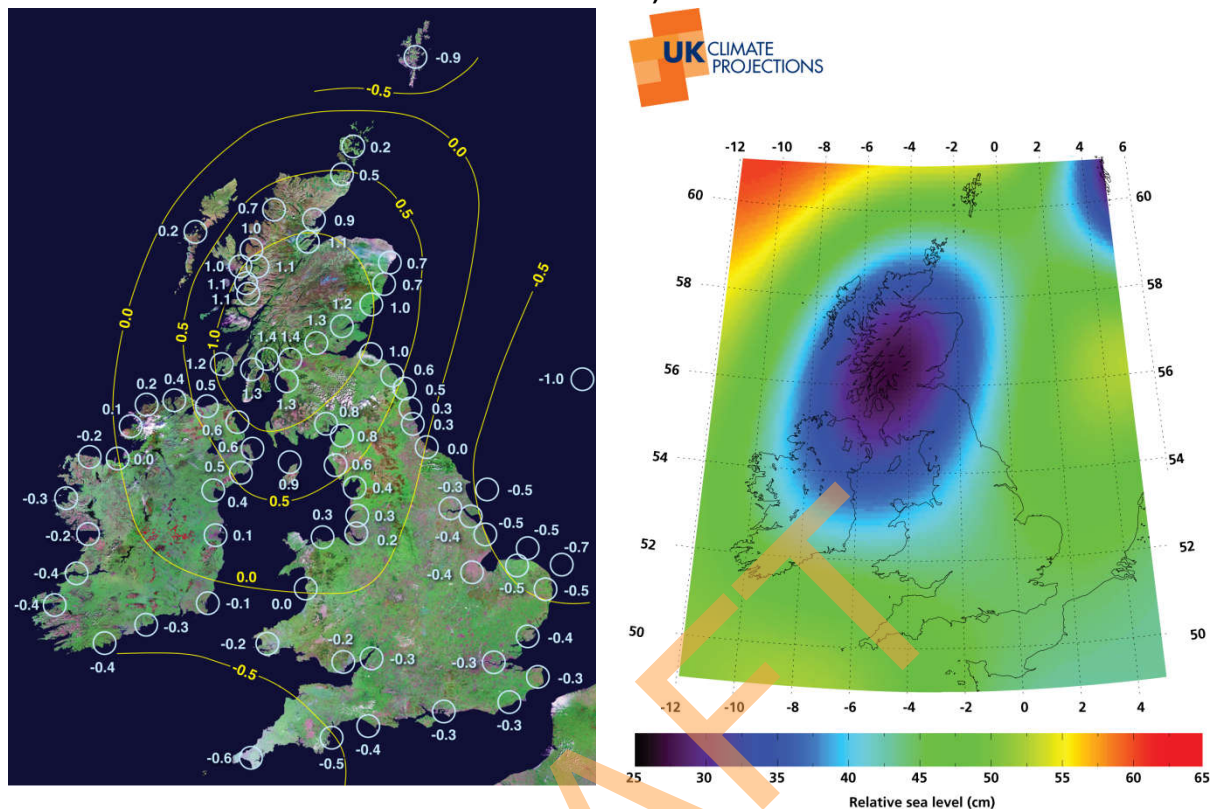
²⁹⁶ Yokoyama Y, Lambeck K, De Deckker P, Johnston P, & Fifield LK (2000). Timing of the Last Glacial Maximum from observed sea level minima. *Nature* **406**:713-716.

²⁹⁷ May VJ & Hansom JD (2003). Coastal Geomorphology of Great Britain, Geological Conservation Review Series, No. 28. Joint Nature Conservation Committee.

²⁹⁸ Shennan I & Horton B (2002). Holocene land- and sea-level changes in Great Britain. *Journal of Quaternary Science* **17**: 511-526.

²⁹⁹ Shennan I, Milne G & Bradley S (2009). Late Holocene relative land- and sea-level changes: Providing information for stakeholders. *GSA Today* **19**: 52-53.

Figure F2: Isostatic adjustment (mm/yr) and relative sea-level rise (cm) for 2095 (Source: Shennan *et al.*³⁰⁰; UKCP09, after Bradley *et al.*³⁰¹. Note: Relative sea-level rise based on a central estimate of the medium emissions scenario).



360. Anthropogenically augmented climate change has been linked to a global eustatic change in sea-levels in the order of 2.8-3.6 mm a⁻¹ between 1993 and 2010³⁰², primarily through the reduction in the size of valley glaciers and ice caps, and the thermal expansion of the ocean associated with increased global temperatures. For the English Channel, this has led to a relative rise of ~12cm during the 20th century³⁰³. Sea-level is expected to increase (in absolute terms) by 12 to 76 cm over the next 100 years^{304, 305}, outpacing even the highest positive isostatic uplift figures for the UK, and exacerbating flooding low lying coastal areas (including parts of Poole, Christchurch, Langstone and Chichester Harbours). The resulting relative sea-level rise (such as 21 to 68cm for

³⁰⁰ Shennan I, Milne G & Bradley S (2009). Late Holocene relative land- and sea-level changes: Providing information for stakeholders. *GSA Today* 19: 52-53.

³⁰¹ Bradley S, Milne GA, Teferle FN, Bingley RM & Orliac EJ (2009). Glacial isostatic adjustment of the British Isles: New constraints from GPS measurements of crustal motion. *Geophysical Journal International*. 178: 14-22.

³⁰² IPCC (2013). Summary for Policymakers. In: *Climate Change 2013: The Physical Science Basis*. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S. K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

³⁰³ Wahl T, Haigh I, Woodworth PL, Albrecht F, Dillingh D, Jensen J, Nicholls RJ, Weisse R, Wöppelmann G (2013). Observed mean sea level changes around the North Sea coastline from 1800 to present. *Earth-Science Reviews* 124: 51-67.

³⁰⁴ The range derived from estimates based on the 5th percentile (low emissions scenario) and 95th percentile (high emissions scenario).

³⁰⁵ Lowe JA, Howard TP, Pardaens A, Tinker J, Holt J, Wakelin S, Milne G, Leake J, Wolf J, Horsburgh K, Reeder T, Jenkins G, Ridley J, Dye S, Bradley S (2009). UK Climate Projections science report: Marine and coastal projections. Met Office Hadley Centre, Exeter, UK.

London, see Figure F2) will lead to a greater risk of coastal flooding and erosion - there has been an increase in extreme sea levels following the increase in mean sea level globally, and a study of English Channel sea level data revealed consistent findings,³⁰⁶. An increased frequency in storms and storm surges (including an increase in wave height) which can be directly attributed to climate change, remains unproven in the most recent probabilistic projections for the UK³⁰⁷. (also see the Met Office & CEH report³⁰⁸ relating to the winter 2013/14 storms) and the IPCC presently attribute a low confidence in projected changes to storm surge

361. The IPCC highlight that statistically linking sea level change to magnitudes of beach erosion is presently challenging due to the number of other non-climate change related factors which influence coastal processes, but that the connection may become detectable as extreme water levels are raised^{Error! Bookmark not defined.}. They place a high confidence in the issue of coastal squeeze increasing, and that in the absence of adaptation (which may become prohibitively expensive), beaches will narrow and some dune systems may be lost. Integrated coastal zone management (ICZM) has been highlighted by the IPCC³⁰⁹ as a means to deal with the threat of sea-level rise, and the principles of this form of coastal zone management are being adopted in the UK, for instance through SMPs (see above) and marine planning (as indicated in the East of England draft marine plans), and there is increasing recognition in planning policy that a long-term view of coastal development needs to be taken in this regard.
362. JNCC³¹⁰ list 31 principal coastal physiographic features which are located in the South inshore area, and 67 lagoons. These update and reclassify a number of previous works³¹¹ and include estuaries (e.g. River Exe, Southampton Water), bays (Poole Bay, Torbay) and lagoons (The Fleet, Bembridge harbour lagoon). The importance of such features in coastal processes and as supporting habitats is recognised in statutory designations, for instance as Annex I habitats of the Habitats Directive, through the Water Framework Directive (transitional and coastal waters). The status of these principal transitional (estuarine) and coastal water bodies identified for the South inshore area has been classified under the WFD across two River Basin Management Plans, the South East RBMP and South West RBMP. These include an assessment on the degree of physical modification that these waterbodies have undergone. For those 31 transitional water bodies and 15 coastal water bodies in the South inshore area, most are considered to be heavily modified, largely reflecting physical modifications in the form of historic coastal defences and alterations (see issues section below).
363. Since 1998 the joint Defra/Environment Agency Estuaries Research Programme has facilitated study in UK estuary morphology and process, including the modelling and simulation of estuarine processes and morphological change for the purposes of estuarine management. The studies provide models suitable for use in order to

³⁰⁶ Haigh I, Nicholls R & Wells N (2010). Assessing changes in extreme sea levels: Application to the English Channel, 1900–2006. *Continental Shelf Research* **30**: 1042-1055.

³⁰⁷ Horsburgh K & Lowe J (2010). Mean Sea Level and Sea Level Extremes in MCCIP Annual Report Card 2010-11, MCCIP Science Review.

³⁰⁸ Met Office (2014). The Recent Storms and Floods in the UK. Met Office and the Centre for Ecology & Hydrology, 27pp.

³⁰⁹ Nicholls RJ, Wong PP, Burkett VR, Codignotto JO, Hay JE, McLean RF, Ragoonaden S & Woodroffe CD (2007). Coastal systems and low-lying areas. *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, Parry ML, Canziani OF, Palutikof JP, van der Linden PJ & Hanson CE (Eds.), Cambridge University Press, Cambridge, UK.

³¹⁰ McBreen F, Askew N, Cameron A, Connor D, Ellwood H & Carter A (2011). UKSeaMap 2010: Predictive mapping of seabed habitats in UK waters. JNCC Report, No. 446.

³¹¹ Davidson NC & Buck AL (1997). An Inventory of UK Estuaries: Introduction and Methodology. Joint Nature Conservation Committee.

determine the morphological characteristics and processes and predict change based on a number of natural and anthropogenic variables. The reports and models are largely disseminated through the Defra Research Programme webpages and the estuary-guide.net website.

What would the situation be without the plan?

