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# South East Inshore Marine Plan Area Sustainability Appraisal Options Assessment Report





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## South East Inshore Marine Plan Area

# Sustainability Appraisal Options Assessment Report

April 2018

**Report prepared by:** ClearLead Consulting Ltd, WSP, and MarineSpace.

clearlead 



**MarineSpace**  
Making Sense of the Marine Environment™



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A	Johanna Mitchell	
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Marine Management Organisation  
Lancaster House  
Hampshire Court  
Newcastle upon Tyne  
NE4 7YH

Tel: 0300 123 1032  
Email: [info@marinemanagement.org.uk](mailto:info@marinemanagement.org.uk)  
Website: [www.gov.uk/mmo](http://www.gov.uk/mmo)

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# 1 Introduction

## 1.1 The Purpose of this Report

ClearLead UK Ltd, working in association with WSP and MarineSpace were awarded a contract in June 2017 to carry out a Sustainability Appraisal of the Marine Plans for the North East, the North West, the South East and the South West Marine Plan Areas.

This report provides detail on the assessment of the options for the South East Marine Plan Area. The options were presented as part of the Iteration 2 Stakeholder engagement process in February / March 2018. The options were organised under a series of groupings which are detailed in Section 1.4.

This report is organised in four sections:

- Section 1 sets out the purpose of this report and details on the options being assessed for the Marine Plans;
- Section 2 outlines the methodology of the SA options assessment;
- Section 3 summarises the results of the SA options assessment; and
- Section 4 outlines the next steps in the plan making and SA processes.

## 1.2 Background to the Marine Plans and SA process

The Marine Management Organisation (MMO) was established in 2010 following the publication of the Marine and Coastal Access Act (MCAA) 2009 and one of its delegated responsibilities is to prepare marine plans for the English inshore and offshore waters. Marine plans seek to provide greater coherence of policy and a forward-looking, proactive and spatial approach to the management of the marine area, its resources and the activities and interactions that take place within it. Marine plans and their reflection of the Marine Policy Statement (MPS), form part of a planned regulatory system for marine activities, which is in the early stages of being established. The MMO has now completed marine plans for the East Inshore and Offshore and the South Inshore and Offshore Marine Planning Area and is currently progressing the seven remaining marine plan areas simultaneously.

The remaining Marine Plan Areas include the:

- North East Inshore and Offshore;
- North West Inshore and Offshore;
- South West Inshore and Offshore; and
- South East Inshore.

These Marine Plans will set out how the UK MPS will be implemented in these Marine Plan Areas. They will reflect the MPS at the sub-national level, taking into account the social, economic and environmental factors that affect each Marine Plan Area and the communities that are dependent on or have an interest in the Marine Plan Areas.

The requirement for SA in the marine plan process is outlined in the Marine and Coastal Access Act 2009, which stipulates that all marine plans are subject to SA, and that it is undertaken in line with the procedures prescribed by the SEA Directive. The first stage of SA (scoping) for the remaining marine plans has been completed. This stage included extensive collation of baseline data into an SA Database. Key

issues were recorded into 'Report Cards' for each marine plan area and an SA Scoping Report.

The SA Scoping Report was published for consultation with statutory consultees for a 5-week period between 11th April and 13th May 2016. Following consultation, the Scoping Report was revised in response to comments received and the final version is available to download from the MMO website, here:

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/535172/SA\\_scoping\\_report\\_NE\\_NW\\_SE\\_SW.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/535172/SA_scoping_report_NE_NW_SE_SW.pdf)

The SA Database was updated in August 2017.

### 1.3 Development of Marine Plan Options

The legal requirement for undertaking the options stage of planning comes from the [Strategic Environmental Assessment Directive](#) and the UK Regulations of this Directive, which requires those developing a plan or programme to consider 'reasonable alternatives taking into account the objectives and geographical scope of the plan'. The Directive requires that plan-makers must look at different ways of achieving the objectives of the plan in a reasonable manner.

The options stage is a significant phase in the planning process; it considers the different ways of delivering the vision and objectives and is the mechanism that determines how marine plans will respond to issues in each marine plan area.

This stage is part of Iteration 2, each option is tested against the SA Framework and potential significant sustainability effects identified. The feedback from the SA at this stage will feed into the work in Iteration 3, 'Preferred Options'. Figure 1.1 below shows this process.

**Figure 1.1 Development of Marine Plan Options**



This is the first stage where each marine plan area will be considered on its own, because although there may be common responses to issues, these may not be suitable for achieving the different marine plan area visions. A decision was made early in the planning process to not develop specific plan objectives, but to use the High Level Marine Objectives (HLMOs). Marine plans are expected to deliver the HLMOs through sector/activity specific policy, so there is no need to develop marine

plan area objectives. The additional advantage of having static objectives is that the preferred option can be developed around the issues under each of the objectives. The differences in the spread of the issues between the HLMOs within each marine plan area is where the marine plans become area specific.

Prior to options development, key issues were identified within the Issues and Evidence Database and arranged into themes:

- **Economy:** ports, dredging, oil and gas decommissioning, beneficial use of dredged material, blue growth, tidal lagoon development.
- **Environment:** coastal squeeze, marine litter, invasive non-native species, water quality, compensatory habitat.
- **Governance:** plan integration, monitoring and enforcement, port management, new marine infrastructure.
- **Social:** flood protection, tourism opportunities, management of recreational access, social deprivation, fishing industry decline.

The issues under these themes are not exclusive and others are included as appropriate when issues and supporting evidence are identified through the planning process.

Once key issues were identified, options for delivering the HLMOs in the context of the issues or groups of issues were raised. From this, realistic and, deliverable alternatives were created, which align with the MPS and other relevant legislation, as well as address current and future issues in marine plan areas. As a result, each of the marine plan areas has a variety of different 'groupings' (eg coastal change) and each 'grouping' has a number of potential options. The groupings and options reflect key issues in each marine plan area, and therefore vary across marine plan areas.

## 1.4 Groupings & Options

The south east consists of 28 groupings. Four groupings (Cumulative Effects, Governance, Evidence Gaps and Implementation) contain options which are not possible to assess through the SA. The remaining 28 groupings contain 264 individual options which have been assessed. The groupings and number of options assessed are set out in Table 1.1 below.

<b>Table 1.1: Assessment Groupings &amp; Options</b>			
<b>Grouping</b>	<b>Number of Options</b>	<b>Grouping</b>	<b>Number of Options</b>
Access Encouraging	11	Fisheries	4
Access Managing	7	Habitat Loss	8
Aquaculture	10	Heritage Assets	12
Cables	6	Infrastructure	10
Climate Change	15	Litter	9
Coastal Change	7	MPAs and Geodiversity	10
Co-Existence	11	Non Native Invasive Species	6
Co-Existence Recreation	10	Ports and Harbours	5
Disturbance: Birds	11	Recreation	4
Disturbance: Habitats and Species	11	Seascapes	8
Dredge Disposal	8	Shipping	12
Ecosystem Approach	10	Species	15
Employment	13	Tourism	7
Energy	10	Water Quality	14

## 2 Assessment Methodology

### 2.1 Introduction

This stage of the SA has involved assessment of the options against the SA framework (which was developed at the scoping stage of the SA) (Table 2.1 below), taking into account the evidence base.

The assessment of the marine plan options has been designed to:

- Be proportionate;
- Focus on identifying key potential significant effects to inform the decision making between options; and
- Refer to the baseline database to provide quality assured evidence as the basis of the assessment.

Each of the 28 groupings and 264 options for the South East Marine Plan Area have been assessed to the same level of detail. The assessment has been organised within an Excel workbook which ensures a rigorous, evidenced based approach to the assessment.

Table 2.1: SA framework	
Overarching SA topic	Proposed SA Sub Topic
<b>Physical and Chemical Aspects</b>	
Cultural heritage	<ul style="list-style-type: none"> <li>• Heritage Assets within Marine Plan Area</li> <li>• Heritage Assets adjacent to Marine Plan Area</li> </ul>
Geology, Substrates and Coastal Processes	<ul style="list-style-type: none"> <li>• Seabed substrates and bathymetry</li> <li>• Coastal features and processes</li> </ul>
Seascape and landscape	<ul style="list-style-type: none"> <li>• Effects on seascape and landscape</li> </ul>
Water	<ul style="list-style-type: none"> <li>• Tides and currents</li> <li>• Water temperature and salinity</li> <li>• Pollution and water quality</li> <li>• Marine litter</li> </ul>
Air quality	<ul style="list-style-type: none"> <li>• Air pollutants</li> </ul>
Climate	<ul style="list-style-type: none"> <li>• Greenhouse gas emissions</li> <li>• Climate change resilience and adaptation</li> </ul>
<b>Social and Economic Aspects</b>	
Communities, health and well being	<ul style="list-style-type: none"> <li>• Health and wider determinants of health Effects on communities</li> <li>• Effects on protected equality groups</li> </ul>

<b>Table 2.1: SA framework</b>	
<b>Overarching SA topic</b>	<b>Proposed SA Sub Topic</b>
Economy	<ul style="list-style-type: none"> <li>• Ports and shipping</li> <li>• Fisheries and aquaculture</li> <li>• Leisure / recreation</li> <li>• Tourism</li> <li>• Marine manufacturing</li> <li>• Defence</li> <li>• Aggregate extraction</li> <li>• Energy generation and infrastructure development</li> <li>• Seabed assets</li> </ul>
<b>Ecological Aspects</b>	
Biodiversity, Habitats, Flora and Fauna	<ul style="list-style-type: none"> <li>• Protected sites and species</li> <li>• Benthic and inter-tidal ecology Fish and shellfish</li> <li>• Marine mega fauna</li> <li>• Plankton</li> <li>• Ornithology</li> <li>• Non-indigenous species</li> </ul>

An assessment spreadsheet was prepared for each marine plan area, which included all the relevant groupings. The assessment of options was undertaken in two stages: screening and assessment of significant effects, with the main focus of the assessment on the identification of significant effects. These steps are described in more detail in Section 2.3.

## 2.2 Involving the Advisory Group

The SA Advisory Group (SAAG) has been involved with the development and review of the approach to the options assessment. The Iteration 1 SAAG was held on 15th August 2017 at which the group reviewed and commented on the causes and effects relating to issues identified for further validation. The Iteration 2 SAAG was held on the 28<sup>th</sup> February 2018. As part of this session the SAAG members were invited to comment on the approach being taken to the option assessment and examples of some of the completed assessments of the groupings were provided.

The advisory group consists of the following members –

- Royal Yachting Association;
- Chamber of Shipping;
- Devon Maritime Forum;
- The Wildlife Trusts;
- Environment Agency;
- The Crown Estate;
- Natural England;
- Historic England;
- Thames Estuary Partnership;
- North West Coastal Forum;
- Wildlife and Countryside Link;
- World Wildlife Foundation;
- Severn Estuary Partnership
- Association of Severn Estuary Relevant Authorities; and
- Durham Heritage Coast Partnership.

## 2.3 Stages in the Options Assessment Methodology

### Screening of SA sub-topics

Prior to the assessment of options, a screening process was carried out to determine whether the SA sub-topics were relevant to the specific grouping.

In order to determine this, assessors carried out a brief review of the SA Database for relevant information. Following this, the assessor selected either 'Yes' or 'No' to indicate whether each SA sub-topic is screened in or out. This then subsequently greyed out the row within the assessment spreadsheet to avoid accidental inclusion within the assessment process.

For any sub-topics which were deemed to be irrelevant to the grouping, a justification was entered (into the worksheet). To ensure consistency, only two justifications were used:

- No key baseline issue of relevance; or
- No potential impact pathway.

Justification was not provided for the sub-objectives screened in, as the assessment process provides the required validation.

### Identifying the Sustainability of the Options

The second step was to identify the potential significant effects and uncertainties of the options. Each option was considered against the relevant SA Framework sub-topics. Expert judgement and the updated SA Database (developed at the scoping stage of the SA process and refreshed prior to this assessment) was used as evidence for the assessment.

The South East assessment workbook contained separate tabs for each grouping, with all options listed (A, B, C, D etc.) across the top row of each grouping tab. As mentioned previously in Section 1.3, the number of options varies between groupings. Each option was assessed in turn. To provide consistency, assessors have used the following significance criteria for the assessment of each option:

- Potential significant positive effects (ie the existing situation would be much improved by the option, resulting in a significant positive outcome);
- Potential significant negative effects (ie an existing negative effect would be made worse by the option, resulting in a significant negative outcome);
- No significant effects (either only minor positive or negative effects, or no effect);
- Uncertain (depending on implementation); and
- Uncertain (lack of evidence).

Justification for significance was provided by reference to the SA Database. Assessors identified relevant issues and baseline data and provided at least one relevant topic identifier (eg Cultural\_167) from the 'SA Database Topic Identifier' columns. Justification was not required for options that were deemed 'Not Significant' as there was no baseline data which would give rise to a significant effect.

For each of the groupings, the first option was always 'do nothing' and final option was always 'none of the above'. The 'none of the above' options are all unknown and therefore the assessment records an 'uncertain (depending on implementation)' effect against each SA sub-topic for these options.

Following the completion of the assessment, assessors provided a commentary which justified the assessment and highlighted any potential significant effects resulting from specific options.

## **Mitigating Potential Negative Effects of Options**

At the options assessment stage of the SA the key recommendation is to avoid taking forward options which the SA has identified could result in significant negative effects. It is also recommended that policy authors select the options which enhance the significant positive effects and seek to provide sufficient detail to minimise the uncertainty associated with the implementation of a policy.

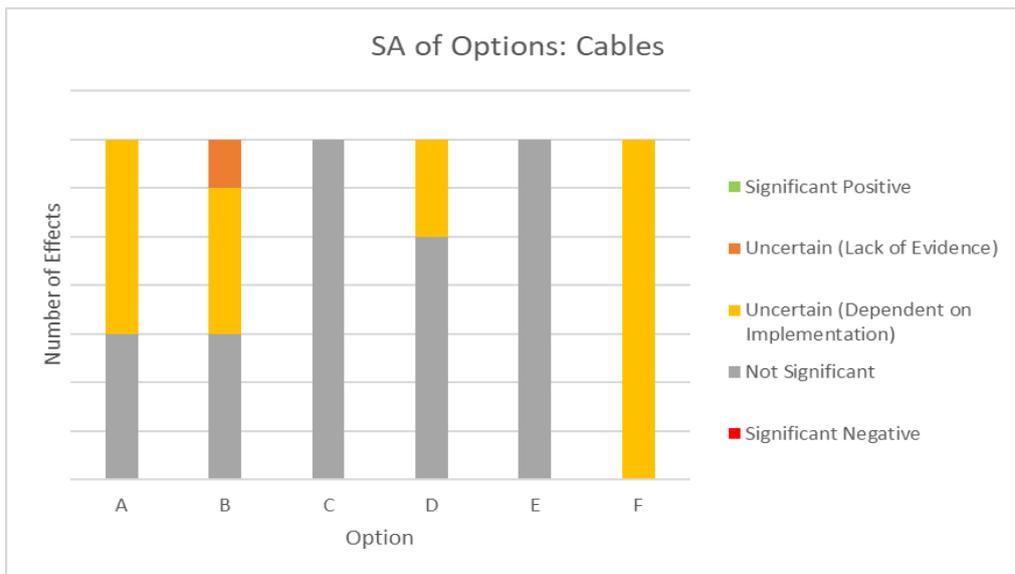
In addition, the assessors have highlighted, where possible, mitigation which can be considered to assist in the identification and development of the preferred options for the South East Marine Plan Area.

Mitigation for the potential negative and uncertain effects of policies will be dealt with when preferred options have been developed and assessed in detail through the SA.

## **Assessment Outputs**

The assessment spreadsheet has generated a pivot table for each grouping and an interactive graph for each marine plan area. The table counted the number of effects (ie significant positive, significant negative, not significant, uncertain depending on implementation and uncertain lack of data). An example of this is shown in Figure 2.1 below. These graphs provide a quick visual representation of the findings of the assessment for each grouping, allowing a comparison to be made of the relative performance of options.

**Figure 2.1: Example Output**



## **3 Results of the Assessment**

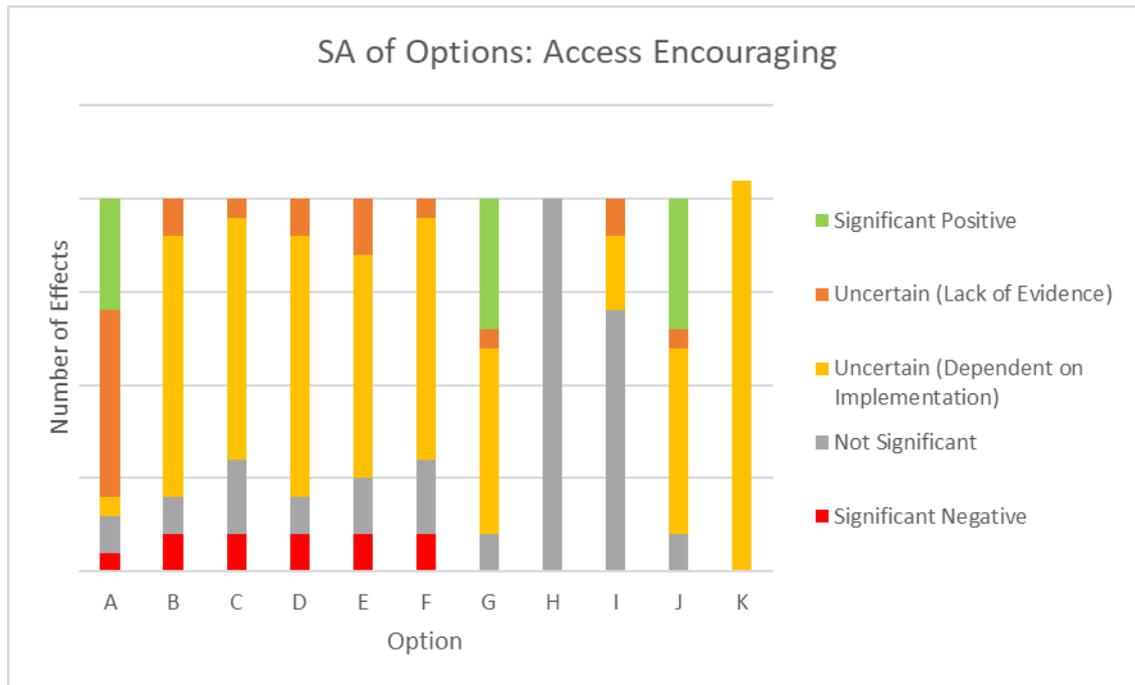
### **3.1 Introduction**

The following sections set out the results of the options assessment for the South East Marine Plan Area. Each section presents the comparison of the performance of options assessed for each grouping. The assessment has focused on identifying significant positive and negative effects and highlighting where there is a large amount of uncertainty either due to a lack of data or due to how the option could be implemented.

For each grouping a comparative graph is provided which shows the performance of each of the options. A narrative of the assessment is also provided to aid the interpretation of the graph which makes reference to the relevant SA sub-topics.

For detail on the results of the assessments, including the references to the supporting data which justify the assessment, please see Appendix A: South East Inshore Marine Plan Area Assessment Spreadsheet.

### 3.2 Access – Encouraging



The assessment of the ‘access-encouraging’ grouping of options has identified that there is the potential for significant negative effects with relation to Options B, C, D, E and F, whereas Options G and J have the potential to give rise to significant positive effects. Option A has the potential to give rise to a combination of both positive and negative significant effects depending on the receptors/SA sub-topics being considered.

There is a close relationship between the presence of marine heritage assets and the character, value and appreciation of the landscape. Presence of, and access to, heritage assets is becoming increasingly recognised as important to wellbeing, and as an important source of economic and social benefits to coastal communities through leisure, recreation and tourism (Cultural\_179, Cultural\_185, Cultural\_186, Cultural\_187). As stated in the baseline, there are potential adverse effects of functions and decisions of public authorities; of activities subject to marine licences; and of other human activities not subject to marine licences/public authorities on the historic environment within the marine plan area (Cultural\_82, Cultural\_166, Cultural\_167), and as such, implementation of options must consider the sustainable and appropriate increase of access. Options G and J would have a significant positive effect on heritage assets both within and adjacent to the marine plan area. Note that these Options, G and J, are the same. Option F in particular, is at risk of having significant negative effects if it is not implemented in a sustainable and appropriate manner.

Developments and other activities can have adverse effects on transitional, coastal and marine waters, and movement of water offshore between catchments means that action in one catchment can have a profound impact on water quality in waters at some distance away along the coast (Water\_286). Option A, to do nothing, would have significant positive effects on pollution and water quality as it would not exacerbate adverse effects as highlighted within the baseline database.

Increased shipping and/or tourism as a result of increased access are likely to exacerbate the existing baseline issues surrounding marine litter (Water\_253, Economy\_630). As it does not encourage increased access, Option A would not result in increased litter entering the marine environment, with significant positive effect.

It has been suggested that to reduce congestion, greenhouse gas emissions and cost in logistic chains, transport could be moved from roads to river in London (Air\_27). However, increased port expansion, shipping activity and associated industry growth could lead to increased sulphur oxides and nitrous oxides emissions at coastal locations, which in turn could have negative effects on air quality, contribute to the breach of national objectives for air quality, or eutrophication and acid deposition effects (Air\_19, Air\_23, Air\_25, Air\_28). Option E may exacerbate sulphur oxides and nitrous oxides associated with shipping and/or may offset greenhouse gas emissions through reduced road transport. Implementation of this option would have to be managed carefully to ensure positives outweigh the negative effects.

Despite access to high quality open spaces and opportunities for sport and recreation being recognised as making an important contribution to the health and well-being of communities (Communities\_46), current regulation and management of access to estuarine, coastal and marine area is inadequate and unsustainable into the future (Communities\_159, 160, 167). Options G and J promote increased access in an appropriate and sustainable manner, with significant positive effect.

The sea can provide a variety of leisure, recreation and tourism opportunities (Economy\_482), and The Thames area is popular for boating (Economy\_573). However, access to the River Thames can be poor, and so new development in London needs to take account of riverside walks, cycle paths and public access to the water (Economy\_764). Policy A would not alleviate baseline issues of poor access to the River Thames for leisure, recreation and tourism. Its implementation would have significant negative consequences. Options G and J would improve access when sustainable and appropriate, bringing significant positive benefits to leisure, recreation and tourism within the South East Marine Plan Area.

