



Marine Management Organisation

South West Inshore and Offshore Marine Plan Areas Sustainability Appraisal Options Assessment Report





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Management
Organisation

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April 2018

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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 tasks relating to the 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 West Inshore and Offshore Marine Plan Areas. 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 areas and is currently progressing the seven remaining 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 the
- 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

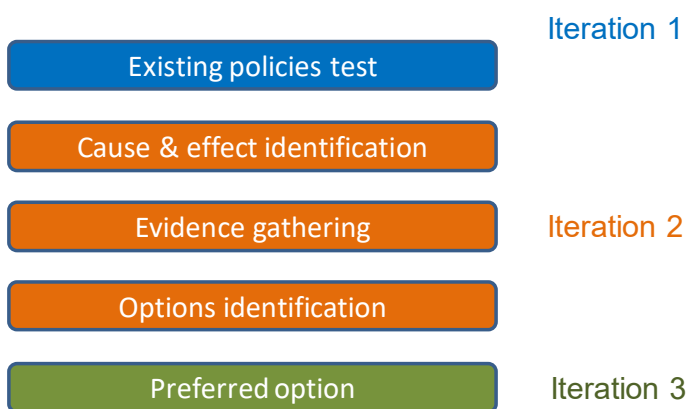
The SA Database was updated in August 2017.

1.3 Development of 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 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 addressing current and future issues in 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 of the marine plan areas, and therefore vary across plan areas.

1.4 Groupings & Options

The South West consists of 33 groupings. Four groupings (Cumulative Effects, Governance, Evidence Gaps and Implementation) contain options which are not possible to assess through the SA. The remaining 29 groupings contain 254 individual options which have been assessed. The groupings and number of options assessed are set out in Table 1.1 below.

Table 1.1: Assessment Groupings & Options			
Grouping	Number of Options	Grouping	Number of Options
Access	9	Habitat Loss	13
Aquaculture	9	Heritage Assets	15
Cables	7	Infrastructure	9
Climate Change	14	Litter	6
Coastal Change	11	MPAs and Geodiversity	14
Co-Existence	13	Non Native Invasive Species	6
Disturbance	10	Ports and Harbours	7
Dredge Disposal	7	Recreation	11
Dredge Harbours and Ports	4	Renewables	6
Deep Sea Habitat	8	Seascape	7
Ecosystem Approach	6	Shipping	6
Employment: Diversification	4	Species	12
Employment: Growth Skills	11	Tourism	7
Energy	5	Water Quality	10
Fisheries	7		

2 Assessment Methodology

2.1 Introduction

This stage of the SA has involved assessment of 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 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 29 groupings and 254 options for the South West Marine Plan Areas 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
Physical and Chemical Aspects	
Cultural heritage	<ul style="list-style-type: none"> • Heritage Assets within marine plan areas • Heritage Assets adjacent to marine plan areas
Geology, Substrates and Coastal Processes	<ul style="list-style-type: none"> • Seabed substrates and bathymetry • Coastal features and processes
Seascape and landscape	<ul style="list-style-type: none"> • Effects on seascape and landscape
Water	<ul style="list-style-type: none"> • Tides and currents • Water temperature and salinity • Pollution and water quality • Marine litter
Air quality	<ul style="list-style-type: none"> • Air pollutants
Climate	<ul style="list-style-type: none"> • Greenhouse gas emissions • Climate change resilience and adaptation
Social and Economic Aspects	
Communities, health and well being	<ul style="list-style-type: none"> • Health and wider determinants of health Effects on communities • Effects on protected equality groups

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

An assessment spreadsheet was prepared for each of the marine plan areas, which included all of 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 causes and effects relating to issues identified for further validation. The Iteration 2 SAAG was held on 28th February 2018. As part of this session the SAAG members were invited to comment on the approach being taken to the options assessment and examples of some of the completed assessments of the groupings were provided.

The advisory group consists of the following organisations –

- Royal Yachting Association;
- Chamber of Shipping;
- Devon Maritime Forum
- Wildlife Trusts;
- Environment Agency;
- 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 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 West 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 positive 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 (e.g. 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.

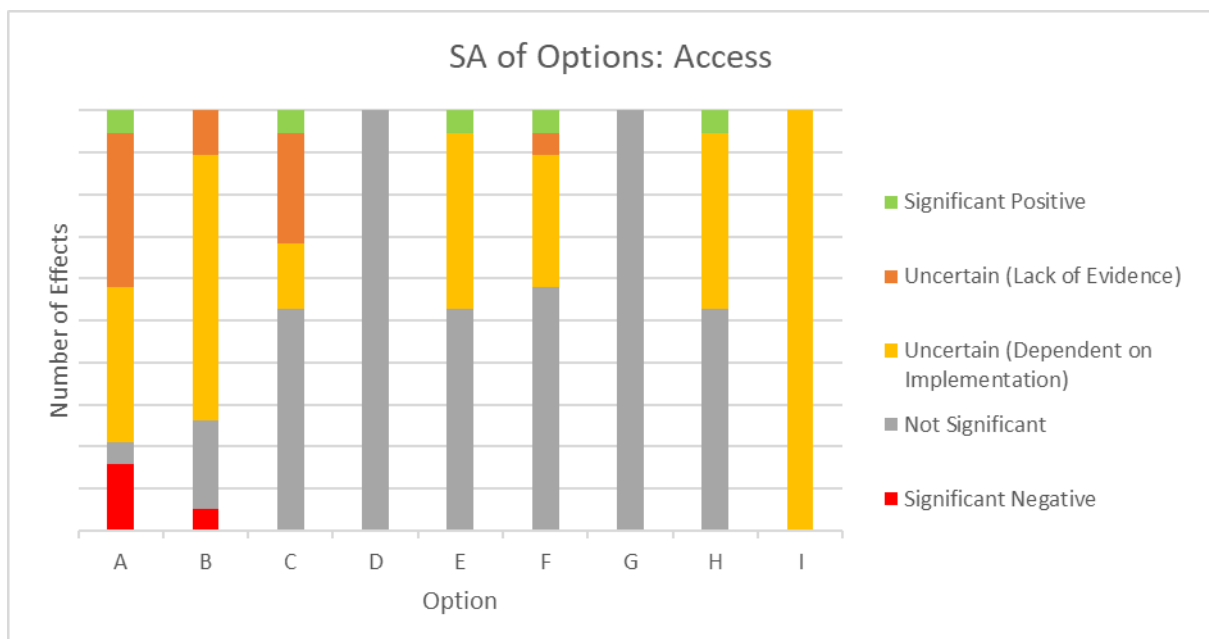
In addition, the assessors have highlighted, where possible, mitigation which can be considered to assist in the identification and development of the preferred options for the South West Marine Plan Areas.

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

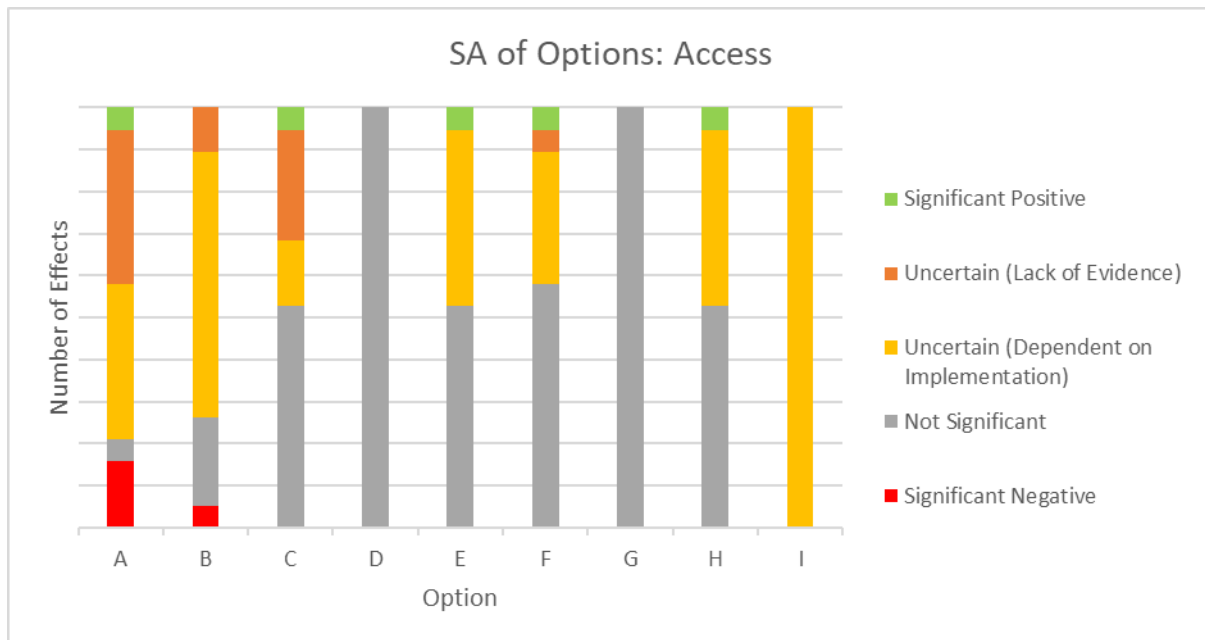
3.1 Introduction

The following sections set out the results of the options assessment for the South West Marine Plan Areas. 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 policy could be implemented.

For each grouping a comparative bar chart is provided below which shows the performance of each of the options. A summary of the assessment is then provided to aid the interpretation of the chart which makes reference to the relevant SA Sub-Topics.

For further detail on the results of the assessments, including the references to the supporting data which justifies the assessment, please see Appendix A: South West Inshore and Offshore Marine Plan Areas Assessment Spreadsheet.

3.2 Access



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

Any potential coastal or marine development which is inter-visible with the coast may influence views in different ways (Landscape_132, Landscape_133, Landscape_170). In the South West Marine Plan Areas, a significant sense of place is derived from the terrestrial / marine interaction at the coast and the associated seascapes and landscapes. Options E and H support enhanced public access only where appropriate and sustainable, and as such, would presumably take effects on the seascape and landscape into consideration. As such, their implementation could have significant positive effects on seascape and landscape whilst still enabling improved access.

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 and not improve access, could have significant positive effects on pollution and water quality as it would remove risks associated with development, thereby not exacerbating the adverse effects as highlighted within the baseline database.

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 contribute to the breach of national objectives for air quality, or eutrophication and acid deposition effects (Air_19, Air_23, Air_28). Increasing

access to land-based infrastructure which facilitates marine activity, and vice versa, could lead to increased emissions to air through increased land and marine vehicle / ship movements, hence the implementation of Option B X-INF-1 could have significant negative impacts on air quality.

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 areas is inadequate and unsustainable into the future (Communities_159, Communities_160, Communities_167). Marine and terrestrial planning need to become integrated to ensure appropriate coastal development occurs whilst maintaining future access to the marine environment (Communities_178). Option A would have a significantly negative impact on health and wider determinants of health as well as effects on communities, as it would not increase access to the marine environment. As Option C supports increased social benefits, which includes health, wider determinants of health and communities, its implementation would have a significant positive impact on this SA sub-topic.

It is anticipated that the amount of wave and tidal energy being generated will increase markedly up to and beyond 2020. This is expected to result in a change in access for recreational users (Economy_542, Economy_675, Economy_681). Option F considers potential conflicts which may exist between different users accessing the marine environment. Whilst the extent of conflict will be sector and area dependent, and the resolution required will be determined by this, it is considered likely that Option F will result in a significant positive effect for energy generation and infrastructure development within the South West Marine Plan Areas.

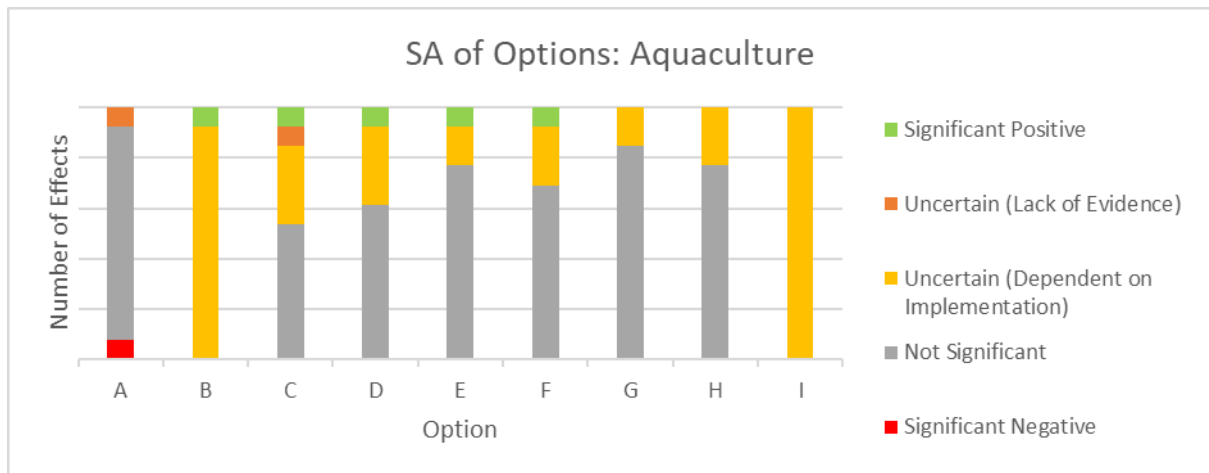
Significant negative effects can occur on marine mega fauna and ornithology via recreational disturbance, marine eco-tourism, sightseeing and pleasure boats, dogs, kite surfers, canoes, jet skis, paddle boards and commercial fishing activity around all parts of the coastline (Biodiv_465, Biodiv_502, Biodiv_503, Biodiv_649, Biodiv_536, Biodiv_537, Biodiv_538, Biodiv_546, Biodiv_547, Biodiv_554, Biodiv_555, Biodiv_556). Increased public access to the marine plan areas would exacerbate these baseline issues, and associated developments such as the construction and extension of marinas or harbour developments amongst other activities, can lead to habitat loss (Biodiv_453). The assessment therefore identifies that Option A could have significant negative effects on both marine mega fauna and ornithology within the South West Marine Plan Areas.

Mitigation

- The existing policies within Option B seem to somewhat contradict one another. Whilst X-ACC-2 supports increased public access, policies X-SOC-1 and X-ACC-1 state that other proposals should simply avoid, minimise or mitigate significant adverse impacts on public access.
- If Option B Policy X-INF-1 were to include mitigation measures for the increased sulphur oxides and nitrous oxides caused as a result of increased marine activity, its adverse effects on air pollutants would be reduced.

- If Option F were more stringent, it could have a significant positive effect on leisure, recreation and tourism.
- Without suitable bio-security measures, developments or proposals within the marine environment could potentially increase commercial and recreational boating traffic within close proximity to vulnerable sites, potentially putting native species at risk from invasive species (Biodiv_274, Biodiv_636). This should be taken into consideration when increasing development and access across the South West Marine Plan Areas, and suitable measures must be devised to prevent the spread of invasive species.

3.3 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 and F 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 (Biodiv_467). The SA database reports issues related to ingestion of or entanglement in marine litter for marine mammals and turtles (Biodiv_467).

Aquaculture may lead to the escape of invasive species that interact with native shellfish (see below). Aquaculture of native species may also affect wild populations through, for example, production of pseudofaeces, smothering of benthic habitats and competition for habitats and food. A lack of policies could make the situation worse or significantly worse and therefore a potential 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). None of the proposed options would have a significant effect on the pollution and water quality SA sub-topic. The assessment identifies either no significant effects or uncertainty due to lack of data. Where uncertainty exists, the effects are unlikely to be significant, given the environmental benefits of aquaculture and the anticipated scale of this development type.

The Fal, Helford, Fowey, Erne, Kingsbridge, Camel and Taw estuaries have moderate ecological status. The chemical groundwater status is classified as 'Poor' in most of the South West River basin district area, including up to coastal areas. Of the 33 classified Shellfish Waters in the South West River Basin Management Plans, only two are achieving their objectives. This will result in shellfish having to undergo deuration phases prior to consumption (Water_187). Option F aims to improve the water quality in the Taw and Torridge estuary, and would therefore result in a significant positive effect.