- 364.** In the absence of the marine plan, a number of existing planning policies and initiatives (such as SMPs, RBMPs, the National and Regional Flood and Coastal Erosion Risk Management Strategies and Plans) would provide an assessment of relative risk at the coast of the South inshore area to erosion and coastal flooding, as well as management strategies to mitigate the risk, which are already ongoing (e.g. managed realignment at Medmerry²⁹³). In addition, the MPS would provide some detail for consideration when deciding on planning applications which may have implications for coastal processes. Ongoing SAC and the possibility MCZ designations should provide adequate statutory protection to notable sites, however, their identification is sometimes limited by data collection and sharing (see below).

What are the key issues?

365. The environmental baseline will evolve slowly in the absence of anthropogenic influences. At present there are no local or regional anthropogenic activities which are likely to cause significant regional scale changes to geology and sediments, though a number of key issues are outlined below:
- Impacts at the coast have wider environmental and social implications, and are derived from both inundation processes, and anthropogenic action including coastal defence and other coastal infrastructure (such as cable and pipe landfall, new port infrastructure) and sea-level change.
 - As coastal erosion and inundation in some areas may be uneconomic or undesirable to halt through engineering, the realignment of some coastal infrastructure and housing may be expected. This is partly accounted for in some SMP policies, though future iterations of SMPs would need to take account of revised sea-level change projections.
 - Connected with sea-level rise, historic land reclamation and coastal defence strategies, coastal squeeze will lead to a reduction in intertidal habitat seaward of existing sea defences, and beach steepening is a general, expected response to sea-level rise where inland coastal migration cannot reasonably occur.
 - The loss of some of the coastal archaeological resource that cannot be studied prior to inundation and erosion may also be expected – see Annex B
 - Many of the coastal and estuarine environments in the South inshore area are defined as heavily modified. Heavily modified water bodies include those sites which have had their character or physical form greatly altered by anthropogenic activities, or which are designated as such under Article 4(3) of the WFD. Work is underway in order to try and achieve Good Ecological Potential (GEP) in such areas. In order to achieve GEP, mitigation measures set out for each water body by the Environment Agency need to be put in place. Similarly, aspects affecting seabed integrity also have relevance to Good Environmental Status (GES) under the MSFD.
 - Offshore habitats have been impacted by human activity, including damage or removal of subtidal rocky habitats by mobile fishing gears. Targets to help achievement of GES under the MSFD have been drafted for seafloor integrity³¹², and monitoring programmes

³¹² HM Government (2012). Marine Strategy Part One: UK Initial Assessment and Good Environmental Status, December 2012.

to measure progress towards achieving GES³¹³. Programmes of measures to achieve/maintain GES are yet to be put in place.

Cross cutting issues

The physical topography and coastal processes of the South marine plans area is a function of its geological past, and interactions with anthropogenic activity (e.g. coastal defence). The geological resources of the South marine plans area contribute to available aggregate and hydrocarbon resource, and seabed topography provides suitable depths for those offshore wind turbine foundations which are currently commercially viable (see Annex D, Economy). The dominance of coarse substrates juxtaposed with soft sedimentary estuaries provides for a diverse array of seabed habitats and related species (see Annex C, Marine Ecology).

Anthropogenically augmented climate change (primarily in the form of enhanced sea-level rise) is being incorporated into coastal defence strategies for the South inshore area in order to protect both economic and environmental interests. In addition to these actions, further mitigation and adaptation measures to improve resilience to climatic change will be required of activities and developments throughout the South inshore and offshore areas.

As noted in Annex F, Landscape and Seascape, the geologically rare and complex form of certain sections of this coast makes a significant contribution to its character and the related tourism offer.

Opportunities

366. The marine planning process also raises a number of opportunities for the topic of geology, substrates and coastal processes, which include:
- The consideration of a number of other relevant and sometimes non-statutory plans including RBMPs, SMPs, flood risk management and other existing coastal policies and initiatives (such as coastal change management areas), in planning decisions and in drafting the marine plans.
 - The consideration of the resilience of proposed developments given present projections with regards to sea-level change, and their potential impact on sediment dynamics, in keeping with the MPS.
 - The cooperation with terrestrial authorities and regulators in the plan making process which has the ability to transcend multiple administrative boundaries (e.g. SMP areas, RBMP districts, EA areas).

Are there any data gaps?

367. The following data gaps have been identified for this topic area, which are of relevant to the South marine plan areas:
- The BGS sediment map for the UKCS is highlighted in Charting Progress 2³¹⁴ as being of insufficient detail to define the UK's marine resources and habitats, evidenced by the

³¹³ Defra (2010). Marine Strategy Framework Directive consultation: Marine Strategy Framework Directive consultation, January 2014, 104pp.

level of detail provided by new multibeam, Olex data and digital single-beam bathymetry studies which presently only cover a limited extent of the UKCS. BGS are presently working on a revised seabed map for the UKCS, though coverage is limited at present

- Bathymetry studies such as the UK Civil Hydrography Programme, that were undertaken for the South Coast REC and Eastern English Channel Marine Habitat Map, continue to add to the increasing multibeam dataset for the UKCS. Commercial programmes also collect data of potential wider use, but the lack of coordination in this area means that separate studies are often not contributing to a single national dataset (though this has been identified through the NERC Marine Environment Mapping Programme, MAREMAP, and the MEDIN initiative).
- The tidal energy industry is due to expand in the coming years as devices become commercially viable. The resources, particularly for tidal devices, are modelled to be in proximity to the coast around headlands (e.g. Portland, Isle of Purbeck) and in the central English Channel (extending offshore from the Isle of Wight). At present there is little empirical data on the impacts of such technologies on coastal processes, for instance the array scale effects of energy removal³¹⁵.
- The MCCIP³¹⁶ note that the regional variability of sea-level changes are poorly addressed at the current resolution of GCMs used for climate projections. Connected with this is future scope for improvements in probabilistic projections³¹⁷, and other resolution issues which may be resolved by future enhances in computing power.
- The publication of the IPCC AR5 and the replacement of the formerly used Special Report on Emissions Scenarios (SRES) scenarios³¹⁸ with a Representative Concentration Pathways approach³¹⁹ may result in changes to projected range of sea-level rise figures based on the SRES scenarios (for instance used in UKCIP modelling).

³¹⁴ Defra (2010). Charting Progress 2: An assessment of the state of UK seas. Published by the Department for Environment Food and Rural Affairs on behalf of the UK Marine Monitoring and Assessment Strategy community, London, 194pp.

³¹⁵ See: Karsten R, McMillan M, Lickley M & Haynes R (2008). Assessment of tidal current energy in the Minas Passage, Bay of Fundy. *Proceedings IMechE, Part A: J. Power Energy* **22**:493-507, Walkington I, Burrows R (2009). Modelling tidal stream power potential. *Applied Ocean Research* **31**: 239-245.

³¹⁶ ³¹⁶ Horsburgh K & Lowe J (2010). Mean Sea Level and Sea Level Extremes in MCCIP Annual Report Card 2010-11, MCCIP Science Review.

³¹⁷ The “mathematical and statistical approaches to climate modelling and prediction” programme being undertaken at the Isaac Newton Institute is given as an example of ongoing research which seeks to improve the statistical probabilistic projections by Horsburgh & Lowe (2010).

³¹⁸ Nakićenović N & Swart R (Eds.) (2000). IPCC special report on emissions scenarios. A special report of IPCC Working Group III. Cambridge University Press, 570pp.

³¹⁹ For an explanation see: Moss *et al.* (2008). Towards New Scenarios for Analysis of Emissions, Climate Change, Impacts, and Response Strategies. Technical Summary. Intergovernmental Panel on Climate Change, Geneva, 25 pp.

Landscape and Seascape

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Annex F - Landscape and Seascape

Introduction

- 368. Aspects of the landscapes and seascapes of the South inshore and offshore plan areas are distinctive and play an important role in affecting the way in which people experience the area in terms of its visual context and character and this annex explores their role in more detail.
- 369. The MMO recognise that whilst there are some common themes in these topics, they are distinct entities and therefore dealt with separately within this annex.

Landscape

- 370. Landscapes can be defined as "An area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors" (from Article 1 of the European Landscape Convention).
- 371. Issues concerning landscape change are important but potentially emotive and subjective, based around the individual perceptions of residents, visitors or tourists. Any potential development in the marine environment which is inter-visible with the coast (or coastal developments themselves) may influence views in different ways depending on structure type, size, number, type of movement and orientation, coastal form, lighting, aspect and scale, settlement pattern and type. Attitudes of people observing the change and the resultant development typically also vary widely.
- 372. In line with the SEA topics (see Section 3), landscape is a consideration of this SA. To provide subject context, and to address section Annex I (a) of the SEA Directive, that is to consider "the contents, main objectives of the plan or programme and relationship with other relevant plans and programmes", a summary table of relevant initiatives (which includes plans, programmes, policy and other relevant items), is shown in Table F1, followed by a brief discussion of the key objectives and targets of the principal initiatives, and the implications of the marine plan with regards to these.

What is the policy context?

- 373. Landscape character varies throughout the UK and in the marine plan areas. The coastline of the South inshore marine plan area has a number of often overlapping, statutory (such as areas of outstanding natural beauty (AONB), National Park) and non-statutory (such as heritage coasts) landscape orientated designations. These reflect the intrinsic natural (or more often semi-natural) and anthropogenic attributes of a particular area. Table F1 provides the policy context for this topic.

Table F1: Relevant landscape plans, initiatives and environmental protection objectives

International
World Heritage Convention 1972
Europe
Council of European Landscape Convention 2000
The Framework Convention on the Value of Cultural Heritage for Society (the Faro Convention) 2005
National
Planning Policy Statements
National Policy Statements for Energy (EN 1-6)

Marine Policy Statement

National Planning Policy Framework (2012)

Marine and Coastal Access Act (2009)

Countryside and Rights Of Way Act (2000)

Other relevant initiatives

Natural England's Landscape Policy 2008 and detailed policies on designated landscapes, future landscapes and historic landscapes

Natural England's European Landscape Convention A: Framework for implementation (2007)

European Landscape Convention: Natural England's 2009/2010 Action Plan

The European Landscape Convention – The English Heritage Action Plan for Implementation (2009)

Coastal Access: An audit of coastal paths in England (2008-09)

Coastal Access: natural England's Scheme (2010)

The National Character Areas of England (presently under review)

The Natural Environment White Paper (2011)

Countryside and Rights of Way Act (2000)

Local

English Heritage Historic Landscape Characterisation programme

Historic Landscape Characterisation of Sussex (2008)

Kent Historic Landscape Characterisation (2001)

Landscape character assessment

South Devon AONB and South Hams District Council Landscape Character Assessment (2007)

Torbay Landscape Character Assessment (2010)

Teignbridge District Landscape Character Assessment (2009)

East Devon Landscape Character Assessment (2010)

West Dorset Landscape Character Assessment (2009)

Weymouth and Portland Landscape Character Assessment (2013)

Purbeck Landscape Character Assessment (2008)

The Dorset Landscape Character Assessment (2008)

Christchurch Borough Council Landscape Character Assessment (2003)

Hampshire Integrated Character Assessment (2010)

West Sussex Landscape Character Assessment (2003)

East Sussex Landscape Character Assessment (2010)

Kent Landscape Character Assessment (2004)

South Downs Integrated Landscape Character Assessment (2005)

Other relevant local initiatives

Local Plans and Local Development Frameworks for relevant district councils.