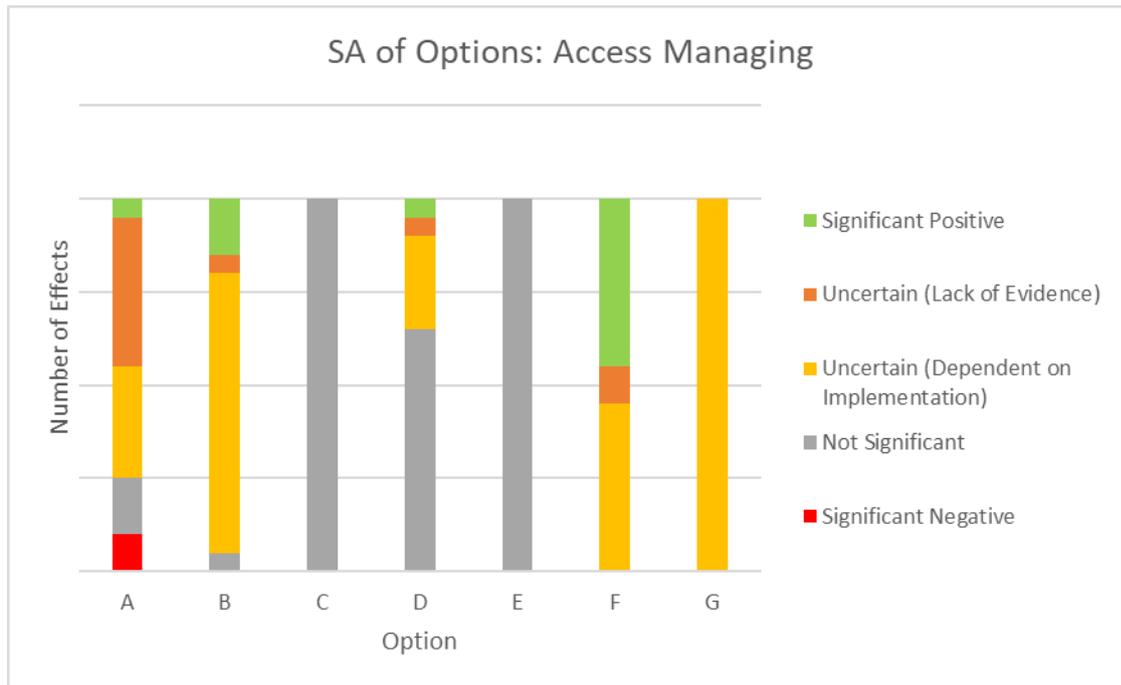
Marine activities including shipping, marine construction, infrastructure, port expansion, leisure, recreation and tourism are known to cause habitat loss and pollution effects on benthic and intertidal habitats and species and ornithology, (Biodiv\_420, Biodiv\_453, Biodiv\_495, Biodiv\_498, Biodiv\_524, Water\_286). Associated noise creation is recognised to impact benthic and intertidal habitats and species and marine mega fauna, affecting migration, communication, reproduction and foraging, with knock on effect to populations. Increased access can be expected to increase these baseline issues, and as such, options which encourage access can be expected to incur significant negative implications on biodiversity, habitats, flora and fauna within the South East Marine Plan Area. Namely, Options B, C, D, E and F would incur significant negative effects on both marine mega fauna and ornithology. Depending on implementation, these options may avoid imposing negative effects on protected sites and species, benthic and inter-tidal ecology and fish and shellfish. Options A, G and J could have significant positive effects on protected sites and species, benthic and inter-tidal ecology and fish and shellfish as

either do not increase access or would do so only if proposals are sustainable and appropriate, which presumably covers effects on biodiversity too. Option A would also have significant positive effects on marine mega fauna, and invasive species, as to 'do nothing' would avoid increased noise pollution as well as reduce the risk of invasive species spread (Biodiv\_531, Biodiv\_636).

## **Mitigation**

- Baseline data 'Air\_19' and 'Air\_23' conflict with 'Air\_27'. Mitigation could be provided, but quantitative data would be needed to do so.
- Baseline data 'Air\_19' and 'Air\_23' conflict with 'Climate\_211'. Mitigation could be provided, but quantitative data would be needed to do so.
- As highlighted by 'Biodiv\_728', identification and mapping of specific sensitive sites within estuaries such as the Stour and Orwell would enable more effective decision. If Options B, C, D, E, and F were to take into consideration the effects of construction and resultant increased access on ornithology and associated relevant habitats, the negative effects anticipated would be significantly ameliorated.
- Assuming 'appropriate and sustainable' proposals as Options G and J would support would include measures to prevent litter entering the marine environment, these policies could have a significant impact on the litter SA sub-topic in addition to Option A.
- Increased access must consider the associated implications of invasive species spread. Whilst none of the proposed options would have a significant effect on fisheries and aquaculture (Economy\_582), nor protected sites and species (Biodiv\_531), all must only be implemented if sustainable, appropriate, and do not encourage the spread of invasive species, in particular pacific oysters.

### 3.3 Access – Managing



The assessment of the 'access-managing' grouping of options has identified that there is the potential for significant positive effects with relation to Options A, C and E, whereas none of the options have the potential to give rise to significant negative effects.

There are numerous marine development pressures on heritage assets along Thames and Kent and Essex waterways, and related to the setting of World Heritage Sites (Cultural\_176, Cultural\_188). Option F would ensure the sustainable management of access and its impact on the marine historic environment, presumably accounting for associated development, and as such, its implementation would have significant positive effects on heritage assets both within and adjacent to the marine plan area.

Increased shipping activity and tourism as a result of increased access has the potential to increase the amount of litter being discharged into the marine environment (Water\_253, Economy\_630). Management of access is required to prevent the discharge of litter as either a direct or indirect effect of its operations. Option F would ensure this with significant positive effect. Equally, Option A would avoid the increase of marine litter associated with access.

Marine and terrestrial planning need to become integrated to ensure appropriate coastal development occurs whilst maintaining future access to the marine environment (Communities\_178). Options B, D and F should have a significant positive effect on health, wider determinants of health and communities as 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 (Communities\_46).

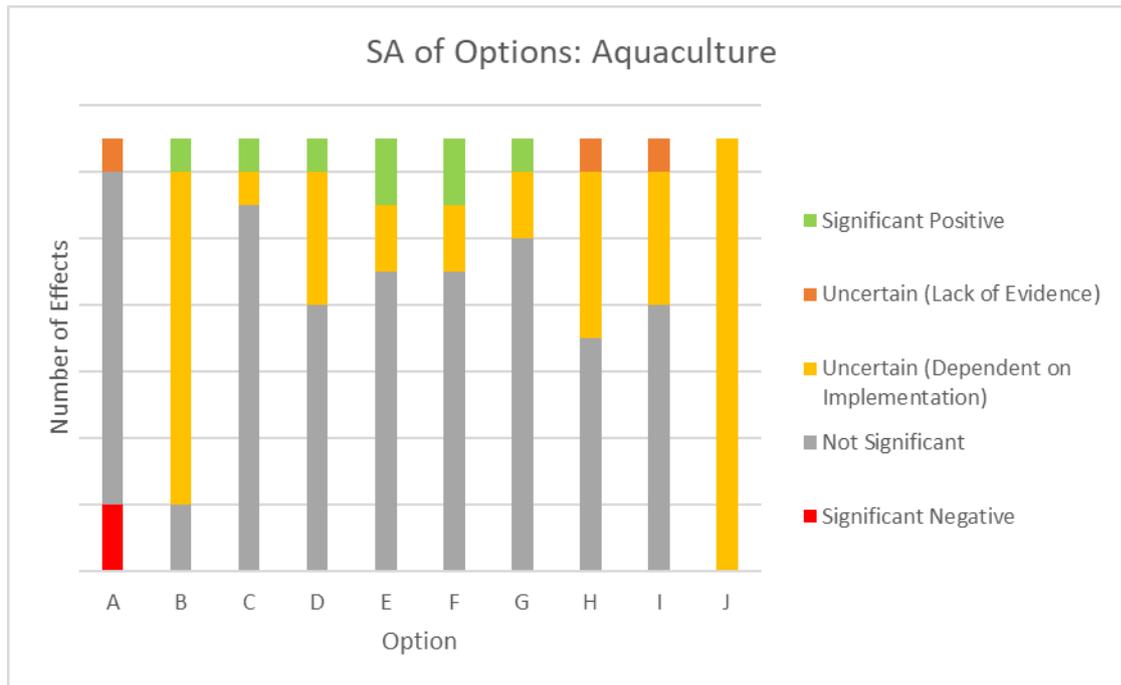
Without adequately managed access, potential leisure, recreation and tourism activities afforded by marine ecosystem services may go unrecognised (Economy\_482, Communities\_159). Efficient management of access is required to alleviate potential interactions between recreational stakeholders and other economic sectors (Economy\_631). Implementation of Options B and F could have significant positive effects on leisure, recreation and tourism.

As highlighted for the South West Marine Plan Area, commercial fishing activity, marine eco-tourism, sightseeing and pleasure boats all have adverse effects on marine mega fauna. In the South East Marine Plan Area specifically, there is a known interaction between disturbance activities and harbour seal haul out areas (Biodiv\_731). To do nothing as per Option A would not alleviate the currently recognised issue affecting harbour seals, and so this course of action would have a significant negative impact. Conversely, to manage access in a sustainable manner as per Option F would much more likely have a significant positive impact. Option F would also have a significant positive impact on ornithology through reducing disturbance, and on invasive species, by reducing the risk of species spread as highlighted by Biodiv\_636.

## **Mitigation**

- Concerning protected sites and species, support should be afforded to the ongoing mitigation strategy and partnership which exists between Local Authorities (Biodiv\_733). The maintenance of coordinated approaches should be ensured.
- Identification and mapping of core haul out area for Harbour seals in the South East Marine Plan Area would enable effective management of disturbance activities (Biodiv\_731).
- Identification and mapping of core specific sensitive sites within estuaries such as the Stour and Orwell would enable more effective decisions and management (Biodiv\_728).

### 3.4 Aquaculture



The assessment of the aquaculture grouping of options has identified that there is the potential for significant negative effects with relation to Option A, whereas Options B, C, D, E, F and G have the potential to give rise to significant positive effects

The aquaculture sector is an important producer of marine litter. It is expected that aquaculture developments could generate more waste with a risk of pollutants entering the marine environment. Litter may include that produced by aquaculture and commercial fishing and plastics (Biodiv\_467). The SA database reports issues related to ingestion of or entanglement in marine litter for marine mammals and turtles (Biodiv\_467). The lack of policies could make the situation worse or significantly worse and therefore a significant negative effect has been identified for Option A, with regards to marine litter and marine mega fauna.

Specific effects of aquaculture developments on water quality parameters are mentioned in the SA database (Economy\_629). For most of the options, no significant effects are predicted for water quality or the outcome is uncertain due to the lack of information on the proposed options. However, these are likely to not be significant given the environmental benefits of aquaculture and the scale of this type of development. Potential significant positive effects are identified for Options B, E and F as they aim to support proposals that enhance shellfish (and other filter feeding) habitats and species that can be beneficial to the water environment.

Aquaculture may lead to the escape of invasive species that interact with native shellfish. Aquaculture of native species may also affect wild populations through the production of pseudofaeces, smothering of benthic habitats and the competition for habitats and food. It is assumed that further increases in aquaculture could lead to higher numbers of invasive species. The current situation in the South East Marine Plan Area is not known and therefore no significant effects have been identified.

The fishing industry is in decline and requires support to prevent further deprivation because it provides essential social, cultural and economic benefits (Economy\_762). Key drivers for the aquaculture sector include economic development, particularly for rural communities; food security to help meet the increasing global demand for seafood as wild capture fisheries plateau; market supply and demand, technological developments to enable the industry to move offshore to suitable sites where production can be increased and, for the shellfish sector and the availability and supply of spat/seed (Economy\_637).

There is potential for growth in the oyster production sector (for pacific oysters primarily), and over 50% of pacific oysters and 75% of native oysters were produced in the South East in 2015. As a result, the production of oysters (pacific and native oysters collectively) is likely to increase progressively over the next 6-20 years. However, the growth rate is relatively modest as the intention to expand is still tempered slightly by constraints, including in relation to water quality, lack of social licence and the requirement for clarification regarding cultivation of pacific oyster, in order for investment to occur (Economy\_641).

A number of options represent opportunities for the aquaculture and fisheries sectors. Options C, D, E, F and G are likely to have a significant positive effect on fisheries and aquaculture, as they aim to promote the development of aquaculture and the associated infrastructure.

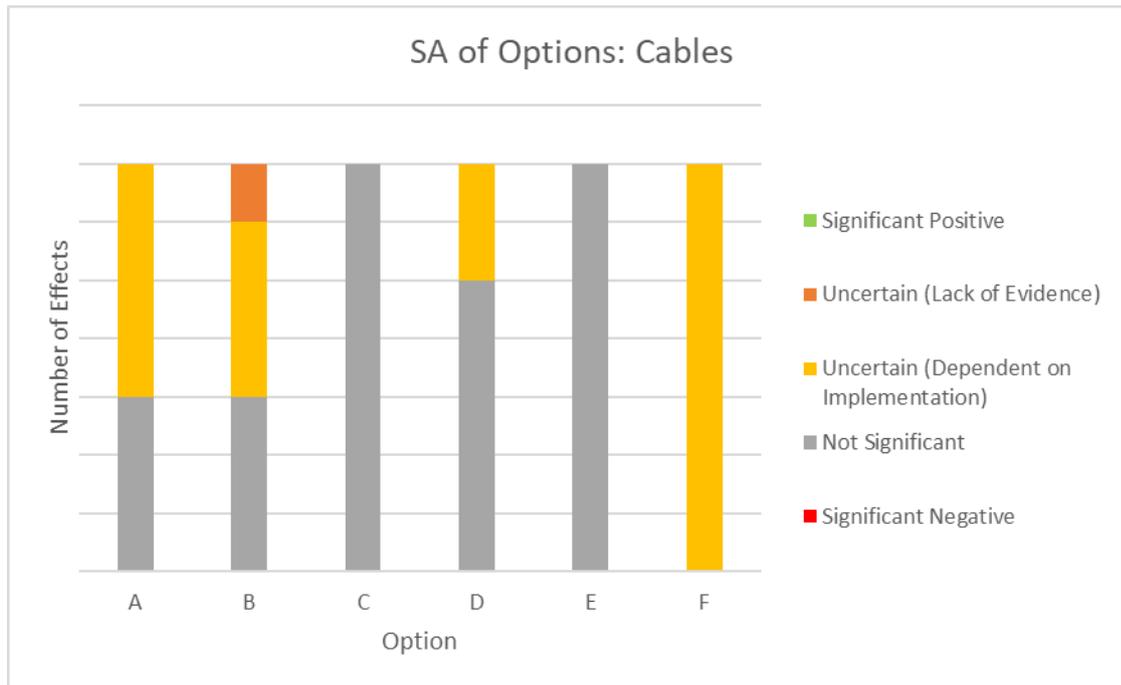
No direct effects of aquaculture developments on ports and shipping have been identified in the SA database. However, aquaculture can represent a constraint for this sub-topic from increased competition for sea space and navigational safety issues (Economy\_621). For small ports, aquaculture could be a proportionately more significant revenue stream than for larger ports, however, this is geography dependent and ports only benefit if they are located near aquaculture sites.

There are potential adverse interactions identified in the database between aquaculture and recreational stakeholders (Economy\_631). Some options which entail the development of aquaculture could result in trade-offs with recreational users. These effects are likely to be minor and therefore no significant negative effects have been identified, as there is no evidence in the database that aquaculture represents a key issue/opportunity for this sub-topic.

## **Mitigation**

- Aquaculture could generate marine litter and therefore policies are required to control the release of litter and pollutants from aquaculture.
- Refer to marine plan policies which protect birds.

### 3.5 Cables



The assessment of the cables grouping of options has not given rise to any significant effects.

Nine telecommunication cables are present in the South East Marine Plan Area. Three of these are currently active while the remaining six are classed as disused (Figure 160). Two of the active cables run from Broadstairs in the United Kingdom to Belgium. The third does not make landfall in the South East but runs between Sennen in Cornwall to Holland, therefore running through the South East Marine Plan Area (Economy\_733). The marine specific proportion of the telecommunication industry in the South East Marine Plan Area support 720 businesses and employ 8,220 people (Economy\_734).

The options do not directly support cable development within the South East Marine Plan Area. Existing policy S-CAB-2 within Option B and Option D consider co-existence and aim to avoid significant adverse impact on new and existing landfall sites for subsea cables, which could be beneficial, but would be dependent upon the implementation.

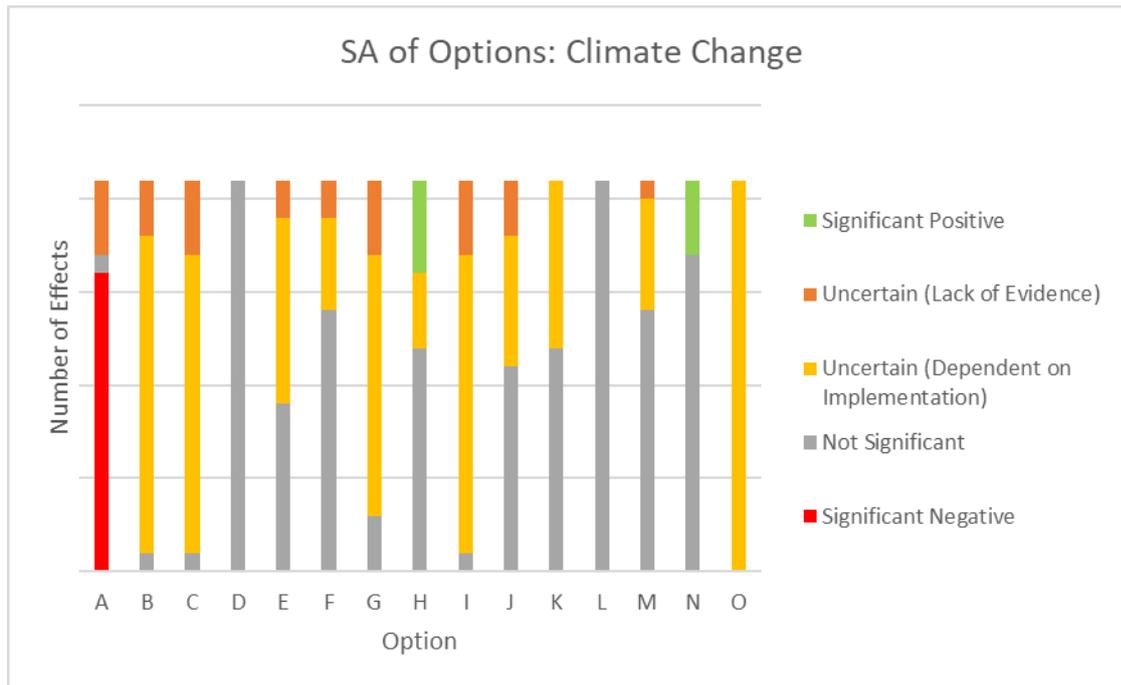
The UK Government has established a new offshore transmission regime to help ensure that the substantial investment required to connect offshore generation projects to the onshore grid is delivered in a cost effective manner to maximise the benefits to consumers and renewable energy developers. In addition, potential new sub-sea cabling to reinforce and better connect certain sections of the onshore grid is a key part of supporting the growth of renewable and low carbon generation. Potential new sub-sea cabling to reinforce and better connect certain sections of the onshore grid is a key part of supporting the growth of renewable and low carbon generation (Economy\_473).

Linkages have not been made to the potential for renewable energy generation, however, Option D signposts to National Policy Statement for Energy. It is not clear how this will be transposed into marine planning, but it has potential to be beneficial.

### **Mitigation**

No specific mitigation has been identified.

### 3.6 Climate Change



The assessment of the climate change grouping of options has identified that there is the potential for significant negative effects with relation to Option A, whereas Options H and N have the potential to give rise to significant positive effects.

Climate change is having a direct impact on heritage assets on shorelines and in intertidal areas and may be having indirect effects on submerged material through biological, chemical and physical changes (Cultural\_168, Cultural\_181). To do nothing, as per Option A, would have significant negative effects on heritage assets both within and adjacent to the marine plan area. As Option N seeks to reduce or buffer carbon dioxide concentrations within seawater, it would have a significant positive impact on heritage assets within the marine plan area.

Coastal erosion is widespread in the United Kingdom and Ireland. It is a complex process with a variety of causes, one of which is sea level rise as a result of climate change (Geology\_193). Option A would exacerbate this baseline issue with significant negative effect.

Increased storminess and sea level rise as a result of climate change are leading to erosion and coastal change (Geol\_227, Geol\_233). Whereas coastal systems can adapt to sea-level rise by re-arranging their sediments, in many coastal systems this adaptive capacity has been compromised by coastal protection structures and has led to coastal squeeze (Geol\_194, Geol\_195), which has ultimately caused steepening of the intertidal profile; inundation and loss of land, properties and infrastructure; and loss or degradation of habitat, particularly saltmarsh and mud flats, which are also bird feeding grounds (Geol\_176, Geol\_179, Geol\_198, Geol\_229). Flooding in the Thames tidal floodplain puts numerous people, assets and designated habitats at risk (Geol\_219). To 'do nothing' would allow these baseline issues to worsen over time, hence implementation of Option A would have a significant negative effect on coastal features and processes. Option H, whilst a

relatively limited scope, would have a significant positive effect on coastal habitats, ecosystem functioning and service provision.

Climate change is predicted to exacerbate pollution and water quality through fluvial flows, flooding and sewer overflows (Water\_300, Water\_338). These baseline issues will worsen over time without intervention, hence Option A would have significant negative effects.