No direct effects of aquaculture developments on ports and shipping have been identified in the SA database. Aquaculture can represent a constraint for this sub-topic, for example, through increased competition for sea space and navigational safety issues, as outlined in the baseline data entry 'Economy_621'. It can also present opportunities, for example, through increasing port activity. For small ports, aquaculture could comprise a proportionately more significant revenue stream than for larger ports, however, this is geography dependent as ports only benefit if they are located near aquaculture sites.

There are several important shellfish beds in the South West Marine Plan Areas including pacific oyster in Salcombe, Bigbury and Avon, blue mussel and pacific oyster in the Dart, Fowey and Yealm Estuaries, and native oyster, blue mussel and pacific oyster in Truro, Tresillian and Fal (Economy_300). Options B, C and D aim to support the provision of infrastructure for fisheries, aquaculture and related industries. Option D uses the term 'sustainable aquaculture' which is assumed would include the long-term sustainability of the industry. Improved infrastructure such as processing facilities, fish markets, transport and transport links are likely to be beneficial to fishing and aquaculture, and as such, significant positive effects have been SA database between aquaculture and recreational stakeholders (Economy_631). Some options which promote 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 the recreation and leisure SA sub-topic. Option E may result in significant positive effects on leisure and recreation as the Option requests that proposals demonstrate that they will, in order of preference, a) avoid, b) minimise, c) mitigate impacts to already existing users. This is likely to safeguard key leisure and recreational areas from aquaculture developments.

There is no evidence in the SA database which suggests that aquaculture represents a key issue for energy generation and infrastructure. However, this grouping may have an impact on the development of energy projects at sea and within the coastal environment. The potential effects are unlikely to be significant.

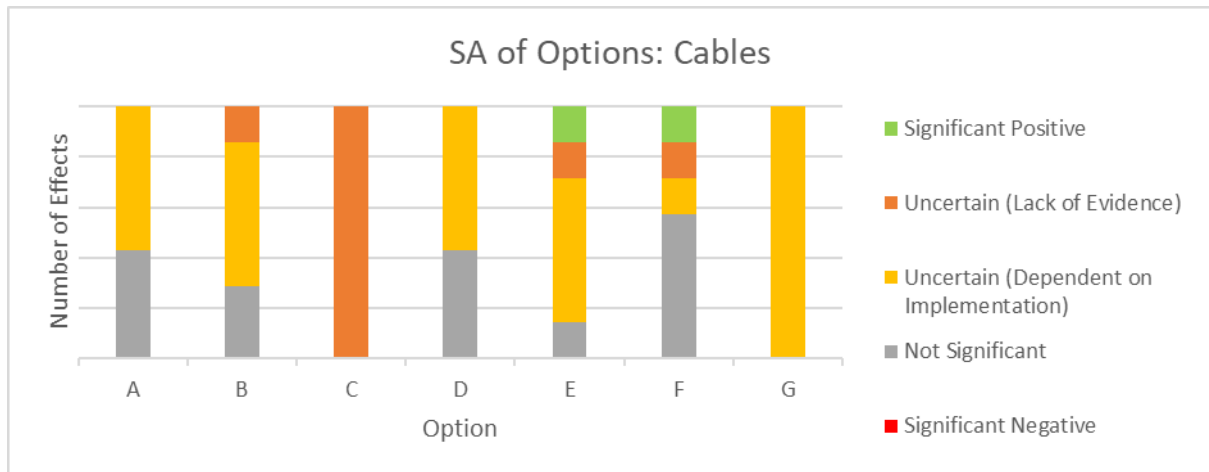
Aquaculture can influence primary and secondary productivity and can cause a series of cascade effects on the water column, including on benthic species and phytoplankton (Economy_629). Effects of pollution from aquaculture can also affect both benthic species and plankton. However, aquaculture can also have positive effects on the marine environment, particularly water quality. Uncertainty has therefore been recorded in the assessment with regards to benthic and inter-tidal ecology, fish and shellfish and plankton.

The SA database reports an issue related to the marked reductions in waterbird survival as a result of shellfish harvesting (Biodiv_452). It is unclear if this refers to commercial or recreational harvesting of shellfish and therefore an uncertain effect is identified. Without specific proposals targeting this issue, the problem could worsen.

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.

3.4 Cables



The assessment of the cables grouping of options has identified that there is the potential for significant positive effects with relation to Option E and F. No potential significant negative effects have been identified.

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 energy generation (Economy_473).

The South West coastline acts as a landing point for a substantial number of economically important cable connections across the Atlantic to North America. (Economy_528). The South West Marine Plan Areas contain 47 telecommunication cables, a larger number than the North East, North West or South East Marine Plan Areas, reflecting the strategic importance of the South West as a telecommunications gateway. Of these telecommunication cables, 30 are currently active and the remaining 17 are classed as disused (Economy_735).

Options E and F support the development of new and existing landfall sites as well as considering the impact of proposals on existing interconnecting cables and ensuring the demonstration that their activity would not reduce opportunities of new and existing landfall sites. Due to the importance of submarine cables and the potential positive impact they may have on future energy generation, significant positive effects have been identified for energy generation and infrastructure.

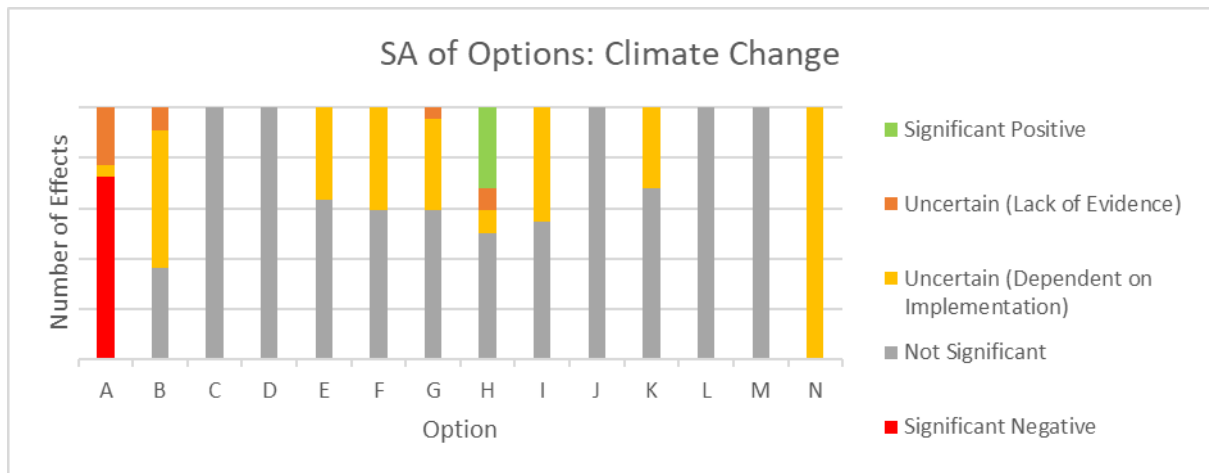
Impacts from cable installations on the sea bed are low, spatially minor and tend to occur due to the physical disturbance incurred during installation. Impacts on biodiversity, habitat, flora and fauna will occur where cable protection, for example, rock armour or concrete mattresses, is required where cable burial is not feasible and, potentially, within the intertidal area where the cable lands (Economy_626). Due to the unknown location and size of developments, uncertainty has been recorded with regards to effects on the 'biodiversity, habitats, flora and fauna' SA topic.

Potential negative effects may also occur if a cable runs through any site designated as being of national or international nature conservation or cultural heritage importance. Uncertainty has been recorded with regards to cultural heritage as the effects had would be dependent upon the proposals that come forward.

Mitigation

No specific mitigation has been identified.

3.5 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 Option H has 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 impacts on submerged material through biological, chemical and physical changes (Cultural_168, Cultural_174, Cultural_181). Option A would have a significantly negative impact on heritage assets both within and adjacent to the marine plan areas as it does not combat issues as highlighted in the baseline database. As Option H prevents increased sea surface temperature and acidity levels as a result of proposals, and its implementation would have a significant positive effect on heritage assets within the South West Marine Plan Areas.

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 and result in significant negative effects on seabed substrates and bathymetry.

Increased storminess and sea level rise as a result of climate change are leading to erosion, coastal change, impacts upon hydrological processes and could exacerbate the impacts of tides and currents on coastal areas (Geol_227, Geol_233, Water_298). 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).

The majority of the preferred management options for coastal erosion within the South West Marine Plan Areas Shoreline Management Plans are 'no active intervention', interspersed with small areas of 'hold the existing defence line', particularly at Newly in Plymouth and Start Bay in South Devon (Geol_125). Despite

the preferred management options highlighted within the South West Marine Plan Areas Shoreline Management Plans, Option A is predicted to have significant negative impacts on coastal features and processes and tides and currents.

There is a lack of baseline data evidence regarding the relationship between climate change and water temperature and salinity. However, as Option H ensures that proposals must not increase sea surface temperature or acidity levels, its implementation would have a significant positive impact on water temperature and salinity.

Climate change is predicted to exacerbate pollution and water quality as more frequent and intense storm events lead to an increased frequency of potential storm and/or sewer overflows, fluvial flows and flooding (Water_300, Water_338). In the South West, historic mining has left legacy issues related to runoff and water quality, which may be exacerbated due to increased storminess linked to climate change (Water_364). Option A does not address issues highlighted within the SA database regarding pollution and water quality and would therefore result in significant negative effects on water quality.

Despite some positive opportunities surrounding employment (Climate_208), Option A would have significant negative impacts on climate change resilience and adaptation as does not address the key baseline issues regarding:

- increased rate of coastal erosion with implications for buildings, infrastructure, activities and development on the coast (Climate_116, Climate_127);
- realignment of infrastructure and housing as erosion and inundation become uneconomic or undesirable to stop (Climate_131);
- coastal squeeze increase and narrowing of beaches leading to loss of both dune systems and intertidal foraging habitat (Climate_126, Climate_129, Climate_140); and
- overall damage to a wide range of social, economic and environmental assets.

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 if Option A were implemented, with potential significant negative effects resulting in relation to protected equality groups.

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 are likely to increase alongside increasing effects of climate change. Implementation of Option A would have significant negative impacts 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; 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). Saltmarshes are particularly sensitive to the effects of climate change combined with resultant human responses (Climate_193).

Specifically, in the South West Marine Plan Areas, 96% of the European sandeel population within Britain inhabits the Severn Estuary, and is critically endangered partially due to both habitat loss and zooplankton composition change associated with climate change (Biodiv_730). Declines in the availability of sandeels has seen an acute fall in breeding success of black-legged kittiwakes and has recently been seen in seventy other offshore species such as common guillemot as well as inshore species such as arctic skua (Biodiv_449). Risk of harmful algal blooms have also been linked to mortality of benthic invertebrates and fish in coastal waters in South West England and West Scotland (Biodiv_623), caused by anthropogenic nutrient enrichment of coastal waters combined with an increased tendency for, and longer duration of, stratification of the water column caused by climate change.

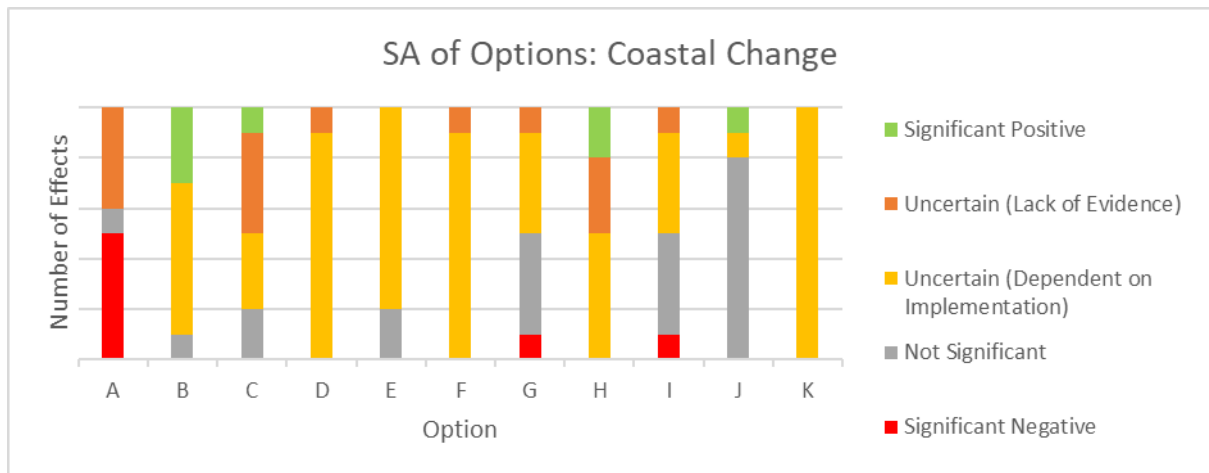
While the specific impacts of climate change on the marine environment remain relatively uncertain, it is important that robust strategies are developed to manage them. Protecting and restoring marine habitats will increase their resilience to climate change (Climate_132). Implementation of Option A would have significant negative impacts on all SA sub-topics within the 'biodiversity, habitats, flora and fauna' SA topic, as it fails to address all relevant key baseline issues regarding both the direct and indirect effects of climate change. Option H could potentially have significant positive effects on protected sites and species, benthic and inter-tidal ecology, fish and shellfish, marine mega fauna, plankton and non-native invasive species.

Mitigation

- If implemented in conjunction with other policies, Option G could have a significant positive effect on heritage assets within the marine plan areas; seabed substrates and bathymetry; effects on seascape and landscape; pollution and water quality; and climate change resilience and adaptation.

- If more stringent, Option B X-MPA-2 would better enhance an MPA's resilience to climate change, resulting in potential positive effects on protected sites and species.
- If more stringent, Policy B X-CC-3 could have a positive effect on coastal features and processes, ie if it avoided all adverse impacts on coastal change rather than just significant adverse impacts.
- Whilst Policy H could have a direct significant positive effect on plankton and shellfish biology, with wider effects had on protected sites and species, benthic and inter-tidal ecology, fish, marine mega fauna and non-native invasive species, its scope is quite small so should be used in conjunction with other policies.
- If more stringent, Option I could reduce the impacts of climate change on tides and currents, seabed assets and all sub-topics under the 'biodiversity, habitats, flora and fauna' SA topic, potentially resulting in significant positive effects.
- It is unclear whether Option K would maintain or enhance biodiversity, hence its effects have been assessed 'uncertain (dependent on implementation)'. Clarification would have the potential to give rise to significant positive effects.

3.6 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 Options A, G and I whereas Options B, C, H and J have the potential to give rise to significant positive effects.

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 Areas. Changes in habitat condition and habitat loss through sea level rise, coastal squeeze and coastal change (Biodiv_535) has resulted in significant negative effects for both ornithology and benthic and inter-tidal ecology, fish and shellfish.

It is assumed that 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. 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 the assessment has therefore identified potential significant positive effects from these options.

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, and therefore significant positive effect has been identified.

It is assumed that protection against coastal change will generally have a positive effect on the seascape and landscape but is dependent upon how this is approached. Option H favours soft engineering approaches, which could be more visually attractive but could have negative implications in the future eg by being short-lived or resulting in the loss of land through managed retreat.

There is a potential for adverse impacts from aggregate extraction on seabed substrates and bathymetry and coastal features and processes, through changes to the hydrodynamic regime that may alter coastal processes. Options I and G take this

into account by assessing the potential impacts to the bathymetry from nearshore mineral extraction sites. However, this is not the only contributing factor to adverse effects on seabed substrates and bathymetry and coastal features and processes, and therefore a minor positive effect has been identified. The addition of beach engineering schemes could have negative implications on coastal features and processes and create issues further down the coast, however, this would be dependent upon what schemes were put in place.