The C-SCOPE Marine Plan

What is the current situation?

374. The Natural England Natural Character Areas Programme (presently under review, with synergies exploited with the MMO seascape character assessment programme), and the Countryside Quality Counts project³²⁰. These projects provide a baseline of information

³²⁰ Haines-Young RH (2007). Tracking Change in the Character of the English Landscape, 1999-2003. Natural England, Catalogue Number NE42

allowing a consideration of landscape character in the South inshore area which is not restricted to designated landscapes (these are covered below). Activities taking place offshore beyond the South inshore area may affect the landscape or change how the inshore area is perceived – for example wind farms located in or close to indicative Royal Yachting Association (RYA) cruising routes and ferry lanes.

375. Visual impacts may arise from developments which are built directly at the coast (such as harbours) or at some distance from the coast, such as offshore wind turbines. With regards to the latter, the visual impact of offshore developments which have surface infrastructure above sea level is generally a function of their visibility from the coast which is dependent on their size, distance from a viewpoint, and the atmospheric conditions (such as contrast and haze) at the time of viewing^{321 322}. The limit of any impact from coastal viewpoints is controlled by the viewable distance over the horizon, ultimately defined by structure height (dipping height), any viewable portion of a development being diminished (or enhanced) by the chromatic contrast of structures and their surroundings (that is the sea and sky) and the arrangement/complexity of structures and how they interact with coastal form (such as scale, complexity, settlement pattern). Though with fewer visual receptors, viewpoints at sea (such as from ferries, yachts) may also be affected.
376. A number of studies have recently been undertaken to assess the possible impact of offshore renewables (chiefly wind farms) on the UK seascapes, which has until recently taken place largely within 12 nm of the coast, and therefore within viewable distance of the coast. These have been strategic level seascape studies to characterise the coastline of the UK and its sensitivity to offshore developments. Studies for Scotland³²³ and Wales³²⁴ have been completed for offshore wind and a wider suite of offshore renewables respectively, adopting an almost uniform methodology of characterisation, based on regional seascape units as devised by Hill *et al.*³²⁵.

Statutory and non-statutory landscape designations

377. There are presently four statutory and three non-statutory landscape designations in the South inshore marine plan area. In addition to these designations (see Figure F1 and Table F2 below), the setting of heritage assets³²⁶, defined in the MPS (paragraph 2.6.6.1) as "buildings, monuments, sites or landscapes – that have been positively identified as holding a degree of significance meriting consideration", should also be a consideration for both landscapes and seascapes. These may include, among other things, scheduled monuments, listed buildings and parks and gardens of special historic interest. These features are considered separately in Annex B Cultural Heritage.

³²¹ Bishop ID & Miller DR (2007). Visual assessment of off-shore wind turbines: the influence of distance, contrast, movement and social variables. *Renewable Energy* 32: 814-831.

³²² Hill M, Briggs J, Minto P, Bagnall D, Foley K and Williams A (2001). Guide to Best Practice in Seascape Assessment. INTERREG Programme

³²³ Scott KE, Anderson C, Dunsford H, Benson JF & MacFarlane R (2005). An assessment of the sensitivity and capacity of the Scottish seascape in relation to offshore wind farms. Scottish Natural Heritage Commissioned Report No.103

³²⁴ White S & Briggs J. (2009). Welsh seascapes and their sensitivity to offshore developments. Countryside Council for Wales.

³²⁵ Hill M, Briggs J, Minto P, Bagnall D, Foley K and Williams A (2001). Guide to Best Practice in Seascape Assessment. INTERREG Programme

³²⁶ The setting, or surroundings in which a heritage asset is experienced, is an underlying consideration of the National Planning Policy Framework (see paragraphs 129, 132, 137).

Table F2: Principal landscape designations in the South inshore area

Site Name	Designation	Summary
Kent Downs	Area of Outstanding Natural Beauty	The area meets the coast at the prominent cliffs of Dover and extends inland behind the Weald to an elevation of 240m. This AONB includes unimproved chalk grassland, scrub and broadleaved woodland communities. Orchards, hop gardens, horticulture and arable farming, ancient lanes and historic parklands all add to the visual amenity of the area.
High Weald		Much of this AONB is located inland and consists of a hilly area of ridges and valleys with the highest proportion of ancient woodland in the country. The area meets the sea at Hastings. The built environment is characterised by brick, tile and weatherboard houses, oasthouses, and traces of the Wealden iron industry.
Chichester Harbour		Features range from tidal inlets and creeks, salt-marsh, intertidal mudflats, orchards and historic harbour settlements with a distinctive vernacular. The tidal flats and saltings in the area are extensive, and host wildfowl, waders and a rich plant and invertebrate diversity.
Isle of Wight		There are five separate areas of land across the island constituting the AONB, representing different attributes of the island. These include: chalk and sandstone cliffs, saltmarsh and mud-flats, chalk farmland, wooded dairy pasture, heathland, hay meadows and distinctive 'chines'.
Dorset		The Dorset AONB is underpinned by a curving chalk ridge which runs from the upland Axe, east to the Stour Valley and a southern section circles Dorchester and reaches the Isle of Purbeck. The area has downland and heath the likes of which are now diminished in southern England.
East Devon		East Devon, from Lyme Regis to Exmouth, is characterised at the coast by red sandstone cliffs, broken by chalk at Beer Head. Inland the area rises to a high flat plateau incised by the rivers Axe, Sid and Otter.
Blackdown Hills		The Blackdown Hills are best known for the dramatic, steep, wooded scarp face they present to the north. To the south the land dips away gently as a plateau, deeply dissected by valleys. On top of the plateau there are wide open windswept spaces; in the valleys nestle villages and hamlets surrounded by ancient and intricate patterns of small enclosed fields and a maze of winding high-hedged lanes.
South Devon		The South Devon AONB stretches from Torbay to the outskirts of Plymouth. The coast ranges from cliffs (Bolt Head), sandy beaches (Slapton Sands) and wooded estuaries (Dart, Kingsbridge) and some of Britain's best ria coastline.
Sussex	Heritage Coast	Comprises the eastern end of the South Downs, terminating at the coast in the chalk cliffs of Beachy Head and the Seven Sisters.
Tennyson		This area includes 'The Needles', high chalk cliffs and 'chines' (steep chalk gullies) unique to the Isle of Wight.
Hamstead		Contains the drowned estuary of Newtown River. The area includes saltmarsh and mudflats which harbour overwintering

Site Name	Designation	Summary
		birds. The clay and limestone cliffs are rich in fossils unique to this area of Britain.
Purbeck		The area ranges between Poole Harbour and Studland. The area includes excellent examples of chalk and limestone cliffs.
West Dorset		This area includes the vast shingle beach at Chesil, which forms a tombolo at its eastern end, joining the island of Portland to the mainland.
East Devon		Red sandstone cliffs with pebble beaches contrast markedly with the white chalk cliffs which outcrop at Beer. The coast forms part of Britain's longest national trail, the 'South West Coast Path'. Tourist pressures have made screening and landscaping of facilities an important management issue.
South Devon		The coastal scenery includes reedbeds, sand dunes, shingle ridges, mud flats, salt marshes, and the freshwater lake of Slapton Ley National Nature Reserve.
Dover-Folkestone		7.2km in length, the area encompasses a section of the white chalk cliffs at Dover and part of the Saxon Shore Way.
South Downs	National Park	The South Downs was formally designated in 2009. The National Park reaches the coast in its eastern extent in east Sussex at Beachy Head and the Seven Sisters between Seaford and Eastbourne, and also for a stretch to the east of Brighton.
New Forest		Ancient woodland, bog, heathland and unspoilt coastline with views of the Solent and Isle of Wight. The area uniquely supports a medieval forest and pastoral system. The National Park is of nature conservation interest in addition to being a working and recreational landscape.
Dartmoor		Dartmoor consists of two, high, boggy plateaux divided by the River Dart. Surrounding them is rocky land which has dramatic stone outcrops (tors). The softer river valleys, with their ancient clapper bridges, provide a contrast to the stark magnificence of the moors. There are many standing stones, Bronze and Iron Age hut circles and hillforts as well as tin mining remains. The last mine closed in 1939.
Dorset and East Devon Coast	World Heritage Site	Known as The Jurassic Coast, this National Park covers 95 miles of coastline from East Devon to Dorset, with rocks recording 185 million years of the Earth's history, and is the only World Heritage Site in England to be selected on the basis of its natural features. The site includes a number of other designations such as the East Devon AONB, West Dorset Heritage Coast, as well as a number of SSSIs and numerous Geological Conservation Review sites related to both the coastal geomorphology of the area and underlying geology, including Jurassic-Cretaceous Reptilia.

Key: AONB=Area of Outstanding Natural Beauty, HC=Heritage Coast, NP=National Park, WHS=World Heritage Site (Source: [Natural England](#))

Seascape

378. For marine planning purposes, seascape is defined as meaning "landscapes with views of the coast or seas, and coasts and the adjacent marine environment with cultural, historical and archaeological links with each other" (MPS Paragraph 2.6.5.1).
379. Consistent with the MPS, the marine plans and therefore the SA, will consider seascape; the potential visual, cultural, historical and archaeological impacts for both designated and non-designated areas. Additionally, the assessment will consider any wider social and economic impacts of a development or activity on coastal landscapes and seascapes (see Section 2.6.5.2 of the MPS), for instance impacts on tourism (see Annex D) and the context of heritage assets (see Annex B).

What is the policy context?

380. In relation to landscapes, the policy context for seascapes is minimal with the specific policies that do exist being at a local level. However, many of the landscape plans above have relevance to this topic. At a strategic level the MPS states: 'When developing Marine Plans, marine plan authorities should consider at a strategic level visual, cultural, historical and archaeological impacts not just for those coastal areas that are particularly important for seascape, but for all coastal areas, liaising with terrestrial planning authorities as necessary.'