Future effects of climate change are likely to include increased storm intensity, increased rainfall, increase in seawater temperature and acidity leading to ecological effects, altered ocean current circulation, coastal erosion increase as near shore area deepen and increased wave energy reaches the coast with associated damage to a wide range of social, economic and environmental assets which almost exclusively negatively impact on services of the system (Climate\_114, Climate\_115, Climate\_116, Climate\_126, Climate\_127, Climate\_147, Climate\_182, Climate\_208). The East and South-East United Kingdom have the greatest increases in risk of river and tidal flooding affecting high-quality agricultural land, and of forest fires due to warmer and drier spring and summer conditions (Climate\_182). As 15% of London's surface area lies on floodplains, significant improvements to the current tidal defence system will be needed before 2070 (Climate\_147), however, halting the effects of erosion through engineering may become uneconomic or undesirable, instead favouring the realignment of some coastal infrastructure and housing (Climate\_131). Option A would have severely negative effects on climate change resilience and adaptation within the South East Marine Plan Area, whereas Option H could provide some amelioration to the effects of climate change. Implementation of Option H would see significant positive effects on coastal habitats, but protection would be indirectly afforded through natural ecosystem functioning and services.

Many coastal communities comprise sizeable or growing numbers of older people with significant care needs. This places an increased demand on health and social care services. Increasing likelihood of more frequent and more severe extreme weather events and coastal flood risk due to climate change may mean health, social care and emergency services lack the resilience to cope with demands when a major flood or other extreme weather event occurs (Communities\_45). This baseline issue would be exacerbated with significant negative effects occurring on protected equality groups if Option A were implemented.

Climate change poses a risk to port access and may increase the requirement and or frequency of maintenance dredging in the future (Climate\_215). To 'do nothing', as per Policy A, would incur significant negative effects on ports and shipping. An increase in extreme weather events as a result of climate change has the potential to adversely affect infrastructure attached to the seabed, for example from increased scouring around wind turbine foundations (Climate\_212). As interconnector capacity is forecast to increase (Economy\_656), the number of seabed assets will likely increase alongside increasing effects of climate change. Implementation of Option A would have significant negative effects on seabed assets.

Climate change and associated increasing sea temperature, sea level rise, ocean acidification, coastal squeeze, storm events and creation of coastal defences is

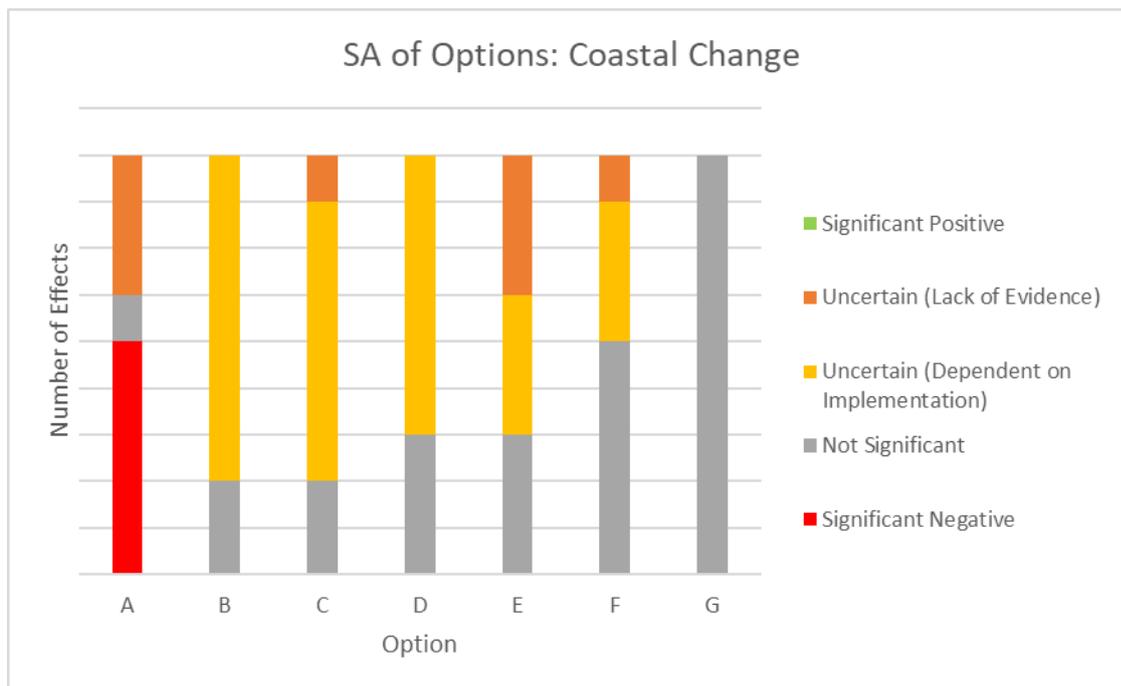
leading to broad-scale changes in habitats and species. This includes the alteration and/or loss of habitat; reduced prey availability and trophic mismatch for all marine species due to the changing community structure of plankton and wider food web implications; declining biodiversity both generally, and more specifically on calcifying and associated organisms; increased risk of Harmful Algal Blooms (HABs); range shift of native species including marine mega fauna and increasing abundance and distribution of non-indigenous species, all of which ultimately alter the structure of communities and ecosystem processes (Biodiv\_412, Biodiv\_417, Biodiv\_421, Biodiv\_422, Biodiv\_428, Biodiv\_429, Biodiv\_430, Biodiv\_435, Biodiv\_436, Biodiv\_437, Biodiv\_449, Biodiv\_504, Biodiv\_543, Biodiv\_548, Biodiv\_558, Biodiv\_622, Biodiv\_623, Biodiv\_646, Climate\_126). While the specific effects of climate change on the marine environment remain relatively uncertain, it is important that robust strategies are developed to manage them. Protecting and restoring marine habitats will increase their resilience to climate change (Climate\_132).

Implementation of Option A would have significant negative effects on all SA sub-topics within the biodiversity, habitats, flora and fauna SA topic, as fails to address all relevant key baseline issues regarding both the direct and indirect effects of climate change. Option H would have significant positive effects on protected sites and species, benthic and inter-tidal ecology, fish and shellfish, and ornithology if implemented. Option N would have significant positive effects on protected sites and species, marine mega fauna and plankton.

## **Mitigation**

- Whilst Option N has been identified as having the potential for significant positive effect on several SA sub-topics within this assessment, it must be used in conjunction with other options which avoid the anthropogenic increase of carbon dioxide within the marine environment rather than simply reducing or buffering concentrations as a remedial step as Option N proposes to do.

### 3.7 Coastal Change



The assessment of the coastal change grouping of options has identified that there is the potential for significant negative effects with relation to Option A. No further significant effects have been identified.

As climate and coastal change is having a direct impact on heritage assets on or close to shorelines (Cultural\_174), Option A could give rise to significant negative effects in relation to heritage assets within and/or adjacent to marine plan area. Option G Signposts to Thames Estuary 2100, which includes objectives that aim to protect the heritage assets from coastal change. A minor positive effect only has been identified, as it is unclear how this will be integrated.

Coastal change and coastal flooding are likely to be exacerbated by climate change, with implications for activities and development on the coast. For this reason, Option A could have a significant negative effect on climate change resilience and adaptation. Options B and C take this into account and aim to protect natural flood defences and ensure resilience to the effects of climate change, and therefore a potential significant effect is recorded. Option J signposts to Flood and Coastal Erosion Management Plans and Shoreline Management Plans, which could include important information on local coastal processes and the best ways to ensure protection and resilience for the future. This would be dependent on implementation as it is not clear as to how this will be integrated into marine planning.

It is assumed that protection against coastal change will generally have a positive effect on the seascape and landscape but is dependent upon the how this is approached. Minor positive effects have been identified in regard to Options B and C, as they aim to protect ecosystem services and against coastal change, which can contribute positively to seascapes and landscapes. Significant positive effects have also been identified in relation to Option D, as this option considers the long term projections of climate change and aims to build in measures to avoid or minimise

risks to people, infrastructure and components of the marine ecosystem that generate natural capital.

Dredging regimes around ports, such as Dover, Harwich and London, need to be sustained to maintain access and safe navigation to ports to ensure continued competitiveness (Economy\_770). It is assumed that options that focused on ecosystem services, carbon sequestration and protection of the natural environment will not support aggregate extractions, and therefore minor negatives have been identified. Option H aims to minimise the risk to infrastructure, which could be beneficial to aggregates. However, this is not clear and would be dependent on implementation.

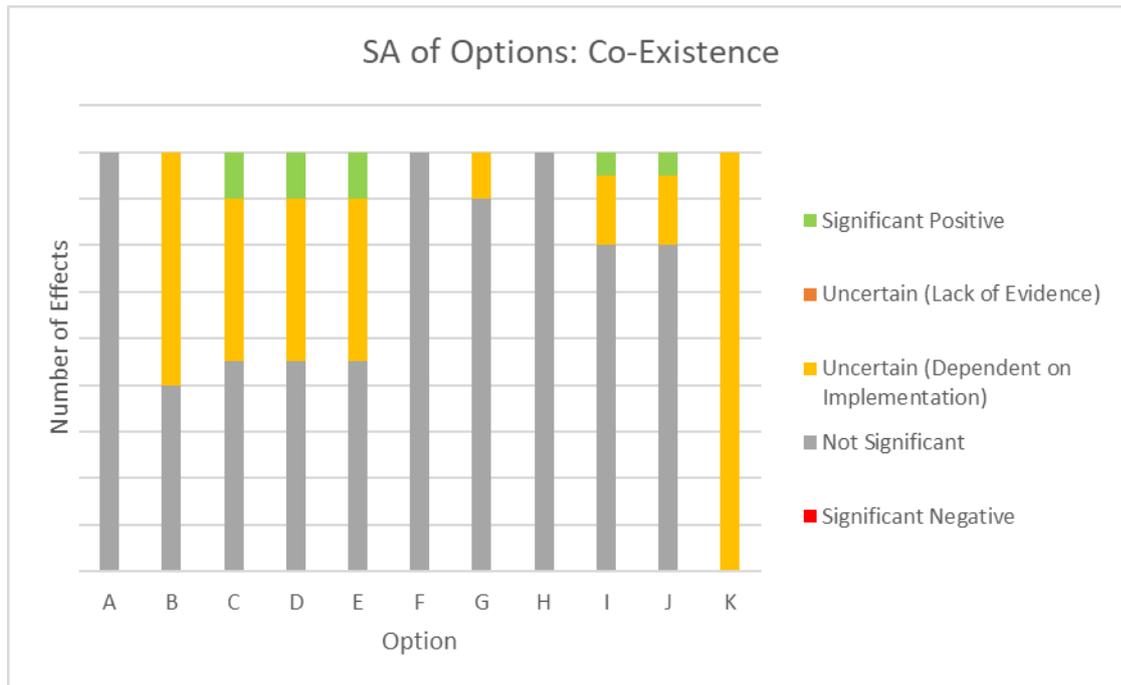
A significant proportion of the South East Marine Plan Area is designated for its internationally important bird populations. The estuaries and intertidal areas support important wintering waders and waterfowl populations, as well as breeding tern colonies (Biodiv\_293). Changes in habitat condition and habitat loss through sea level rise, coastal squeeze, coastal change, storm events from climate change and creation of coastal defences (Biodiv\_535) are occurring within the South East Marine Plan Area. Doing nothing (Option A) is likely to exacerbate this and has resulted in significant negative effects for both ornithology and benthic and inter-tidal ecology, fish and shellfish.

Whilst the proposed options do not specifically support ornithology or benthic and inter-tidal ecology, fish and shellfish, Options H and I aim to support ecosystems that generate natural capital and have therefore resulted in significant positive effects. Options B, D, E, F and J focus on carbon sequestration habitats, and it is not clear how this would be implemented and therefore, uncertainty has been recorded within the assessment.

## **Mitigation**

- Details on coastal defences have not been provided, but harder engineering approaches could have a more negative impact on seascapes and landscapes, compared to softer approaches.
- Mitigation would be needed to ensure that any development is sensitive to the historic environment. Any exposed assets would need to be carefully handled and preserved as much as possible.

### 3.8 Co-Existence



The assessment of the co-existence grouping of options has identified that there is the potential for significant positive effects with relation to Options C, D, E, G, I and J, whereas none of the options have the potential to give rise to significant negative effects.

Competition exists between fisheries and aquaculture and marine developments (Economy\_628). Implementation of Options C, D and E would have significant positive effects on fisheries and aquaculture as would reduce the adverse combined effects of other schemes as highlighted within the SA database through supporting optimisation of shared space and consideration of other sectors.

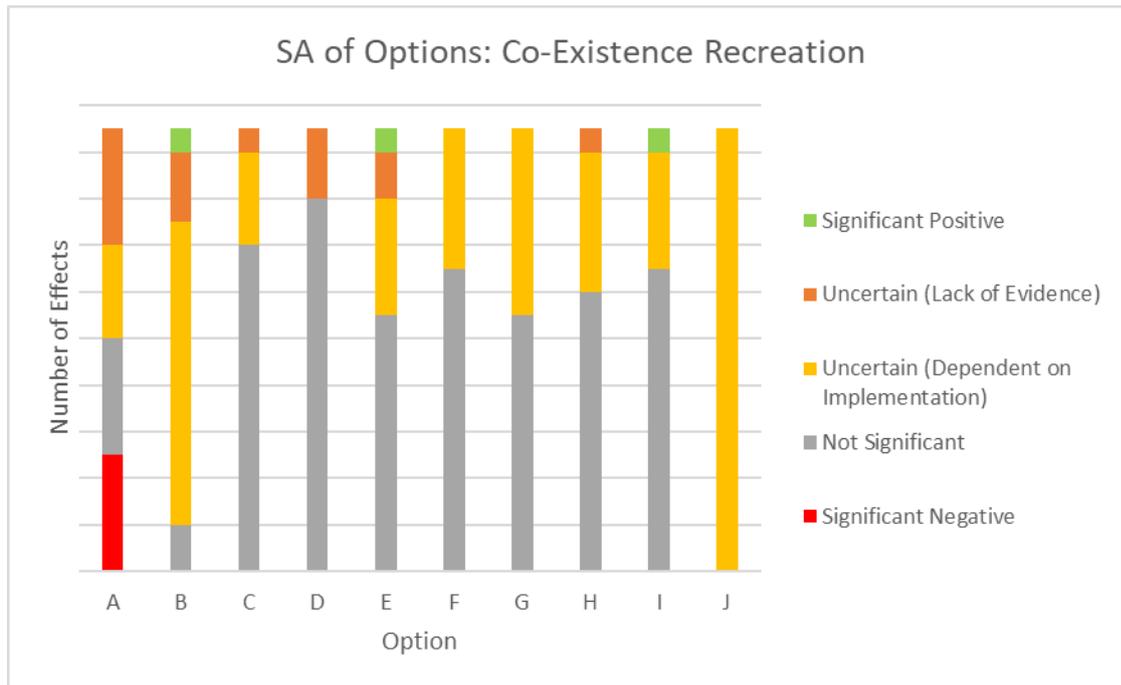
There are cumulative visual effects of multiple existing and new activities and developments within the South East Marine Plan Area. This has implications for tourism, recreation, wellbeing and cultural values within and outside of the marine plan area (Landscape\_170). The combined effects of marine development also affects recreational activities such as boating (Economy\_631). Implementation of Options I and J will likely have significant positive effects on leisure and recreation as they will help to alleviate the issues surrounding co-existence and development pressures on recreational activities.

Seabed assets are part of larger energy and communication schemes and are essential in supporting the operation and development of renewables. Cumulative effects exist at landfall location (Economy\_627), and there are key baseline issues concerning competition of space with other sectors (Economy\_727, Economy\_779). Options C, D and E would have significant positive effects on seabed assets as they promote the optimisation of space and consider co-operation, collaboration and co-existence between various activities.

**Mitigation**

No specific mitigation has been identified.

### 3.9 Co-Existence – Recreation



The assessment of the co-existence recreation grouping of options has identified that there is the potential for significant negative effects with relation to Option A, whereas Options B, E and I have the potential to give rise to significant positive effects.

A reduction in the quality of seascapes is being caused by the cumulative visual impact of multiple existing and new activities and developments within the plan area. This has implications for tourism, recreation, wellbeing and cultural values within the South East Marine Plan Area (Landscape\_170). These are likely to be relevant for large scale developments located within or near the coastal area. To do nothing, as per Option A would not reduce these cumulative effects as highlighted within the baseline database, and so would have a significant negative impact.

Combined effects of a range of marine developments and coastal activities on marine litter occur, particularly from fishing and shipping (Water\_253). Widespread marine litter and beach plastic are reducing aesthetic quality of the environment and resulting in wildlife mortality (Water\_357), which in turn is affecting recreation and associated activities. Option A would not alleviate this issue, and as such, its implementation would have significant negative effects.

Access to the coast is recognised as being important for health and well-being (Communities\_46). Other sectors, especially renewable energy generation and defence, have the potential to hinder access to the coast (Economy\_633, Economy\_675) therefore having implications on health, wider determinants of health and communities. Implementation of Options E and I would have significant positive effects on this SA sub-topic, as they support proposals which enhance or promote social benefits and discourage the displacement of coastal communities.

The sea can provide a variety of tourism and recreational opportunities, including visiting the beach, dog walking, walking, pleasure boating, sailing, recreational diving (including diving on wrecks), sea angling, kayaking and surfing, as well as exploration of underwater and coastal heritage assets. However, cumulative visual effects of multiple existing and new activities and developments exist within the South East Marine Plan Area (Landscape\_170) and can impact recreational activities (Economy\_630). Developments and other activities can also cause adverse effects on transitional, coastal and marine waters, and movement of water offshore between catchments means that action in one catchment can have a profound impact on water quality in waters at some distance away along the coast (Water\_286). Degraded bathing water quality again reduces leisure, recreation and tourism appeal (Economy\_482). To do nothing would therefore have significantly negative effects on leisure, recreation and tourism.

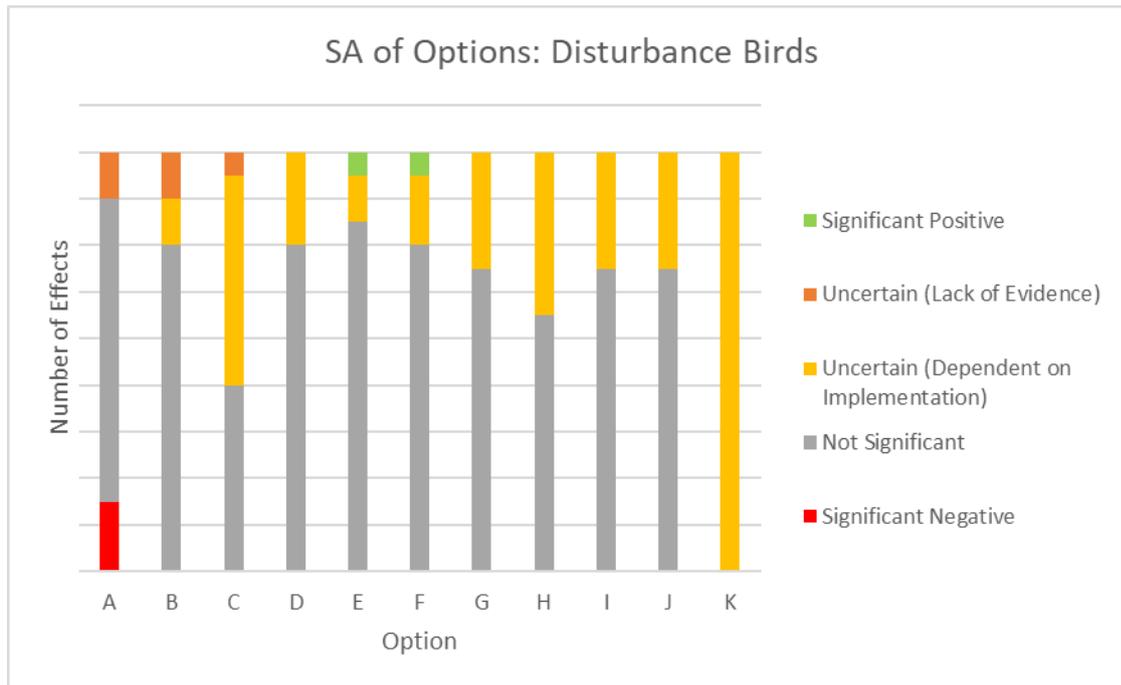
There is a potential for invasive species to impact protected sites and species (Biodiv\_531), the risk of which will increase with increased recreational use and co-existence of various sectors using the marine environment, for example, through both recreational and commercial shipping. Various sectors are affected by protected sites and species, especially the designation of MPAs. Recreational boating, anchorage and landfall sites associated with energy generation and infrastructure are particularly affected. However, Option B S-MPA-1 discourages adverse effects of other activities on MPAs, affording the sensitive sites extra protection from co-existence and recreational issues, with significant positive effect.

Marine megafauna and ornithology are also affected by the presence of co-existing sectors including recreation. For example, disturbance activities on harbour seals are recorded in the South East Marine Plan Area (Biodiv\_731). Recordings of disturbance will be exacerbated by increased access, commercial fishing activity, recreational wildlife sighting and pleasure sightseeing boat trips, other recreational boating, surfers, canoes and paddle boards and land-based recreational activities (Biodiv\_450, Biodiv\_465, Biodiv\_559, Biodiv\_495). Option A would have significant negative effects on marine mega fauna and ornithology if implemented as would not tackle key baseline issues.

## **Mitigation**

No specific mitigation has been identified.

### 3.10 Disturbance – Birds



The assessment of the disturbance birds grouping of options has identified that there is the potential for significant negative effects with relation to Option A, whereas Options E and F have the potential to give rise to significant positive effects. A discussion of the potential effects with relation to each of the receptors and relevant SA Sub-Topics is provided below.

Activities associated with leisure and recreation can impact on some seabird species, largely through disturbance to nesting sites or disturbance to feeding birds by recreational boat traffic. This phenomenon is probably greatest in the East, South East and South Marine Plan Areas. Little terns are particularly susceptible to disturbance from people as this species nests on beaches used for recreation (Biodiv\_425). Due to this negative trend, significant negative effects have been identified in relation to Option A, 'do nothing', with regards to ornithology.

The baseline indicates further negative trends with regards to benthic ecology (Biodiv\_420, Biodiv\_423, Biodiv\_425, Biodiv\_471, Biodiv\_571) and marine megafauna (Biodiv\_432, Biodiv\_438, Biodiv\_447, Biodiv\_731) in the south east based upon existing policy. Significant negative effects have therefore been identified in relation to Option A.