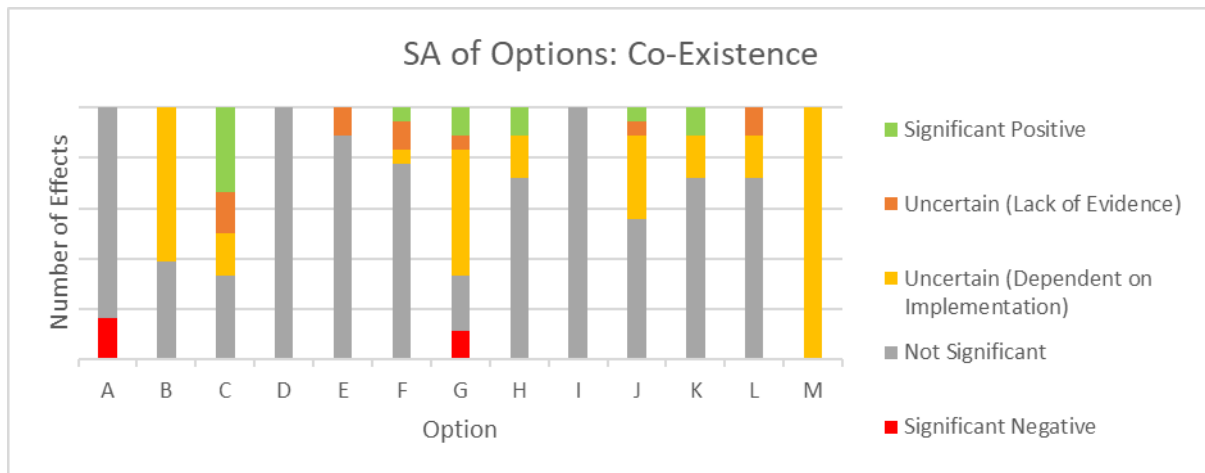
Conversely, it is assumed that by considering the future applications of nearshore mineral extraction and the potential impacts on bathymetry, coastal processes and/or coastal change could limit aggregate extraction within the South West Marine Plan Areas. For this reason, Options G and I have been deemed to have a potential significant negative effect on aggregate extraction.

There is extensive coastal erosion in the South West Marine Plan Areas which is causing a decrease in the intertidal area. Some of this is caused by the presence of 'hard' coastal defences. This in turn is causing loss of habitat, particularly saltmarsh and mud flats, which are feeding grounds for birds. Existing policy X-BIO-3 within Option B and Option H focus on protecting and enhancing biodiversity from adverse effects of coastal change. Option H opts to provide softer, eco engineering defences that improve biodiversity as well as ensuring that adequate space is allowed for coastal habitats. For these reasons, potential significant positive effects have been identified in relation to ornithology and benthic and inter-tidal ecology, fish and shellfish.

Mitigation

- Mitigation would be needed to ensure that development is sensitive to the historic environment. Any exposed assets would need to be carefully handled and preserved as much as possible.

3.7 Co-Existence



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

The co-existence of various marine developments occurring at sea may enhance or prevent coastal squeeze. A strategic oversight of licenses and planning permission for land claim is needed within the estuaries in Devon to prevent coastal squeeze (Landscape_171). In the absence of adaptation and with increasing coastal squeeze, beaches will narrow, and some dune systems may be lost (Climate_129). Option A would enable this situation to worsen, hence would have a significant negative impact. The implementation of Option G, which seeks to promote land-based coastal infrastructure and industries to facilitate marine activities, would also worsen issues highlighted in the SA database, resulting in a potential significant negative effect. Conversely, Options C and F may have positive significant effects on coastal features and processes.

There are cumulative effects of agricultural runoff and combined sewer overflows on water quality in the South West Marine Plan Areas (Water_367), and combined effects from co-existing marine developments could occur on water quality (Economy_421). No significant effects are predicted on pollution and water quality for the proposed options, but it should be recognised that an issue does exist. It is assumed that other policies within the Marine Plans will control water pollution as far as possible from developments and activities in and adjacent to the Marine Plan Areas.

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). No significant effects are expected on marine litter from the proposed options, but again, it should be recognised that an issue does exist.

Co-existence of various marine developments may increase/decrease greenhouse gas emissions. The SA database does not list specific examples/issues related to this, hence the assessment has been deemed 'not significant' for Option A. The development of renewable energy could contribute to the decrease of greenhouse gas emissions in the long term.

Saltmarshes are particularly vulnerable to the effects of a range of physical changes which interact with one another including sea level rise, storm events, and changes in the availability and movement of sediment (Climate_193). Without any measures being put in place to improve climate change resilience and adaptation, as is proposed by Option A, these baseline issues will worsen with time and could result in significant negative effects. Considering these currently pressing issues on the coast, implementation of Option G would have significant negative effects as it promotes the development of land-based infrastructure and industries by the coast.

There is competition for marine resources and sea space (Economy_621), which affects ports and shipping. Implementation of Options C, G, J and K would have significant positive effects on ports and shipping as they seek to ensure compatibility between marine activity and other sectors. There are issues related to non-port related developments such as housing being approved next to ports and marine industry sites.

There is an opportunity for aquaculture products to be used for biofuel and cosmetics rather than only a food source (Economy_768), and bioremediation opportunities exist in the Taw/Torridge estuary (Economy_769). There is competition surrounding marine developments (Economy_628). As Option C promotes consideration of opportunities for co-existence and co-location with other activities, it would likely have a significant positive impact on fisheries and aquaculture within the South West Marine Plan Areas.

The sea can provide a variety of leisure, recreation and tourism 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 impacts of multiple existing and new activities and developments can occur (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). Implementation of Option C would have a significant positive impact on leisure, recreation and tourism as it promotes consideration of opportunities for co-existence and co-location with other activities. Option K would also have significant positive impacts on leisure and recreation.

An interaction is recognised between renewables and other sectors, including recreation, commercial fisheries, other infrastructure and/or extractive industries and shipping (Economy_681). Option H would have significant positive effects on energy

generation and infrastructure development as it supports the development of renewable energy and promotes consideration for co-existence with other activities.

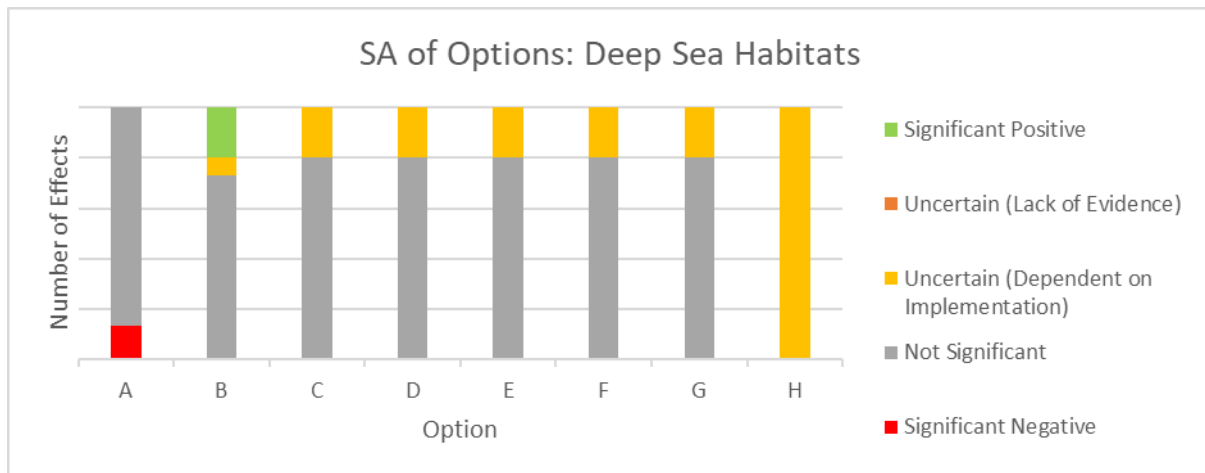
Seabed assets are part of larger energy and communication schemes and are essential in supporting the operation and development of renewables. Cumulative effects exist at landfall locations (Economy_627), and there are key baseline issues concerning competition of space with other sectors (Economy_727, Economy_779). To do nothing, as per Option A, it is likely that the situation will worsen over time as infrastructure grows. Options C, G and H may have positive significant effects on seabed assets as they promote opportunities for co-existence and co-location.

The combined effects of land reclamation, sea level rise, storm events, erosion, coastal squeeze and changes in the availability and movement of sediment are having adverse effects on saltmarsh and mudflat habitats in estuaries (Climate_193, Geol_229). None of the proposed options are predicted to have a significant effect on the biodiversity, habitats, flora and fauna SA topic.

Mitigation

- Proposals should prevent the increase in coastal squeeze, by:
 1. Considering strategic and coordinated approaches to approach proposed coastal development which may enhance coastal squeeze.
 2. Ensuring consideration of adaptive solutions to climate change by proposals to prevent the increase of coastal squeeze.
- Proposals should include appropriate measures to manage the potential cumulative effects between seabed assets and other marine developments over time.
- Opportunities exist for cooperation to enhance the resilience of existing projects and/or infrastructure to climate change.

3.8 Deep Sea Habitats



The assessment of the deep-sea habitats grouping of options has identified that there is the potential for significant negative effects with relation to Option A, whereas Option B has the potential to give rise to significant positive effects.

As highlighted by issues 654SW and 841SW, deep sea habitats within the South West Marine Plan Areas, which are unique amongst all the English marine plan areas, are vulnerable to impacts from mobile fishing gear such as that used for bottom trawling, and from marine litter (usually discarded nets).

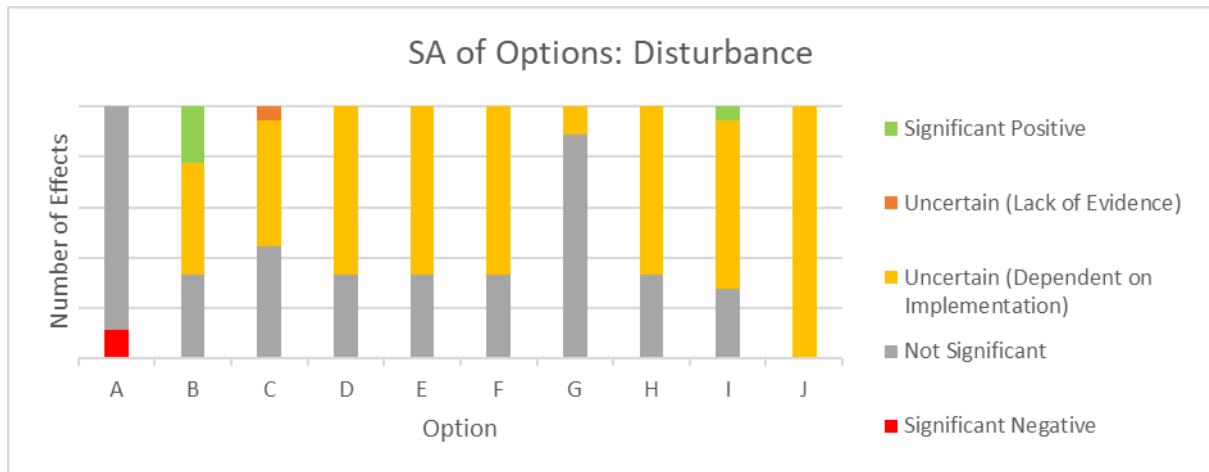
Implementation of Option B would have significant positive impacts on marine litter, and on protected sites and species including deep-sea habitats, as it supports proposals that enhance coastal habitats where important in their own right and/or for ecosystem functioning and provision of goods and services. It also specifically mentions management of the introduction of litter into the marine environment and fishing activity, which, as highlighted by issues 841SW and 654SW, are the main threats to deep-sea habitats.

To do nothing as per Option A, would have significant negative effects on benthic and intertidal ecology, fish and shellfish and marine mega fauna as it would not combat the current negative trend as highlighted within the SA database (Biodiv_487, Biodiv_542, Biodiv_562, Biodiv_574, Biodiv_708, Biodiv_502, Biodiv_536, Biodiv_546, Biodiv_549, Biodiv_567, Biodiv_722). Option B would, however, address this negative trend, and as such, would have significant positive effects on benthic and intertidal ecology and fish and shellfish.

Mitigation

- Whilst significant negative effects on benthic and intertidal ecology, fish and shellfish and marine mega fauna were identified in the assessment of Option A, due to the negative trend in the baseline data, implementation of most of alternative options would act, at least in part, as appropriate mitigation.

3.9 Disturbance



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

Benthic and intertidal ecology and fish and shellfish are subject to disturbance from several activities, including the impacts of mobile fishing gear and marine litter (Biodiv_487); impacts on subtidal sediments from offshore industry including aggregate extraction, dredging and offshore energy production as well as loss of subtidal rocky habitat as a result construction, infrastructure (mainly coastal) or smothering from dredged deposits (Biodiv_542); removal of non-target species and habitat damage or loss, including sensitive reefs and maerl beds within intertidal and subtidal rocky and estuarine habitats as a result of shellfisheries (Biodiv_562); and impacts on coastal lagoons as a result of infilling and marine construction (Biodiv_574). To do nothing, as per Policy A, would have significant negative effects, whereas Option B would have a significant positive effect on benthic and intertidal ecology and fish and shellfish within the South West Marine Plan Areas.

Marine mega fauna is also impacted by numerous disturbance activities. Impacts occur on marine mega fauna from fisheries (including bycatch from inshore pots, entanglement in nets and competition for food resources), marine eco-tourism, sightseeing and pleasure boats, and anecdotal evidence exists of vessel collisions off Cornwall (Biodiv_502, Biodiv_536, Biodiv_546, Biodiv_549, Biodiv_567). Further conflicts exist between seal populations and humans, with instances of legal shooting of problem animals, despite Defra guidelines stating that this should be a last resort option, and that this is thought to be an ineffective method of controlling the population (Biodiv_722). Whilst Option A would have significant negative effects on marine mega fauna, implementation of Option B could have significant positive effects on marine mega fauna.

As Option I specifically mentions that relevant local authorities should make best efforts to inform coastal access users about potential negative effects on habitats, species and heritage assets as well as promote considerate access in areas of ecological or historical importance, its implementation would have a significant positive effect on heritage assets within the South West Marine Plan Areas.

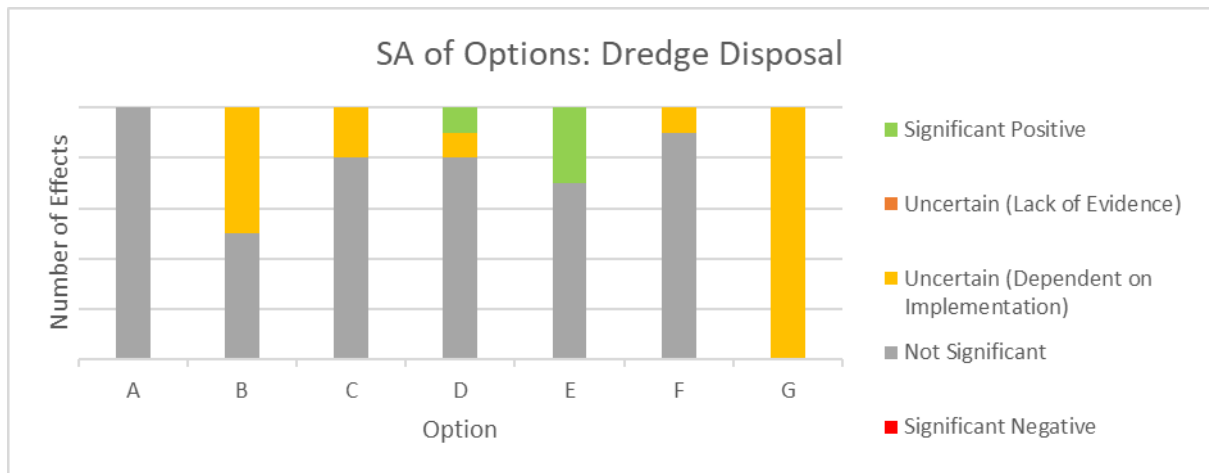
Dredging activities within the South West Marine Plan Areas for activities such as mineral extraction has been or are being investigated within the Fal Bay to St Austell Bay potential Special Protection Area and the St Ives Bay area. There are a number of harbours that regularly carry out capital or maintenance dredges which could potentially affect important areas for birds and other marine life including the Tamar Complex Special Protection Area, Fal Estuary Special Area of Conservation, and Fal Bay to St Austell Bay potential Special Protection Area, either alone or in combination with future developments (Biodiv_489). Option B would have a significant positive impact on protected sites and species if it were implemented.

In addition to dredging activities affecting important areas for birds and other marine life (Biodiv_489), there is potential for seabird bycatch from driftnet and gillnet fisheries in southern England (Biodiv_580). Option B would therefore have a potential significant positive impact on ornithology if it were implemented.

Mitigation

- Whilst significant negative effects were assessed for Option A on benthic and intertidal ecology, fish and shellfish and marine mega fauna due to the negative trend in the baseline, implementation of the majority of alternative options would act, at least in part, as appropriate mitigation.

