

Planning Scotland's Seas

SEA of Plans for Wind, Wave and
Tidal Power in Scottish Marine Waters

Appendix D: Draft Plan Options Assessment

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1 Wind Draft Plan Options

OWSW1

SEA Topic	Summary of Key Baseline Evidence	Potential for Effects	Characteristics	Mitigation Available and Potential Residual Effects
Biodiversity, Flora and Fauna ¹	<p>The Draft Plan Option is located near to Luce Bay and Sands SAC (primarily designated for habitats and sediments) and Loch of Inch and Torrs Warren SPA (for non-breeding harriers and geese). Close to the Draft Plan Option, in Luce Bay, is Back Bay to Carghidown SSSI (for coastal and sediment features), Mull of Galloway SSSI (recognised for breeding birds) and Scare Rocks SSSI (recognised for breeding birds including an important Gannet Colony), amongst others. Several IBAs have also been identified in the vicinity of the Draft Plan Option.</p> <p>Further east is the Solway Firth SAC (with River Lamprey interests amongst others), Upper Solway Flats and Marshes SPA (with bird interests), and the River Bladnoch SAC (considered important for its Atlantic Salmon interests) amongst others. The implication is that the Solway Firth is an important area for a wide range of protected fish and bird species.</p> <p>The seabird maps presented in the baseline indicates low seabird collision and displacement vulnerability for wind energy devices in winter, with slightly higher vulnerability during the breeding season. However, this vulnerability will differ for individual species.</p> <p>The available distribution data indicates the potential presence of cetaceans within the Solway Firth area. Seal density surveys and the presence of Grey seal haul out sites within the area, particularly in Luce Bay and the Inner Solway Firth, indicates they use the area. Basking sharks are known to be located around the Isle of Man and have been sighted within the Firth, particularly to the south west of OWSW1. It is believed that Basking sharks travel up the west coast of Scotland, and there is the potential for other elasmobranch species in these waters.</p> <p>The area is known to be used by fish species, including diadromous species, such as Atlantic salmon, and others including Sea trout by many commercially caught species. The waters of the Solway Firth and the northern portion of the Irish Sea contain known nursery areas for several fish species, particularly the eastern portion of the Firth (including commercially important species such as Spurdog, Herring, Cod, Whiting and Sole</p>	<p>The vulnerability mapping included in the baseline identified a potential vulnerability for seabird collision and displacement, particularly in the breeding season. Given the presence of important seabird sites for a number of bird species (including Gannets and Greenland white-fronted goose in proximity to the Draft Plan Option and within the Solway and South West region), there remains a risk of collision and displacement within this area. However, the potential for such effects depend on a range of factors including the bird species considered (e.g. vulnerability varies for different bird species), and the size and design of wind energy devices (e.g. some species are known to be more susceptible to collision with larger devices, and others with devices with lower clearance above the water surface).</p> <p>Given the likely presence of marine mammals and fish, particularly Basking sharks and other elasmobranchs, Cetaceans and fish within the Solway Firth, there may be the potential for effects such as barriers to movement, collision with the devices and associated infrastructure, above and below water noise impacts during construction and operation, and aggregation effects (e.g. aggregation of predators near structures). However, there are currently gaps in research knowledge which mean it is difficult to establish the likelihood of impact.</p> <p>The review of technologies identified potential effects from EMF on fish and elasmobranchs although research into the magnitude of effects demonstrates that this is uncertain.</p> <p>The presence of sub-tidal sediments indicates the potential for loss of habitat from placement of devices on the seabed, and from smothering of benthic habitats. However, the dynamic and turbid environment in the Solway would indicate that the benthos present will be conditioned to dynamic environments, and as a result, the magnitude of any impact may be reduced. However, there are currently gaps in research knowledge which make it difficult to establish certainty of such effects.</p>	<p>Potential for significant effects on designated sites, particularly those in Luce Bay, if associated grid infrastructure was to be sited in this location.</p> <p>Potential for bird strike with blades, collision for diving birds with underwater infrastructure, and the potential displacement for species. However, the significance of impact is uncertain as effects on the population viability of individual species are not known.</p> <p>Potential effects on Cetaceans, Seals, elasmobranchs and fish including barriers to movement, collision with infrastructure, and possible noise impacts as a result of piling activities associated with installing devices. These effects may range from changes to existing feeding behaviour to mortality, although the precise effects on populations cannot be ascertained at this strategic stage but should rather be a consideration at the project level (e.g. in monitoring).</p> <p>Effects associated with construction activities, such as fauna disturbance from underwater noise associated with piling for monopile or jacket devices, would be temporary but longer term effects from wind devices with underwater infrastructure remain.</p> <p>Potential for EMF impacts on fish and elasmobranchs from electricity cables associated with wind energy devices. Indirect effects may include altered migratory pathways with unknown energetic/biological consequences.</p> <p>Potential for direct benthic effects associated with the siting and construction of devices, and indirect effects including sediment movements (i.e. scouring, smothering, sediment deposition and abrasion). However, such effects may be limited as the existing environment is dynamic.</p>	<p>Project level investigation (EIA) will need to include specific impact modelling and/or assessment to demonstrate that there will be no significant impact on the habitats (e.g. Luce Bay SAC) from direct benthic impacts from siting of devices, and from changes to hydrology and sedimentation from the construction of devices.</p> <p>Potential onshore effects from grid connections could be avoided if supporting onshore/offshore connections were located away from sensitive areas such as Luce Bay.</p> <p>Further research into the potential collision, displacement and the effects on Cetaceans, Seals elasmobranchs and fish will help to identify the potential for significant effects.</p> <p>To date research has indicated that there are uncertain effects of EMF and noise on fish and elasmobranchs. The results of monitoring of existing and operational projects in this region have the potential to provide greater certainty on the scale of effects.</p>