Options that propose to support proposals that enhance or facilitate coastal habitats and priority species have been judged to have a significant positive impact. Other options that suggest any disturbance must be avoided or damage minimised have been scored as uncertain as it is unclear what the impact of those options would be.

Options E and F have been judged to be significant positive as they signpost to specific OSPAR guidance and local measures to actively reduce disturbance to birds. The only option explicitly relevant to heritage is H, 'public authorities whose functions include the management and provision of access to the marine area must ensure

that measures are taken to avoid or minimise disturbance to protected habitats, species and historic assets’.

Protection of priority habitats will prevent disturbance to seabed substrates and coastal features as a by-product, but effects are judged to be minor positive due to the difference in spatial scale.

Dover, Felixstowe, Harwich, Ipswich, London, Medway, and Ramsgate are major ports in the South East and most important interactions are potential noise and visual disturbance to highly mobile species and contamination to benthic habitats and water (Econ\_380). Fisheries and shellfish farming are extremely important in the South East and appear to be growing (Econ\_300, 333, 641). There are potential interactions with all biodiversity components.

Defence activities that utilise the marine environment, directly or indirectly, in support of operational capability are diverse but include operational vessels and aircraft, HM Naval bases, surface and sub-surface navigational interests, underwater acoustic ranges, maritime exercises, amphibious exercises, coastal training ranges and coastal test and evaluation ranges (Econ\_484). Although there is a potential interaction here it was felt that the proposed Responses were unlikely to affect military activities due to their autonomy.

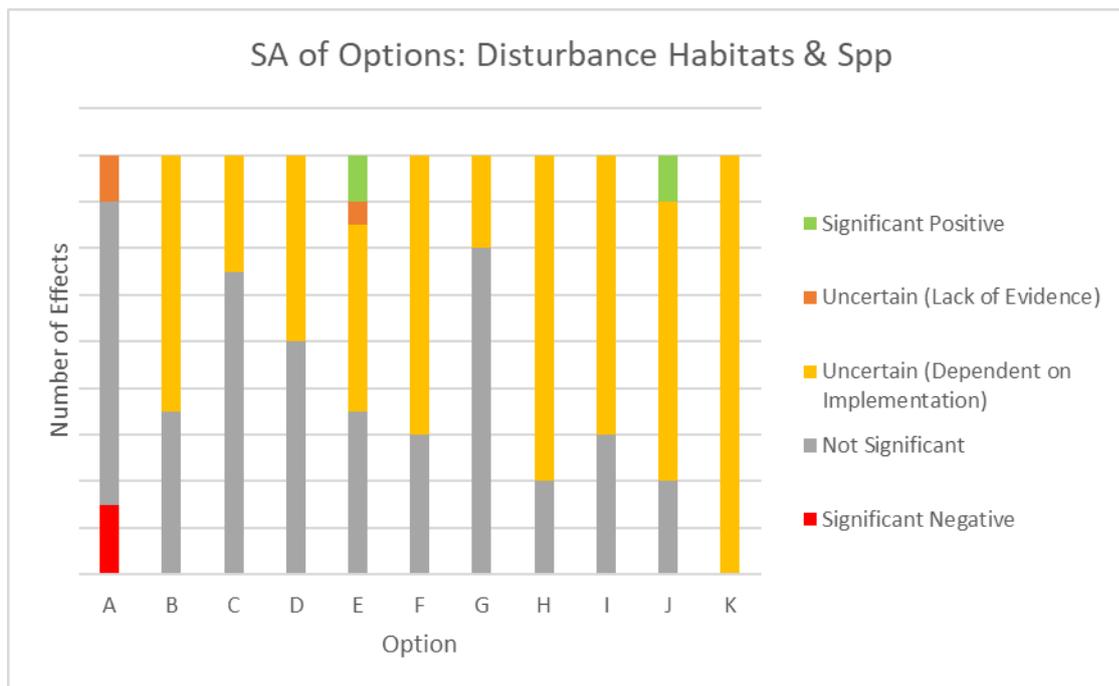
There are a large number of aggregate wharves in the South East. These are mainly concentrated in the Thames Estuary (Barking, Cliffe, Dagenham, Denton, Erith, Greenhithe, and Greenwich Wharves) and Dover. Aggregate dredging has the potential to interact with all biodiversity components (Econ\_522).

The South East Marine Plan Area contains offshore wind (Energy\_335), nuclear development (Energy\_604), and oil energy generation (Energy\_336). The South East Marine Plan Area contains seven offshore wind farms, all of which are operational, including: Gunfleet Sands I, Gunfleet Sands II, Gunfleet Sands III, Kentish Flats I, Kentish Flats II, London Array and Thanet. These projects have the potential to interact with all biodiversity components. The South East has a number of existing and planned pipelines, cables and interconnectors (Kent to Belgium) (Economy\_325, Economy\_733, Economy\_734). These projects have the potential to interact with all biodiversity components.

## **Mitigation**

No specific mitigation has been identified.

### 3.11 Disturbance – Habitats and Species



The assessment of the disturbance habitats and species grouping of options has identified that there is the potential for significant negative effects with relation to Option A, whereas Options E and J have the potential to give rise to significant positive effects. A discussion of the potential effects with relation to each of the receptors and relevant SA sub-topics is provided below.

Disturbances of marine mammals from sightseeing and pleasure boats, including visiting breeding/haul-out sites is increasing. Such disturbance from vessel activity (including propeller or engine noise) may result in vessel avoidance and increased dive time. This can cause increased energy expenditure, reduced resting time and could cause cetaceans to abandon or not use ideal habitats, potentially resulting in a reduction of energy reserves which could affect foraging efficiency, overall fitness and reproductive capacity (Biodiv\_546). Recreational disturbance is regularly recorded within the South East Marine Plan Area, affecting both waterbirds and seabirds (Biodiv\_465). Due to this negative trend, Option A, 'do nothing' has resulted in significant negative effects for both marine mega fauna and ornithology.

Benthic and intertidal habitats and species are often affected by pollution from marine activities, including cumulative effects from increasing levels of contaminants and risk of high level mortality from oil spills. Intertidal and estuarine species and habitats are at particular risk from a variety of pollutants entering the marine environment through point discharges, diffuse atmospheric and riverine pathways and accidental spillages (Biodiv\_420). For this reason, significant negative effects have been identified in relation to benthic and intertidal habitats, fish and shellfish, with regards to Option A.

Option E has been judged to have significant positive effects on marine megafauna and protected sites for marine megafauna as it relates to the active management of underwater noise through strategic plans and programmes. Option J was judged to

have significant positive effects on substrates and coastal processes through signposting to updated Environmental Impact Assessment guidance.

Dover, Felixstowe, Harwich, Ipswich, London, Medway, and Ramsgate are major ports in the South East and most important interactions are potential noise and visual disturbance to highly mobile species and contamination to benthic habitats and water (Economy\_380). Fisheries and shellfish farming are extremely important in the south east and appear to be growing (Economy\_300, Economy\_333, Economy\_641). There are potential interactions with all biodiversity components.

There is an interaction between increasing access to the marine area for recreation and tourism and protection of heritage and conservation sites. The extent to which this effects the economy will be dependent on specific implementation.

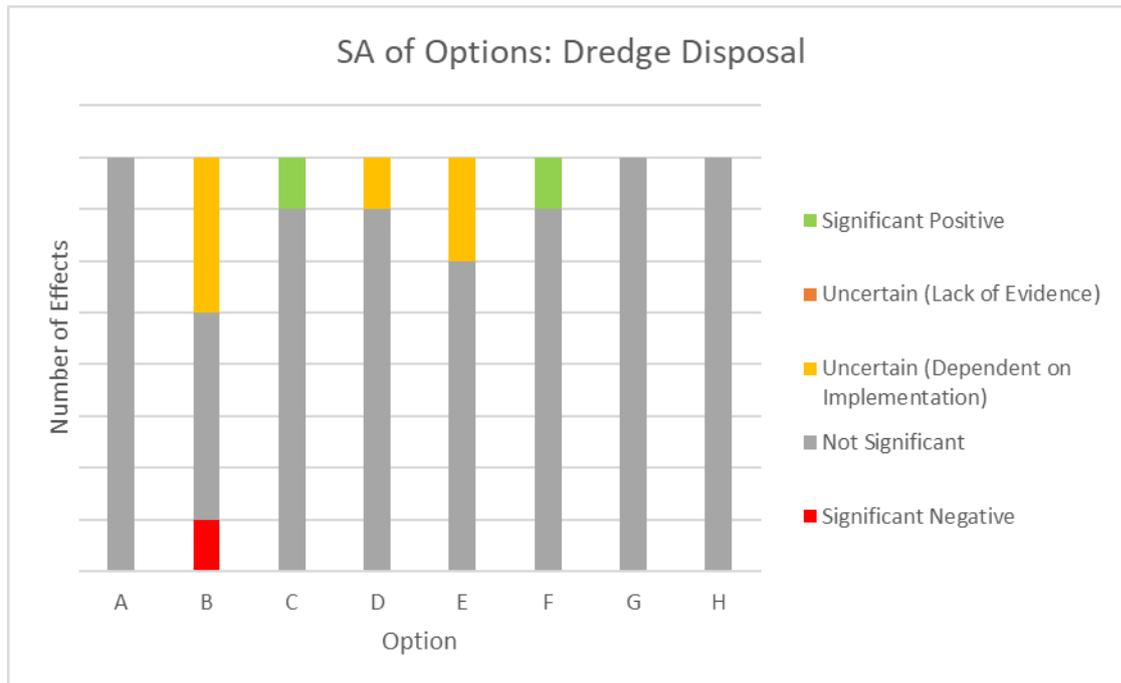
Defence activities that utilise the marine environment, directly or indirectly, in support of operational capability are diverse but include operational vessels and aircraft, Her Majesty's Naval bases, surface and sub-surface navigational interests, underwater acoustic ranges, maritime exercises, amphibious exercises, coastal training ranges and coastal test and evaluation ranges (Economy\_484). Although there is a potential interaction here, it was felt that the proposed options were unlikely to affect military activities due to their autonomy.

There are a large number of aggregate wharves in the South East. These are mainly concentrated in the Thames Estuary, and include Barking, Cliffe, Dagenham, Denton, Erith, Greenhithe and Greenwich Wharves as well as Dover. Aggregate dredging has the potential to interact with all biodiversity components (Economy\_522).

### **Mitigation**

No specific mitigation has been identified.

### 3.12 Dredge Disposal



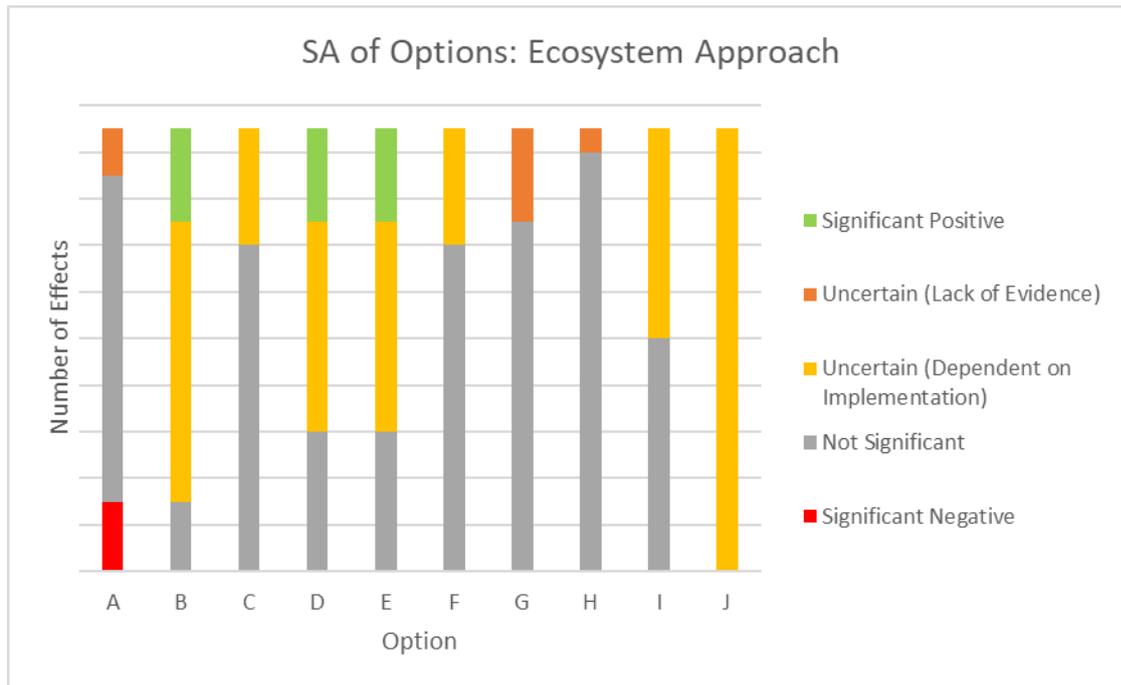
The assessment of the dredge disposal grouping of options has identified that there is the potential for significant negative effects with relation to Option B, whereas Options C and F have the potential to give rise to significant positive effects.

Disposal activities are important for ports (Economy\_719), and the use of disposal sites provides a space to dispose of dredged material at sea at a competitive cost compared to the alternative of bringing large amounts of dredged material for on-land treatment, management or disposal. Option X-DD-2 could have significant adverse effects on ports, hence its implementation would have a significant negative effect. Options C and F would have significant positive effects on ports and shipping in the South East Marine Plan Area as dredging regimes around ports need to be sustained to maintain access and safe navigation to ports in order to ensure continued competitiveness (Economy\_770).

#### Mitigation

- The wording 'must' in Option B X-DD-2 can represent a significant constraint on ports as the re-use of dredged materials is not always possible, depending on grain size, reception site characteristics, etc.
- If beneficial reuse of dredged material is to be an alternative, there needs to be an identified pipeline of possible projects, with sufficient lead time, and clarity on material characteristics that they require. Short notice and/or a lack of awareness of projects can delay dredge disposal, increase costs (through studies), and result in potentially unsuitable material being used.
- Whilst the Environmental Impact Assessment process attempts to mitigate the effects of disposal activities on biodiversity, habitats, flora and fauna as highlighted by baseline data Biodiv\_542, options should ensure that all adverse effects are avoided.

### 3.13 Ecosystem Approach



The assessment of the ecosystem approach grouping of options has identified that there is the potential for significant negative effects with relation to Option A, whereas Options B, D, and E have the potential to give rise to significant positive effects. A discussion of the potential effects with relation to each of the receptors and relevant SA Sub-Topics is provided below.

The baseline indicates negative trends in terms of benthic ecology (Biodiv\_420, Biodiv\_423, Biodiv\_425, Biodiv\_471, Biodiv\_571), marine megafauna (Biodiv\_432, Biodiv\_438, Biodiv\_447, Biodiv\_731) and ornithology (Biodiv\_449, Biodiv\_495, Biodiv\_498, Biodiv\_728) in the south east based upon existing policy. Options that propose to support proposals that enhance or facilitate coastal habitats and priority species have been judged to have a significant positive impact. Other options that suggest any disturbance must be avoided or damage minimised have been scored as uncertain as it is not clear what the impact of those options will be. Options B, D and E have been judged to be significant positive as they aim to enhance components of the marine ecosystem and, in the best case, enhance or facilitate natural habitat and species adaptation, migration and connectivity.

There is no specific option for plankton within this grouping, but an ecosystem approach should benefit all levels of the ecosystem, including plankton. As such, Options B, D and E have been scored uncertain (depending on implementation).

Option C specifically mentions that infrastructure supporting the development of new houses and their facilities which have an impact on the marine area must demonstrate that it is avoided or mitigated. However, the impact was judged to be uncertain as it largely depends on how this option is implemented.

Protection of priority habitats will prevent disturbance to seabed substrates and coastal features as an indirect effect, but effects are judged to be minor positive due to the difference in spatial scale.

Dover, Felixstowe, Harwich, Ipswich, London, Medway, and Ramsgate are major ports in the south east and most important interactions are potential noise and visual disturbance to highly mobile species and contamination to benthic habitats and water (Economy\_380). Fisheries and shellfish farming are extremely important in the south east and appear to be growing (Economy\_300, Economy\_333, Economy\_641). There are potential interactions with all biodiversity components.

There is an interaction between increasing access to the marine area for recreation and tourism and protection of heritage and conservation sites. The extent to which this impacts the economy will be dependent on specific implementation.

There is a lack of baseline information concerning marine manufacturing in the South East Marine Plan Area. The only ports suited for Round 3 offshore wind farm development in the south east are Ramsgate and Medway (Economy\_534).

Defence activities that utilise the marine environment, directly or indirectly, in support of operational capability are diverse but include operational vessels and aircraft, Her Majesty's Naval bases, surface and sub-surface navigational interests, underwater acoustic ranges, maritime exercises, amphibious exercises, coastal training ranges and coastal test and evaluation ranges (Economy\_484). Although there is a potential interaction here it was felt that the proposed Responses were unlikely to affect military activities due to their autonomy.

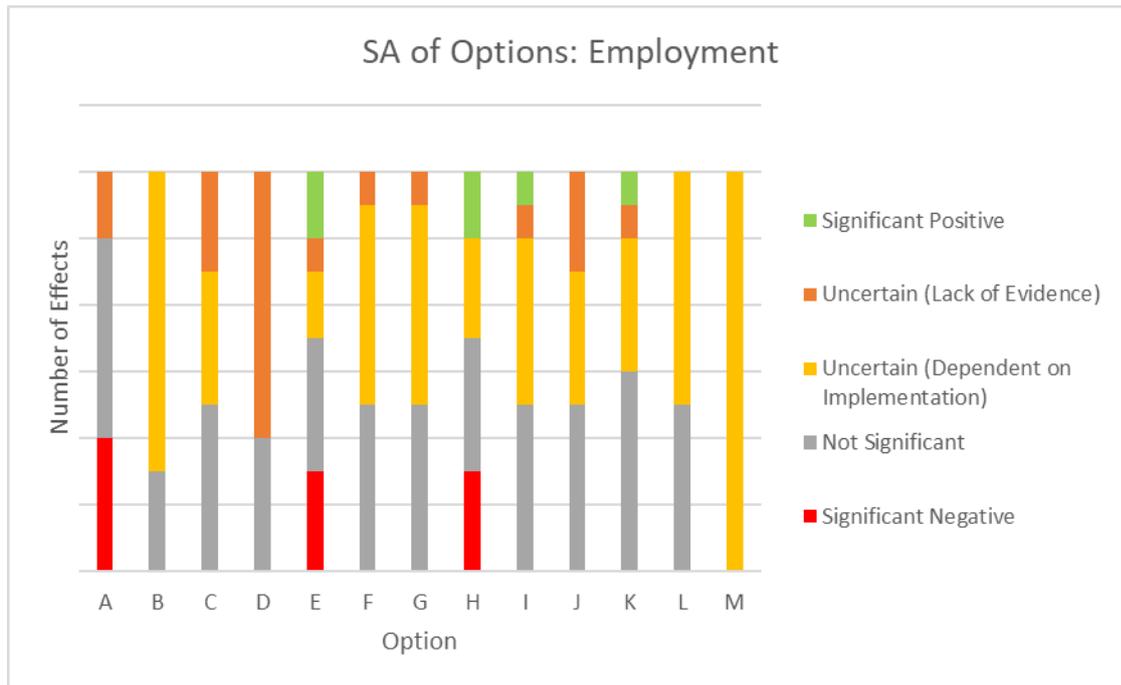
There are a large number of aggregate wharves in the South East. These are mainly concentrated in the Thames Estuary, and include Barking, Cliffe, Dagenham, Denton, Erith, Greenhithe, and Greenwich Wharves as well as Dover. Aggregate dredging has the potential to interact with all biodiversity components (Economy\_522).

The South East is an area of offshore wind (Energy\_335), nuclear development (Energy\_604), and oil (Energy\_336) energy generation. The South East Marine Plan Area contains seven offshore wind farms, all of which are operational, including: Gunfleet Sands I, Gunfleet Sands II, Gunfleet Sands III, Kentish Flats I, Kentish Flats II, London Array and Thanet. These projects have the potential to interact with all biodiversity components. The south east has a number of existing and planned pipelines, cables and interconnectors (Kent to Belgium) (Economy\_325, Economy\_733, Economy\_734). These projects have the potential to interact with all biodiversity components.

## **Mitigation**

No specific mitigation has been identified.

### 3.14 Employment



The assessment of the employment grouping of options has identified that there is the potential for significant negative effects with relation to Option A, whereas Options I and K have the potential to give rise to significant positive effects. Options E and H have the potential to give rise to a combination of both positive and negative significant effects depending on the receptors/SA sub-topics being considered.

Fishing activities can help support communities which are fragile by providing direct employment but also employment along the supply chain which are often ‘closely linked to the local economy’ (Communities\_51). Decline in fisheries due to overfishing and the implementation of the quota system under the Common Fisheries Policy has made fishing as a livelihood and way of life difficult in recent years (Communities\_49). In light of this, Option A ‘do nothing’ could have a significant negative effect on the industry as well as the local community. Whilst none of the options directly address this issue, Option L considers the needs of local maritime industries, which could mean support for fishing and aquaculture industries. However, this would be dependent upon implementation.

Many coastal communities comprise growing numbers of older people with significant care needs, which places an increased demand on health and social care services (Communities\_45). Poor health is linked to social and economic disadvantages. It is assumed that by the supply of further employment opportunities will help to improve health and deprivation in the South East Marine Plan Area. The options do not make specific reference to this, so many would be dependent upon implementation.

Protection of equality groups can also be linked to social and economic disadvantages. It is assumed that the supply of further employment opportunities could help to promote equality. Option K supports the diversification of employment in coastal towns as well as supporting opportunities to transfer skills to new and

emerging economies. This is likely to have a significant positive effect on equality groups, as it is assumed it will give opportunities to a wider range of social groups, ultimately reducing inequalities.

Ports and shipping have positive interactions with economic and social topics including job creation, tourism and recreation, as well as wider benefits to local, regional and national economy. Whilst none of the options make specific mention to ports and shipping, it is assumed that increases in employment could be beneficial to the industry within the area. Option L considers the needs of local maritime industries, which could include ports and shipping, and therefore a significant positive effect has been identified.