3.10 Dredge Disposal



The assessment of the dredge disposal grouping of options has identified that there is the potential for significant positive effects with relation to Options D and E, whereas none of the options have the potential to give rise to significant negative effects.

Potential changes in coastal features and processes occur as a result of dredging and disposal activities. There are opportunities to re-use dredged material for beach recharge to nourish and sustain beaches in the South West (Economy_776), hence a significant positive effect is identified for Option E.

Disposal activities have the potential to release contaminants in the water column and subsequent effects can occur on marine species in the sediment and in the water column (Water_171). Contamination issues on a marine conservation zone have been reported as a result of dredging activities at HMNB Devonport and disposal of dredged material at the Rame Head South disposal site (Economy_588). Implementation of Option D would have positive significant effects on pollution and water quality within the South West Marine Plan Areas as it promotes the execution of characterisation studies to identify new or alternative dredging disposal sites.

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. Over the past two decades, the areas permitted for disposal have altered, and a large number of sites have been closed, partly in response to legislative changes restricting the disposal at sea of certain types of material. There is currently a view to restrict the opening of new disposal sites (Economy_711). Implementation of Option E could have significant positive effects on ports and shipping through the re-use of waste for coastal protection against flood and erosion.

There are potential opportunities for the recycling of dredged material through beach recharge to nourish and sustain beaches. This would reduce flood and coastal erosion risk and enhance economic growth through environmental and tourism

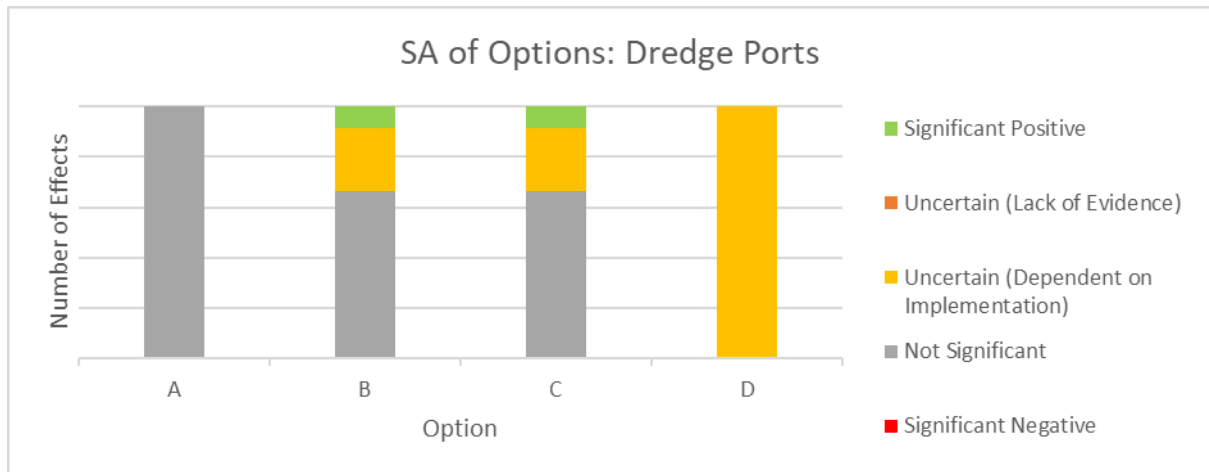
benefits (Economy_776). Option E would therefore have significant positive effects on tourism if implemented.

Conflict exists between other marine users, habitats and species as a result of disposal activities, as highlighted by the baseline data regarding dredging and disposal at HMNB Devonport and Rame Head South disposal site respectively, within the South West Marine Plan Areas (Economy_588). Environmental issues exist surrounding contamination of biodiversity by dredging activity and material which sees the resuspension of poorly degradable and persistent chemicals, with resultant bioaccumulation impacts on marine organisms such as fish and marine mammals (Water_171). There is a need to dispose of dredge material safely and employ beneficial reuse where appropriate in order to reduce adverse impacts on other marine users, habitats and species (Economy_774).

Mitigation

No specific mitigation has been identified.

3.11 Dredge Ports



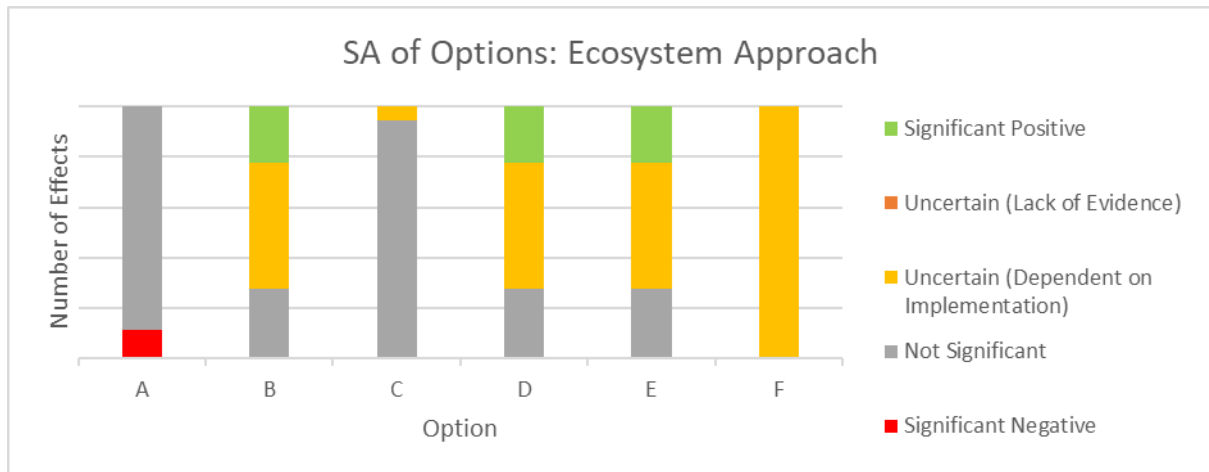
The assessment of the dredge ports grouping of options has identified that there is the potential for significant positive effects with relation to Options B and C, whereas none of the options have the potential to give rise to significant negative effects.

Many of the ports in the South West Marine Plan Areas have dredged access channels to facilitate the accommodation of vessels (Economy_725). Maintenance and capital dredging are critical activities that the ports need to execute to allow the safe navigation of sea users including for shipping vessels (Economy_706). Options B and C would have positive significant effects on ports and shipping as they seek to reduce impacts on licenced dredging and disposal areas and support enhanced access and safe navigation around ports and harbours.

Mitigation

No specific mitigation has been identified.

3.12 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.

Dredging activities within the South West Marine Plan Areas for activities such as mineral extraction has been or are being investigated within the Fal Bay to St Austell Bay potential Special Protection Area and the St Ives Bay area. There are a number of harbours that regularly carry out capital or maintenance dredges which could potentially affect important areas for birds and other marine life including the Tamar Complex Special Protection Area, Fal Estuary Special Area of Conservation, and Fal Bay to St Austell Bay potential Special Protection Area, either alone or in combination with future developments (Biodiv_489). Options B, D and E would have a significant positive impact on protected sites and species if it were implemented.

Benthic and intertidal ecology and fish and shellfish are subject to disturbance from several activities, including the impacts of mobile fishing gear and marine litter (Biodiv_487); impacts on subtidal sediments from offshore industry including aggregate extraction, dredging and offshore energy production as well as loss of subtidal rocky habitat as a result construction, infrastructure (mainly coastal) or smothering from dredged deposits (Biodiv_542); removal of non-target species and habitat damage or loss, including sensitive reefs and maerl beds within intertidal and subtidal rocky and estuarine habitats as a result of shellfisheries (Biodiv_562); and impacts on coastal lagoons as a result of infilling and marine construction (Biodiv_574). In addition, changes in agricultural practises and development has led to a loss of coastal grazing marsh in areas such as the land east of Weston-Super-Mare, the coastal zone of Portishead and the Portbury Dock Area (Biodiv_708). To do nothing, as per Policy A would have significant negative effects, whereas implementation of Options B, D and E would have significant positive effects on benthic and intertidal ecology and fish and shellfish within the South West Marine Plan Areas.

Impacts occur on marine mega fauna from fisheries (including bycatch from inshore pots, entanglement in nets and competition for food resources), marine eco-tourism, sightseeing and pleasure boats, and anecdotal evidence exists of vessel collisions

off Cornwall (Biodiv_502, Biodiv_536, Biodiv_546, Biodiv_549, Biodiv_567). Further conflicts exist between seal populations and humans, with instances of legal shooting of problem animals, despite Defra guidelines stating that this should be a last resort option, and that this is thought to be an ineffective method of controlling the population (Biodiv_722). Whilst Option A would have significant negative effects on marine mega fauna, implementation of Options B, D and E could have significant positive effects on marine mega fauna.

In addition to dredging activities affecting important areas for birds and other marine life (Biodiv_489), there is the potential for seabird bycatch from driftnet and gillnet fisheries in southern England (Biodiv_580). Options B, D and E would have a significant positive impact on ornithology if they were implemented.

Mitigation

- Whilst significant negative effects were assessed for Option A on benthic and intertidal ecology, fish and shellfish and marine mega fauna due to the negative trend in the baseline, implementation of the majority of alternative options would act, at least in part, as appropriate mitigation.

3.13 Employment Diversification



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

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 can be linked to social and economic disadvantages. Deprivation in relation to income, employment and education (Indices of Multiple Deprivation, 2015) shows more deprived Lower Super Output Areas (LSOA) on the coast compared to the rest of England, particularly in the South West (Communities_40). It is likely that the current situation is likely to worsen and therefore Option A 'do nothing' could have a significant negative effect on both health and wellbeing and the protection of equality groups.

It is assumed that the supply of further employment opportunities as well as providing opportunities to upskill, will help to improve health and deprivation in the South West Marine Plan Areas. However, none of the options makes specific linkages to this, and therefore the effects of Options B and C would be dependent upon implementation.

Fishing activities can help support communities which are fragile by providing direct employment but also employment along the supply chain which is 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 (CFP) has made fishing as a livelihood and way of life difficult in recent years (Communities_49). Considering this, Option A 'do nothing' could have a significant negative effect on the industry as well as local communities.

Existing policy X-FISH-1 within Option B supports the diversification of a sustainable fishing industry as well as ensuring the industry is resilience to the effects of climate change. The assessment has therefore identified a potential significant positive effect as Option B it tackles the current decline of the industry within the South West Marine Plan Areas.

Decline in employment in fishing and improvement in education promotes employment in other sectors or emigration of younger generation from local fishing communities. The younger generation is turning to other, more secure, jobs in the local and regional economy (Communities_52). Option C aims to enable the use of existing skill sets and encourages employment in new and growing marine industries. Aquaculture is a growing marine activity (Communities_92) in the South West, so it has been assumed that Option C could include jobs within aquaculture and has therefore resulted in the identification of significant positive effects.

The defence sector is a large employer within the region. Option C encourages employment in new and growing marine industries, but it is uncertain whether this will include the defence sector. There could also be potential for conflict with other emerging industries, however, there is little supporting evidence within the baseline and therefore uncertainty has been recorded.

There are also uncertainties regarding Hinkley Point and its future employment opportunities. It is likely to require a larger and more highly skilled workforce. Options do not directly address the potential from nuclear energy and therefore no significant effects have been identified.

Fishing is having a negative impact on fish and shellfish through pollution, invasive fishing techniques and over fishing, as well as impacts on marine mega fauna from collisions, mobile fishing gears and accidental capture. For this reason, Option A could result in significant negative effects. Option B supports the diversification of a sustainable fishing industry. It is assumed that this could include more sustainable fishing techniques which will avoid overfishing and any other adverse effects. For this reason, significant positive effects have been identified in relation to fish and shellfish. It is unclear the impact that this option will have on marine mega fauna.

Mitigation

No specific mitigation has been identified.

3.14 Employment Growth Skills



The assessment of the employment growth and skills grouping of options has identified that there is the potential for significant negative effects with relation to Option A, whereas Options F, J and K have the potential to give rise to 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.

Poor health can be linked to social and economic disadvantages. Deprivation in relation to income, employment and education (Indices of Multiple Deprivation, 2015) shows more deprived Lower Super Output Areas (LSOA) on the coast compared to the rest of England, particularly in the South West (Communities_40). Many coastal communities comprise of growing numbers of older people with significant care needs, which places an increased demand on health and social care services (Communities_45). Without intervention it is likely that the current situation will worsen and therefore Option A could have a significant negative effect on both health and wellbeing as well as the protection of equality groups.

Option C aims to support proposals that enhance social benefits by, for instance, improving health, wellbeing, quality of life and access to high quality public open spaces. This option has performed well as it aims to enhance social benefits such as improving health, wellbeing and overall quality of life. Significant positive effects have been identified in relation to health and wellbeing and the protection of equality groups. Options do not directly address inequality issues. However, providing new employment opportunities and chances for people to upskill, could have a positive effect, but it would depend on how this would be implemented to address inequality.

Fishing activities can help support communities which are fragile by providing direct employment but also employment along the supply chain which is 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 (CFP) has made fishing as a livelihood and way of life difficult in recent years (Communities_49). In light of this, Option A could have a significant negative effect on the industry as well as local communities.

Existing policies X-FISH-1 and X-FISH-3 within Option B along with Option F, both support the diversification of a sustainable fishing industry as well as ensuring the industry is resilience to the effects of climate change. Option K aims to safeguard sites identified for fishing and related activities. Potential significant positive effects have therefore been identified in relation to Options B, F and K.

Decline in employment in fish catching sector and improvement in education promotes employment in other sectors or emigration of younger generation from local fishing communities. Younger generation turning to other more secure jobs in the local and regional economy (Communities_52). Options D and H aim to enable the use of existing skillsets and encourage employment in new and growing marine industries. Aquaculture is a growing marine activity (Communities_92) in the South West, so it has been assumed that Options D and H could include jobs within aquaculture, however, this would be dependent upon implementation.

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. Option J aims to support the sustainable development of coastal quarries, which could result in the creation of larger ports to cope with higher aggregate volumes. The effects are not known for certain and therefore uncertainty has been recorded in the assessment for ports and shipping. It is, however, likely that Option J will result in significant positive effects on marine aggregates.

Existing policy X-TR-1 within Options B focuses on enhancing social benefits, sustainable tourism and recreational activities, which have resulted in a significant positive effect on leisure and recreation and tourism. have resulted in significant positive effect. Option I offers potential for additional sustainable tourism and recreation activities, particularly where this creates additional utilisation of related facilities beyond typical usage patterns. This again has given rise to a significant positive effect for leisure and recreation and tourism. There are some uncertainties regarding the impact new marine industries may have on leisure a recreation as current recreational land may be lost, but new leisure and recreational activities may emerge as a result.

The defence sector is a large employer in the south west. There are uncertainties surrounding Options E and H which propose increases in marine employment and technologies, and if/or how this could translate into the defence sector. Options K and F focus on protecting sustainable fishing and limiting access to these areas. This could result in minor negative effects on water based military training, as 60% of the South West Inshore area is designated as practise and exercise areas (PEXAs) (Economy_292).

Coastal quarries (Option J) could provide a significant positive effect on both employment and aggregates. Marine aggregates can present reduced impacts on local communities compared to the extraction of land-won aggregates, in particular, with regard to the extraction process and transportation. Marine aggregates can contribute to energy security and economic development through provision of fill for major coastal infrastructure projects. There is uncertainty regarding the impact of new marine technologies may impact on the aggregate sector.

The options do not directly result in further energy generation and infrastructure. There are large uncertainties regarding Hinkley Point and the South West Energy Park and their future employment opportunities. Both are likely to require a larger and more highly skilled workforce. Option H supports new and growing marine industries, which could include the energy sector, however, this is not known for certain.

Fishing and recreation are having a negative impact on fish and shellfish through pollution, invasive fishing techniques and over fishing, as well as marine mega fauna from disturbance, noise, collisions, mobile fishing gears and accidental capture. For this reason, Option A is likely to have a significant negative effect. Option I aims to support, promote or facilitate sustainable tourism and recreation activities; it is not clear as to what this could entail, but there is potential for positive effects.

Option F aims to increase access to sustainable shell-fishing or aquaculture sites, to promote more sustainable harvesting techniques. It is assumed that this will help to avoid over fishing and any other adverse effects from fishing activities. For this reason, significant positive effects have been identified in relation to fish and shellfish. It is unclear the impact that this option will have on marine mega fauna.