¹ Informed by SNH (2013) SNHi, Interactive Map [online] Available at: <http://www.snh.gov.uk/publications-data-and-research/snhi-information-service/map/> [accessed 09/04/2013]

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	<p>amongst others). Spawning areas for Plaice and Sole have been identified within the eastern portion of the Solway Firth,</p> <p>The Luce Bay coastline is a mix of intertidal rocks and sediments with the predominant habitat type in the vicinity of OWSW1 being shallow sub tidal sediments. Predominantly coarse sediments are found in areas further offshore. Parts of the Solway are generally turbid environments and the benthos present is conditioned to dynamic environments.</p>			
Population and Human Health ²	<p>Solway Firth and surrounding waters are used for a number of recreational activities including salmon and sea trout fisheries, recreational sea angling, sailing, bathing and recreational tourism.</p> <p>Stakeholder consultation has also identified that the Draft Plan Option straddles cruising routes for vessels navigating the Mull of Galloway from the isle of man, and harbours within the Scottish and English sides of the Solway.</p>	<p>There is potential for collisions between recreational vessels and offshore energy infrastructure and supporting vessels, particularly during installation. However, given the height of wind turbines these would be highly visible during most conditions which should reduce collision risk.</p> <p>The presence of offshore wind turbines has the potential to displace some existing recreational activities, through limiting access to areas of the sea and potential disruption to perceived amenity value.</p>	<p>Any collision could directly affect vessels and passengers, however it is not expected that wind developments would result in a significant increase in collisions.</p> <p>It is difficult to predict the precise impact of potential changes to amenity on recreational use of the area. Some displacement could be permanent leading to recreational activities being discontinued. However it is likely that most activities could continue within a smaller range or in other nearby locations.</p>	<p>Potential mitigation for collisions through the inclusion/mapping of offshore energy developments on navigational charts and the use of navigational aids (such as marker buoys and lighting, etc.) in the vicinity of the infrastructure.</p> <p>When planning projects, developers could work with the recreation sector to consider best how recreational activities might continue within the option boundary. Early consultation can also help to reduce impacts on important cruising routes.</p> <p>There may be the requirement for commercial shipping to be excluded from developed areas. This would be determined through further engagement between MS-LOT and the relevant navigation authorities at the project level.</p>
Water and the Marine Environment ³	<p>The coastal waters within the draft plan area and Luce Bay to the north, were classified at being of good status under the WFD in 2011.</p>	<p>Potential for adverse water quality impacts during installation, operation and decommissioning of the developments (e.g. increased turbidity caused by works on the seabed, contamination from installation and maintenance vessels).</p> <p>Wind turbines that use gravity based foundations that use sediment as fill, may carry a pollution risk depending on where the sediment is sourced.</p>	<p>Impacts associated with any contamination from seabed material disturbed during installation or potentially decommissioning, is likely to be of localised and temporary nature, with the significance of effects dependant on the level of contamination. Impacts during operation and maintenance are considered less likely.