Options E and H aim to, support, promote or facilitate tourism and recreation activities, particularly where this creates additional employment opportunities. It is assumed that this could lead to an increase in tourism and recreational activities in the region and has resulted in a significant positive effect. Option D aims to support the delivery of local growth plans, which are likely to include benefits for tourism and recreation, but this is not clear how this will be implemented and therefore uncertainty has been recorded.

The defence sector is a large employer in the region, both directly and indirectly. It is estimated that in 2014 the industry employed around 8,310 people within the South East Marine Plan Area. The estimate for indirect and induced employment is 12,760 jobs (Economy\_652). There is uncertainty surrounding Option I as it proposes increases in marine employment and technologies, and how or if this will translate into the defence sector.

There are a large number of aggregate wharves in the south east. These are mainly concentrated in the Thames Estuary (Barking, Cliffe, Dagenham, Denton, Erith, Greenhithe and Greenwich Wharves) and Dover (Economy\_352). Aggregate reserves in the Thames are being depleted (Economy\_583); the proposed options do not tackle this issue. There is potential for conflict with tourism as it can limit aggregate activity. For this reason, minor negatives have been identified in relation to Options H and E. Option L considers the needs of local maritime industries, which could include aggregate extraction, however, as this is not clear uncertainty has been recorded, within the assessment.

Option I aims to diversify employment opportunities by supporting the development of and/or implementation of new technologies. It has been assumed that this could include the advancement of renewable generation technologies and therefore a significant positive has been identified for energy generation and infrastructure.

Pollution from marine activities such as aquaculture, shipping and marine construction, including cumulative effects from increasing levels of contaminants and risk of high level mortality from oil spills, is having a negative effect on benthic and intertidal habitats and species (Biodiversity\_420). Noise and cumulative noise effects from seismic surveys, piling, dredging, defence, shipping, use of acoustic deterrent devices and explosions from previously unexploded explosive ordnance are having adverse effects on marine mega fauna. Significant negative effects, with regards to

Option A 'do nothing' would result in significant negative effects on marine mega fauna, ornithology and benthic and intertidal ecology, fish and shellfish.

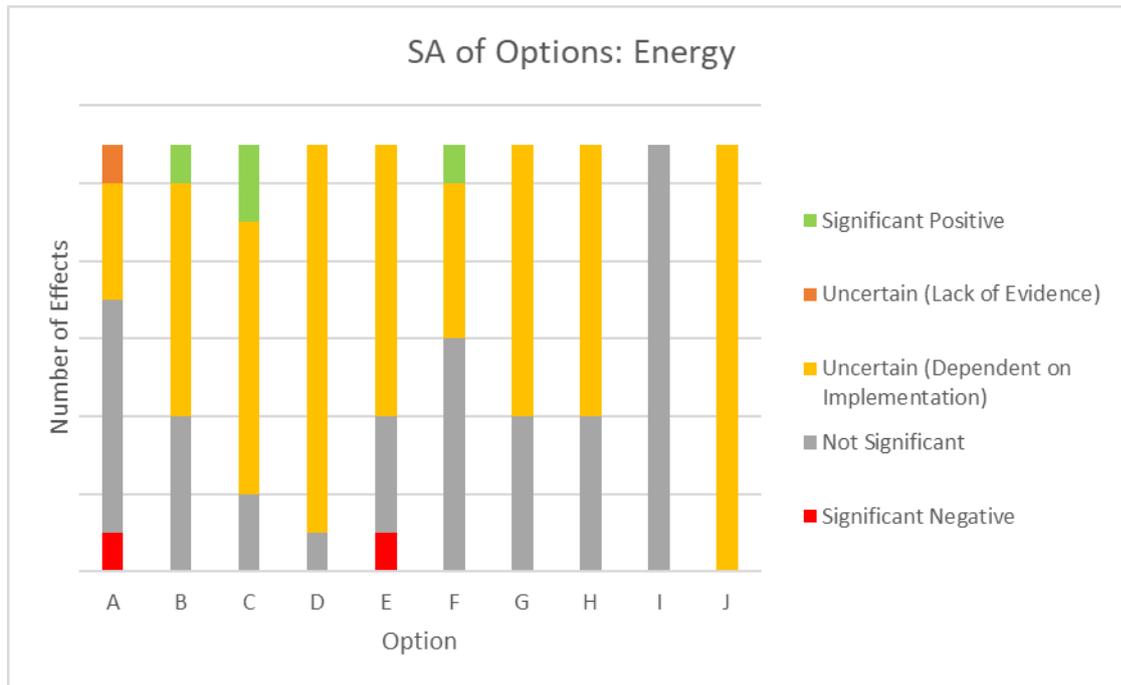
Growth in some marine sectors could have conflicts with local ornithology, particularly with regards to offshore wind farms. Noise and cumulative noise effects may also arise from further development of marine sectors, which could impact on marine mega fauna. It is assumed that options which support, promote or facilitate tourism and recreation activities will exert additional strain on both marine mega fauna and ornithology, as will options which may increase noise and cumulative noise effects arising from further development of marine sectors. For these reasons, Options A, E and H have scored negatively regarding marine mega fauna and ornithology.

Disturbances from tourism are having adverse effects on biodiversity. Physical damage to cetaceans and seals through collision with vessels and other recreational activities (Biodiversity\_559) are common in the south east. Activities associated with leisure and recreation can also impact some seabird species, largely through disturbance to nesting sites or disturbance to feeding birds by recreational boat traffic. This is probably greatest in the East, South East and South Marine Plan Areas. Little terns are particularly susceptible to disturbance from people as this species nests on beaches used for recreation (Biodiv\_495).

### **Mitigation**

- Options need to address the ongoing decline in the fishing sector
- Measures are needed to control the disturbance of bird species
- Effects from noise on marine mega fauna and ornithology need to be minimised wherever possible

### 3.15 Energy



The assessment of the energy grouping of options has identified that there is the potential for significant negative effects with relation to Option A and E, whereas Options B, C and F have the potential to give rise to significant positive effects

Carbon dioxide may be stored in a range of geological formations including depleted hydrocarbon reservoirs and saline aquifers. Due to the maturity of most of the UK continental shelf hydrocarbon basins, the availability of sites for carbon dioxide storage is likely to increase in the coming years and has the potential to exploit existing infrastructure. Saline aquifers can have similar characteristics to hydrocarbon reservoirs and may also be suited to carbon dioxide storage. The central and southern North Sea are presently most prospective due to the presence of suitable formations and proximity to areas of high carbon dioxide emissions such as the Thames Estuary (Economy\_303).

Option C aims to consider the potential for use of oil and gas infrastructure for future carbon capture and storage during the decommissioning phase of oil and gas facilities. This is likely to result in significant positive effects for greenhouse gas emissions and climate change resilience and adaption, as it will facilitate the use of depleted oil fields for carbon capture and storage.

The technology to enable wave and tidal energy generation is at an earlier stage of development than offshore wind. However, it is anticipated that the amount of wave and tidal energy being generated will increase markedly up to and beyond 2020 (Economy\_542). Options B (specifically existing policy X-REN-1) and F both support the development of renewable energy and are likely to have a significant positive impact on energy generation and infrastructure development.

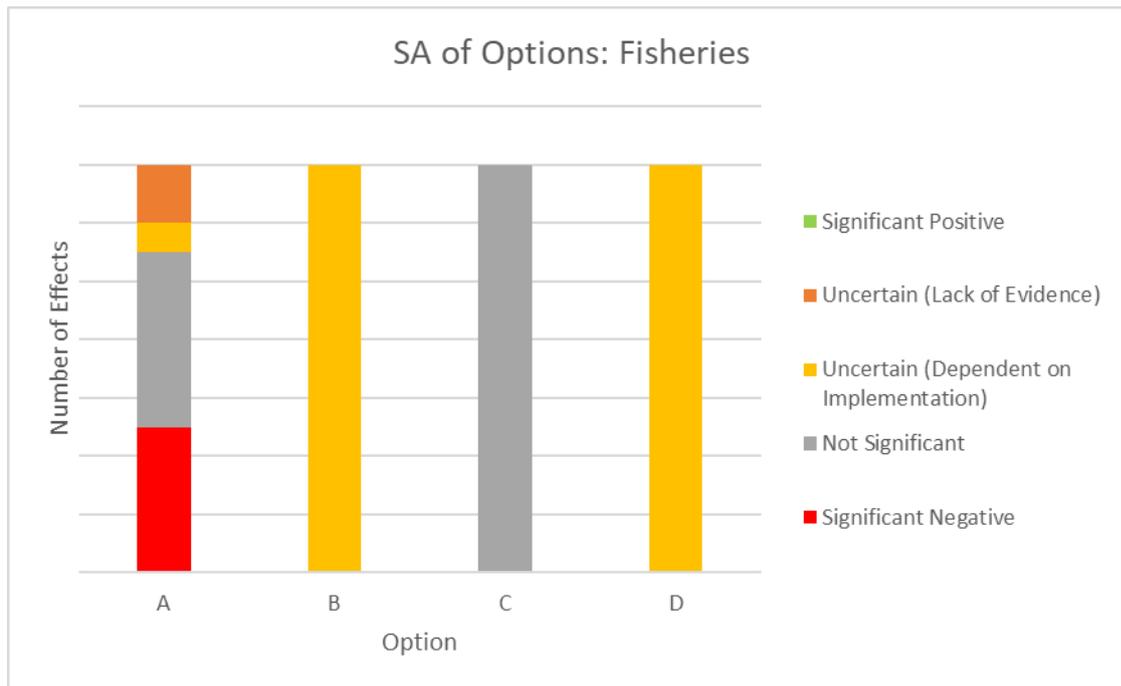
Effects on subtidal sediments from offshore industry including from aggregate extraction, dredging, offshore energy production are an issue for the South East Marine Plan Area. At various locations near large ports, subtidal rocky habitat has been lost due to construction, infrastructure (mainly coastal) or via smothering from dredged deposits (Biodiv\_542). For this reason, significant negative effects have been identified in relation to Option A, 'do nothing', with regards to benthic and intertidal ecology fish and shellfish.

The South East Marine Plan Area has a number of consented and proposed offshore wind farms. These have been assessed under the Habitats Regulations to determine the cumulative effect of displacement on the red-throated divers of the Outer Thames special protection site. Further developments in the South East Marine Plan Area should be considered in relation to an increased cumulative impact to these features (Biodiv\_498). Further offshore wind development is likely to result in significant negative effects on birds, hence has been assessed as a significant negative effect in relation to Option E.

### **Mitigation**

- Options that support growth in renewable energy, particularly wind farms, need to minimise the impact on ornithology.

### 3.16 Fisheries



The assessment of the fisheries grouping of options has identified that there is the potential for significant negative effects with relation to Option A, whilst none of the options have the potential to give rise to significant positive effects.

The SA database identified fishing activities as a key contributor to marine litter in all of the marine plan areas (Water\_253, Water\_233). This can be generated through discarded fishing gear or waste from the fishing industry. It is likely that this situation will not improve without the implementation of specific measures to tackle this problem, hence the potential significant negative effect for Option A.

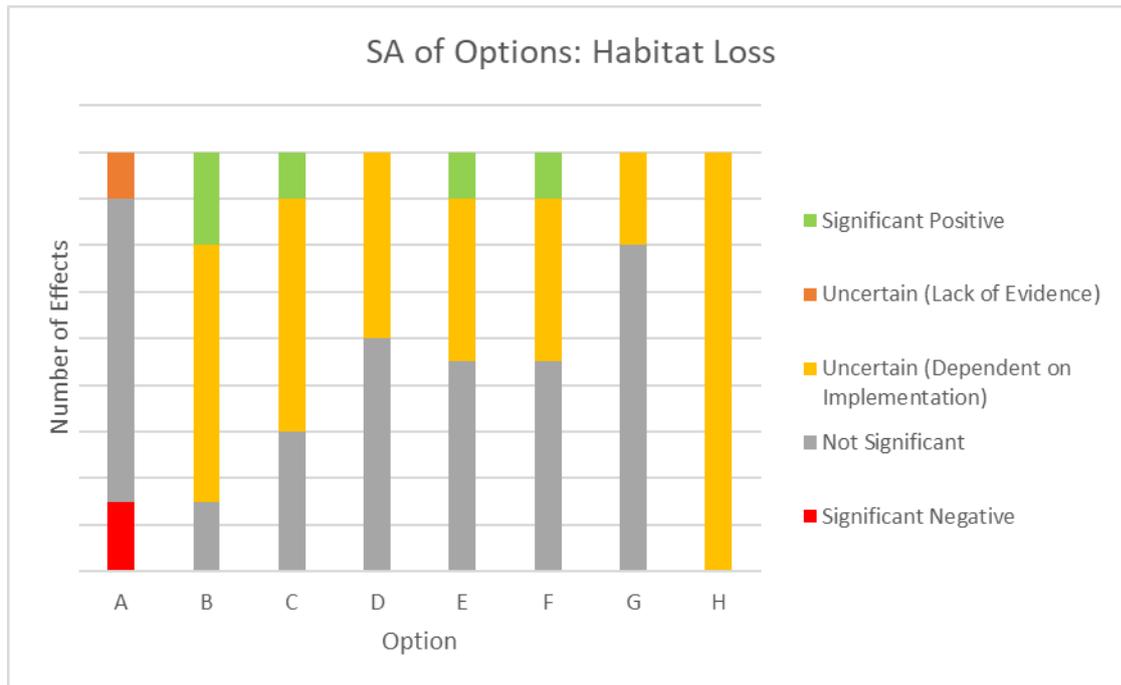
Fishing trawlers and anchorage are known to be the main cause of submarine cable faults, and it is likely that the frequency of incidents will increase in the future (Economy\_627). It is very unlikely that the effects of fisheries on seabed assets will improve without the implementation of specific measures to tackle this problem, hence the potential significant negative effect for Option A.

Fisheries currently impose adverse effects on protected sites on species; benthic and inter-tidal ecology and fish and shellfish; and marine mega fauna. There is a lack of understanding of the purpose of marine conservation zones within the fishing sector (Biodiv\_702), fisheries pose a threat to vulnerable or rare species (Economy\_628), compete for food resources with marine organisms (Biodiv\_536), and have adverse effects on subtidal sediments (Biodiv\_425). Commercial over-fishing is one of the key contributors to fishing stock depletion. In addition, ingestion of, and entanglement in, marine litter, of which the fishing sector is a key contributor, by marine mega fauna is highlighted within the baseline database, see Biodiv\_467. Implementation of Option A would not alleviate any of these issues imposed on biodiversity, habitats, flora and fauna by the fishing industry, and so could have significant negative effects.

## Mitigation

- Further consultation and engagement with stakeholders is recommended in order to find solutions to address the contribution of the fishing sector on marine litter. Proposals may consider:
  - (1) Education and awareness actions and campaigns. These should apply to the fishing sector and be received by both existing and future staff, for example, as part of staff training/education modules.
  - (2) Measures to ensure compliance with The International Convention for the Prevention of Pollution from Ships (MARPOL) Annex V.
- Proposals should include collaboration with key stakeholders/authorities to prevent and/or avoid the issue of fishing activities causing detriment to seabed assets. Such proposals may advocate use of zoning and marks at sea amongst others. Seabed assets are already clearly marked on marine charts and the likes of Kingfisher cable awareness charts. Cable protection is designed to reflect the risks posed by fishing. Seabed infrastructure may prove attractive to fish (as aggregation area) and therefore attractive to fishermen. Other potential solutions could include restriction of fishing in some area, or certain fishing methods, near infrastructure, but this is likely to be resisted by fishermen.
- Proposals should involve further consultation between regulators in charge of MPAs and key representatives of recreational and commercial fisheries to find solutions to increase awareness and prevent/avoid potential effects of fishing activity on vulnerable or rare species.
- Proposals should involve further consultation between regulators in charge of fisheries and key representatives of recreational and commercial fisheries to prevent/avoid over-fishing and to find ways of better regulating these activities. The sustainability objectives of fisheries should be aligned with those defined for biodiversity.
- Proposals should involve further consultation between regulators in charge of fisheries and key representatives of commercial fisheries to raise awareness about marine litter and potential effects on marine mega fauna, and devise methods by which this can be avoided.
- Proposals should consider key feeding grounds for marine mammals and adapted protection measures to prevent/avoid competition between this receptor and commercial fishing activity.

### 3.17 Habitat Loss



The assessment of the habitat loss grouping of options has identified that there is the potential for significant negative effects with relation to Option A, whereas Options B, C, E, and F have the potential to give rise to significant positive effects.

Changes in habitat condition and habitat loss are being caused by sea level rise, coastal squeeze, storm events from climate change as well as the creation of coastal defences. This is particularly a concern in sensitive intertidal area (Biodiv\_423). Due to this negative trend, significant negative effects have been identified with regards to benthic ecology, marine mega fauna and ornithology, in relation to Option A, 'do nothing'.

Options B, C, E and F propose to support proposals that enhance or facilitate coastal habitats and priority species have been judged to have a significant positive impact, on protected sites and species and benthic and intertidal ecology, fish and shellfish. Existing policies X-BIO-1 and X-BIO-2 within Option B have also resulted in significant positive effects for marine mega fauna and ornithology.

Option D suggests that any disturbance must be avoided, or damage minimised. This has been scored as uncertain as it is not clear what the impact of those options will be.

Protection of priority habitats will prevent disturbance to seabed substrates and coastal features as a by-product, but effects are judged to be minor positive due to the difference in spatial scale.

Dover, Felixstowe, Harwich, Ipswich, London, Medway, and Ramsgate are major ports in the south east and the most important interactions between these and biodiversity are potential noise and visual disturbances to highly mobile species and contamination to benthic habitats and water (Economy\_380). Fisheries and shellfish

farming are extremely important in the South East and appear to be growing (Economy\_300, Economy\_333, Economy\_641). There are potential interactions with all biodiversity components.

There is an interaction between increasing access to the marine area for recreation and tourism and protection of heritage and conservation sites. The extent to which this impacts the economy will be dependent on specific implementation.

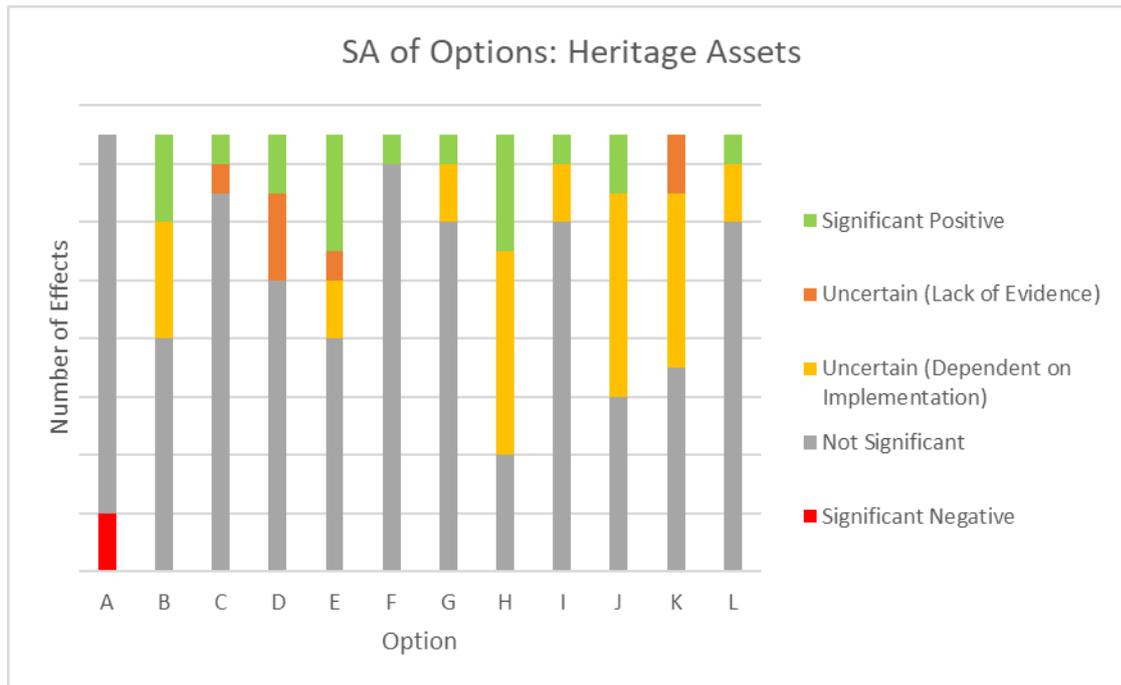
There are a large number of aggregate wharves in the South East Marine Plan Area. These are mainly concentrated in the Thames Estuary, including Barking, Cliffe, Dagenham, Denton, Erith, Greenhithe, and Greenwich Wharves as well as Dover. Aggregate dredging has the potential to interact with all biodiversity components (Economy\_522).

The South East Marine Plan Area contains offshore wind (Energy\_335), nuclear development (Energy\_604), and oil (Energy\_336) energy generation. The South East Marine Plan Area contains seven offshore wind farms, all of which are operational, including: Gunfleet Sands I, Gunfleet Sands II, Gunfleet Sands III, Kentish Flats I, Kentish Flats II, London Array and Thanet. These projects have the potential to interact with all biodiversity components. The south east has a number of existing and planned pipelines, cables and interconnectors (Kent to Belgium) (Economy\_325, Economy\_733, Economy\_734). These projects have the potential to interact with all biodiversity components.

## **Mitigation**

No specific mitigation has been identified.

### 3.18 Heritage Assets



The assessment of the heritage assets grouping of options has identified that there is the potential for significant negative effects with relation to Option A, whereas Options B, C, D, E, F and G have the potential to give rise to significant positive effects.

If nothing is done, as per Option A, significant negative effects can be anticipated to be incurred by heritage assets within and adjacent to the South East Marine Plan Area as important assets will continue to be lost to natural and anthropogenic driven change. This would represent a missed opportunity to utilise marine planning to enhance protection and access to heritage.

Significant positive effects may be anticipated arising from the implementation of policies C, E, H and J as these policies have potential to result in increased protection and access to heritage assets, leading to development of greater understanding, awareness and protection. As such a combination of policies providing protection, recording and enhanced access should be supported.

Option E and existing Policy X-CC-3 within Option B support aim to avoid significant adverse impact on coastal and estuary change. Significant positive effects have been anticipated in relation to coastal change and climate change resilience, as these options will deliver in kind benefits through enhanced protection.