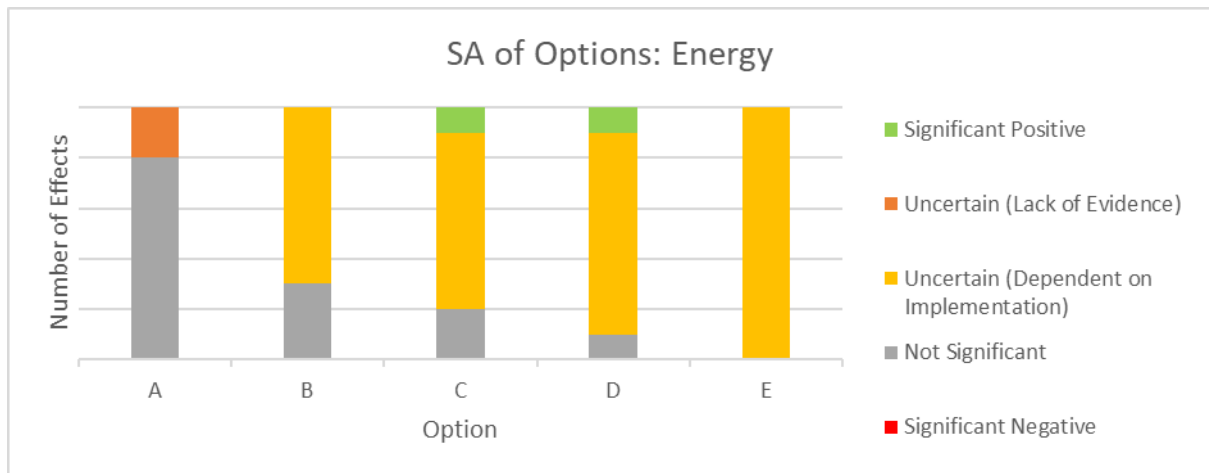
Options B and C could give rise to an increase in public access and could worsen the current situation for marine mega fauna. This has therefore resulted in the identification of a significant negative effect within the assessment. The effects of new industries and technologies and new coastal quarries (Options J, H and E) on biodiversity are uncertain and there is a lack of information in the SA database to support this. Uncertainty has therefore been recorded in the assessment

Option I promotes more sustainable tourism which could be beneficial to biodiversity, but this would depend upon how it was implemented. Option F focuses on more sustainable fishing, but it is uncertain as to whether this will also be beneficial to marine mega fauna.

Mitigation

- Recreational land should be safeguarded from development.

3.15 Energy



The assessment of the energy grouping of options has identified that there is the potential for significant positive effects with relation to Option C and D. No significant negative effects have been identified.

In the South West Marine Plan Areas there are no oil or gas fields or terminals and no currently licenced areas. A large portion of these marine plan areas are designated as a restricted area. However, whilst a large proportion of the South West Marine Plan Areas are designated as restricted, the remaining blocks in the area could potentially be licensed in future licensing rounds run by the Oil and Gas Authority, within the marine plan period, especially if further strategic seismic programmes are undertaken (Economy_322).

Option D supports the oil and gas sector by facilitating access to licensed offshore oil and gas extraction blocks. This could potentially result in increased greenhouse gas emissions on a national / global scale. However, uncertainty has been recorded in the assessment as it would be dependent upon the proposals that come forward. Conversely, Option D could potentially result in a significant positive effect for energy generation and infrastructure.

The South West Marine Energy Park, the country's first, serves the wider South West peninsula, and offers direct access to superb physical assets and resources including the North Devon and North Somerset marine energy coasts for opportunities in wind, tidal and nuclear energy (Economy_602).

Option C supports renewable energy proposals of below 100MW, which could result in a reduction of greenhouse gas emissions on a national scale, hence a potential significant positive effect is identified. It is uncertain whether this policy will result in significant positive effects for the renewables industry, as it would be dependent upon the nature and scale of proposals that come forward.

Mitigation

No specific mitigation has been identified.

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, and Option B has 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_233, Water_253). 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.

There are likely to be effects on commercial fisheries as a result of both sea temperature and salinity change, which will affect the range and distribution of many marine species (Water_328). This redistribution presents both opportunities for aquaculture and fisheries, and challenges around predator-prey interactions, competition and population level impacts (Climate_206). Trophic mismatch between phytoplankton, zooplankton and fish larvae as a result of sea temperature rise and ocean acidification has led, and will continue to lead, to fish recruitment failure (Biodiv_412), which will impinge on currently active fisheries. Whilst a relatively high level of uncertainty surrounds the effects of the climate change on fisheries and aquaculture, implementation of Option B (existing policy X-FISH-1) would have significant positive effects on fisheries and aquaculture as it supports diversification of a sustainable fishing industry and resilience to the effects of climate change.

Fishing trawlers and anchors 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 impacts on subtidal sediments (Biodiv_425). Commercial over-

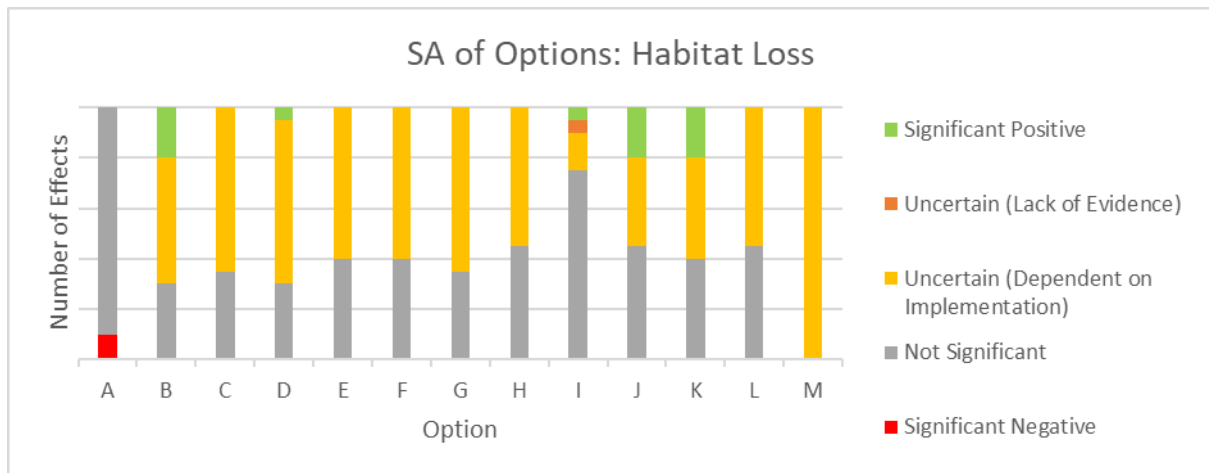
fishing is one of the key contributors to fishing stock depletion. In addition, ingestion of, and entanglement in, marine litter, of which the fishing sector is a key contributor, by marine mega fauna is highlighted within the baseline database (Biodiv_467). Turtles are a summer visitor to the South West Marine Plan Areas but are commonly observed falling victim to bycatch from inshore pot fisheries (Biodiv_549). Implementation of Option A would not alleviate any of these issues imposed on biodiversity, habitats, flora and fauna by the fishing industry, and would therefore 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 (eg part of training/education modules)
 - (2) Measures to ensure compliance with MARPOL Annex V.
 - (3) Implementation of waste management measures, including increased recycling, avoidance of single use products and product eco-design eg to minimise release of micro plastics into the marine environment.
- 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 areas) and therefore attractive to fishermen. Other potential solutions could include restriction of fishing in some areas, 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 Marine Protected Areas 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.

- The majority of the proposed options are unlikely to have a significant impact on marine litter and associated problems, hence the outcome on the current situation cannot be anticipated. Options should be created or revised to prevent fisheries' discharge of litter into the marine environment and associated implications.

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, D, 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_487, 542, 562, 574, and 708) and marine megafauna (Biodiv_502, 536, 546, 549, 567, 722) in the South West Marine Plan Areas.

Option B, D, J and K could result in significant positive effects for benthic and intertidal ecology, fish and shellfish, protected sites and species and marine megafauna, as they support proposals that enhance or facilitate biodiversity adaptation, migration, connectivity and net environmental gain.

In general, salmon and eel populations within estuaries in the South West Marine Plan Areas are deteriorating. Option I suggests that all proposals in the Severn that require water pumping systems from the river or estuary area must put in place measures to avoid, minimise, mitigate ingress of eels or other mobile species into these systems. This Option has had a significant positive effect on benthic and intertidal ecology, fish and shellfish as it addresses a specific regional issue.

It is assumed that through the protection of priority habitats, it 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.

Fishing is a very important industry in the South West with 39% of landings into English ports by UK vessels landed into Plymouth and Newlyn (Economy_384). This is in addition to large shellfisheries (Economy_642, 401, 465). Both have potential interactions with all components of biodiversity.

Noise and cumulative noise impacts on marine megafauna eg seismic survey, piling, dredging, defence, shipping, use of acoustic deterrent devices, UXO explosions and potentially wave and tidal devices. Each marine plan area has its own noise profile that varies according to the types of development and activity (Biodiv_438). Impacts

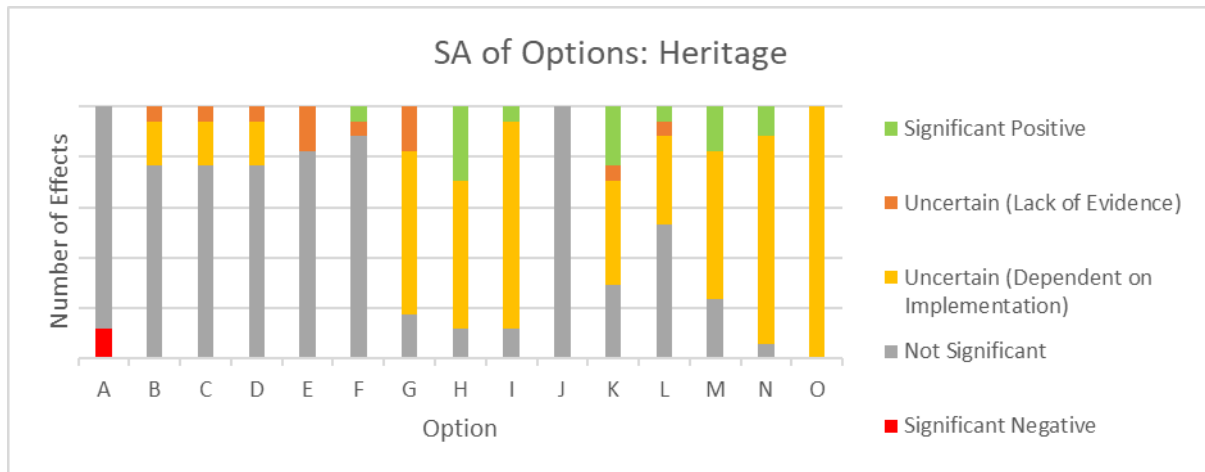
to fish and shellfish from noise may affect migration, communication, reproduction, foraging, with knock on effect to populations (Biodiv_472).

Avonmouth and Severnside are significant marine manufacturing areas in the South West (Econ_530). There is a potential interaction here between manufacturing and all biodiversity components via several pathways particularly noise and contamination. There is potential for trade-offs, however, the options do not aim to limit these activities and therefore uncertainties have been recorded.

Mitigation

No specific mitigation has been identified.

3.18 Heritage Assets



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

Negative significant effects to heritage assets within and adjacent to marine plan areas may be anticipated by doing nothing (Option A) 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.

The marine historic environment is important as a source of economic and social benefits to coastal communities through eg leisure, recreation and tourism (Cultural_178). Option K aims to encourage participation of the local population in the preservation and enjoyment of their cultural and natural heritage and has therefore resulted in significant positive effects for heritage assets within and adjacent to marine plan areas. Further significant positive effects have been identified in relation to Options F, H, M and N as they have potential to result in increased protection and access to heritage assets, leading to development of greater understanding and awareness. As such a combination of options providing protection, recording and enhanced access should be supported.

Broadly speaking, options that are beneficial to heritage are mutually beneficial to the seascape and landscape, owing to the contribution heritage makes to historic character of these areas. Significant positive effects may be anticipated for Options L and M owing to the protection and enhancement of landscape and seascape that these options will provide.

Significant positive effects to health and wellbeing may be anticipated for Options H and I as the implementation of heritage policies enhancing access can have added value benefits for local communities, health and wellbeing. These measures enable access to high quality open space and promote the importance of historic character to local tourism and sense of place. Heritage options that increase access and health and wellbeing should be supported.

No significant effects have been identified for ports and shipping and fishing and aquaculture from the proposed options. Option B-D are primarily in line with the current situation and should be considered in combination with other beneficial policies such as H, M which may enhance protection of undesignated heritage and access.

Significant positive effects with regards to leisure and recreation and tourism may be anticipated through the implementation of Options H and K, as these measures will provide greater opportunities for access and participation in heritage. Whilst the benefits of a number of the options are uncertain for leisure and recreation, options that lead to additional protection, enhancement, and access to heritage will also be beneficial to leisure and recreation (eg scuba diving wrecks), and as such should be supported.

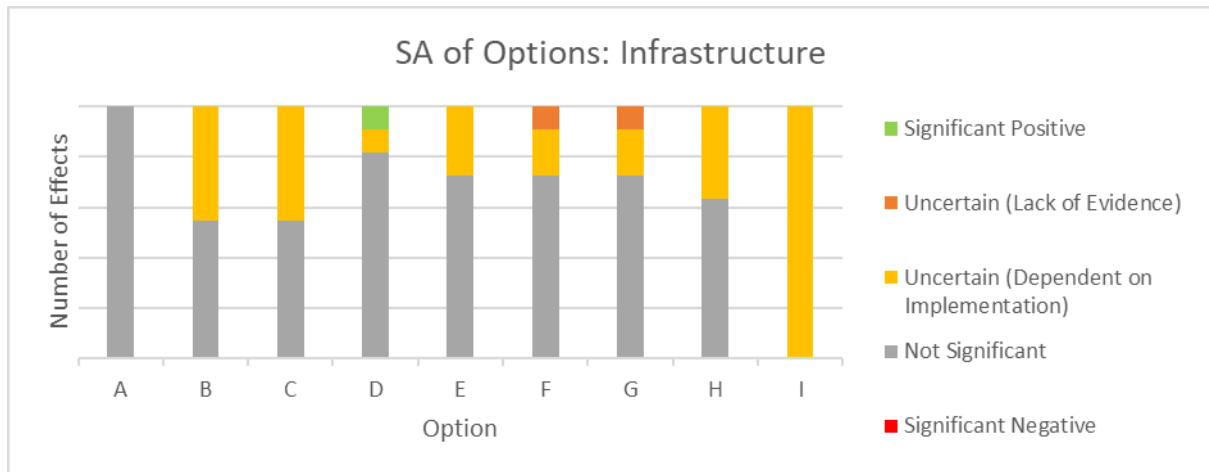
No significant effects have been identified from any of the proposed options on energy generation and aggregate extraction. Options B-D primarily in line with current situation and should be considered in combination with other beneficial policies such as H, M which will lead to greater access, and recording and protection of undesignated heritage.

No significant effects on protected sites and species and benthic and inter-tidal ecology have been identified. Policies supporting access to marine heritage must be implemented with due consideration of the potential impact upon benthic and inter-tidal ecology and take into account the conservation objectives and management of marine protected areas.

Mitigation

- Implement policies that ensure the recognition of the significance of the marine historic environment and its contribution to society and ensure its ongoing protection and management.
- Mitigation and management of heritage assets will be of particular importance for any instances where public benefits of proposals are found to outweigh the compromise or harm to discovered heritage assets (eg Options B, C, D and L).

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 Option D, whereas none of the options have the potential to give rise to significant positive effects.