Table F2: Relevant seascape plans, initiatives and environmental protection.

Local
Hastings to Purbeck and Adjacent Waters Historic Seascape Characterisation
Solent and Isle of Wight, and adjacent Marine Zone Historic Seascape Characterisation
English Heritage Historic Seascape Characterisation programme
Dover Strait
CSCOPE Pilot Study
Other relevant local initiatives
Local Plans and Local Development Frameworks for relevant district councils.
MMO Seascape Assessment for the South marine plans area (Marine Plan Areas 6 and 7) (2013)
The C-SCOPE Marine Plan

What is the current situation?

381. The MMO undertook a seascape assessment for the South inshore and offshore marine plan areas following the Natural England³²⁷ methodology, previously used in the characterisation of the East inshore and offshore marine plan areas³²⁸. The project presents a character study and visual resource mapping. It also produced an approach to develop visual resource mapping for other marine plan areas in England.
382. A characterisation for 14 areas identified in the South marine plan areas was provided for stakeholder comment and publication by the MMO³²⁹. Rather than providing an assessment (for instance seascape unit sensitivity or capacity in relation to a particular existing or future technology) the document provides a seascape character area map (Figure F3) and associated high-level character descriptions, comparable to the existing

³²⁷ Natural England (2012). An approach to Seascape Character Assessment (NECR105).

³²⁸ See: <http://publications.naturalengland.org.uk/publication/2729852>

³²⁹ MMO (2014). Seascape character assessment: South Inshore and East Offshore marine plan areas.

onshore and coastal national character area network (above). The MMO acknowledge in the SPAR that the seascape characterisation for marine planning is at a strategic scale, and that local scale seascape studies being undertaken by local authorities will help to underpin seascape assessment in South marine plan areas.

383. The MMO also commissioned work to produce a visual resource map for the South marine plan areas. This map considers onshore topography and combines land with sea views and the relative visibility of the offshore area from land. The resulting map (Figure F3) provides an indication of which areas have sea views and which areas of sea are visible. The maps can provide an indication of, for instance, the proportion landscape designations which have sea views, and have the potential for use in strategic level considerations of where changes to the character to seascape could be observed (note that such studies are limited by the topographic complexity they can consider, e.g. screening by built infrastructure, forestry etc.). Similar mapping has been previously undertaken by offshore wind farm developers at a local to regional level to understand areas of theoretical turbine visibility.

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Figure F1: Statutory and non-statutory landscape designations

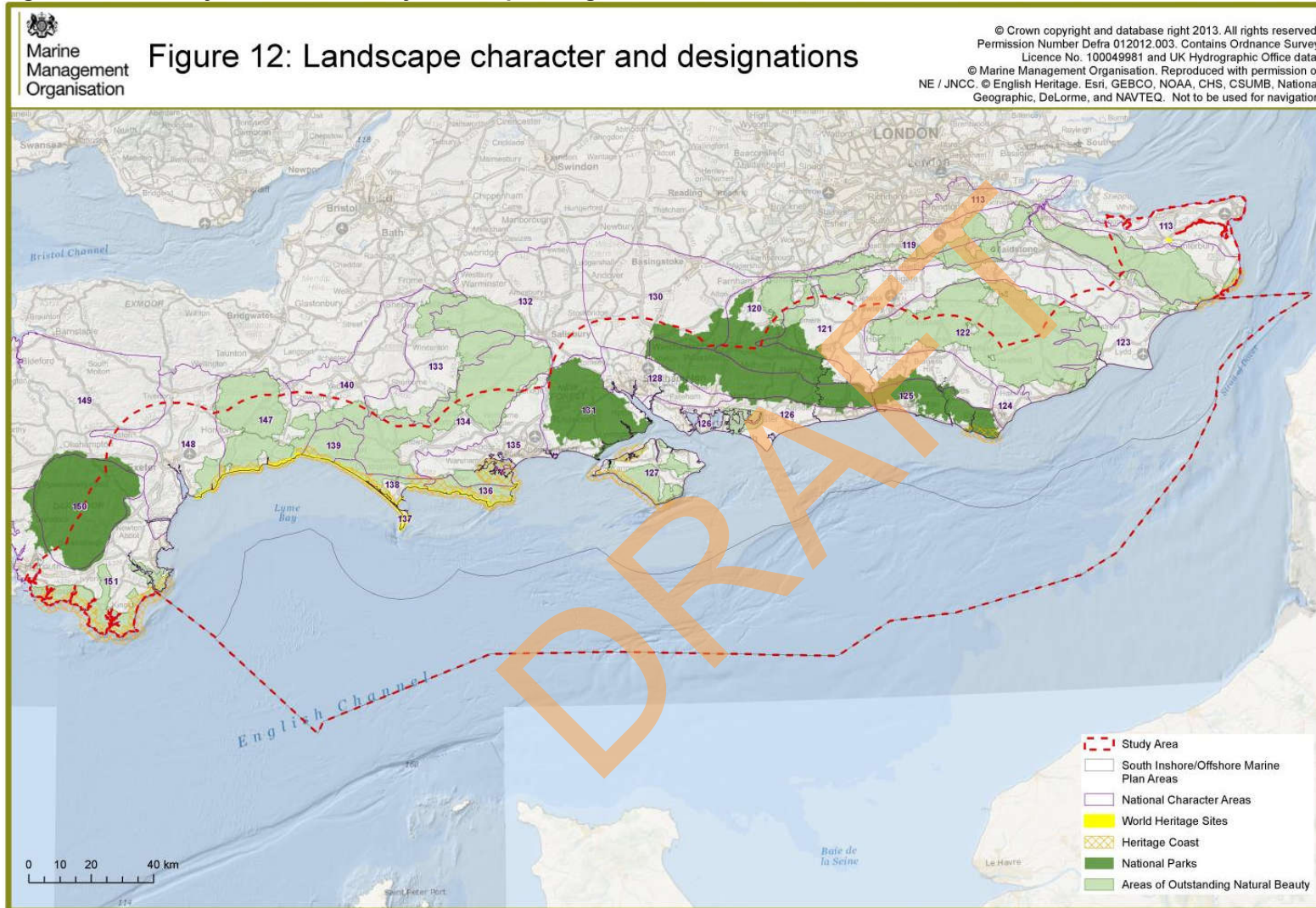


Figure F2 Draft marine character areas identified in the South marine plan areas

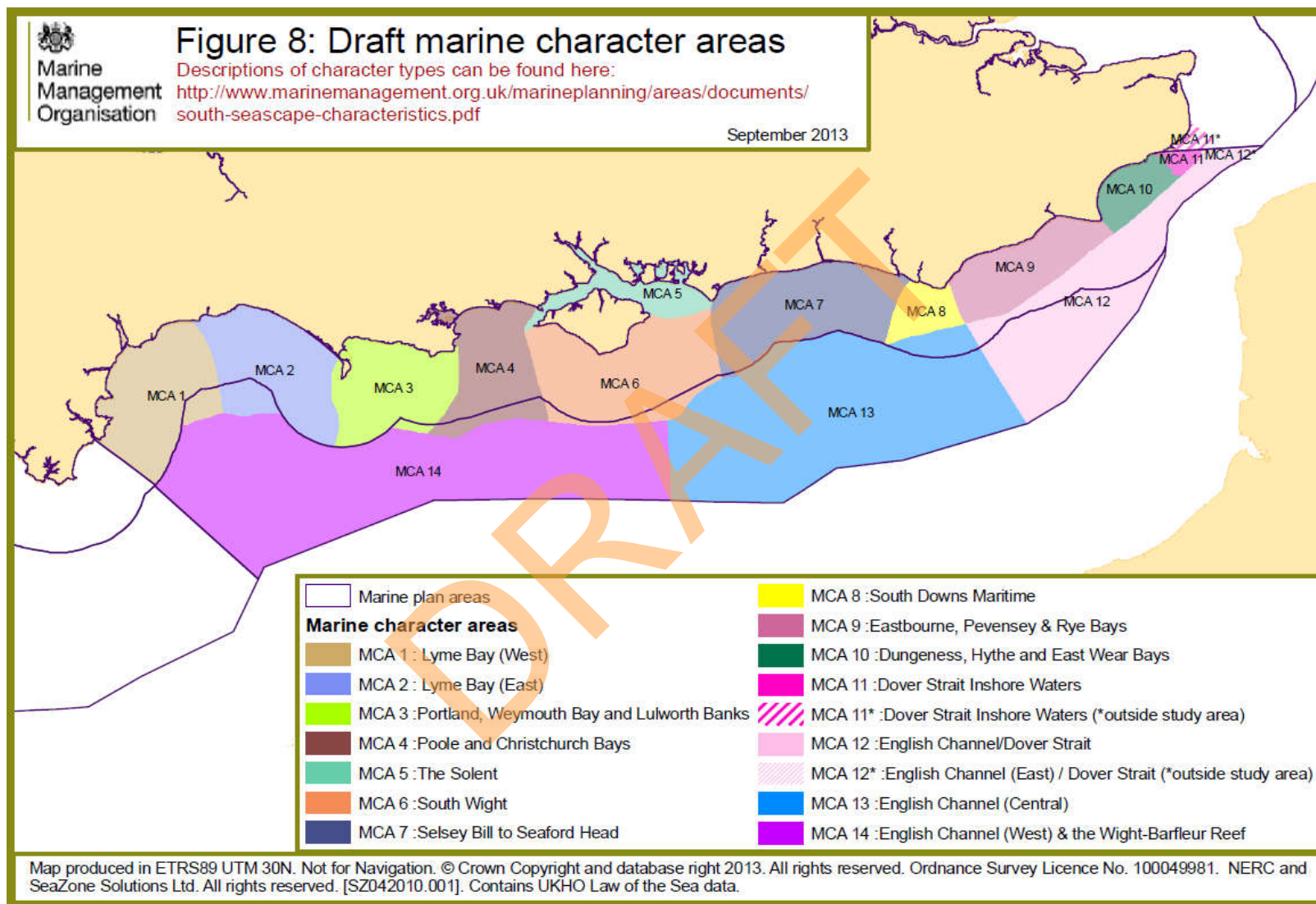
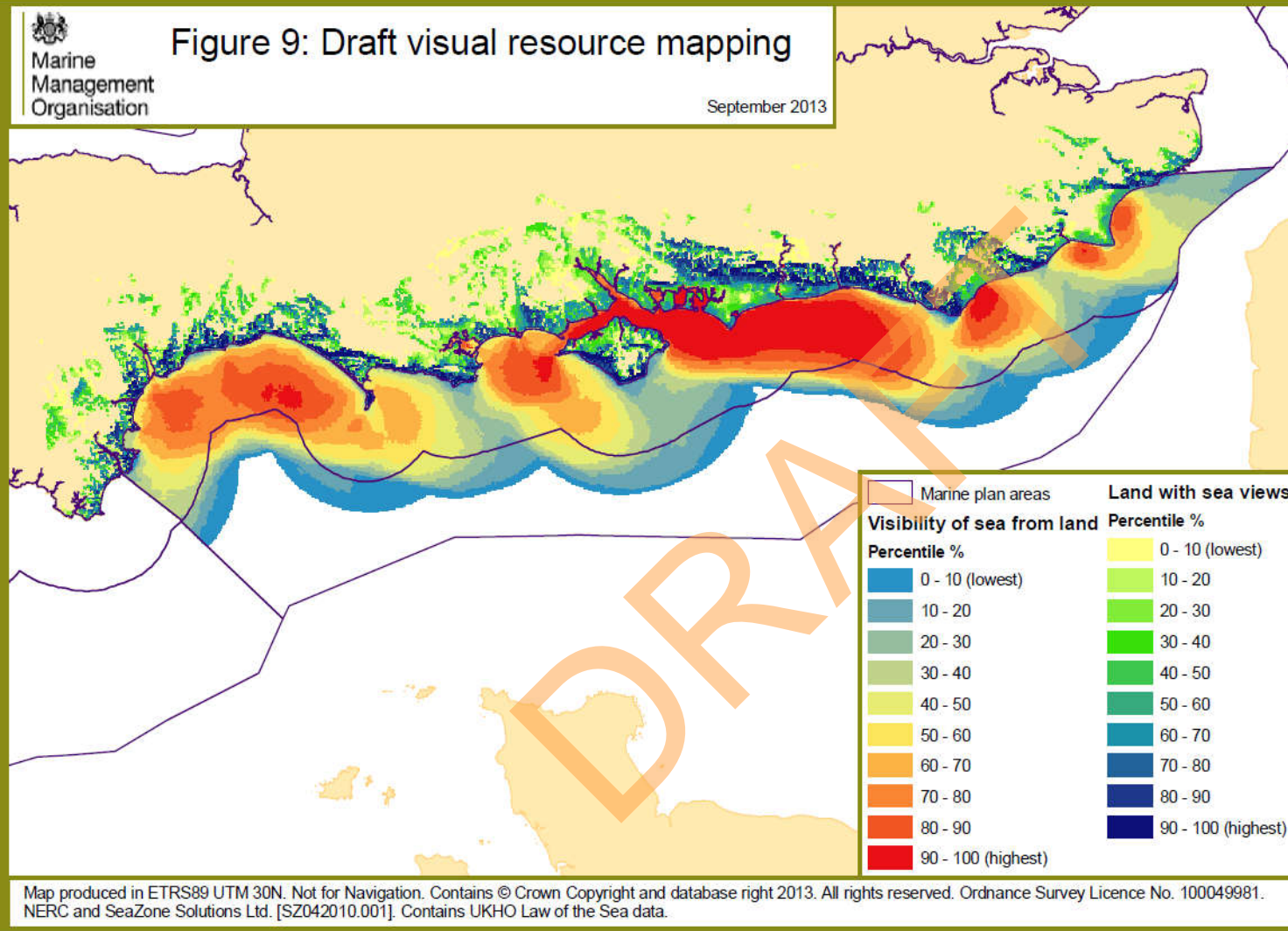