Broadly speaking, policies that are beneficial to the protection and enhancement of heritage assets deliver mutual benefits to landscape and seascape owing to the contribution heritage makes to historic character. Significant positive effects to landscape and seascape are therefore anticipated from the implementation of Options B, F, G, I and L.

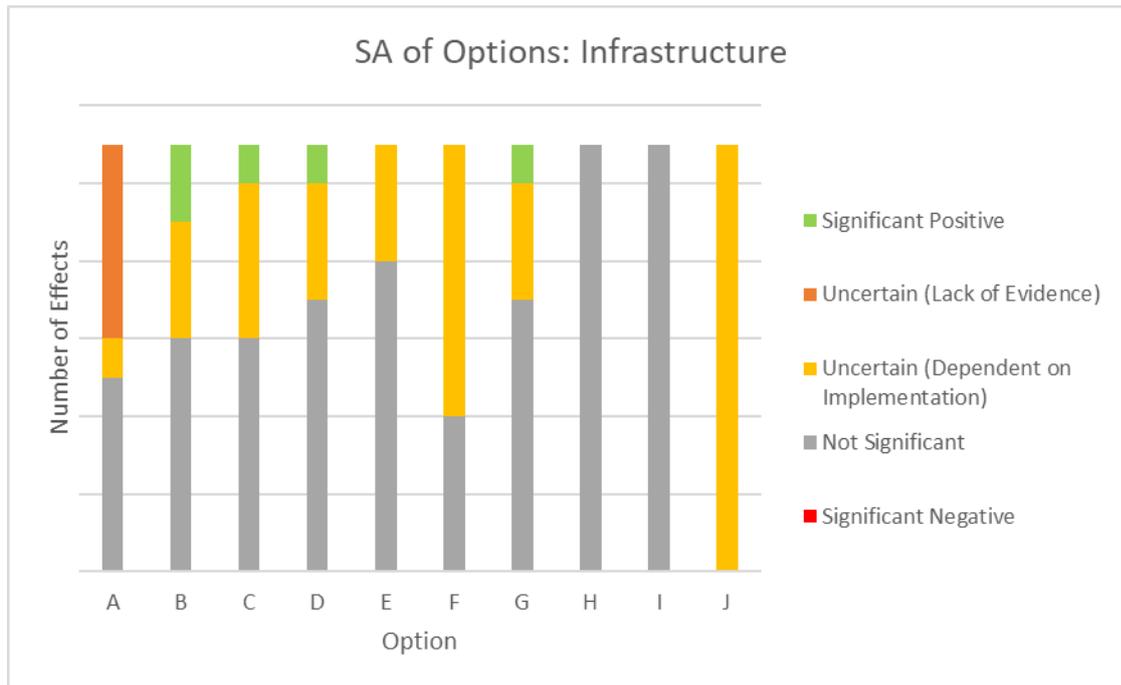
Options H and D aim to encourage the participation of the local population in the preservation and enjoyment of their cultural and natural heritage. Significant positive effects are therefore anticipated with regards to health and wider determinants of health effects on communities, as these options may deliver benefits to health and wellbeing in local communities through increased access and participation in heritage activities.

None of the proposed options would have significant effects on tourism. However, it is possible that protection and enhancement of heritage assets through planning will have indirect benefits for tourism through the creation of high quality open spaces at the coast.

### **Mitigation**

- Support options that enable greater protection, management, and enhanced understanding of the marine historic environment.
- Mitigation and management of heritage assets will be of particular importance for any instances where public benefits are found to outweigh the compromise or harm to discovered heritage assets (eg Options B, F, G).

### 3.19 Infrastructure



The assessment of the infrastructure grouping of options has identified that there is the potential for significant positive effects with relation to Options B, C, D and G, whilst none of the options have the potential to give rise to significant negative effects.

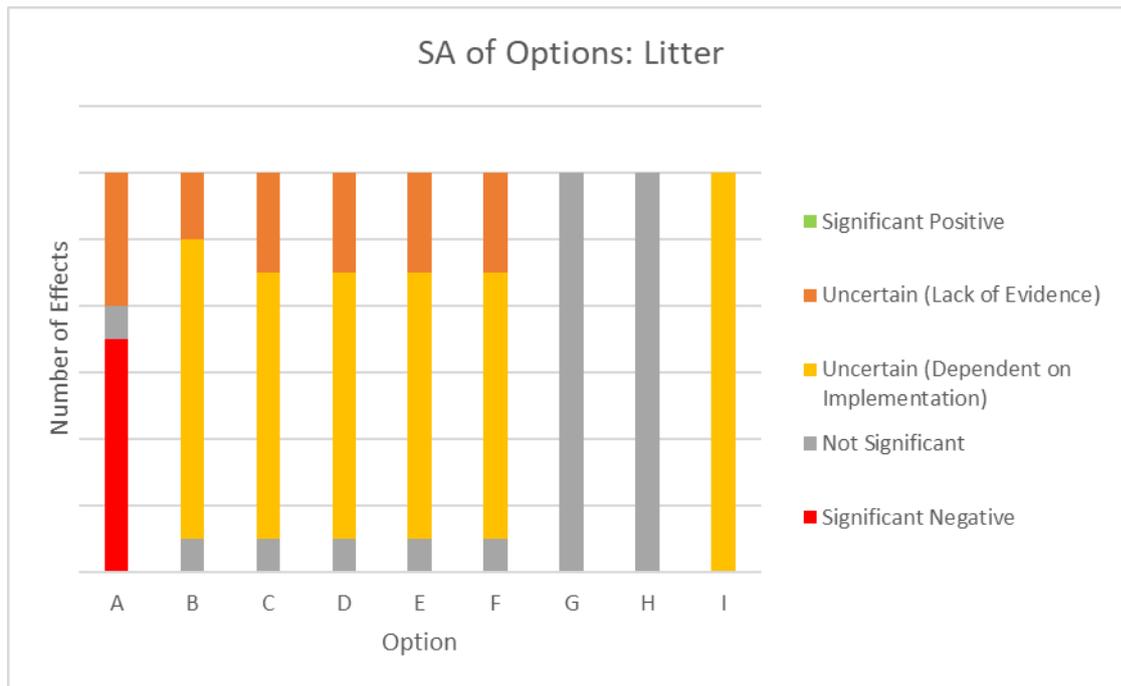
As highlighted by Communities\_42, the Coastal Communities Fund is to be extended to 2020/2021 and at least a further £90 million will be available to help seaside towns revitalise area, create jobs, and boost local economic growth. Launched in 2012, the Coastal Communities Fund has already invested nearly £119 million on 211 projects local infrastructure and economic projects across the UK. This is helping to create almost 13,700 jobs and provide more than 10,280 training places and apprenticeships. Implementation of Option B may have significant positive effects on health and wider determinants of health and effects on communities.

The location of ports in England and Wales has changed over time, in response to changes in global markets, in the size and nature of ships, and in the transport networks which support them. The west coast of the United Kingdom meets the needs of transatlantic and Irish traffic. It is not possible to anticipate future commercial opportunities as new shipping routes and technologies emerge and the needs of trading partners change as their economic circumstances develop. 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 (Economy\_430). Options B, C, D and G support land-based infrastructure and industries which see the facilitation of marine activity, as well as the protection of wharves, and so would have significant positive effects on ports and shipping.

**Mitigation**

No specific mitigation has been identified.

### 3.20 Litter



The assessment of the litter grouping of options has identified that there is the potential for significant negative effects with relation to Option A, whilst none of the options have the potential to give rise to significant positive effects.

The marine historic environment promotes increased leisure, recreation and tourism (Cultural\_178), but can be adversely affected by the associated litter that this brings (Economy\_767). Fisheries too may have an impact on the marine historic environment, as highlighted by Cultural\_184 and Water\_234. To 'do nothing' as per Option A would have significant negative effects on heritage assets adjacent to the marine environment.

Marine litter acts as a source of persistent pollutions, other chemical derivatives, and adsorption surfaces which lead to biomagnification within marine organisms and has the potential to cause sublethal toxicological effects and endocrine disruption (Water\_263). However, this is considered for the North West and South West Marine Plan Areas only in the baseline database. For this reason, significant effects of the potential implementation of Options A, B, C, D, E and F on water quality and pollution within the South East Marine Plan Area cannot be anticipated but should be taken into consideration.

It is recognised that there is little understanding of marine litter, biodegradability and toxicity (Water\_244). Densities of beached litter, especially plastics, recorded in the United Kingdom have increased since monitoring commenced in 1994, and, in all areas in which surveys are systematically completed, are recognised as problematic by Marine Strategy Framework Directive Good Environmental Status targets (Water\_233, Water\_240, Water\_289). There have however been some reductions seen in the South, primarily as a result of reduced public litter (Water\_233). Microplastics have been found globally on beaches, in surface waters, sediment and

a wide range of biota (Water\_252), it is therefore recognised that both primary and secondary microplastics have the potential to pass into cells (Water\_321). Evidence is missing regarding the bioaccumulation of microplastics along food chains, including from seafood to humans (Water\_321). Chemical additives both contained within the plastic and adsorbed to the plastic can biomagnify with chronic effects had on marine organisms (Water\_291). Marine litter and beach plastic are both reducing aesthetic quality of the environment and resulting in wildlife mortalities in the South East and South West Marine Plan Areas (Water\_357). Option A would therefore have a significant negative impact as it fails to address any key issues as highlighted within the baseline database.

The mental health effects of contact with green spaces and nature as detailed in Communities\_135 are reduced by the widespread marine litter and beach plastic which reduce aesthetic quality of the environment as well as result in wildlife mortality (Water\_357). Option A would incur significant negative effects on health, wider determinants of health and communities if it were implemented, as it fails to address the key baseline issues. In addition, Option A would forego the opportunity to increase training, skills, employment and community involvement in citizen science concerning environmental issues in the marine environment and how to look after it (Communities\_161, Communities\_166).

Marine litter includes ghost fishing gear, so its generation is directly connected to Fisheries and Aquaculture (Water\_234). Option A does not address the major contribution of fisheries and aquaculture to marine litter, and so its implementation would have significantly negative effects.

The sea can provide a variety of leisure, recreation and tourism activities, which generate a considerable amount of income for the economy and many coastal towns. All coastal activities are enhanced by a well-managed and healthy marine environment, attractive and well maintained beaches, seashore and clean bathing water, of which marine litter is a key driver (Economy\_482). Enhanced tourism, population growth, the extension of the tourist season and associated growth in the leisure industry will have environmental effects including pollution from litter, and so will have social and amenity effects if not managed sustainably (Economy\_630, Economy\_746, Economy\_762, Economy\_763, Water\_273). Option A does not ensure the sustainable management of leisure, recreation and tourism activities regarding marine litter, and so would have significant negative effects.

Ingestion of, and entanglement by, marine litter can cause damage and death of marine species as well as reproductive and population effects (Biodiv\_476). Intertidal sediment habitats are deteriorating due to cumulative effects including beach litter (Biodiv\_470, Biodiv\_471). Option A does not address key baseline issues regarding the effects of marine litter on benthic and inter-tidal ecology nor fish and shellfish, and so its implementation would have significant negative effects.

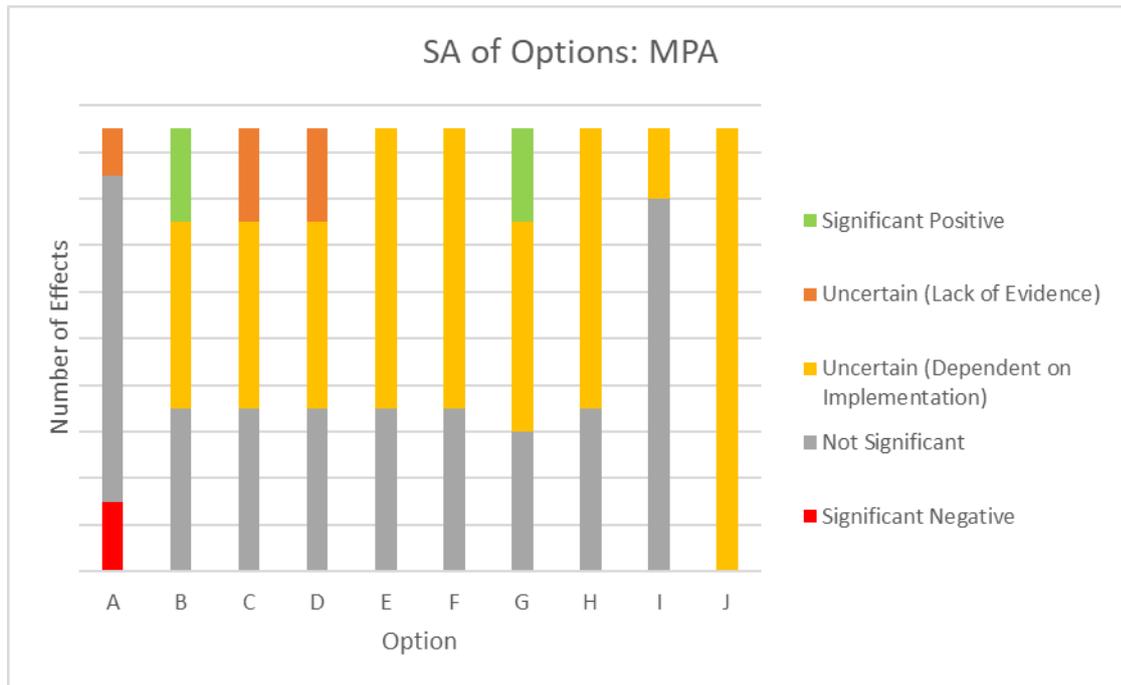
At present, ingestion of, or entanglement in, marine litter is considered a potential issue for marine mammals and turtles as although both ingestion of plastic by cetaceans has been recorded and plastic debris is commonly found in the turtle gut during post-mortem examinations, data is currently insufficient to adequately assess the effects of this, and so the effects of marine litter on marine megafauna is not

currently considered to be a significant pressure in UK waters (Biodiv\_467, Biodiv\_468, Biodiv\_469, Biodiv\_650). Entanglement and bycatch of seals can be caused by both active fishing nets and discarded or storm-damaged ghost nets (Biodiv\_553, Biodiv\_554). Due to the insufficient data surrounding the extent of the effects of litter on marine mega fauna, the implications of Option A cannot be anticipated. Whilst the assessment of this SA sub-topic therefore deems Option A 'Uncertain (Lack of Data)', its effects must still be taken into consideration.

## **Mitigation**

- It is recognised that further action may need to be taken regarding marine litter should the Marine Strategy Framework Directive Programme of Measures for achieving Descriptor 10 show that the effect of the combined measures will not deliver Good Environmental Status in line with expectations (Water\_244).
- Wording of Options B X-ML-2, C and E would all have the potential for much greater positive effects if more stringent ie if they were to state that 'proposals...must build in measures to prevent the discharge of waste and plastic into the marine area', note the absence of the option to 'minimise' or 'limit' the discharge only as currently included within Options B X-ML-2, C and E.
- Options B X-ML-1, D and F could be used for positive effect in conjunction with revised options which prevent the discharge of waste and plastic into the marine area as above. Alone however, these options (B X-ML-1, D and F) are inadequate to have significant positive effect.

### 3.21 Marine Protected Areas



The assessment of the MARINE PROTECTED AREA grouping of options has identified that there is the potential for significant negative effects with relation to Option A, whereas Options B and G have the potential to give rise to significant positive effects. A discussion of the potential effects with relation to each of the receptors and relevant SA Sub-Topics is provided below.

The baseline indicates negative trends in terms of benthic ecology (Biodiv\_420, Biodiv\_423, Biodiv\_425, Biodiv\_471, Biodiv\_571), marine megafauna (Biodiv\_432, Biodiv\_438, Biodiv\_447, Biodiv\_731) and ornithology (Biodiv\_449, Biodiv\_495, Biodiv\_498, Biodiv\_728) in the south east based upon existing policy. This has therefore resulted in significant negative effects with regards to Option A, 'do nothing'.

Option B would have significant positive effects on benthic and intertidal ecology, fish and shellfish, protected sites and species, marine mega fauna and ornithology, as it supports proposals that incorporate features that enhance or facilitate natural habitat and species adaptation, migration and connectivity (X-BIO-2).

Option G has also been judged as significant positive for benthic and intertidal ecology, fish and shellfish, protected sites and species, marine mega fauna and ornithology as it requires strategic plans and programmes to not adversely affect the ability of marine protected area, and priority habitats and species to adapt to climate change. Other options that suggest any disturbance must be avoided or damage minimised have been scored as uncertain as it is unclear what the impact of those options would be.

Protection of priority habitats will prevent disturbance to seabed substrates and coastal features as a by-product, but effects are judged to be minor positive due to the difference in spatial scale.

Dover, Felixstowe, Harwich, Ipswich, London, Medway, and Ramsgate are major ports in the South East and most important interactions are potential noise and visual disturbance to highly mobile species and contamination to benthic habitats and water (Economy\_380). Fisheries and shellfish farming are extremely important in the South East and appear to be growing (Economy\_300, Economy\_333, Economy\_641). There are potential interactions with all biodiversity components.

Defence activities that utilise the marine environment, directly or indirectly, in support of operational capability are diverse but include operational vessels and aircraft, Her Majesty's Naval bases, surface and sub-surface navigational interests, underwater acoustic ranges, maritime exercises, amphibious exercises, coastal training ranges and coastal test and evaluation ranges (Economy\_484). Although there is a potential interaction here it was felt that the proposed Responses were unlikely to affect military activities due to their autonomy.

There is an interaction between increasing access to the marine area for recreation and tourism and protection of heritage and conservation sites. The extent to which this effects the economy will be dependent on specific implementation.

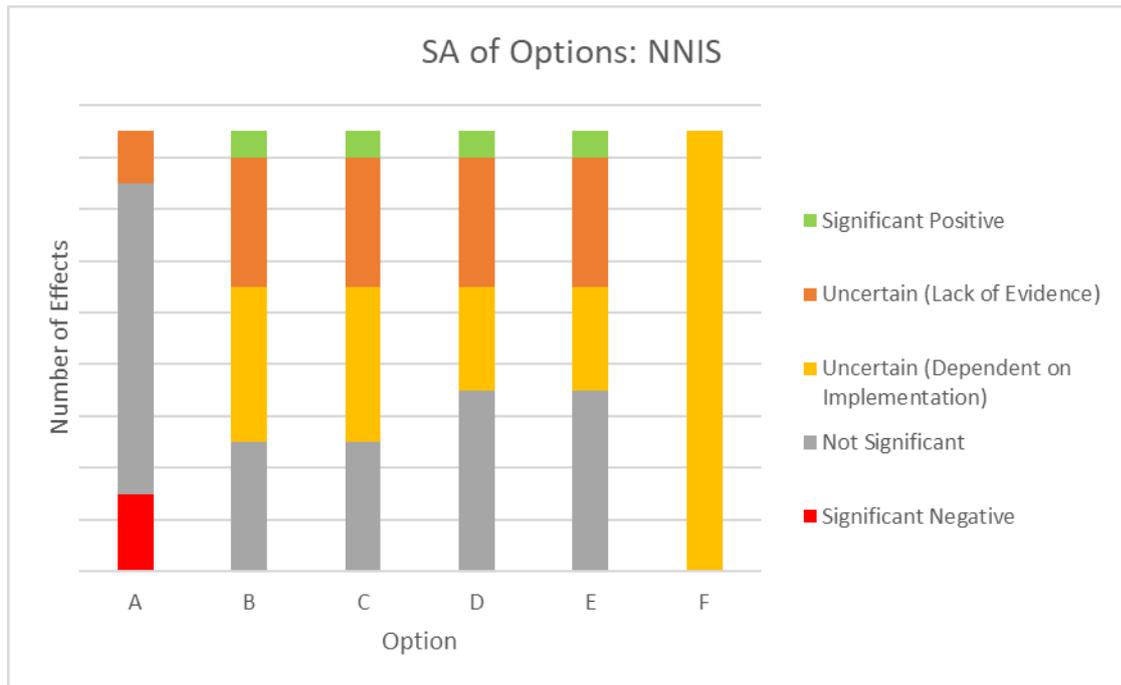
The South East is an area of offshore wind (Energy\_335), nuclear development (Energy\_604), and oil (Energy\_336) energy generation. The South East Marine Plan Area contains seven offshore wind farms, all of which are operational, namely: Gunfleet Sands I, Gunfleet Sands II, Gunfleet Sands III, Kentish Flats I, Kentish Flats II, London Array and Thanet. These projects have the potential to interact with all biodiversity components. The South East has a number of existing and planned pipelines, cables and interconnectors (Kent to Belgium) (Economy\_325, Economy\_733, Economy\_734). These projects have the potential to interact with all biodiversity components.

There are a large number of aggregate wharves in the South East. These are mainly concentrated in the Thames Estuary, including Barking, Cliffe, Dagenham, Denton, Erith, Greenhithe, and Greenwich Wharves as well as Dover. Aggregate dredging has the potential to interact with all biodiversity components (Economy\_522).

## **Mitigation**

No specific mitigation has been identified.

### 3.22 Non-Native Non-Indigenous Species



The assessment of the non-native indigenous species grouping of options has identified that there is the potential for significant negative effects with relation to Option A, whereas Options B, C, D, and E have the potential to give rise to significant positive effects. A discussion of the potential effects with relation to each of the receptors and relevant SA sub-topics is provided below.

The South East Marine Plan Area has a number of established pacific oyster populations, which can form dense groups, sometimes forming reefs, which can alter the environment such as through affecting waves, currents and sedimentation, with knock-on effects on native species. Pacific oyster populations compete with native benthic species for space and resources (Biodiv\_504). Due to this, amongst further implications for biodiversity, Option A would have significant negative effects on benthic and intertidal ecology, fish and shellfish, marine mega fauna and ornithology.