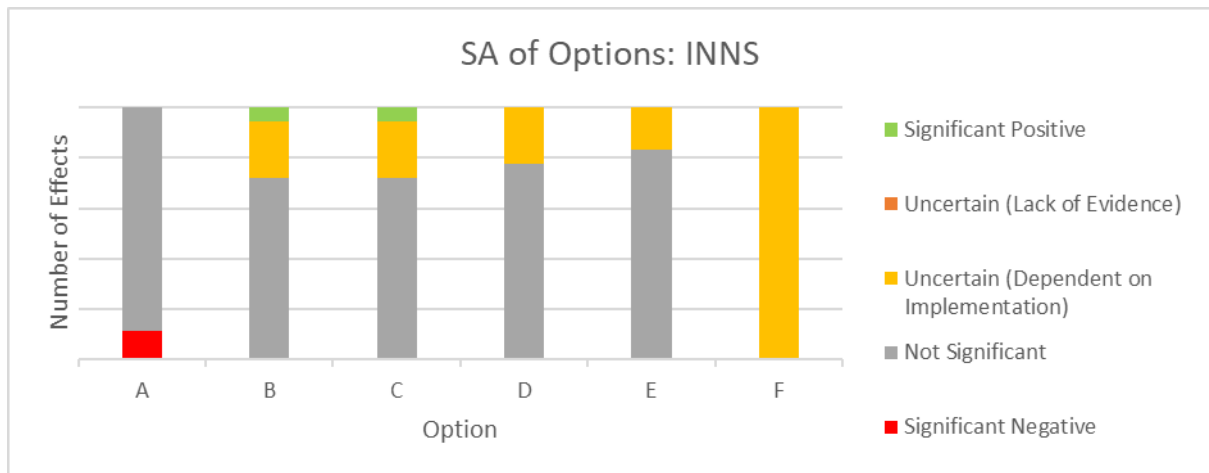
The rate of coastal erosion is likely to increase as sea levels rise, leading to deeper water in near shore areas, which would in turn cause an increase in wave energy reaching the coast. Impacts of coastal erosion on buildings and infrastructure located along the coast are therefore likely to increase (Climate_116). As coastal erosion and inundation in some areas may be uneconomic or undesirable to halt through engineering, the realignment of some coastal infrastructure and housing may be expected (Climate_131). None of the proposed options are predicted to have a significant effect on climate change resilience and adaptation.

Marine aggregate contributes to energy security and economic development through provision of fill for major coastal infrastructure projects, for example ports, renewable energy and nuclear energy projects (Economy_479), and as such, increased infrastructure projects would require increased aggregate extraction. As Option D offers support to proposals which aim to safeguard strategic landing facilities for locally-won marine aggregates in the South West Marine Plan Areas and surrounding areas, its implementation would have a significant positive impact on aggregate extraction.

Mitigation

No specific mitigation has been identified.

3.20 Invasive Non-Native Species (INNS)



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

There are established populations of Pacific Oysters in the South West, which can form dense groups, sometimes forming reefs, which can alter the environment (waves, currents, sedimentation, etc), with knock-on effects to native species. They compete with native benthic species for space and resources, which has therefore resulted in significant negative effects for Option A, 'do nothing' with regards to benthic ecology and marine mega fauna.

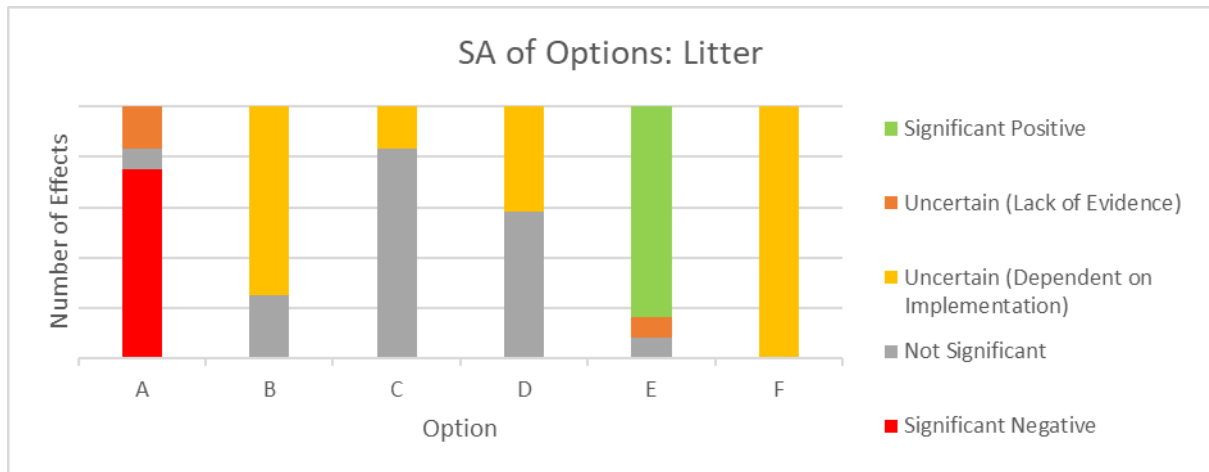
Options B and C have been scored significant positive for non-indigenous species as they aim to put in place active measures to avoid or minimise adverse impacts on the marine area that would arise through the introduction and transport of non-indigenous species.

Existing policy X-NIS-1 within Option B, aims to put proposals in place that will include appropriate measures to avoid or minimise the significant adverse impacts that arise from the introduction and transport of non-indigenous species, with particular regard to fish and shellfish, infrastructure, moving equipment and shipping. This could result in negative trade-offs with fishing and aquaculture, aggregates, ports and shipping and energy generation and infrastructure. However, it is not clear how this will be implemented and how restrictive Option B could be. Uncertainty has therefore been recorded within the assessment.

Mitigation

No specific mitigation has been identified.

3.21 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, whereas Option E has 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 the SA database entries '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. Implementation of Option E would significantly reduce the issues surrounding litter generation as a result of, and impinging on, marine heritage assets, potentially resulting in a significant positive effect.

Marine litter acts as a source of persistent pollutions, other chemical derivatives, and adsorption surfaces which lead to biomagnification within marine organisms and have the potential to cause sublethal toxicological effects and endocrine disruption (Water_263). Option A does not alleviate the key issues as highlighted in the baseline database regarding pollution and water quality, hence would have a significantly negative impact, whereas Option E, which states that proposals must build in measures to avoid or minimise waste and plastic into the marine environment, would have a significant positive effect.

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 UK have increased since monitoring commenced in 1994, and, in all areas in which surveys are systematically completed, are recognised as problematic by MSFD GES targets (Water_233, Water_240, Water_289). The South West Marine Plan Areas have the highest litter density in the United Kingdom, the main sources attributed to pressure from tourism and fishing, as well as litter entering United Kingdom waters through Gulf Stream prevailing currents, of which there is evidence to suggest is worsening (Water_233, Water_254). Furthermore, the South West Marine Plan Areas have marine litter problems associated with sewer overflows, and it is suggested that this issue will increase as future weather patterns change (Water_256).

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 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. However, Option E would have significant positive effects if it were implemented.

The mental health effects of contact with green spaces and nature (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 result in significant negative impacts 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 within the South West Marine Plan Areas is of particular importance as a significant sense of place and ecosystem services are derived from its distinctive and quality natural environment (Communities_168). Option E would negate these baseline issues, hence its implementation would have significant positive impacts.

Marine litter includes ghost fishing gear, so its generation is directly connected to Fisheries and Aquaculture (Water_234). In addition, aquaculture and mariculture can potentially increase local seafood supplies and associated tourism within the South West Marine Plan Areas (Economy_766), leading to indirect increased litter generation. Option A does not address the major contribution of fisheries and aquaculture to marine litter, and so its implementation would have significantly negative impacts. Option E would again tackle this problem as highlighted within the baseline database, hence its implementation would have significant positive impacts.

Marine Plan Areas 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 impacts including pollution from litter, and so will have social and amenity impacts 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 impacts. Conversely, Option E could have significant positive impacts if implemented.

Ingestion of, and entanglement by, marine litter can cause damage and death of marine species as well as reproductive and population impacts (Biodiv_476). Intertidal sediment habitats are deteriorating due to cumulative effects including beach litter (Biodiv_470, Biodiv_471), and deep sea habitats within the South West Marine Plan Areas are vulnerable to marine litter including discarded nets (Biodiv_487). Option A does not address key baseline issues regarding the impacts of marine litter on benthic and inter-tidal ecology nor fish and shellfish, and so its implementation would have significant negative impacts. Option E on the other hand could have significant positive 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 impacts of this, and so impacts 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). Although marine litter is present in all marine plan areas, it is particularly prevalent in the South West Marine Plan Areas and includes that produced through aquaculture and commercial fishing as well as plastics (Biodiv_467, Biodiv_468, Biodiv_469, Biodiv_650). Impacts on basking sharks (*Cetorhinus maximus*) by fisheries have been recorded in the North West and South West Marine Plan Areas, and includes entanglement (Biodiv_502, Biodiv_503, Biodiv_649).

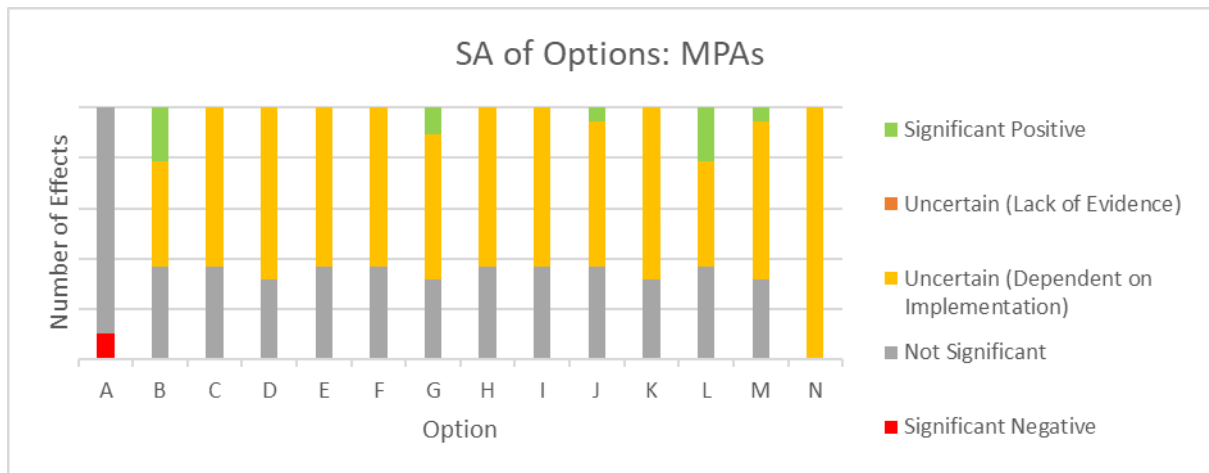
Due to the insufficient data surrounding the extent of the effects of litter on marine mega fauna, the implications of Option A cannot be anticipated. Whilst the assessment of this SA sub-topic therefore deems Option A 'Uncertain, Lack of Data', its effects must still be taken into consideration. Option E on the other hand, would have a significant positive impact on marine mega fauna, as it seeks to prevent the discharge of litter into the marine environment, either intentionally or accidentally.

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).
- Option B would have the potential to significantly reduce the effects of marine litter on heritage assets; pollution and water quality; marine litter; leisure and recreation; tourism; protected sites and species; benthic and intertidal ecology and fish and shellfish; and marine mega fauna. If more stringent and/or used in conjunction with Option E, its implementation would have a significant positive effect.

- Due to the potential market for recycled marine litter in the South West, Options B X-ML-1, C and D have the potential to have a significant positive effect on the amount of marine litter in the environment, but must be used in conjunction with Option E.
- Options C and D could reduce the amount of litter being discarded into the marine environment as a result of the fishing industry if harbour-side recycling facilities were offered. Again, these options must be used in conjunction with Option E to have a significant positive impact.

3.22 Marine Protected Areas



The assessment of the marine protected areas grouping of options has identified that there is the potential for significant negative effects with relation to Option A, whereas Options B, G, J, L, and M have the potential to give rise to significant positive effects.

Within the South West Marine Plan Areas, increasing erosion rates as a result of sea level rise and subsequent coastal squeeze is leading to loss of intertidal habitat (Geol_196, Geol_197). Whilst local and regional factors, including coastal management strategies, are important, implementation of Option M would also have a significant positive effect on seabed substrates and coastal features.

Protecting and restoring marine habitats will increase their resilience to climate change (Climate_132). Option G would have a significant positive effect regarding climate change resilience and adaptation if it were implemented as it states that proposals must demonstrate that they will avoid, minimise or mitigate effects that could prevent the ability of marine protected areas, and priority habitats and species to adapt to climate change.

Dredging activities within the South West Marine Plan Areas for activities such as mineral extraction has been or are being investigated within the Fal Bay to St Austell Bay potential Special Protection Area and the St Ives Bay area. There are a number of harbours that regularly carry out capital or maintenance dredges which could potentially affect important areas for birds and other marine life including the Tamar Complex Special Protection Area, Fal Estuary Special Area of Conservation, and Fal Bay to St Austell Bay potential Special Protection Area, either alone or in combination with future developments (Biodiv_489). Options B X-MPA-4, G, J and L would all have significant positive impacts on protected sites and species if implemented as they seek to reduce adverse impacts of proposals until the ecological coherence of the Marine Protected Area network is confirmed; avoid, minimise or mitigate effects of proposals which could prevent the ability of Marine Protected Areas, priority habitats and species to adapt to climate change; support proposals which enhance or contribute to the overall coherence of the Marine

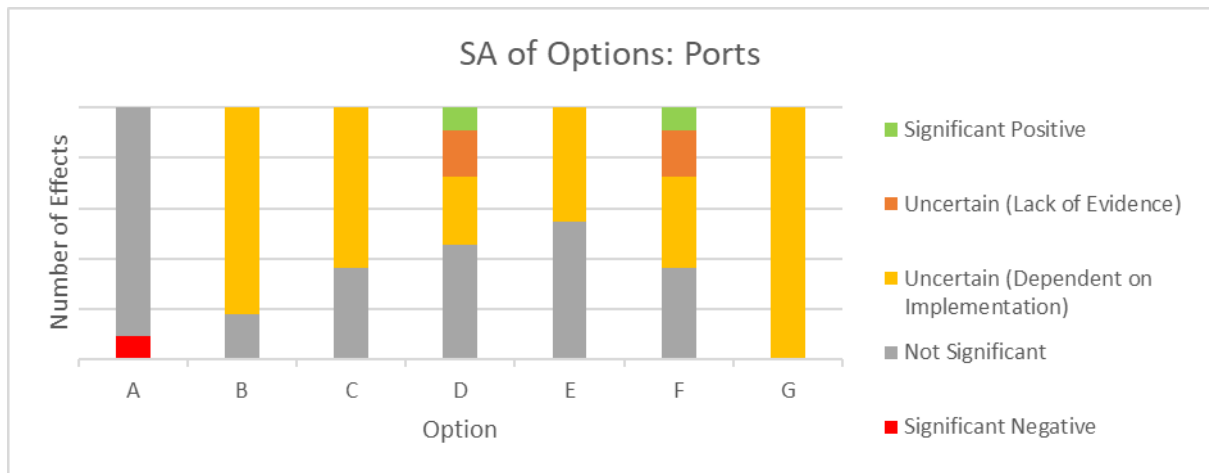
Protected Areas network; and encourage a precautionary approach to be taken in considering any proposal which may adversely impact upon on the protected features of a site, including in a Marine Protected Area where no management measures are yet in place.

As a negative trend has been identified in the baseline regarding benthic and intertidal ecology, fish and shellfish (Biodiv_487, Biodiv_542, Biodiv_562, Biodiv_574, Biodiv_708) and marine mega fauna (Biodiv_502, Biodiv_536, Biodiv_546, Biodiv_549, Biodiv_567, Biodiv_722), Option A would have significant negative effects. Implementation of Options B and L would have significant positive effects on these SA sub-topics, as well as on ornithology.

Mitigation

- Within the English Severn, an overarching plan is needed for renewable energy generation, seeking to encourage a mix of sustainable technologies and projects which minimise impacts on the European Marine Site and other features. This should be considered in relation to the development of the Welsh National Marine Plan to ensure a consistent approach for transboundary sites and features (Biodiv_489).

3.23 Ports



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

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. New shipping routes and technologies may emerge over time. The needs of trading partners may change as their economic circumstances develop. So, capacity needs to be provided at a wide range of facilities and locations, to provide the flexibility to match the changing demands of the market, possibly with traffic moving from existing ports to new facilities generating surplus capacity (Economy_430).

Increased shipping activity, port expansion and associated industry growth could lead to increased sulphur oxides and nitrous oxides emissions at coastal locations, which in turn could contribute to the breach of national objectives for air quality. Although there are already stringent controls on fuels and emissions in European waters, these do not seem to be sufficient alone to respect existing emission limits/standards. For this reason, significant negative effects have been identified in relation to Option A.