Figure F3 Draft marine visual resource map for the South marine plan areas

Figure 9: Draft visual resource mapping

September 2013



Water Environment

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Annex G – Water Environment

Introduction

384. The south of England marine water environment is considered to be highly varied with the offshore areas comprising some shallow water depths and shipping channels and the inshore areas comprising areas of intertidal muds, sands and cliffs. The area is also subject to significant anthropogenic pressure being heavily used for shipping and aggregates extraction.
385. Marine water quality is a function of both riverine and aeolian terrestrial inputs of pollutants, and those derived from marine activities. Emissions from terrestrial and marine sources to the atmosphere lead to deposition on the sea surface, and these include acidifying components as well as heavy metals. This section covers the following issues:
- Tides and Currents;
 - Water Temperature and Salinity;
 - Pollution and Water Quality;
 - Eutrophication;
 - Contamination; and
 - Marine Litter.

What is the link between marine planning and this topic?

386. Developments and activities at the coast and sea can have adverse effects on the water environment. For example, during all phases of development there may be increased demand for water, discharges to water and adverse effects on ecological resources as a result of physical modifications to the water environment. Therefore, there is the potential for activities covered in marine plans to have both direct and indirect cumulative effects upon the water environment. Effects may also be beneficial if there is improved management of coastal and marine resources and a more holistic approach to planning.

What is the policy context?

387. Table G1 summarises the key elements of the marine water environment context, from which it becomes possible to gain a better understanding of the issues. Following the table is a short discussion that seeks to highlight some of the most pertinent messages.

Table G1: Relevant Plans, Initiatives and Environmental Protection Objectives

International
Convention for the Protection of the Marine Environment of the North East Atlantic (the OSPAR Convention 1992)
IMO International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 (MARPOL 73/78)
International Convention for the Control and Management of Ships' Ballast Water and Sediments (IMO 2003)
OSPAR Decision 2007/1 to Prohibit the Storage of Carbon Dioxide Streams in the Water Column or on the Sea-bed

International Convention on Oil Pollution Preparedness, Response and Co-operation (1990)
 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (1972, as amended) 1996 protocol - revision to convention (2006) and amendments to 1996 protocol
 OSPAR Strategy to Combat Eutrophication (2003)
 OSPAR Biological Diversity and Ecosystems Strategy
 OSPAR Hazardous Substances Strategy
 OSPAR Offshore Oil and Gas Strategy
 OSPAR Radioactive Substances Strategy
 OSPAR Recommendation 2003/1 on the Strategy for the Joint Assessment and Monitoring Programme
 OSPAR Decision 2000/3 on the use of organic-phase drilling fluids (OPF) and the discharge of OPF-contaminated cuttings
 OSPAR Decision 2000/2 on a harmonised mandatory control system for the use and reduction of the discharge of offshore chemicals (as amended by decision 2005/1)
 OSPAR Decision 2007/1 to Prohibit the Storage of Carbon Dioxide Streams in the Water Column or on the Sea-bed
 OSPAR Decision 2007/2 on the Storage of Carbon Dioxide Streams in Geological Formations
 OSPAR Recommendation 2000/5 on a Harmonised Offshore Chemical Notification Format (HOCNF), as amended by OSPAR Recommendation 2005/3 and 2008/2
 OSPAR Recommendation 2005/2 on Environmental Goals for the Discharge by the Offshore Industry of Chemicals that are, or Contain Added Substances, Listed in the OSPAR 2004 List of Chemicals for Priority Action
 OSPAR Recommendation 2006/3 on Environmental Goals for the Discharge by the Offshore Industry of Chemicals that are, or which Contain Substances Identified as Candidates for Substitution
 OSPAR Recommendation 2011/12 for the Management of Produced Water from Offshore Installations as amended by Recommendation 2006/4
 OSPAR Co-ordinated Environmental Monitoring Programme (CEMP)
 Regional OSPAR (2010) Quality Status Reports (QSRs) of the North Atlantic and its sub-regions
 2012 Status Report on the OSPAR Network of Marine Protected Areas (2013)

Europe

Water Framework Directive (2000/60/EC) and daughter directives: the Groundwater Directive (2006/118/EC) and Priority Substances Directive (2008/105/EC)
 Bathing Waters Directive (2006/7/EC)
 Shellfish Waters Directive (2006/44/EC)
 Urban Wastewater Treatment Directive (91/271/EC)
 Nitrates Directive (91/676/EC)
 Priority Substances Directive (2008/105/EC)
 Marine Strategy Framework Directive (June 2008)
 Integrated Pollution Prevention Control Directive (2008/1/EC)
 Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)
 Directive 2004/35/EC on environmental liability with regard to the prevention and remedying of environmental damage
 Directive 2009/28/EC on the promotion of the use of energy from renewable sources

National

Marine and Coastal Access Act 2009
 Safeguarding our seas: A strategy for the conservation and sustainable development of our marine environment (Defra, 2002)
 Cleaner Coasts Healthier Seas, Working for a better marine environment, Our strategy for 2005-2011 (Environment Agency)
 A strategy for promoting an integrated approach to the management of coastal areas in England

(2008)

Our Seas – a shared resource. High level marine objectives (2009)

Draft National Policy Statement for Ports (DfT, 2009)(England and Wales)

National Policy Statements for Energy (EN-1-5) and National Policy Statement for Nuclear Power Generation (EN-6) (DECC, 2011)

Marine Policy Statement (Defra 2011)

Water Resources Act 1991 UK

Working for a better marine environment, Our strategy for 2005-2011 (Environment Agency, England and Wales)

The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003

Flooding in England: A National Assessment of Flood Risk

Shoreline Management Plans (SMP2) (England and Wales)

Defra's Charting Progress II (2010)

Marine Strategy Framework Directive - putting in place the legal framework for implementation The Marine Strategy Regulations 2010

National Planning Policy Framework 2012

Local

Borough of Poole Adopted Core Strategy (2009)

New Forest District Council Adopted Core Strategy (2009)

Environment Agency Bathing Water Profiles for South East Region and South West Regions

Shoreline Management Plans for: South Foreland to Beachy Head, Beachy Head to Selsey Bill, Selsey Bill to Hurst Spit, Isle of Wight, Hurst Spit to Durlston Head, Durlston Head to Rame Head, Rame Head to Hartland Point and Hartland Point to Anchor Head (Environment Agency).