</p> <p>The significance and characteristic of impacts associated with contamination from vessels is uncertain and cannot be described beyond the potential for it to occur.</p>	<p>Pollution risks associated with installation, maintenance and decommissioning of devices should be reduced and limited through building mitigation into construction procedures, to avoid discharges of harmful material and substances.</p> <p>Further assessment work may be required to reduce uncertainty regarding potential impacts on water quality, particularly on including shellfish waters. This includes a recommendation for hydrodynamic and water quality modelling as part of project level assessment</p>
Climatic Factors ⁴	<p>Potential coastal flooding issues associated with surge threats at heads of estuaries (e.g. Solway Firth).</p> <p>Coastal erosion and accretion have been identified in the soft coastal landforms in the Solway Firth, including in Luce Bay.</p>	<p>Potential for mixed effects on coastal erosion and accretion caused by changes to hydrodynamics and wave energy particularly in vulnerable sections of coastline such as the Luce Bay Sands.</p> <p>Likely contributions to achieving GHG reductions through replacing energy generation from non-renewable sources to renewable sources.</p>	<p>Significance and character of effects are unknown. Depending on how offshore infrastructure affects hydrodynamics the effects on coastal erosion and accretion could be positive or negative. However any effects that do occur are likely to depend on the specific nature and location of the proposed development. Effects on the coastline are likely to be indirect.</p>	<p>Project level assessment of hydrodynamic changes, as a result of renewables development, should include any relevant climate related changes to the marine environment when assessing impacts.</p>
Marine Geology and Coastal Processes ⁵	<p>The seabed in the vicinity of the Draft Plan Option is shallow (between 20 – 60m depth) and varied, ranging from mixed coarse sediments (i.e. sandy gravels, gravelly sands and some gravelly muddy sands) to the south west of the Rhins Peninsula</p>	<p>Some sediment disturbance and loss of seabed habitat is likely with the site preparation and placement of device foundations, although the significance of the effect will depend on the type and size of the device.</p>	<p>Direct effects such as disturbance of the seabed during installation are likely to be temporary and localised (e.g. increased turbidity in sediments with muddy components).</p>	<p>When projects are in the design process, consideration should be given to the location and arrangement of devices in order to build in mitigation to avoid potential impacts on marine geology and coastal processes, particularly in</p>

² Informed by Scottish Government (2011) Scotland's Marine Atlas: Information for the National Marine Plan, pg. 144 – 159.

³ Informed by SEPA (2012) Water Classification report: 2007 – 2011 [online] Available at: http://www.sepa.org.uk/water/monitoring_and_classification/classification.aspx [accessed 10/04/2013]

⁴ Informed by Wallingford H.R. (1997) Coastal Cells in Scotland, SNH Research, Survey and Monitoring Report [online] Available at: <http://www.snh.org.uk/pdfs/publications/research/56.pdf> [accessed 10/04/2013]

⁵ Informed by the Wind, Wave and Tidal Regional Locational Guidance, British Geological Society datasets, European University Information Systems (EUNIS) data and BERR Atlas of UK Marine Renewable Energy Resources (available at: <http://www.renewables-atlas.info/>).