Ports and shipping has positive interactions with economic and social topics including job creation and benefits to local fishermen, as well as wider benefits to national, regional or local economies. Despite continuing advances in efficiency, ports remain substantial employers in their own right and they generate and facilitate economic activity in trade-related sectors. In addition, they are essential to support emerging industries such as renewable energy development (Economy_620). However, there is potential for negative trade-offs between leisure and recreation and ports and shipping, particularly from boating activities.

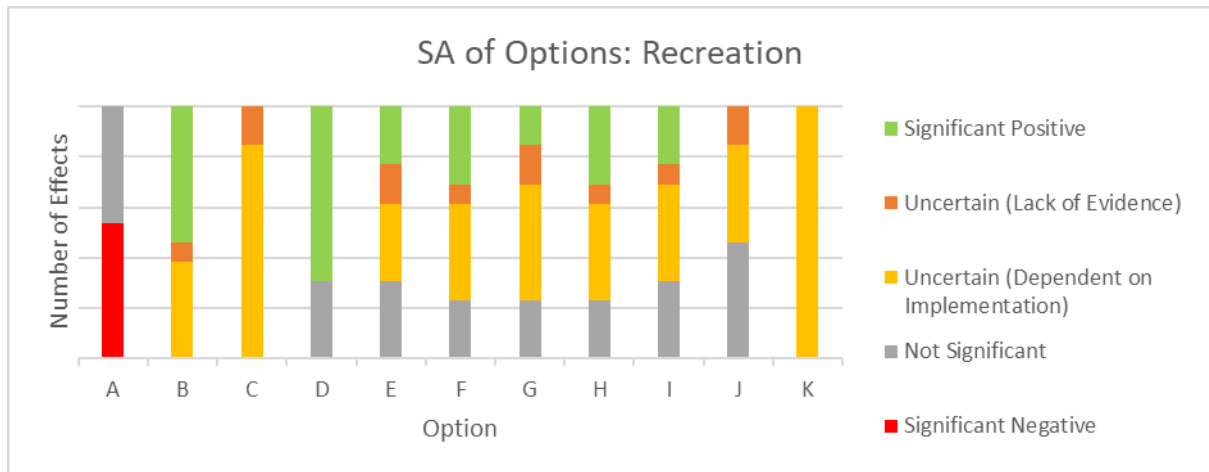
Options D and F aim to enhance the resilience to ports and harbours to changing market and international needs will be supported as well as limiting the potential impacts on existing port and harbour activity (including recreational pressures). The

assessment has therefore identified significant positive effects on ports and shipping from Options D and F.

Mitigation

No specific mitigation has been identified.

3.24 Recreation



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

Tourism and recreational pressures have the ability to damage the seascape and landscape character and contribute to the worsening of water quality and marine litter. Increased visitor numbers are likely to put more pressure on the water supply which could affect the quality and call for more infrastructure to support it. Poor water quality and marine litter may also have the potential to deter people away from water-based recreational activities. For these reasons significant negative effects for Option A have been identified in relation to seascape and landscapes, pollution and water quality and marine litter.

Tourism and recreational disturbances are also having adverse impacts on biodiversity. Physical damage to cetaceans and seals through collision with vessels and other recreational activities (Biodiversity_559) are common in the South West. Recreational boating 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. There is also the potential for risks to communities and health and wellbeing from using waters for recreational purposes at times where water quality is poor.

Existing Policy X-WQ-2 within Option B along with Options D and H are aimed at improving water quality and managing waste water must and the introduction of nutrients, pollution and plastics to the marine area. These options have therefore resulted in a significant positive effect on water quality, marine litter, non-indigenous species and health and wellbeing.

Ports and harbours offer an opportunity to provide more access to the marine environment and subsequent recreational activities, however, increasing the number of tourists could result in trade-offs between with ports and shipping activities eg boat trips.

Birds, mega fauna and protected sites and species provide resources for a variety of recreational activities such as fishing, birdwatching, diving, eco-tourism and recreational sea uses. Recreational disturbances are regularly recorded within the South West Marine Plan Areas, which often effects birds, seals, cetaceans and sharks. Disturbances are often caused by people, dogs, boats, surfers canoes and paddle boards.

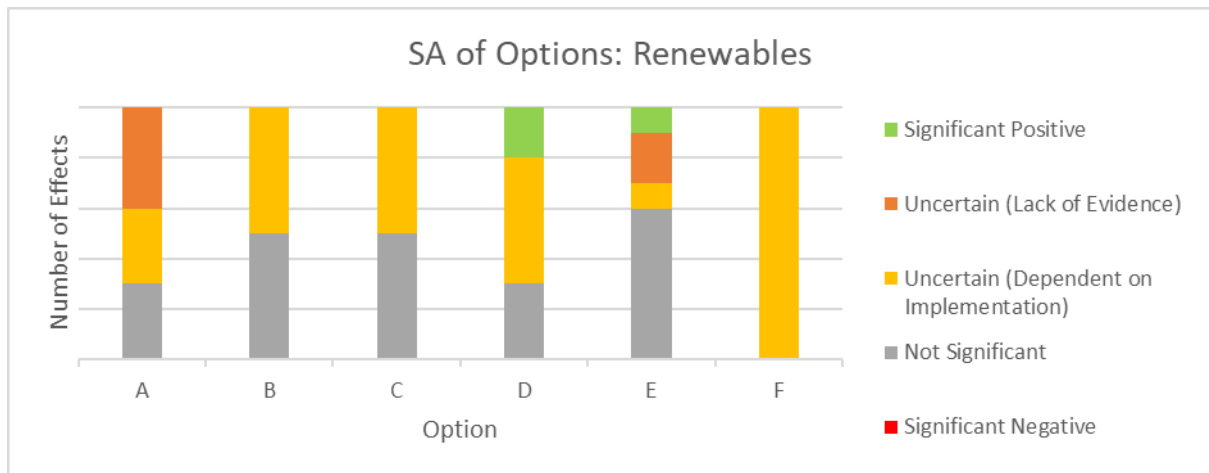
Options B (particularly existing policies X-DIST-1 and X-WQ-1), E, F and I that consider the impact of recreation on the marine environment and have therefore resulted in the identified of potential significant positive effects in relation to ornithology, marine mega fauna and protected sites and species.

Unless controlled, increased recreational activity may bring about higher numbers of non-native species. There is the potential for invasive species to directly impact protected species (Biodiv_531) by competing with native species for habitat, food sources or directly through predator-prey, disease or parasite interactions. It is assumed that Option H which aims manage waste water and minimise the introduction of nutrients, pollution and plastics to the marine area, will help to tackle this issue. Option D Signposts to Water Framework Directive and Option F signposts to codes of conduct for recreation activities to minimise their impact on the marine environment. It is assumed that both options will include policies that will address invasive species and therefore further significant positive effects have been identified.

Mitigation

- 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 tourism and recreation developments.
- Measures are needed in order to limit the pressure on water supplies and its effect on the overall quality.
- Measures are needed to control litter which is generated from public access.
- Access to protected nature conservation sites needs to be carefully controlled in order to ensure that the species and habitats they are designated for are protected.
- The 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.

3.25 Renewables



The assessment of the renewables grouping of options has identified that there is the potential for significant positive effects with relation to Options D and E, whereas none of the options have the potential to give rise to significant negative effects.

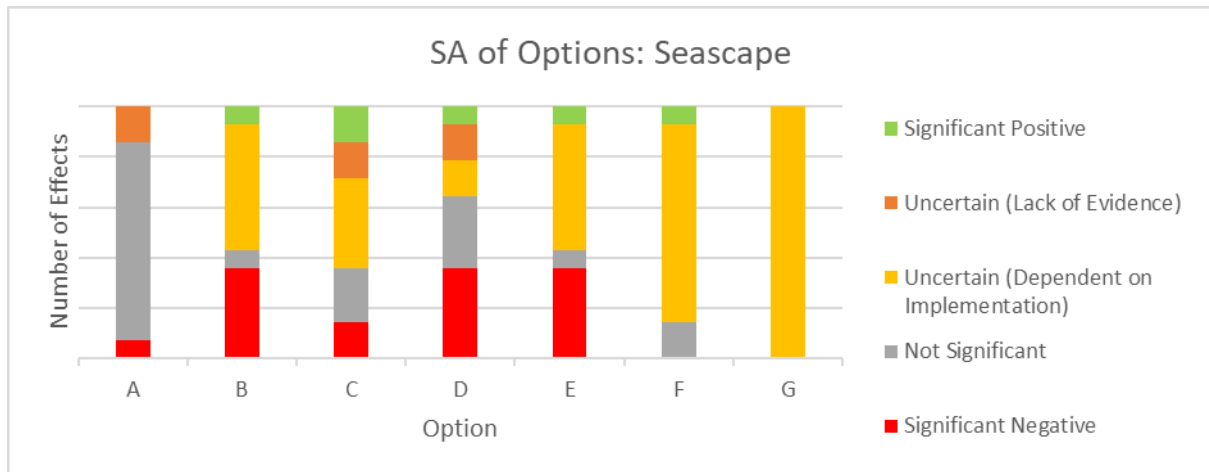
As Option D supports proposals for offshore wind farms, including relevant supporting projects and infrastructure, it will indirectly reduce the demand oil and gas activity. For this reason, its implementation would have a significant positive effect on greenhouse gas emissions by reducing the release of carbon dioxide. In addition, Option D would also have a significant positive effect on energy generation and infrastructure development.

Impacts exist on subtidal sediments from the offshore industry, including through aggregate extraction, dredging and offshore energy production. 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). As Option E supports proposals which enhance or facilitate biodiversity adaptation, migration, connectivity and net environmental gain, its implementation would have significant positive effects on benthic and intertidal ecology, and fish and shellfish.

Mitigation

No specific mitigation has been identified.

3.26 Seascape



The assessment of the seascape grouping of options has identified that there is the potential for significant negative effects with relation to Option A, whereas Option F could result in significant positive effects. Option B, C, D and E 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. The highest densities of beached litter are found in the South West Marine Plan Areas, which has been attributed to pressure from tourism and fishing as well as litter entering UK waters through prevailing currents (Water_233).

It is therefore assumed that by doing nothing the situation is likely to worsen, therefore Option A, 'do nothing', has resulted in a significant negative effect on marine litter. None of the options directly address the issue that marine litter, however, Options E and F consider the cumulative effects of activities, which could include marine litter.

There is a close relationship between the presence of heritage assets and the character, value and appreciation of landscape / seascape. Options do not directly target heritage assets, but it is assumed that Options B, C and E aimed at protecting seascape/landscape could include them, but this would be dependent upon how policies are being implemented.

Options B, C and E are focused on minimising adverse effects on the seascape and landscape. For these reasons they have been deemed to have a significant positive effect. Options that focus on ecosystem services could also be beneficial to seascape, but it would be more dependent upon implementation. Option F is less specific, but it does include the minimisation of cumulative effects, which could also be beneficial to seascapes and landscape.

Seascape can provide a number of benefits to both physical and mental health. Options do not directly tackle this and are some (Option C, D and F) are more weighted towards an ecosystem approach. However, it is assumed that Options B

and E, which provide a positive contribution to seascape, will have a positive contribution on health and wellbeing. No potential significant effects have been identified.

There is potential for improvements in seascapes which could conflict with ports and shipping activities, as visual impacts may arise from developments which are built directly at the coast (Landscape_133). Significant negative effects have been identified in relation to Options B, D, E and F, as they are focused on ecosystem approaches, which could inhibit shipping activity. Option C could be beneficial for ports and shipping as the economic and social benefits could far outweigh the negative impacts on seascape and the natural environment. However, this would be dependent upon implementation.

The fishing industry is in decline and requires support to prevent further deprivation because it provides essential social, cultural and economic benefits. It is unlikely that fishing and aquaculture will enhance or facilitate the natural habitat and ecosystems, hence why a significant negative effect has been identified in relation to Options B, D and E. Displacement of fisheries activity due to seascape and landscape restrictions could result in negative trade-offs. Options C and F could be more beneficial for fishing and aquaculture as the economic and social benefits could far outweigh the negative impacts on seascape and the natural environment. This would again be dependent upon implementation.

In general, it is assumed that improvements to seascapes will be beneficial to both tourism and recreation. However, Options B and E could see some popular recreational activities restricted in order to protect seascapes and landscape. Options C and F could be more beneficial for tourism and recreation as the economic and social benefits could far outweigh the negative impacts on seascape and the natural environment, but this would again be dependent on implementation.

The main area in the South West for marine manufacturing is Avonmouth, located between Bristol and the River Severn. Option C could limit marine manufacturing activity specifically at Avonmouth. Option F considers cumulative effects and takes into consideration both the negative and positive impacts of proposals. This could be more beneficial for marine manufacturing as the economic and social benefits could far outweigh the negative impacts on seascape and the natural environment.

No potential significant effects have been identified in relation to defence, however, there is potential for conflict between defence activities and enhancements of seascape. Defence activities could require limitations of activities/access to coastline and could create noise which would reduce tranquillity.

There is potential for improvements in seascapes which could conflict with aggregate activities and energy generation projects. Minimising impacts on the seascape could see a reduction in aggregate activity and future energy generation projects. Potential significant negative effects have been identified in relation to Options B, D, C and E. Option F considers cumulative effects and takes into consideration both the negative and positive impacts of proposals. This could be more beneficial for aggregates and energy generation as the economic and social benefits could far outweigh the negative impacts on seascape and the natural environment.

Options D and F take into account the potential negative impacts on ecosystems and the natural environment and have therefore resulted in significant positive effect on protected sites and species. Option C aims to consider the cumulative impacts of any activity within the Severn Estuary and Inner Bristol Channel. There is a Special Protection Area and Ramsar site within the Severn Estuary; therefore, Option C could result in these sites better protected from development and has therefore resulted in the identification of a potential significant positive effect.

Mitigation

- Any potential developments will need to be assessed for visual impact and designed well to avoid any negative effects on heritage assets.

3.27 Shipping



The assessment of the shipping grouping of options has identified that there is the potential for significant negative effects with relation to Option A, whereas Option D could result in significant positive effects.

Shipping is recognised as a key contributor to nitrogen dioxide and sulphur dioxide (Air_8). Increased shipping activity, port expansion and associated industry growth could lead to an increase in these emissions. This is likely to lead to the breach of national air objectives for air quality (Air_19). Greenhouse gas emissions are recognised as a national issue and affect all marine plans. These include emissions from the shipping sector. Emissions from shipping is expected to increase significantly by 2050 due to increase in global trade (Climate_110).

Without any action on this issue, it is likely that the situation will get worse and a potential significant negative effect identified for Option A with regards to air quality and greenhouse gas emissions. Options D could have a positive significant effects as on both greenhouse gases and air quality as it aims to disallow the development of schemes which are likely to have impact on the achievement of national objectives for air quality.

Option D and E focus on the protection of air quality, which could have potential adverse effects on ports and shipping. However, the outcome of this option on this sub-topic would depend of the air quality limits enforced in the future and the capacity of the ports and shipping sectors to adapt to these restrictions. Uncertainty has therefore been recorded.

Shipping can also contribute to the introduction of non-native species and is reported to be among the key pathways (Biodiv_636). Monitoring and management of invasive species on the coast of Great Britain and Ireland poses significant challenges given the length of coastline and the different ways in which invasive species can be introduced and spread (Biodiv_637). Therefore, a potential significant negative effect for Option A has been identified.

Environmental impacts 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 the short and

long term. The shipping sector is identified as a potential contributor to offshore litter (eg rope, polypropylene twine and hard plastics) (Water_253).

Ports and shipping have positive interactions on regional or local economies (including tourism and recreation) (Economy_620). Other adverse effects include the risk of collision with recreational users of the sea, although this specific issue is not reported in the database. No significant effects are expected as a result of all of the options; or the outcome is unknown.