South West River Basin Management Plan (Environment Agency 2009)

South East River Basin Management Plan (Environment Agency 2009)

388. The Convention for the Protection of the Marine Environment of the North East Atlantic (the OSPAR Convention) was signed in Paris in 1992 with the aim of preventing and eliminating pollution and to protect the maritime area against the adverse effects of human activities. Currently five annexes are in force: I: Prevention and elimination of pollution from land-based sources; II: Prevention and elimination of pollution by dumping or incineration; III: Prevention and elimination of pollution from offshore sources; IV: Assessment of the quality of the marine environment; and V: Protection and conservation of the ecosystem. A range of further OSPAR decisions have also been made which have relevance to the water quality of the South marine plans area.
389. The OSPAR Quality Status Report (QSR) published in September 2010 evaluated the implementation of the OSPAR strategies and their effectiveness in improving the quality of the marine environment. Key aspects of the QSR cover biodiversity, eutrophication, hazardous substances, offshore oil and gas industry and radioactive substances.
390. The MARPOL Convention is the main international convention covering prevention of pollution of the marine environment by ships from operational or accidental causes. It is a combination of two treaties adopted in 1973 and 1978 respectively and also includes the Protocol of 1997 (Annex VI). It has been updated by amendments through the years.
391. The Water Framework Directive (WFD) is the most substantial piece of European water legislation to date and is designed to improve and integrate the way water bodies are managed throughout Europe. In the UK, much of the implementation work will be undertaken by competent authorities. It came into force on 22 December 2000, and was transposed into UK law in 2003 (WFD (England and Wales) Regulations 2003). The Directive aims to take a holistic approach to water management, preventing deterioration of aquatic ecosystems and restoring surface waters (which includes rivers, lakes,

estuarine and other transitional waters, and coastal waters out to 1nm) and groundwater to “good status” in terms of ecological and chemical objectives for surface waters and quantitative and chemical objectives for groundwater by 2015. The status of transitional and coastal waters is measured not only in relation to the presence or absence of pollutants, but also risk factors including introduced non-native species. The Directive also aims to ensure that protected areas such as bathing waters and drinking waters achieve their objectives. Two daughter directives accompany the WFD; the Groundwater Directive (2006/118/EC) and the Priority Substances Directive (2008/105/EC). This legislation underpins the requirements of the WFD with regard to groundwater and surface water pollution. The latter will not only contribute to the decline in the emission of priority substances, but also the cessation of their discharge by 2020. NB the WFD is also covered within Annex E - Geology, Geomorphology and Coastal Processes.

392. The Bathing Water Directive sets the microbial standards for water quality at popular beaches and inland bathing sites that have been designated as bathing waters because they attract large numbers of bathers. The Shellfish Waters Directive protects or improves shellfish waters in order to support shellfish life and growth, therefore contributing to the high quality of shellfish products directly edible by man. It sets physical, chemical and microbiological water quality requirements that designated shellfish waters must either comply with (‘mandatory’ standards) or endeavour to meet (‘guideline’ standards).
393. The Marine Strategy Regulations 2010 transpose the EU Marine Strategy Framework Directive (MSFD) into UK law and require the development of the five elements of the marine strategy: (1) the assessment of marine waters; (2) the determination of the characteristics of good environmental status for those waters; (3) the establishment of environmental targets and indicators; (4) the establishment of a monitoring programme; (5) the publication of a programme of measures. Qualitative descriptors for determining good environmental status are listed in Annex I of the MSFD and those of relevance to water quality include:
- Human-induced eutrophication is minimised, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algae blooms and oxygen deficiency in bottom waters.
 - Concentration of contaminants are at levels not giving rise to pollution effects.
 - Properties and quantities of marine litter do not cause harm to the coastal and marine environment.
394. The Marine and Coastal Access Act was enacted in 2009. The Act aims to help the UK achieve clean, healthy, safe, productive and biologically diverse oceans and seas. It seeks to provide better protection for the marine environment; sustainable use of marine resources; an integrated planning system for managing UK seas, coasts and estuaries; a robust legal framework for decision-making; streamlined regulation and enforcement; and access to the coast. A key output of the act was the requirement to produce a Marine Policy Statement (MPS) and marine plans. The MPS was adopted in 2011 and seeks to enable an appropriate and consistent approach to marine planning across UK waters, and ensure the sustainable use of marine resources and strategic management of marine activities from renewable energy to nature conservation, fishing, recreation and tourism. The MPS is underpinned by a series of objectives detailed in, Our Seas – a shared resource. High level marine objectives (2009).
395. Safeguarding our seas: A strategy for the conservation and sustainable development of our marine environment was published by Defra in 2002. This report sets out the UK Government’s vision for the marine environment - clean, healthy, safe, productive and biologically diverse oceans and seas. It is underpinned by the principles of sustainable development, integrated management, the conservation of biological diversity, robust science, the precautionary principle and stakeholder involvement. It outlines how

Government seeks to adopt an ecosystem-based approach to marine management to better integrate marine protection objectives with sustainable social and economic goals. It covers the broad spectrum of policies that affect the marine environment including water quality.

396. Charting Progress 2 was published in 2010 and provides an updated assessment of the state of UK seas since Charting Progress was published in 2005. Supporting technical reports on healthy and biologically diverse seas, ocean processes, clean and safe seas, and productive seas provide relevant information on the current baseline and issues affecting the water environment.
397. The Flood and Water Management Act 2010 makes provisions for the creation of a National Flood and Coastal Erosion Risk Management (FCERM) Strategy, which was published in May 2011. In addition to the above, the NPPF and related guidance outlines how developers and authorities should manage development at the coast. This includes considering, amongst other things, impacts that may arise from a development (e.g. as to whether it may enhance flood risk elsewhere), whether the development is itself flood resilient, whether it may be more appropriately located elsewhere, and whether it is sustainable in the long-term (e.g. in the face of rising sea-levels).
398. River Basin Management Plans (RBMPs) now completed for England are one of the principal means that the WFD has been implemented in the UK and will be used in combination with other plans including Shoreline Management Plans (SMPs) to achieve a fully integrated approach to coastal management. RBMPs have been produced for the south west and the south east regions in the south of England. Similarly, the second tranche of Shoreline Management Plans (SMP2) are being consulted on or have been finalised for England and Wales. These are non-statutory policy documents for coastal flood and erosion risk management planning. Eight SMPs exist in the South marine plans area.

Implications for the sustainability appraisal and the marine plan

399. The South marine plans would be used by the MMO when considering the potential impacts of development applications, many of which will require to be assessed with regards to their impact on water quality, circulation and coastal flooding. It would be important when drafting the plan, and at the project level, to account for the degree of risk to the water environment (or from the water environment e.g. flood risk to new development) that certain developments may represent. Given the future trajectory for certain industries, the potential future cumulative impacts could also be a consideration of the plan.

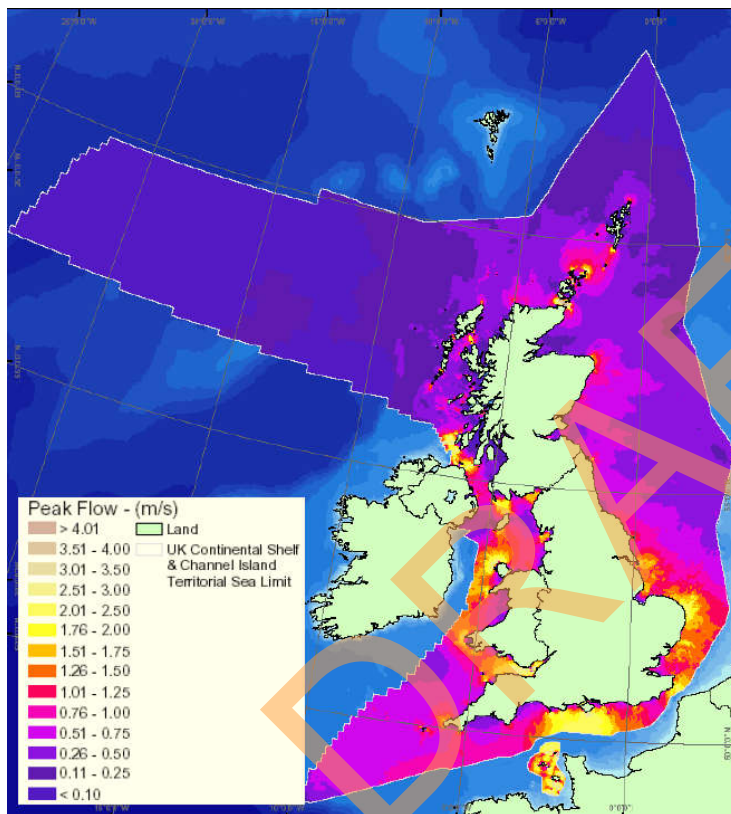
What is the current situation?

Tides and currents

400. The South marine plans area is characterised by a reasonably well-defined transition between two marine provinces, centred on the Solent. The Eastern Channel is largely influenced by cool Boreal water (which dominates the North Sea system), whereas the western part of the Channel is influenced by relatively warmer Lusitanian water, which comes in part from the Gulf Stream and in part from the water leaving the Mediterranean. Overall, there is a residual flow of water entering the North Sea from the eastern end of the English Channel, though this accounts for just 10% of the inflow into the North Sea.
401. The tidal currents in the English Channel flood eastwards and ebb westwards. The maximum tidal current speed at Dover is approximately 1.75m/s due to the restriction of the English Channel. Stronger tidal currents, however, occur off Portland Bill at the

western end of the South marine plans area, where they can reach over 3.5m/s. Strong tidal currents, often with associated overfalls, occur off pronounced headlands such as Selsey Bill, St Catherine's Point and St Alban's Head. Within Rye Bay on the Kent/East Sussex border, Christchurch Bay, Poole Bay and Weymouth Bay, currents are relatively weak, especially in shallow water. For most of the central part of the English Channel the maximum speed of tidal currents is between 0.75 and 1.25m/s. A feature of the tides in the central part of the English Channel is the distortion of tidal curves due to the effect of shallow water. A consequence of this is that tides have a marked double low water between Portland Harbour and Kimmeridge Bay. From Swanage to Southampton double high waters occur. In Poole and Christchurch Bays, this distortion results in a long stand of the tide at, or very close to, the high water level. Peak flow for mean spring tide is presented on Figure G1.