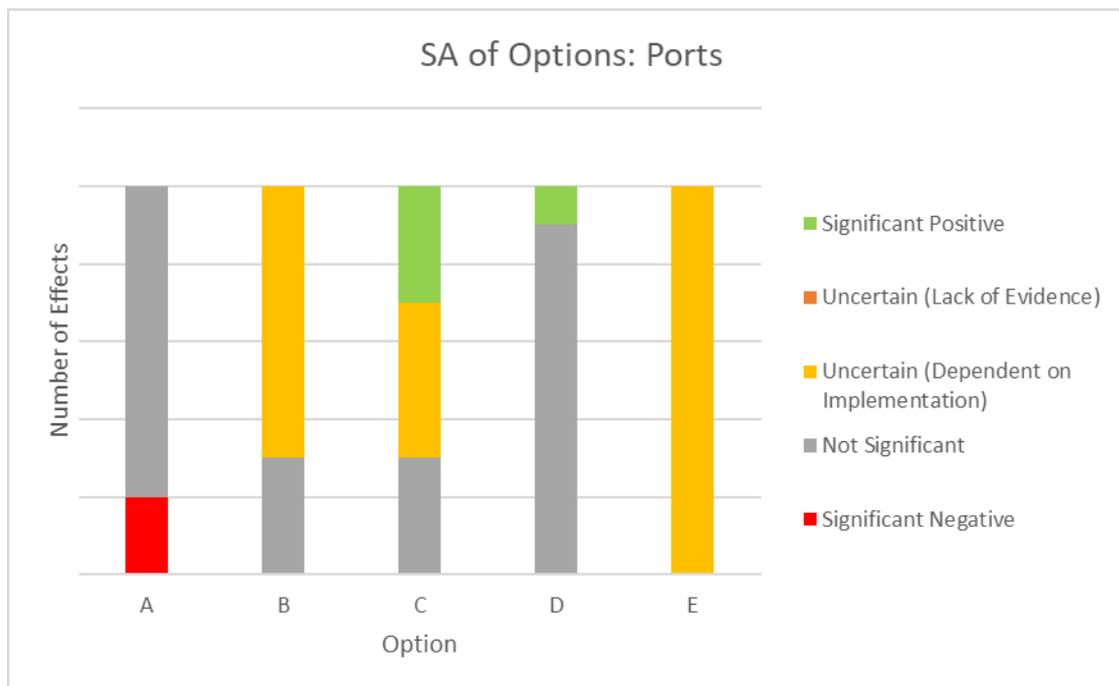
Options B, C, D and E have been assessed as having significant positive effects on non-native species as they signpost to specific regulation for activities which are most likely to interact with the SA sub-topic.

Fisheries and shellfish farming are also extremely important in the South East Marine Plan Area and appear to be increasing (Economy\_300, Economy\_333, Economy\_641). In addition, there are seven major ports in the South East, namely Dover, Felixstowe, Harwich, Ipswich, London, Medway and Ramsgate. Options which support a reduction in invasive species could result in negative trade offs for fishing and aquaculture as well as ports and shipping through restricting activities. However, as options do not explicitly limit these activities, uncertainties have been recorded.

#### Mitigation

No specific mitigation has been identified.

### 3.23 Ports



The assessment of the ports grouping of options has identified that there is the potential for significant negative effects with relation to Option A, whereas Options C and D have the potential to give rise to significant positive effects

Increased shipping activity, port expansions and associated industry growth such as the London Gateway port development, the planned expansion of Port of Felixstowe and the Port of Dover Masterplan, could lead to increased sulphur oxide and nitrous oxide emissions at coastal locations, which in turn could contribute to the breach of national objectives for air quality. A lack of policies could make the situation worse or significantly worse, hence a potential significant negative effect has been identified for Option A.

Significant negative effects with regards to Option A 'do nothing' have also been identified in relation to benthic and inter-tidal ecology fish and shellfish, as at various locations near large ports, subtidal rocky habitat has been lost due to construction, infrastructure (mainly coastal) or via smothering from dredged deposits (Biodiv\_542).

Options C and D aims to facilitate the expansion and development of sustainable marine industries and enhance the resilience of ports and harbours to changing market and international needs. These are likely to support ports and shipping activity within the South East Marine Plan Area, both now and in the future and have resulted in significant positive effects.

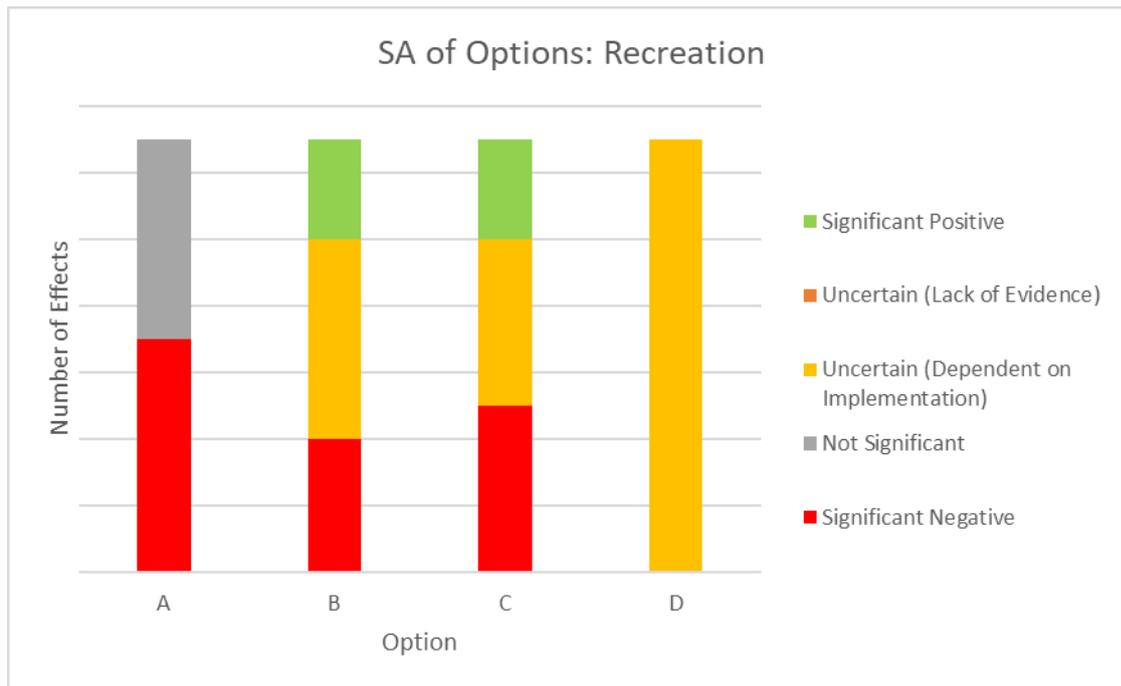
It is assumed that any constraints on ports could also represent constraints for some marine developments. Ports support a range of marine activities, including offshore wind farms, interconnectors and marine manufacturing. Option C aims to support proposals for infrastructure which facilitates expansion and development of sustainable marine industries. It has been assumed that this will include energy

generation and infrastructure and marine manufacturing and has therefore resulted in significant positive effects.

### **Mitigation**

- The associated pressures of port expansion and its effects on coastal habitats and maintenance dredging to support the shipping channel will need consideration within the marine plan.
- Measures are needed to minimise air pollution within ports and harbours.

### 3.24 Recreation



The assessment of the recreation grouping of options has identified that there is the potential for significant negative effects with relation to Option A. Options B and C have the potential to give rise to a combination of both positive and negative significant effects depending on the receptors/SA sub-topics being considered.

Densities of beached litter recorded in the UK have increased since monitoring commenced in 1994, with an average of around 1000 items per kilometre in 1994 having almost doubled by 2007 (Water\_233). This can contribute to a reduction in water quality, which has the potential to deter people away from water based recreational and tourist activities. Significant negative effects have therefore been identified in relation to Option A, 'do nothing', with regards to marine litter and water quality.

Option C encourages increased access within the marine area, which could increase the amount of marine litter, exacerbating the current situation. For this reason, significant negative effects have been identified in relation to marine litter. Option B contain two contrasting policies; existing policy X-ACC-2, like Option C, aims to increase further access to the marine area, which is likely to result in significant negative effects. However, existing policy X-TR-2 aims to minimise the effects on tourism and recreation, which could include water quality and marine litter, however this is not clear. Uncertainty has therefore been recorded.

The marine historic environment is important as a source of economic and social benefits to coastal communities through leisure, recreation and tourism amongst others. Options B and C aim to increase access which could include access to heritage assets. This could be beneficial but adverse effects would need to be minimised.

A reduction in the quality of seascapes is being caused by the cumulative visual impact of multiple existing and new activities and developments within the marine plan area. This has implications for tourism, recreation, wellbeing and cultural values within and outside of the marine plan area. Recreational pressures have the ability to damage the seascape and landscape character. Options B and C aim to improve access within the marine area, which haven't generated any significant effects, but adverse effects on the landscape and/or seascape would need to be minimised.

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 (Communities\_46). Increasing access to the marine environment is likely to be beneficial for both mental and physical health, and for this reason, Options B and C have resulted in significant positive effects.

Increasing access to the marine environment is also likely to be beneficial to tourism, leisure and recreation, and therefore significant positives have been identified in relation to options B and C. However, these options do not result in additional recreational attractions/activities.

There is potential for increased access to have a negative impact on defence training areas, however, due to the lack of baseline data on the current situation in the South East Marine Plan Area, uncertainties have been identified within the assessment.

Recreational disturbances are having adverse effects on biodiversity. Physical damage to cetaceans and seals through collision with vessels and other recreational activities (Biodiversity\_559) are common in the south east. There are increasing numbers of disturbance to marine mammals from sightseeing and pleasure boats, including visiting breeding/haul-out sites. Such disturbance from vessel activity, including that caused by propeller or engine noise, may result in vessel avoidance and increased dive time, which can cause increased energy expenditure, reduced resting time and could cause cetaceans to abandon or not use ideal habitats (Biodiversity\_546).

Activities associated with leisure and recreation can impact on some seabird species, largely through disturbance to nesting sites or disturbance to feeding birds by recreational boat traffic. This is probably greatest in the East, South East and South Marine Plan Areas. Little terns are particularly susceptible to disturbance from people as this species nests on beaches used for recreation (Biodiversity\_495). Recreation is also a key introduction pathway for invasive species (Biodiversity\_636). For these reasons, significant negative effects have been identified for protected sites and species, marine mega fauna, ornithology and non-indigenous species, with regards to Option A.

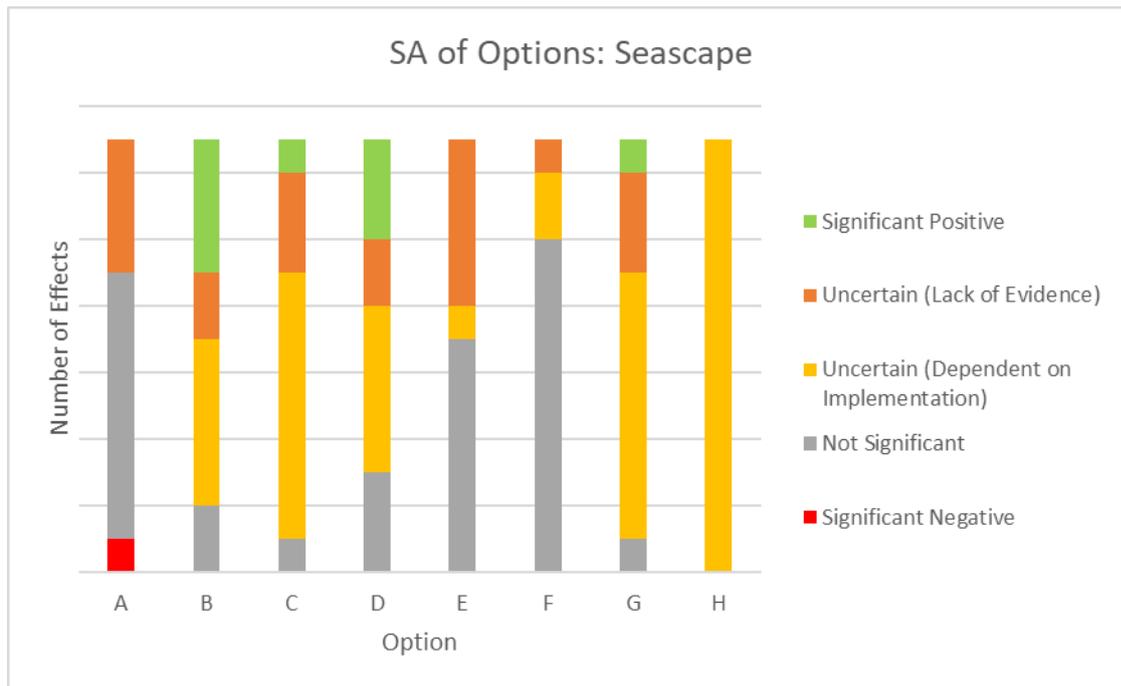
None of the proposed options work towards the protection of marine birds, marine mega fauna or protected sites and species. All provide popular recreational activities in the area and increased access is likely to increase the number of recreational disturbances which are often caused by boats, surfers, canoes and paddle boards. For these reasons, Options B and C could result in significant negative effects.

Unless control measures are implemented, increased recreational activity may increase population numbers and distribution spread of non-native species. There is the potential for invasive species to directly impact protected sites and species (Biodiv\_531) by competing with native species for habitat, food sources or directly through predator-prey, disease or parasite interactions. Significant negative effects have therefore been identified in relation to Options B and C.

### **Mitigation**

- Access to protected sites needs to be carefully controlled in order to ensure that the species and habitats they are designated for are protected.
- Measures are needed to control litter which is generated from public access.
- Effects of recreational pressures on biodiversity need to be controlled
- Adverse effects on historic assets will need to be minimised.
- Measures are needed to control the spread of non-native species.

### 3.25 Seascape



The assessment of the seascape grouping of options has identified that there is the potential for significant negative effect with relation to Option A, whereas Options B, C, D and G have the potential to give rise to significant positive effects.

There is a close relationship between the presence of heritage assets and the character, value and appreciation of landscape / seascape. Existing policy X-HER-1 within Option B considers the potential adverse effects on heritage assets and has therefore resulted in a significant positive effect. Option F refers to National Character Profiles, which often include cultural heritage, therefore a minor positive has been identified.

Significant positives have been identified in relation to Options B, C and G, with regards to seascape and landscape. Options G and C support the conservation of seascapes and avoidance of significant negative effects, whilst existing policies within Option B have enhancement measures for habitats and the natural environment. None of the options include specific enhancements of the seascape and/or landscapes.

Marine litter is an ongoing issue in the South East Marine Plan Area and can contribute to the deterioration of the landscape and seascape. None of the options directly address this issue. Options C and G both consider the cumulative effects on seascape which could include marine litter, but this remains unclear. Option D encourages further access to the landscape and seascape, which could contribute further to marine litter, however, uncertainty has been recorded.

Seascape can provide a number of benefits to both physical and mental health. It is assumed that options that provide a positive contribution to seascape will have a positive contribution on health and wellbeing. Option D has been identified as having

a significant positive effect on health, wider determinants of health and communities as it encourages enjoyment and access to the landscape and seascape.

There is potential for improvements in seascapes which could conflict with ports and shipping activities. Seascape improvements could potentially limit new and expanded port and shipping developments. Minor negative effects have been identified in relation to Options B, C, E and G. Option D aims to improve access to seascapes which could be beneficial to ports and shipping with increases in passenger numbers, however, it is uncertain what increased access would entail.

The fishing industry is in decline and requires support to prevent its further demise in order to maintain the essential social, cultural and economic benefits that it provides. It is unclear how options which protect seascapes, Options B, C and G, could affect fisheries and aquaculture. Displacement of fisheries activity due to seascape and landscape restrictions may result in negative trade-offs. The potential effects, particularly on aquaculture, are dependent on implementation as well as the types and locations of developments or proposals which come forward.

Improving seascape and landscapes is likely to have a positive effect on leisure, recreation and tourism. Option D is likely to have the most significant positive effect on tourism, leisure and recreation, as it encourages enjoyment, appreciation and access to the seascape and landscape.

No significant effects have been identified in relation to defence, however, there's potential for conflict between defence activities and enhancements of seascape. Defence activities could require limitations of activities and access to coastline. Practice exercise areas (PEXA) for training could be limited or reduced and activities could create noise which could contribute to reductions in tranquillity.

There's potential for improvements in seascapes which could conflict with aggregate activities. Dredging regimes around ports, such as Dover, Harwich and London, need to be sustained to maintain access and safe navigation to ports to ensure continued competitiveness (Economy\_770). Minimising effects on the seascape could see a reduction in aggregate activity. Option E aims to avoid, minimise, mitigate proposals that may compromise or harm iconic views of and from the Thames. There are a number of important aggregate wharves within the Thames Estuary, which could be at risk if preference is given to Option E. However, the effects of this are unlikely to be significant as there are further options which would mitigate this. For this reason, only a minor negative has been identified for the impact Option E may have on aggregate extraction.

Protected sites and species can play a big role in seascape quality. Option B considers the impact on coastal priority habitats and has therefore resulted in a significant positive effect. Option D encourages further access to the seascape and landscape which could have negative implications on the protected sites and species, unless well managed.

## Mitigation

- Any potential developments will need to be assessed for visual impact and designed well to avoid any negative effect on heritage assets.
- A natural capital approach would need to include consideration of the economic and wellbeing values of seascapes and landscapes.
- It is suggested that policy is developed to both enhance and protect seascapes and landscapes, such as through the support of coastal regeneration schemes.
- Access to protected sites needs to be carefully controlled in order to ensure that the species and habitats they are designated for are protected.

### 3.26 Shipping



The assessment of the shipping grouping of options has identified that there is the potential for significant negative effects with relation to Options A and J, whereas Options B, C, D, E, F, G, H and I has the potential to give rise to significant positive effects.

Shipping is recognised as a key contributor of nitrous oxides and sulphur oxides (Air\_8). Due to the significant increase in shipping activity as is anticipated by 2050 as a result of increased global trade, as well as port expansion and associated industry growth, shipping activities could lead to an increase in these emissions, and a likely breach of national air objectives for air quality (Air\_19, Climate\_110). Without any action on this issue, as proposed by Option A, it is likely that the situation will worsen with potential significant negative effects on both air pollutants and greenhouse gas emissions. Option G on the other hand would have significant positive effects on air pollutants as supporting short sea shipping could lead to a significant reduction in terrestrial traffic, and Options E, F and G would have significant positive effects on greenhouse gas emissions if implemented, especially if incentives were considered alongside implementation.

Short sea shipping should be encouraged for the transport of goods to reduce pressure on the terrestrial road network (Community\_175). Options E, F, G and I would likely reinforce this, with significant positive effects possible on the transport network. Resultant improvements in localised air quality would have significant positive effects on health, wider determinants of health and communities, and would likely reduce diseases associated with air pollution.

Environmental effects from shipping may occur from accidental or unlawful operational discharges (eg oil, waste or sewage) (Economy\_421). This can have adverse effects on coastal waters and marine waters (Water\_286) in both the short and long term. Uncertainty has been identified for Options E, F, G and H in relation

to water quality as these options could result in an increase in shipping and therefore water pollution. Option J could have potential positive effects by reducing the risk of collision and would enhance the prevention of oil spill arising from collision. However, the significance of this effect is unknown.

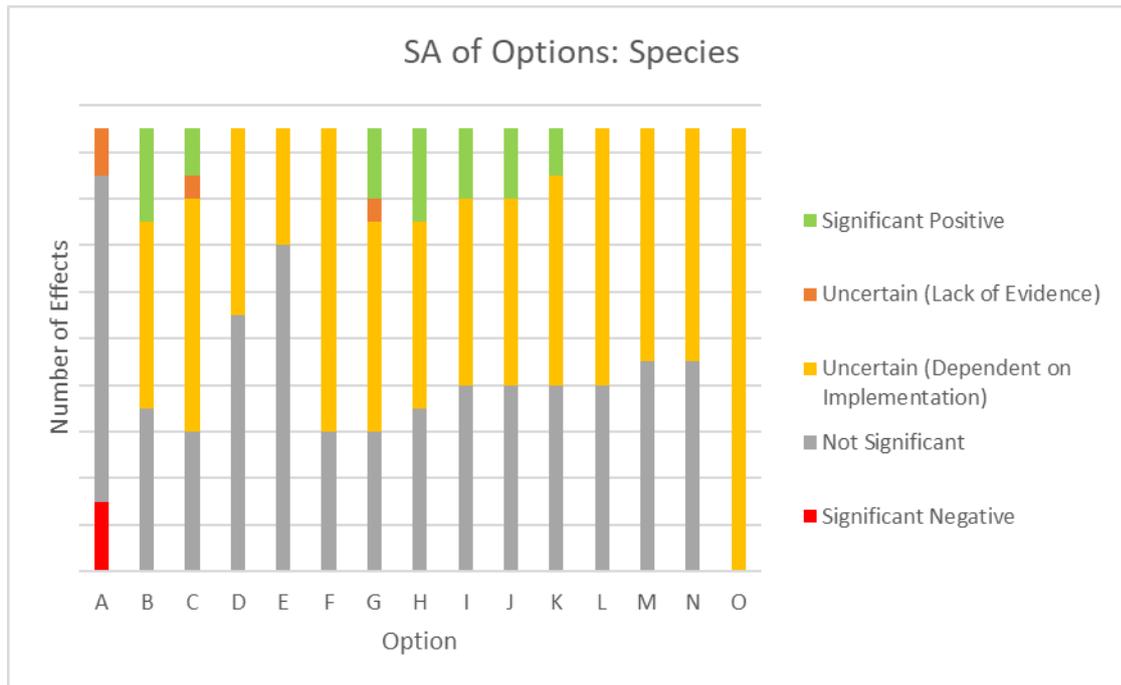
Ports and shipping would experience significant positive effects following the implementation of Options B, C, D and H as they prevent the obstruction and/or reduction of water draught and minimise subsequent impacts on the navigability of the channels; reduce impacts of other proposals on existing port and harbour activity; reduce significant adverse impacts to vessels and aircraft navigating through the marine area; and promote the development of the London Blue Ribbon Network including use of the waterways for leisure, passenger and tourist traffic, and the transport of freight and general goods respectively. Option J is predicted to have an adverse effect as it may involve significant constraints for the ports/shipping sector.

Ports and shipping have positive interactions on regional or local economies, including through leisure, recreation and tourism (Economy\_620). Options B and D, through enabling viability of high density navigation routes and passenger services and reducing significant adverse impacts on vessels navigating through the marine area, would have a significant positive effect on leisure, recreation and tourism if implemented.