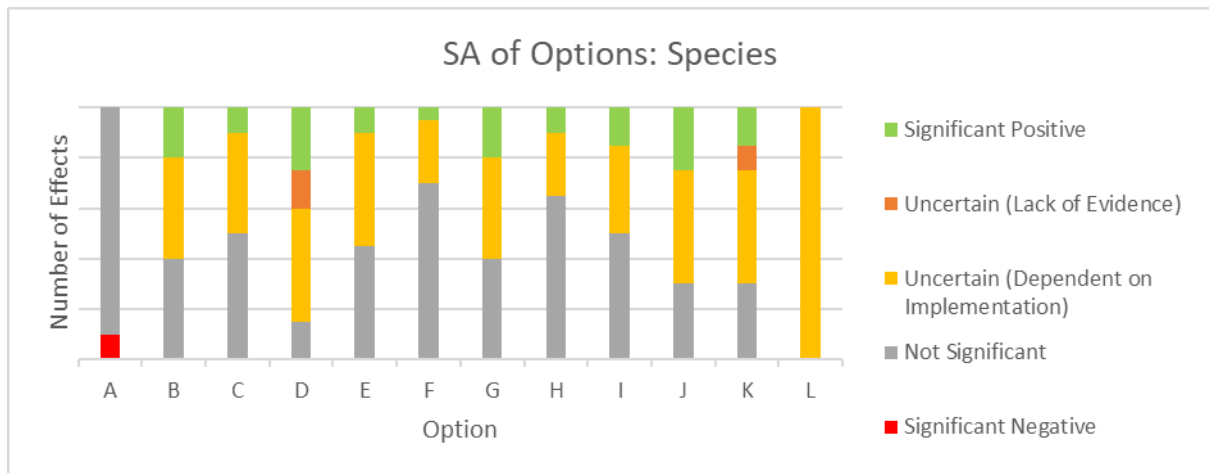
The SA database identifies an adverse interaction between shipping and aggregate which relates to the requirement for mitigation for aggregate licenses to manage vessel traffic during operation (Economy_773). The role of shipping in this restriction on the aggregates sector is not fully known. However, we assume that the growth of the shipping activity can increase this adverse effect.

A number of interactions have been identified between shipping and marine developments. There are particular issues with regard to shipping and offshore renewable energy installations. Navigational safety around these installations is essential. It is assumed that appropriate navigational safety measures are currently in place or will be put in place for future windfarm development.

Ports and shipping are essential in supporting emerging industries such as renewable energy development (Economy_620). Most of the options do not have much direct influence on this synergy. At present, no wind farms are in development in this region. However, tidal stream, tidal barrage and wave power all are. Ports and shipping are needed to support them, but the infrastructure could impact on shipping; for example, a major barrage or lagoon.

Displacement of species can result from shipping and this activity can have potential consequences on Special Protection Areas and Special Areas of Conservation mobile features (Biodiv_621). No significant effects are expected from the proposed options on this issue due to the mobility of a wide range of species and potential alternative sites.

3.28 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, C, D, E, F, G, H, I, J and K all have the potential to give rise to significant positive effects.

Protection of priority habitats would indirectly prevent disturbance to seabed substrates and coastal features (Geol_209, Geol_211). The implementation of Options D, I, J and K, would therefore have a positive impact on seabed substrates and coastal features within the South West Marine Plan Areas. Options I, J and K in particular mention specific issues concerning land reclamation and activity in the Severn Estuary.

There is an interaction between increasing access to the marine area for recreation and tourism and protection of heritage and conservation sites (Economy_482, Economy_523). The extent to which different options would impact either the economy associated with recreation and tourism, or biodiversity as a result of protection afforded, would largely depend on implementation. Option F would however have significant positive impacts on tourism if it were implemented, as it supports eco-tourism which aims to educate or make sustainable recreational use of the marine area.

Implementation of Options B, C, D, E, G, H, I, J and K would all have a significant positive impact on protected sites and species as they aim to improve coherence or connectivity of protected sites. Whilst Option F aims to minimise disturbance, it does not include reference to protected sites, and as such, the effects of its implementation on protected sites and species remain uncertain depending on how it might be implemented. In relation to deep-sea habitats, litter and demersal fishing are the main impact pathways.

The baseline indicates a current negative trend regarding benthic ecology in the South West based upon existing policy (Biodiv_487, Biodiv_542, Biodiv_562, Biodiv_574, Biodiv_708). Option A would therefore have a significant negative effect

on benthic and intertidal ecology and fish and shellfish. As Options B, D, G, I, J and K support the enhancement and facilitation of coastal habitats and priority species, their implementation would have a significant positive impact.

Similarly, to 'Do nothing', as per Option A would exacerbate current negative trends in the baseline concerning marine mega fauna (Biodiv_502, Biodiv_536, Biodiv_546, Biodiv_549, Biodiv_567, Biodiv_722), with significant negative effect. Options B, C, D, G, H and J would have significant positive effects if implemented as, amongst other reasons, they consider proactive measures by which to reduce impacts on marine mega fauna from vessels and enhance biodiversity adaptation, migration, connectivity and net environmental gain.

Water quality may improve due to signposting to the Marine Strategy Framework Directive, Water Framework Directive, relevant River Basin Management Plans, the Stockholm Convention on Persistent Organic Pollutants, Shoreline Management Plans and Local and Harbour Authority plans, but would be dependent on implementation.

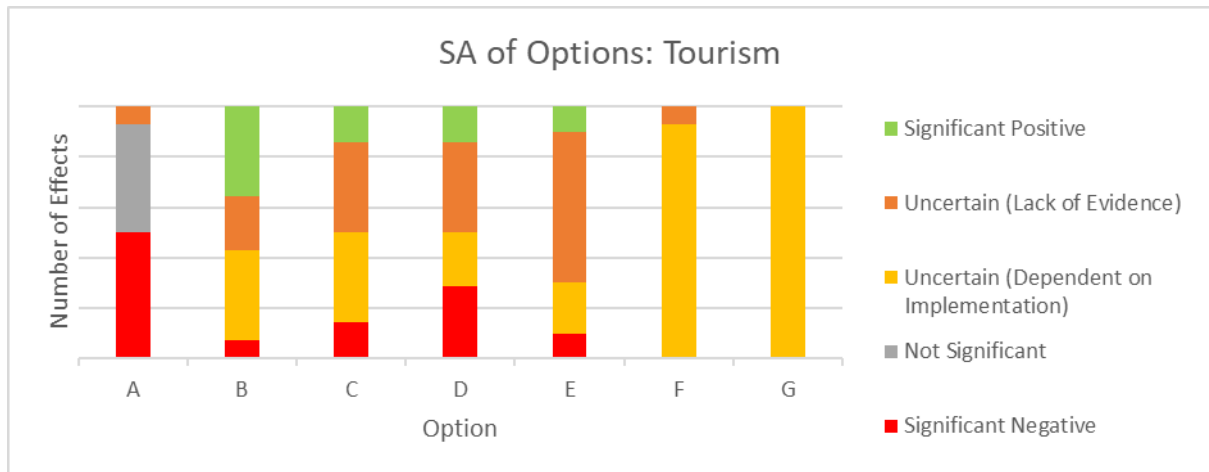
Bristol, Falmouth and Plymouth are major ports in the South West and most important interactions are potential noise and visual disturbance to highly mobile species and contamination to benthic habitats and water (Economy_383).

The baseline also indicates a negative trend concerning ornithology in the South West (Biodiv_489, Biodiv_580). As Options B, D, E, G and J seek to support proposals that enhance or facilitate coastal habitats and priority species, as well as those which are not protected by designations, their implementation would likely have a significant positive impact on ornithology within the South West Marine Plan Areas.

Mitigation

- Whilst significant negative effects were assessed for Option A on benthic and intertidal ecology, fish and shellfish and ornithology due to the negative trend in the baseline, implementation of the majority of alternative options would act, at least in part, as appropriate mitigation.

3.29 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. Option B, C, D and E 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.

Disturbances from tourism are having adverse impacts on biodiversity. Physical damage to cetaceans and seals through collision with vessels and other recreational activities (Biodiversity_559) are common in the South West. Pleasure boats can also be 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.

Existing policy X-BIO-1, within Option B aims to avoid, minimise or mitigate the significant adverse impacts of tourism on natural habitat, species adaptation, migration and connectivity. It is assumed that this will work towards the protection of protected sites and species, marine mega fauna and ornithology, and has therefore resulted in significant positive effects on these SA sub topics.

Tourism and recreational pressures have the ability to damage the seascape and landscape character and contribute to the worsening of water quality and marine litter. Increased visitor numbers are likely to put more pressure on the water supply which could affect the quality and call for more infrastructure to support it. For these reasons significant negative effects resulting from Option A have also been identified for seascape and landscapes, pollution and water quality and marine litter.

Attracting more visitors to the coast is likely to increase the amount of traffic which will contribute to a reduction in air quality, however, there is insufficient information within the baseline to grasp the current situation within the marine plan areas.

Option F aims to support an eco-tourism approach, with the intention to educate or make sustainable recreational use of the marine area. Although this option could result in overall benefits to biodiversity, water quality, marine litter and health and wellbeing, it is not clear how this will be implemented. Uncertainty has been recorded within the assessment.

The marine historic environment is important as a source of economic and social benefits to coastal communities through eg leisure, recreation and tourism. Options are not specific to heritage assets, therefore no significant effects have been identified.

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.

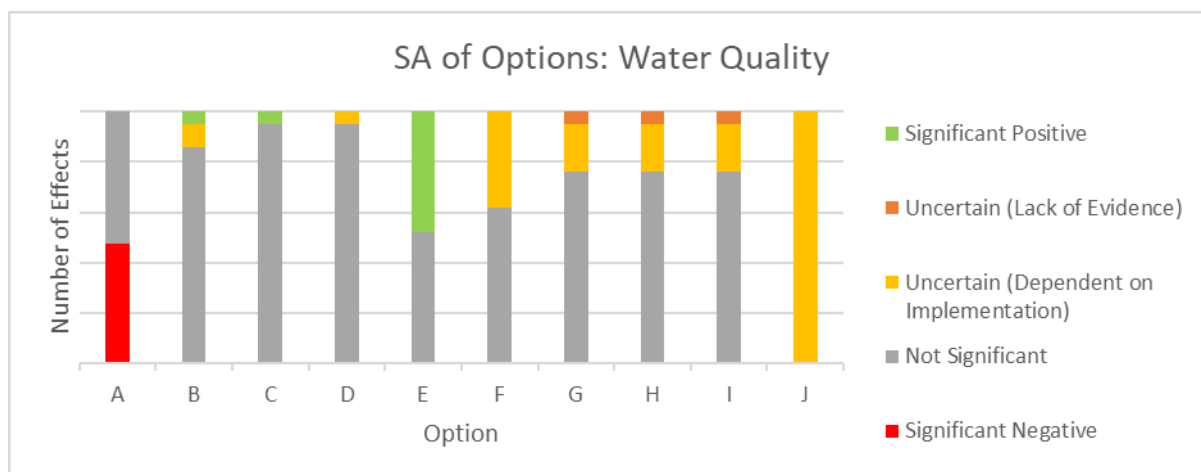
Ports and harbours can provide tourist attractions in themselves. However, increasing the number of tourists could conflict with ports and shipping activities eg boat trips. Option E aims to increased number of industrial developments, which could result in a greater need for ports and shipping within the area. This would be dependent upon the size and location of proposals that come forward.

Most options will increase the number of tourists in the region. Extension of the holiday season has been deemed to be a significant positive effect, as it provides more options and opportunities for tourists and locals to use recreational and tourist attractions, as well as attracting visitors all year round. Option D has therefore resulted in a significant positive effect. Conversely, this option could have significant negative effect on protected sites and species, marine mega fauna, ornithology and non-indigenous species, as it is likely increase the number of disturbances.

Mitigation

- 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.
- New industrial developments would need to be strategically located away from water bodies, to avoid potential pollution.
- Measures are needed to control litter which is generated from public access.
- Measures are needed to avoid increases in private motorised transport to access the coast on land
- A balance is needed between increasing tourist activity and protecting the interests of ports and shipping.
- Access to protected nature conservation 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.

3.30 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 E has the potential to give rise to significant positive effects.

Water quality is vital for tourism and human health (Water_176). In the South West Marine Plan Areas, 91% of the 126 classified bathing water beaches are achieving good or excellent status; 7 are achieving sufficient status; and 4, poor. The Bathing Waters Directive required all beaches to have a minimum of Sufficient status by 2015. There are 10 blue flag beaches and high levels of surfing and water sports (Water_181). The South West has five eutrophication problem areas: Truro, Tresillian and Fal estuaries, Taw estuary and Lower Fal Estuary (Water_208), and large scale farming in the area between Trevoze Head and Stepper Point can have large scale impacts, for example soil run off into the sea (Water_39). South West Water has invested £75 million to reduce the volume of, and improve the quality of, discharges into the most sensitive areas including bathing waters and shellfish waters (Water_312). There is a large potential risk of a major pollution incident due to large merchant vessels calling into Torbay (Water_351).

Implementation of Option A would not ensure the improvement of outstanding problems associated with pollution and water quality such as the risk of hazardous substance pollution, hence to 'do nothing' would have significant negative impacts. Conversely, Option E would have a significant positive impact as it ensures that proposals must include measures which will improve 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 West Marine Plan Areas 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 impacts. Conversely, improved water quality as a result of Option E would have a significant positive effect.

Whilst no significant effects have been identified for the air pollutants and greenhouse gas emissions SA sub-topics, it should be noted that Options G, H and I consider air quality in Air Quality Management Areas (AQMAs), despite air quality affecting water quality rather than vice versa. This assessment therefore considers the effects of air quality on water quality for Options G, H and I only. The same relationship will exist for the other options within the South West Marine Plan Areas, as well as for the North East, North West and South East Marine Plan Areas.

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). Surfing, scuba diving and other water sports activities occur throughout the year in the South West Marine Plan Areas, all of which can be affected by poor water quality (Water_181, Water_271, Economy_359). Water quality can deteriorate particularly during summer storm events in the South West, due to agricultural run-off and the presence of tourists inflating the population with added pressure had on Combined Sewer Overflows (Water_312, Water_367). 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 impacts 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. Option E would 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 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 (PCBs) 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, whereas Option E would have significant positive effects on marine organisms if implemented.

Anthropogenic nutrient enrichment of coastal waters creates a risk of harmful algal blooms, which is further exacerbated by the effects of climate change and summer storm events (Biodiv_623, Water_312, Water_367). The importance of diatoms in the marine environment is not recognised – silica deposition from diatoms in the Severn Estuary is a key contributor to silica cycling and availability in the marine environment, and the impact of diatoms on water quality can be as big a factor as

phosphate and nitrogen run-off (Biodiv_719). Option A would not combat key baseline issues, and so would have significant negative effects on plankton with the South West Marine Plan Areas, whereas implementation of Option E would seek to reduce the discharge of nutrients and pollution into the marine area, resulting in significant positive effects.

Mitigation

- If more stringent, Options B, D and F could have significant positive impacts on pollution and water quality; litter; health and wider determinants of health as well as effects on communities; fisheries and aquaculture; leisure and recreation; tourism; benthic and inter-tidal ecology and fish and shellfish; marine mega fauna; and plankton.
- Within Option B, policies X-WG-2 and X-WQ-1 somewhat contradict one another, as to support activities which can deliver an improvement to the water environment, or enhance habitats and species which can be of benefit to water quality, would be in vain if other proposals which may have significant adverse impacts upon the water environment, including upon habitats and species that can be of benefit to water quality, must only demonstrate that they will a) avoid, b) minimise, c) mitigate these significant adverse impacts. Proposals must be prohibited from having any adverse impact on water quality and habitats and species that can be of benefit to water quality.
- If more stringent, Options G, H and I would have a significant impact on air pollutants; greenhouse gas emissions; climate change resilience and adaptation; and plankton and also health and wider determinants of health as well as effects on communities; leisure and recreation; and tourism by reducing the risk of harmful algal blooms.

4 Cumulative Assessment – South West Marine Plan Areas

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. 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 assessment of cumulative impacts in the introductory text of the marine plan 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 West Inshore and Offshore Marine Plans and the Sustainability Appraisal are described below. The work which will be undertaken to conclude the Iteration 2 marine plan area 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 SA of the options;
- Editing the draft vision for the South West Marine Plan;
- 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.

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 West Marine Plan and a Sustainability Appraisal Report (SA Report) produced.

The outputs of Iteration 3 will feed into the production of a South West 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 areas. These include:

- Implementation work;
- Developing a monitoring approach and data gathering;
- Continued monitoring of the effectiveness of the East and South marine plans 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 Plan Areas;
- Continuing data and evidence gathering; and
- Undertaking European Maritime and Fisheries Fund (EMFF) projects.