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	<p>and to the south of Wigtown Bay, to coarser sediments in waters south of Luce Bay, and muddy sands and gravels within Luce Bay itself.</p> <p>The region has moderate wave and tidal energy across much of the Draft Plan Option, with higher resource in the north west and north east portions near to the Rhins Peninsula and Burrowhead respectively.</p>	<p>Sediment disturbance caused during the installation process could also lead to secondary impacts such as increased turbidity during installation in areas with fine sediments and release of existing contaminants present in fine sediments.</p> <p>Water quality impacts from installation works are considered to be less likely in areas of high wave or tidal energies, and where coarse seabed sediments are predominant.</p> <p>There is the potential for offshore developments within the Draft Plan Option to alter sediment dynamics and tidal flow fluxes in the vicinity of the site. This could lead to general effects such as scour and abrasion at the site, and deposition of sediments in nearby areas. This may be of particular concern for sites near to relatively sheltered areas such as Luce Bay. However, these systems are likely to be complex and, as such, the potential for impacts is likely to be site specific and dependent on a range of factors, including the type and size of the devices and their foundations.</p>	<p>Loss of seabed area beneath device foundations may be permanent, although some natural regeneration may occur upon decommissioning of devices and removal of infrastructure.</p> <p>Changes in sediment dynamics and direct impacts such as scour, deposition and abrasion of seabed sediments are likely to be limited to the installation and operation phases of developments. However, in some circumstances, the effects of such changes may have long-term effects in coastal areas (e.g. changes to local sediment dynamics, deposition of sediments in nearby coastal areas).</p>	<p>relation to Luce Bay.</p> <p>It is recommended that sediment dynamic modelling is undertaken at project level to demonstrate potential effects in order to consider appropriate mitigation.</p> <p>Mitigation measures should include the design and use of rock scour protection around the base of gravity-based foundations, jacket and monopile devices placed on or into the seabed.</p>
Historic Environment ⁶	<p>Solway Firth and surrounding coastlines are rich in historic features, particularly the south coast of Dumfries and Galloway which contains a number of scheduled monuments (e.g. coastal fortifications, chambered cairns and early church sites including at Whitthorn Peninsula).</p> <p>Numerous historic wrecks have been identified in or near to Draft Plan Option area, and within the Solway Firth.</p>	<p>The proximity of the Draft Plan Option to the south coast of Dumfries and Galloway suggests that there is potential for impacts on the site and setting of historic environment assets located both within the marine environment and along the nearby coastline. Effects could be direct, caused by changes to coastal conditions (e.g. coastal processes, scour, sedimentation, etc.) or from the siting of devices and associated infrastructure, or indirect effects on the setting of features.</p> <p>There may also be the potential for impacts on historic wreck sites if devices were to be installed near to these sites.</p>	<p>Direct effects on historic environment assets e.g. loss of assets caused by changes to coastal processes or the siting of offshore developments, would likely be permanent. The significance of the effects would, depend on the significance of the receptor.</p> <p>Effects on the setting of historic environment features would be indirect, and last for the lifespan of the development.</p>	<p>Direct effects on historic environment features can be avoided through appropriate siting of devices away from vulnerable coastlines and known historic marine features.</p> <p>Project level assessments should consider the potential for impacts on the setting of sites and seek to mitigate accordingly.</p>
Landscape / Seascape ⁷	<p>Three NSAs are located along the Solway Coast: Fleet Valley, East Stewartry Coast and Nith Estuary. However, direct views to the plan option from these areas may be limited.</p> <p>Local landscape designations extend over much of the Solway coastline, and there are several local designated landscapes in proximity to the option area. These include the southern tip of the Rhins Peninsula (Rhins Coast RSA), Burrowhead (Machars Coast RSA) and within Luce Bay (Mochrum Lochs RSA).</p>	<p>Wind energy developments in the Draft Plan Option are likely to be visible from the coastline, from areas of local landscape designations, and potentially, from the northern coastline of the Isle of Man.</p> <p>It is considered unlikely that the Draft Plan Option would be highly visible from the identified NSAs located along the Solway coast.</p> <p>There are a number of potential offshore receptors, including recreational boats that may sail close to the Draft Plan Option.</p> <p>It is likely that construction and maintenance works, and navigational aids (e.g. marker buoys, lighting) will have visual effects.</p>	<p>The wind devices will likely be visible from the mainland and Isle of Man, and will include areas designated for their landscape importance at a local level.</p> <p>Lighting of wind devices may result in visual effects during day and night, although the scale of any effects for onshore receptors is expected to decrease with greater distance from the light source.</p> <p>Development within the Draft Plan Option would likely alter the current seascape.</p> <p>Visual impacts would likely be greater for offshore receptors, such as recreational sea users, as their proximity to devices would be greater than onshore receptors.</p>	<p>Full visual impact assessment will be required at the project level (EIA) to establish the visual envelope and significance of any effects. However, the potential for visual impacts to onshore receptors could be limited by undertaking construction further from the mainland.</p> <p>Impacts to the landscape and seascape character of Luce Bay would also need to form part of project level assessments.</p> <p>Development that will affect NSA should avoid adverse effects on the integrity of the area or the qualities for which it has been designated.</p>