Figure G1: Peak flow for mean spring tide



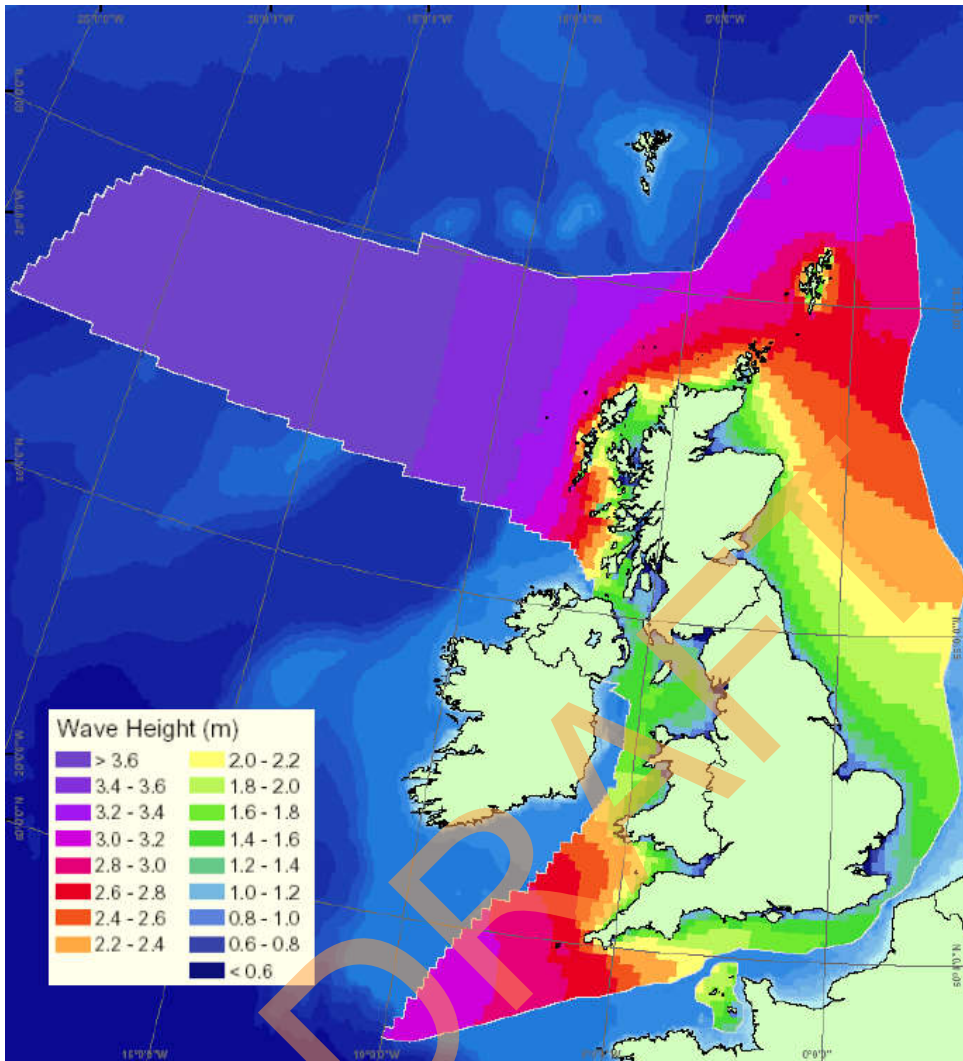
Source: *Atlas of UK Marine Renewable Energy Resources: Technical Report*

402. Sea levels around the UK have risen by approximately 1mm per year over the 20th century, with this rate of increase rising since the 1990s³³⁰. This is in response to higher temperatures resulting in thermal expansion of ocean water, and the melting of glaciers and ice caps. Sea levels around the UK are anticipated to rise by 12 to 76cm by the year 2095. Taking account of the vertical movement of land, this gives slightly larger sea level rise projections in the southern UK where land is subsiding, compared with the north.
403. Changes in the winter mean wave height are anticipated to be between -35cm and +5cm and changes in the annual maxima are projected to be between -1.5m and +1m. There is no evidence for future changes in storm-related extreme sea levels for the UK, due to low confidence in the simulation of extreme winds in climate models. Therefore, future

³³⁰ Jenkins et al, 2009. UK Climate Projections: Briefing report.

changes in extreme sea level will be governed by mean sea level rise, rather than any change in the storm surge component³³¹.

Figure G2: Annual mean significant wave height



Source: *Atlas of UK Marine Renewable Energy Resources: Technical Report*

Water temperature and salinity

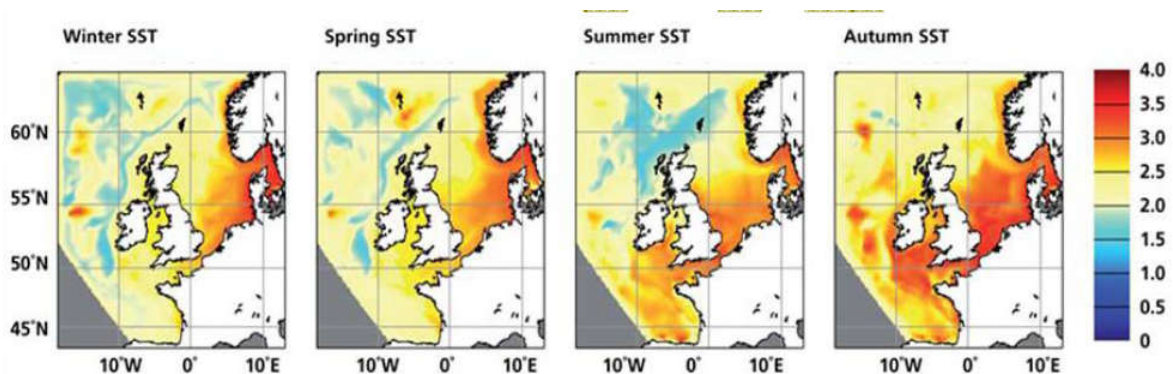
404. Sea surface temperatures are increasing and waters around the UK have warmed by approximately 0.7°C over the last three decades. The UK Climate Projections 2009 (UKCP09)³³² are the latest climate projections that cover the UK (and its shelf seas). Under the medium emissions scenario, the UK's shelf seas are likely to experience warming of between 1.5 and 4°C by the end of the 21st century. Sea surface temperatures in the South marine plans area are strongly influenced by the movement of water along the English Channel which modifies the influence of continental Europe. In winter, relatively warm waters move up the English Channel, and average February temperatures range between 6.5°C and 8°C. Notable increases are expected in the

³³¹ MCCIP (2010) Marine Climate Change Impacts Partnership Climate of the marine environment

³³² Murphy, J.M., et al. 2010 UK Climate Projections Science Report: Climate change projections Version 3. Met Office Hadley Centre, Exeter, UK.

South marine plans in the east of approximately 2.5 to 4°C. As shown in Figure G3, it is expected that the largest increases will be experienced in autumn³³³.

Figure G3: Seasonal increases in sea surface temperature (°C) from present to 2080s – medium emissions scenario



Source: Lowe, J.A., et al., 2009 UK Climate Projections science report: Marine & coastal projections. Met Office Hadley Centre, Exeter

405. In coastal waters, land run-off is important in determining temperature and salinity profiles. Salinity in the South marine plans area is considered to be slightly lower in the winter than summer months with averages of 35.0-35.2%. In the summer months salinity values are relatively high along the centre of the English Channel (between 34.75-35.0%), owing to the eastward movement of Atlantic water. Salinity values decrease towards the coast in both summer and winter but normally remain above 34.5%, except locally at river mouths where there is dilution from freshwater discharge.

Pollution and water quality

Eutrophication

406. Increasingly strict legislation and considerable investment from water companies has significantly improved water quality in the UK. This has resulted in a steady increase in bathing water quality since 1988 in the South marine plans area. Similarly there has been a general increase in the number of monitored shellfish waters in England and Wales and much of this is due to sewerage improvement schemes. It is important to note that for both directives, there have been variations in the year on year increases which are often due to weather patterns, especially heavy rainfall which leads to increased incidences of storm overflows and diffuses agricultural pollution.
407. There are a large number of waste water discharge points across the South marine plans area which are mostly managed by Southern Water, South West Water and Wessex Water. There are high concentrations of water treatment works and sewerage disposal points around the main settlements including Exeter, Weymouth, Poole, Southampton, east Isle of Wight, Portsmouth, Chichester, Brighton and Hove, Hastings and Folkestone. These and all other surface water and waste water treatment plants to ensure the water is treated before being discharged back to the marine area.
408. Under the Urban Waste Water Directive there are requirements for sewage treatment, this includes specific provisions for sensitive areas. Sensitive areas are waters which are eutrophic, or at risk of becoming eutrophic, contain nitrate concentrations >50mg/l, or may fail to meet standards required in other directives. Sewerage discharges entering

³³³ MMO (2013) South Inshore and South Offshore Marine Plans Analytical Report (SPAR)

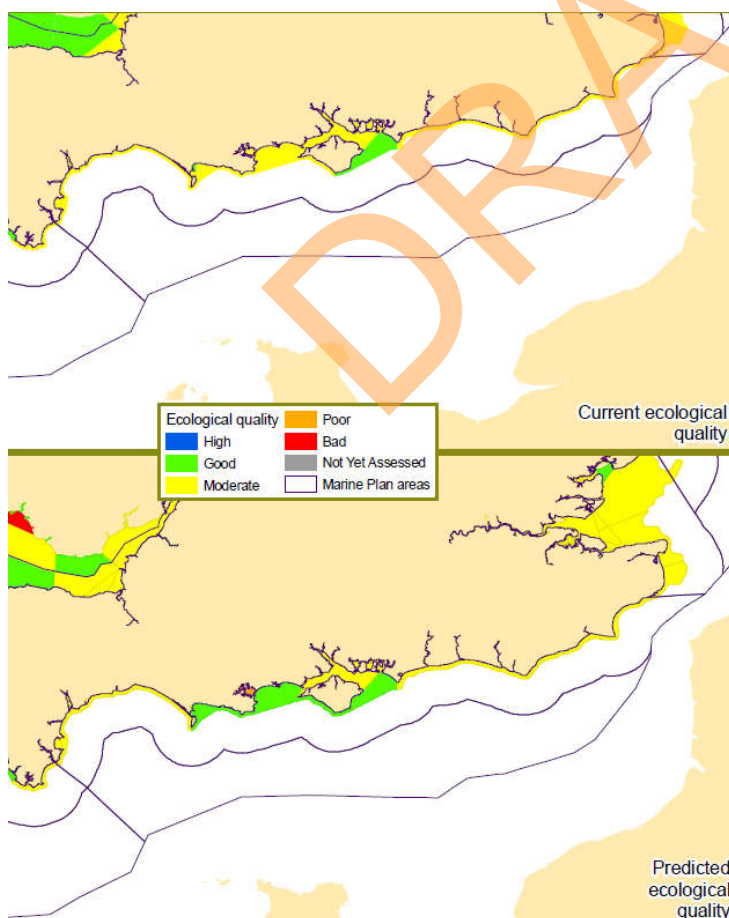
these waters are required to have a greater degree of treatment. In the South marine plans area, there are:

- Eight coastal waters considered to be sensitive - located in the Solent including Chichester, Langstone and Portsmouth Harbours as well as Poole Harbour;
- 36 are considered sensitive under the Bathing Waters Directive, these are located around Dungeness, the east Solent, Poole Bay and Lyme Bay; and
- 16 are considered sensitive under the Shellfish Waters Directive and these are located within the east Solent, Poole Bay, the Exe Estuary and the River Dart.