## **Mitigation**

- Options should ensure that both existing and future proposals will be compliant with air quality standards and objectives, as well as those for greenhouse gas emissions.
- Regarding air pollutants, it is suggested that the MMO liaise with Transport for London regarding the Transport for London Water Freight Toolkit.
- In a bid to reduce greenhouse gas emissions, freight transport by water could be incentivised further.
- Proposals should incorporate a mitigation process to ensure that shipping activity will not be adversely impacted by the options.
- Proposals should consider the development of appropriate measures to prevent the spread of invasive species. Measures must be developed in coordination with ports, shipping organisations and relevant stakeholders (such as authorities and the International Maritime Organisation) to target the pathways for the transfer of aquatic invasive species, including via vessel ballast water and hull fouling.

### 3.27 Species



The assessment of the species grouping of options has identified that there is the potential for significant negative effects with relation to Option A, whereas Options B, G, H, I, J, and K have the potential to give rise to significant positive effects.

The baseline indicates negative trends in terms of benthic ecology (Biodiv\_420, Biodiv\_423, Biodiv\_425, Biodiv\_471, Biodiv\_571), marine megafauna (Biodiv\_432, Biodiv\_438, Biodiv\_447, Biodiv\_731) and ornithology (Biodiv\_449, Biodiv\_495, Biodiv\_498, Biodiv\_728) in the south east based upon existing policy. Options that propose to support proposals that enhance or facilitate coastal habitats and priority species have been judged to have a significant positive impact. Options B, G, H, I, J and K have been judged to be significant positive as they support proposals that enhance the extent and distribution of priority species. Option C also states that cumulative effects arising from multiple proposals and existing activities within the South East Marine Plan Area, that increase the risk of release of hazardous substances or litter into the marine environment, should be addressed in decision making. Other options that suggest any disturbance must be avoided or damage minimised have been scored as uncertain as it is not clear what the impact of those options will be.

Protection of priority habitats will prevent disturbance to seabed substrates and coastal features as a by-product, but effects are judged to be minor positive due to the difference in spatial scale.

Dover, Felixstowe, Harwich, Ipswich, London, Medway, and Ramsgate are major ports in the south east and most important interactions are potential noise and visual disturbance to highly mobile species and contamination to benthic habitats and water (Econ\_380). Fisheries and shellfish farming are extremely important in the south east and appear to be growing (Economy\_300, Economy\_333, Economy\_641). There are potential interactions with all biodiversity components.

There is an interaction between increasing access to the South East Marine Plan Area for recreation and tourism and protection of heritage and conservation sites. The extent to which this impacts the economy will be dependent on specific implementation.

Defence activities that utilise the marine environment, directly or indirectly, in support of operational capability are diverse but include operational vessels and aircraft, HM Naval bases, surface and sub-surface navigational interests, underwater acoustic ranges, maritime exercises, amphibious exercises, coastal training ranges and coastal test and evaluation ranges (Economy\_484). Although there is a potential interaction here it was felt that the proposed options were unlikely to affect military activities due to their autonomy.

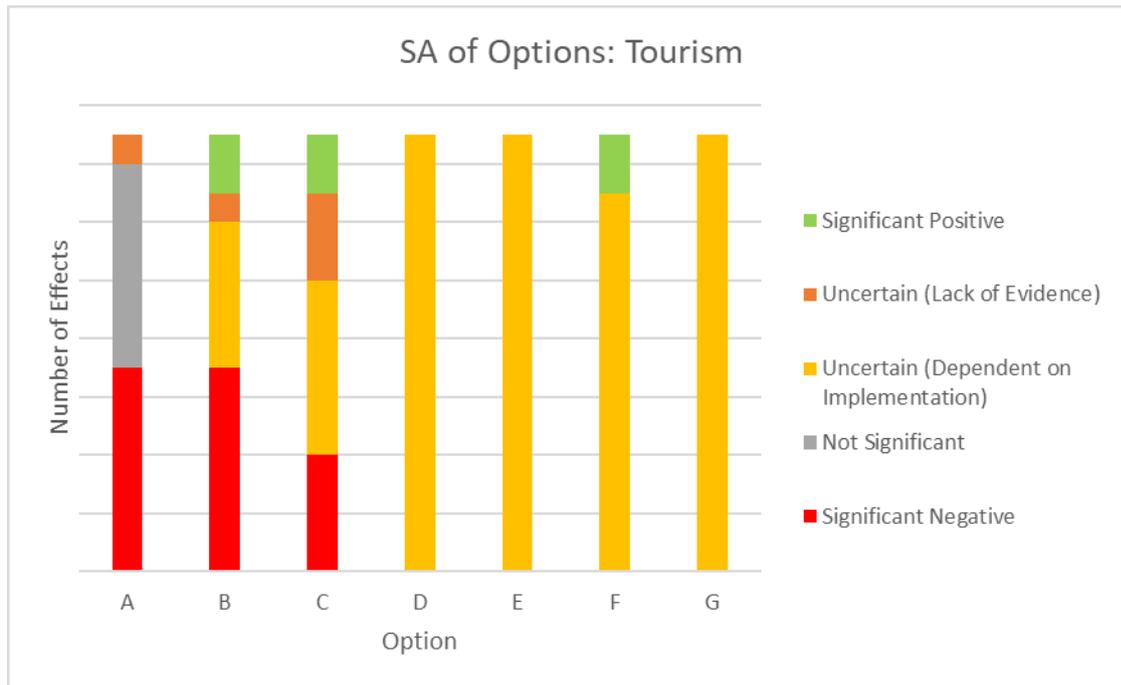
There are a large number of aggregate wharves in the south east. These are mainly concentrated in the Thames Estuary and include Barking, Cliffe, Dagenham, Denton, Erith, Greenhithe, and Greenwich Wharves as well as Dover. Aggregate dredging has the potential to interact with all biodiversity components (Economy\_522).

The south east is an area of offshore wind (Energy\_335), nuclear development (Energy\_604), and oil (Energy\_336) energy generation. The South East Marine Plan Area contains seven offshore wind farms, all of which are operational. These are Gunfleet Sands I, Gunfleet Sands II, Gunfleet Sands III, Kentish Flats I, Kentish Flats II, London Array and Thanet. These projects have the potential to interact with all biodiversity components. The south east has a number of existing and planned pipelines, cables and interconnectors (Kent to Belgium) (Economy\_325, Economy\_733, Economy\_734). These projects have the potential to interact with all biodiversity components.

### **Mitigation**

No specific mitigation has been identified.

### 3.28 Tourism



The assessment of the tourism grouping of options has identified that there is the potential for significant negative effects with relation to Option A, whereas Option F has potential for significant positive effects. Options B and C have the potential to give rise to a combination of both positive and negative significant effects depending on the receptors/SA sub-topics being considered.

Tourism pressures have the ability to damage the seascape and landscape character. A reduction in the quality of seascapes is being caused by the cumulative visual impact of multiple existing and new activities and developments within the marine plan area. This has implications for tourism, recreation, wellbeing and cultural values within and outside of the marine plan area (Landscape\_170). For this reason, significant negative effects have been identified in relation to Option A, 'do nothing'. Further significant negative effects in regard to seascape and landscape have been identified in relation to Option B, as it aims to increase tourism and recreational activities and avoid any activities which could have negative implications on tourism and recreation. This is likely to worsen the current situation.

Option F supports more sustainable tourism which could lessen the impact of tourism on the landscape. Option D refers to local plans and support and enhances their objectives, which could include landscape and seascape objectives. However, this is not known for certain so would be dependent upon implementation.

Developments and other activities can have adverse effects on transitional waters, coastal waters and marine waters. This includes increased demand for water, discharges to water, adverse ecological effects resulting from physical modifications to the water environment and increased risk of spills and leaks and transmission of invasive non-native species. Movement of water offshore between catchments means that action in one catchment can have a profound impact on water quality in waters some distance along the coast (Water\_286).

Poor water quality and marine litter have potential to deter people away from water based recreational and tourist activities. Providing more tourist attractions is likely to generate more litter and further water pollution. More visitors will also put more pressure on the water supply which could affect the quality and call for more infrastructure to support it. None of the options directly target water quality and/or marine litter, however, Option D considers local and regional plans, which may include objectives on water quality. The effects of sustainable tourism (Options E and F) are not known, they could be positive but would be dependent upon implementation.

The marine historic environment is important as a source of economic and social benefits to coastal communities including through leisure, recreation and tourism. Increasing access to heritage assets could be beneficial but adverse effects would need to be minimised. Whilst none of the options directly affect heritage assets, Option D refers to local plans and support, and enhances their objectives, which could include cultural heritage objectives.

Attracting more visitors to the coast is likely to increase the amount of traffic which will contribute to a reduction in air quality. Options E and F promote sustainable tourism which has potential to address air quality issues, depending on how they're implemented. None of the options directly target air quality, however, Option D considers local and regional plans, which may include objectives on air quality.

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. Options do not make direct linkages to health benefits, but it has been assumed that increases in tourist activities and facilities may lead to health benefits.

The south east region is a popular destination for tourists. Dover to Calais is the most popular international passenger route accounting for 48% of all short sea international passengers (Economy\_331). The Port of London Authority is working to safeguard riverside wharves from redevelopment into non-port use (Economy\_594) but increases in the number of tourists and the creation of more tourist facilities could put pressure on these. However, these potential adverse effects have been deemed to be minor.

It is likely that all options will have a positive effect on tourism and recreation, and significant positive effects have been identified in relation to Options B and C. It is not known how restrictive a sustainable tourism approach would be, and as such, the effects of Option E would be dependent upon its implementation. Option D could again include measures referencing tourism, leisure and recreation objectives, but a lack of specificity leaves the effects of its implementation dependent upon implementation.

Tourism and recreational disturbances are having adverse effects on biodiversity. There are increasing numbers of disturbance to marine mammals from sightseeing and pleasure boats, including visiting breeding/haul-out sites. Such disturbance from vessel activity including propeller or engine noise may result in vessel avoidance and increased mammalian dive time, which can cause increased energy expenditure, reduced resting time and could cause cetaceans to abandon or not use ideal

habitats (Biodiversity\_546). Physical damage to cetaceans and seals through collision with vessels and other recreational activities (Biodiversity\_559) are also common in the south east.

Activities associated with tourism can impact on some seabird species, largely through disturbance to nesting sites or disturbance to feeding birds by recreational boat traffic. This is probably greatest in the East, South East and South Marine Plan Areas. Little terns are particularly susceptible to disturbance from people as this species nests on beaches used for recreation (Biodiversity\_495).

Recreation activities are also key introduction pathways for invasive species (Biodiv\_636). Unless controlled, increased recreational activity may increase population numbers and species distribution of non-native species. There is the potential for invasive species to directly impact protected sites and species (Biodiv\_531) by competing with native species for habitat, food sources or directly through predator-prey, disease or parasite interactions. None of the options directly address this issue. For these reasons, significant negative effects have been identified in relation to Option A, 'do nothing', with regards to protected sites and species, marine mega fauna, ornithology and non-indigenous species. Options B and C focus on increasing tourism and recreation within the marine plan area, which is likely to exacerbate the current situation. This has also resulted in significant negative effects on sites and species, marine mega fauna, ornithology and non-indigenous species.

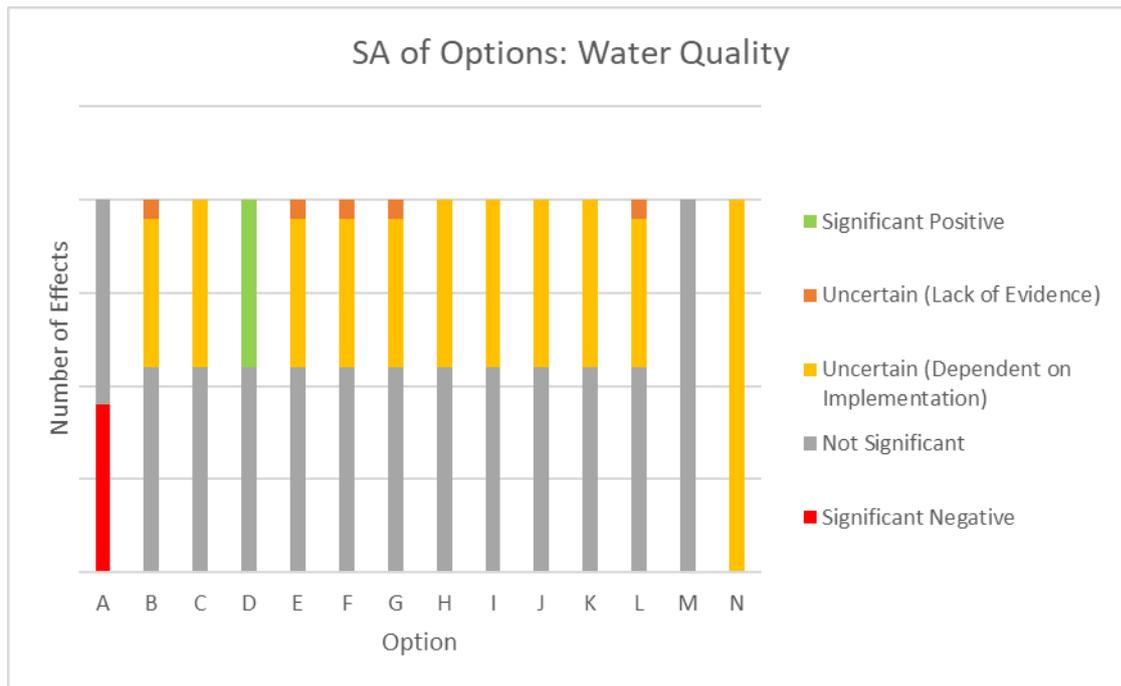
Option D aims to refer to local plans and support, and enhance their objectives, which could include biodiversity objectives. However, this is not certain and so would be dependent upon how it was implemented within marine planning.

Option F aims to increase tourist activity and 'sustainable yearlong recreation' activity, which has potential to exacerbate the current situation, however, it is not fully understood the implications of 'sustainable recreation'. Option E also takes a sustainable tourism approach. There are uncertainties surrounding these sustainable tourism approaches and what this could mean for biodiversity, as there is potential for them to be significantly positive but would be dependent upon implementation.

## **Mitigation**

- Options should include approaches to limit adverse effects on air quality.
- Any development near or adjacent to heritage assets would need to be sensitively designed in order to avoid and adverse impact.
- Seascape and landscape character assessments may need to be carried out to identify the impact of potential developments.
- Access to protected sites needs to be carefully controlled in order to ensure that the species and habitats they are designated for are protected.
- Existing issue of disturbance from sightseeing and pleasure boats needs to be improved.
- Measures needed to control disturbance of bird species, particularly in key locations such as special protection areas.

### 3.29 Water Quality



The assessment of the water quality grouping of options has identified that there is the potential for significant negative effects with relation to Option A, whereas Option D has the potential to give rise to significant positive effects.

Water quality is vital for tourism and human health (Water\_176). Relative to its size, the South East Marine Plan Area has a large number of beaches designated for bathing, nearly 90 per cent of which are achieving good or above status (Water\_188), however, multiple ‘dumps’ of coagulated oil from unknown sources of pollution are impacting the Kent coast (Water\_360). The UK Government is being taken to court by the European Commission over a failure to ensure wastewater is adequately treated at 17 agglomerations or urban area (Water\_287). To ‘do nothing’ as per Option A would likely have significant negative effects on pollution and water quality within the South East Marine Plan Area, as it fails to address baseline issue Water\_360, and issues 693SE, 832SE, 853SE and 872SE covered. Issue 872SE may be alleviated by The Thames Tideway Tunnel which aims to modernise the sewer networks throughout London and the Thames Valley (Water\_251). Option D would have a direct significant positive effect on pollution and water quality as it supports activities which will bring an improvement to water quality.

Chemicals existing in the marine environment such as polychlorinated biphenyls (PCBs), dichlorodiphenyldichloroethylene (DDE) and nonylphenol have the potential to adsorb onto plastics (which themselves contain chemical additives including phthalates and parabens) and can become introduced into the marine food web and/or have chronic effects on marine organisms (Water\_291). To not reduce plastic, nor the presence of adsorption surfaces, within the South East Marine Plan Area would have significant negative effects on water quality and therefore on marine mammals and deep-sea fish, hence the implementation of Option A would have

significant negative effects. Conversely, improved water quality as a result of Option D implementation could have a significant positive effect.

Water quality is integral to health, wider determinants of health and communities (Water\_371), shellfish and algal culture (Economy\_629), leisure, recreation and tourism, and therefore the local economy (Water\_188). As highlighted by baseline data Water\_371, water quality could be improved by effective linkages being made between marine planning and existing regimes. Option A would have significant negative effects on health, wider determinants of health and communities, fisheries and aquaculture, leisure, recreation and tourism as would not address the baseline issues highlighted under the pollution and water quality SA sub-topic, nor issues 693SE, 751SE, 805SE and 872SE. Option D could have significant positive effects if implemented.

Effects of pollution from marine activities are witnessed on benthic and intertidal habitats and species, fish and shellfish, and marine mega fauna. Intertidal and estuarine species and habitats are at particular risk from a variety of pollutants entering the marine environment through point discharges, diffuse atmospheric and riverine pathways and accidental spillages, and there are increasing levels of pollution and nutrient enrichment within benthic and intertidal sediments (Biodiv\_571, Biodiv\_572). Contaminants such as heavy metals, tributyltin, pesticides and polychlorinated biphenyls (PCBs) can reach sublethal to lethal effects in marine organisms and lead to bioaccumulation in higher trophic levels. Persistent contamination can reduce biodiversity, resulting in impoverished communities composed of pollution-tolerant organisms (Biodiv\_420). Similarly, polychlorinated biphenyls and flame retardants impact marine mega fauna through disrupting endocrine systems, which results in susceptibility to disease and reduced reproductive success (Biodiv\_432, Biodiv\_433, Biodiv\_434). Implementation of Option A would have significant negative effects on benthic and inter-tidal ecology, fish and shellfish and marine mega fauna as would fail to address a number of prominent existing baseline issues. Option D could have significant positive effects on marine organisms as supports improvements to water quality.

Anthropogenic nutrient enrichment of coastal waters creates a risk of harmful algal blooms, which is further exacerbated by the effects of climate change (Biodiv\_623). Option A would not reduce anthropogenic nutrient discharge into the marine area, and so would not reduce the risk of harmful algal blooms, with potential for significant negative effects to occur. Implementation of Option D conversely would seek to improve water quality, resulting in potential significant positive effects.

## **Mitigation**

- Options F and G (note that these are the same) must be more stringent, by:
  1. Encompassing proposals which will have any adverse effects on the water environment as opposed to just significant adverse effects.
  2. Preventing release of hazardous substances and litter into the marine area rather than avoiding, minimising and mitigating adverse effects.
- Options H, I, J and K could all have significant positive effects on Water Quality grouping, but only if more stringent, to prevent the introduction of

nutrients, pollution and plastics into the marine area rather than avoid or minimise.

- Option D although significant positive for pollution and water quality; marine litter; air pollutants; greenhouse gas emissions; climate change resilience and adaptation; health and wider determinants of health and effects on communities; effects on protected equality groups; ports and shipping; fisheries and aquaculture; leisure / recreation; tourism; marine manufacturing; defence; aggregate extraction; energy generation and infrastructure development; seabed assets; protected sites and species; benthic and inter-tidal ecology and fish and shellfish; marine mega fauna; and plankton SA sub-topics, must be used in conjunction with other (revised and more stringent) options, as acts as a remedial step rather than preventing the problem occurring in the first instance.

## 4 Cumulative Assessment (South East Marine Plan Area)

The potential for cumulative effects has been difficult to consider at the options assessment stage as it is unclear which policies are likely to be taken forward and in which combination. Potential cumulative effects will be assessed in more detail at the next stage of the marine plan development, when the preferred options are being developed. However, as part of the development of the marine plans, the MMO have been considering the potential for cumulative effects and have been considering options as to how this could be addressed.

These options include discussing the need for assessment of cumulative effects from proposals in the introductory text of the marine plan, including the consideration of cumulative effects of certain proposals or in relation to, for example, seascape, in some options or signposting to the MMO Marine Information System or the MMO Report 1127 Futures analysis.

The SA would recommend the inclusion of specific wording within an appropriate overarching policy to ensure that cumulative effects of proposals are addressed as part of the consideration of applications or the granting of licenses. The larger applications which will be subject to separate processes, such as Environmental Impact Assessment (EIA), will address the potential for cumulative effects, however, the concern is that the smaller piecemeal developments may not take account of the potential for cumulative effects with other small developments.

## 5 Next Steps

The next steps for the development of the South East Inshore Marine Plan and the Sustainability Appraisal are described below. The work which will be undertaken to conclude the Iteration 2 marine plan development following the completion of the workshops will be:

- Collating the responses from the on-line stakeholder engagement and the workshops engagement;
- Reviewing the outputs from the Sustainability Appraisal of the options;
- Editing the draft vision for the South East Inshore Marine Plan Area;
- Developing and analysing the preferred options using the information from the sustainability appraisal and the stakeholder engagement; and
- Undertaking a compatibility testing of preferred options.

The output of the Iteration 2 work will be an improved vision for the South East Inshore Marine Plan Area and the identification of a preferred option for each group of issues that is compatible at a marine plan level and across marine plan boundaries. This work will be fed into the next stage of marine plan products, which is Iteration 3.

Iteration 3 development will take place during 2018 and 2019 culminating in an engagement in early 2019. During this stage the following activities will be undertaken:

- The draft policies will be refined;
- Iteration 3 Stakeholder engagement will take place which will involve a discussion on refinement of policies; and
- The Marine Officers will continue to engage throughout the process.

A Sustainability Appraisal will be undertaken of the preferred options and the draft South East Inshore Marine Plan plus a Sustainability Appraisal Report (SA Report) produced.

The outputs of Iteration 3 will feed into the production of a South East Inshore Draft Marine Plan and accompanying SA Report ready for public consultation in 2019-2020.

There are several other supporting activities that will be taking place alongside the development of the marine plan. These include:

- Implementation work;
- Developing a monitoring approach and data gathering;
- Continued monitoring of the effectiveness of the South East Inshore Marine Plan in achieving high level marine objectives and planning how best practice for monitoring can be applied in the North West/North East/South West/South East Marine Plan Areas;
- Continuing data and evidence gathering; and
- Undertaking European Maritime and Fisheries Fund (EMFF) projects.