⁶ Informed by the Scottish Government's Wind, Wave and Tidal Regional Locational Guidance (RLG) and Historic Scotland

⁷ Informed by Scottish Government (2009) Environment, Map of National Scenic Areas [online] Available at: <http://www.scotland.gov.uk/Topics/Environment/Countryside/Heritage/Areas/Map> [accessed 09/04/2013]

OWSW2

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
Biodiversity, Flora and Fauna	<p>The Draft Plan Option is located near to the Solway Firth SAC (with River Lamprey interests), Upper Solway Flats and Marshes SPA (with bird interests) and the Borgue Coast SSSI (with an assemblage of breeding Gulls). To the North West of the site, the River Bladnoch SAC is recognised for its Atlantic Salmon interests, Several IBAs have also been identified in the vicinity of the Draft Plan Option</p> <p>To the west of the Draft Plan Option, the Luce Bay and Sands SAC (primarily designated for habitats and sediments), Loch of Inch and Torrs Warren SPA (for non-breeding harriers and geese) and Scare Rocks SSSI on the edge of Luce Bay (recognised for breeding birds including an important Gannet Colony), indicating that the Solway Firth is an important area for breeding birds and protected fish species.</p> <p>The seabird maps presented in the baseline indicate lower collision and displacement vulnerability for wind energy devices in winter, with slightly higher vulnerability during the breeding season. However, this vulnerability may differ for individual species.</p> <p>The available distribution data shows that cetaceans are present within the Solway Firth area. Seal density surveys and the presence of Grey seal haul out sites within the area, particularly in the Inner Solway Firth to the north east of OWSW2, indicates the presence of Seals in the vicinity of the Draft Plan Option. Basking sharks sightings are common around the Isle of Man and within the western portion of the Firth, although no recorded sightings have been made in the vicinity of OWSW2. It is believed that Basking sharks travel up the west coast of Scotland, and there is the potential for other elasmobranch species in these waters.</p> <p>The area is known to be used by fish species, including diadromous species, such as Atlantic salmon, and others including Sea trout and many commercially caught species. The waters of the Solway Firth and the northern portion of the Irish Sea contain known nursery areas for several fish species, particularly the eastern portion of the Firth (including commercially important species such as Spurdog, Herring, Cod, Whiting and Sole amongst others). Spawning areas for Plaice and Sole have been identified within the eastern portion of the Solway Firth,</p>	<p>The vulnerability mapping included in the baseline identified a potential vulnerability for seabird collision and displacement, particularly during the breeding season. Given the presence of important sites for a number of birds (including Geese, Plover and Shelduck amongst others), in proximity to the Draft Plan Option and within the Solway and South West region, there remains a likely a risk of collision and displacement in this area. However, the potential for such effects depends on a range of factors including the bird species considered (e.g. vulnerability varies for different bird species), and the size and design of wind energy devices (e.g. some species are known to be more susceptible to collision with larger devices, and others with devices with lower clearance above the water surface).</p> <p>Given the likely presence of marine mammals and fish, particularly Basking sharks and other elasmobranchs, Cetaceans and fish within the Solway Firth, there may be the potential for effects such as barriers to movement, collision with the devices and associated infrastructure, above and below water noise impacts during construction and operation, and aggregation effects (e.g. aggregation of predators near structures). However, there are currently gaps in research knowledge which mean it is difficult to establish the likelihood of impact.</p> <p>The review of technologies identified potential effects from EMF on fish and elasmobranchs although research into the magnitude of effects demonstrates that this is uncertain.