409. There are two River Basin Management Plans (RBMPs) covering the South marine plans area, these are the South East RBMP and the South West RBMP. Within these plans there are 18 coastal waterbodies which fall within the South marine plan areas, 3 are currently at good ecological potential (located between Portland Bill and Selsey Bill and south in the Isle of Wight) and 15 are currently at moderate ecological status or potential (see Figure G1). Regarding chemical status, one water-body is failing to meet good status and 8 do not require assessment within the South marine plan area.

410. RBMPs also address estuarine and transitional waters of which there are 27 in the South marine plans area. Of these, 25 have been assessed as meeting moderate ecological status/potential, one has failed to meet good ecological potential (Poole Harbour) and one has been assessed as meeting good ecological potential (Christchurch Harbour) (see Figure G4).

Figure G4: Current and Predicted Ecological Water Quality



Source: MMO (2013) SPAR

411. In the South marine plans area, sandy gravel and gravel is the predominant form of sediment with some large deposits of gravelly sand. Capital and maintenance dredging of sediments is focussed around the Isle of Wight, Poole Harbour and in Southampton Water and this is to support shipping activity.
412. The Revised Bathing Waters Directive sets out standards for testing certain types of bacteria in the marine area during the bathing season (May – September). Approximately 130 sites were surveyed in the South marine plans area in 2012 of which 6 failed to reach the required standard (all located in the western half of the South marine plans area). It is believed that stricter standards under the Revised Directive along with heavy rainfall in summer 2012 contributed to failures.
413. There are 28 designated shellfish waters in the South marine plans area and these are mostly found around the Solent, Poole Harbour and Portland Harbour.
414. Analysis of local authority Core Strategies within the South marine plans area indicates the importance of good water quality through policies which promote:
- Maintaining the highest standard of water quality for the purposes of tourism and recreation and for the benefit of environmental designations;
 - Management of litter in the estuary and coastal areas;
 - Proposals not having an adverse effect on the quality of coastal waters i.e. reducing pollution; and
 - Support for meeting Water Framework Directive Standards and working at a catchment scale to integrate marine conservation, land use and water quality.

415. Waste water discharges do not generate a measurable economic value but are an often unavoidable product of many industries. Furthermore, sectors such as tourism, recreation and shellfisheries rely on a healthy marine environment, which includes good water quality (ecological and chemical), for the future of the industry. Therefore the provision, and treatment of wastewater is crucial to the development and growth of many marine activities and industries. Contamination of shellfish and bathing waters can have a social and economic impact as well as supporting a healthy marine environment (MMO (2013) SPAR).

Contamination

416. There are trade industry discharge points in various locations, e.g. Poole Harbour, Southampton Water, Portsmouth and Chichester Harbours and Dover. There are 3 power stations (Dungeness nuclear power station, Shoreham power station and Fawley Power Station) which abstract water for cooling purposes and then return the water to the marine environment as waste water³³⁴.
417. Marine pollution is decreasing in the South marine plans area but there is still a legacy of substances from industrialised areas. A series of stringent controls are in place to ensure marine pollution is reduced. The growing traffic in heavy fuel oils through the region raises the risk of accidental spillages occurring although international efforts to improve the quality of ships and crews are likely to have the most significant benefit to this. There may be scope for the South marine plans to help minimise this risk further. Similarly, the predicted expansion of nuclear power stations in the region may result in radioactive discharges to the marine environment, although, however, the OSPAR Radioactive Substances Strategy and UK Strategy for radioactive discharges is already in place to help achieve reductions in emissions and the new generation of reactors may also lessen the impact on the marine environment.
418. Within England there are 55 beaches that have been awarded 'Blue Flag' status 22 of which are located within the South marine plans area. Beaches are awarded the Blue Flag based on compliance with 32 criteria covering the following:
- Environmental education and information;
 - Water quality;
 - Environmental management; and
 - Safety and services.

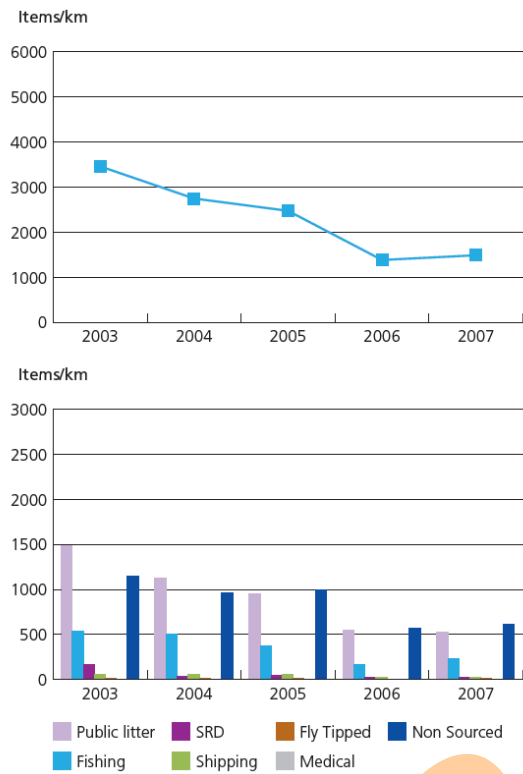
Marine litter

419. During the period 2003 to 2007, 17,780 volunteers took part in beach litter surveys on 1557 UK beaches, together covering 807 km of coastline and collecting 1614 739 items of litter. The surveys took place on the third weekend of September, in line with Ocean Conservancy's International Coastal Cleanup and the beaches were self-selected by volunteer groups. The main sources of beach litter in all regions were public litter, fishing litter, sewage-related debris and shipping litter. Plastic items made up the bulk of the material found, accounting for around 70% of the total litter.
420. The South marine plans area showed a clear downward trend in litter density, from 3500 items/km in 2003 to just under 1500 items/km in 2007 (Figure G5). Although public litter provided the main contribution with an average density of 927 items/km, the downward trend was thought to have been driven largely by a drop in the amount of public litter.

³³⁴ MMO (2013) South marine Plan Areas Futures Analysis. MMO project No: 1039

However, the precise reason for this was unclear (UK Marine Monitoring and Assessment Strategy (UKMMAS) (2007) Charting Progress 2).

Figure G5: Total litter items per kilometre surveyed in the South marine plans area and litter items by source, 2003–2007



Source: Marine Conservation Society Charting Progress 2

What would the situation be without the marine plan?

421. The environmental baseline is likely to be affected by large scale climatic and oceanographic processes, some of which are at present not well resolved. Variations have been observed in North Atlantic and North Sea circulation patterns in the past few decades which are likely to influence sea surface temperatures. Increased wave heights have been observed in the northern North Sea and are known to respond strongly and systematically to the North Atlantic Oscillation (e.g. Woolf *et al*, 2002; 2003). Around the UK, sea temperatures and seasonal stratification strengths are predicted to increase, while salinity is projected to decrease over the 21st Century. At a local level, topography often interacts with these principal forces, focusing currents and leading to the generation of amplified current flow or eddies. At present there are no local anthropogenic activities within the UKCS area that are likely to significantly change the physical properties of the water environment, though the pH of the world's oceans has been declining due to increased CO₂ uptake from anthropogenic sources.
422. The South marine plans would not be able to affect the rate of sea level rise although there may be opportunities to contribute to a more holistic approach to planning in the marine/coastal zone to reduce the risk of coastal flooding to property and infrastructure.

What are the key issues?

423. The following key issues and opportunities have been identified:
 - The potential effects of climate change on coastal flooding and erosion. A large portion of the south coast is vulnerable to flooding and erosion.
 - Population growth and associated infrastructure, will put more demand on the sewage network and water companies with regards the disposal of waste water. It may also contribute to urban creep which has the potential to alter the dynamics of a catchment.
 - The effects of climate change on sea temperatures and ecology. An increase in sea temperature reduces the ability of oceans to absorb CO₂ affecting certain species thereby causing them to migrate or adapt.
 - The likely effects of ocean acidification on ecosystems and marine species.
 - Marine pollution derived from riverine, coastal and marine sources, and atmospheric emissions and subsequent deposition (e.g. metals, acidifying and eutrophying components from sewage and agricultural run-off) and pollutant legacies such as oil based cutting piles, munitions dumping and dredging disposal sites. Whilst these issues are decreasing, there is a persistent legacy of some substances in industrial estuaries.
 - Temporary effects in the water column from dredging and other activities which cause turbidity.
 - Coastal and marine litter and debris (e.g. from beach visitors, shipping litter and fishing related debris) is an aesthetic, ecological and economic problem.
 - A key driver for change is the WFD requirement and the Marine Strategy Framework Directive (MSFD) to attain good ecological status in coastal waters and chemical status within territorial waters.

- There are a significant number of environmental designations in the South marine plans area which could be negatively impacted by discharges and outfalls. The physical appearance of outfalls should also be considered in relation to the impact on seascape.

Cross cutting issues

The marine area is intrinsically linked to society and the wider economy; as such, potential impacts of the water environment on the marine sector will have wider consequences. Particularly clear links are identified with biodiversity, ecosystem services, health, transport and business, industry and services sectors. Tourism, recreation, fisheries and shellfisheries all rely on, and are influenced by, a healthy marine environment, which includes good water quality. Without this, these activities and industries could be impacted economically and socially.

Opportunities

424. The Marine and Coastal Access Act and the Marine Strategy Framework Directive provide a means by which important marine sites and ecosystem functions can be protected. The Marine Plans should carry this forward into regionally specific proposals.
425. The MSFD recognises eutrophication as one of the major threats to the quality of estuarine and coastal waters. Inputs of nitrogen and phosphorous and from sewage effluents and industrial processes are the main causes of anthropogenic eutrophication and so the MSFD is a key policy driver to reduce eutrophication in the UK seas and therefore improve the overall quality of marine waters and health of the marine area in the future.

Are there any data gaps?

426. Further data will be obtained relating to coastal flood mapping.
427. Further information regarding dredged disposal sites within the South marine plans area which is currently monitored by Cefas on behalf of the MMO.