</p> <p>The presence of sub-tidal sediments indicates the potential for loss or smothering of benthic habitats. However, the dynamic and turbid environment in the Solway would indicate that the benthos present will be conditioned to dynamic environments, and as a result, the magnitude of such impacts may be reduced. However, there are currently gaps in research knowledge which means it is difficult to establish certainty of impact.</p>	<p>Potential for bird strike with blades, collision for diving birds with underwater infrastructure, and disturbance of these species. However, the significance of impact is uncertain as effects on the population viability of individual species are not known.</p> <p>Potential effects on Cetaceans, Seals, elasmobranchs and fish include barriers to movement, collision with infrastructure, and possible noise impacts as a result of piling activities associated with installing devices. These effects may range from changes to existing feeding behaviour to mortality, although the precise effects on populations cannot be ascertained at this strategic stage but should rather be a consideration at the project level (e.g. monitoring).</p> <p>Effects associated with construction activities (such as fauna disturbance from underwater noise associated with piling for monopile or jacket devices, would be temporary but longer term effects from wind devices with underwater infrastructure remain..</p> <p>Potential for EMF impacts on fish and elasmobranchs from electricity cables associated with wind energy devices. Indirect effects may include altered migratory pathways with unknown energetic/biological consequences.</p> <p>Potential for direct benthic effects associated with the siting and construction of devices, and indirect effects including sediment movements (i.e. scouring, smothering, sediment deposition and abrasion). However, such effects may be limited as the existing environment is already dynamic.</p> <p>Potentially significant effects on designated sites, such as the Solway Firth SAC, if associated grid infrastructure was to be sited in this location.</p>	<p>Project level investigation (EIA) will need to include specific impact modelling and/or assessment to demonstrate that there will be no significant impact on important habitats (e.g. Solway Firth SAC) from direct benthic impacts from siting devices and from changes to hydrology and sedimentation from the construction of devices. The results of monitoring from operational projects and those currently in the application process have the potential to help provide greater certainty on the scale of these effects.</p> <p>Potential onshore effects could be avoided if supporting onshore/offshore grid connections were located away from sensitive areas, such as Luce Bay and the Inner Solway Firth SAC.</p> <p>Further research into potential collision and displacement effects on Cetaceans, Seals elasmobranchs and fish will help to identify the potential for significant effects.</p> <p>To date research has indicated that there are uncertain effects of EMF and noise on fish and elasmobranchs. The results of monitoring of existing and operational sites have the potential to help provide greater certainty on the scale of effects.</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
	The Solway Firth coastline is a mix of intertidal rocks and sediments with the predominant habitat type being the shallow sub tidal sediments and finer sediments (muddy sands and sands) located in the eastern part of the Firth. The Solway is a turbid environment and the benthos present will be conditioned to dynamic environments.			
Population and Human Health	<p>Solway Firth and surrounding waters are used for a number of recreational activities including salmon and sea trout fisheries, recreational sea angling, sailing, bathing and recreational tourism.</p> <p>Stakeholder consultation has also identified that the Draft Plan Option straddles cruising routes for vessels navigating the Mull of Galloway from the isle of man, and harbours within the Scottish and English sides of the Solway.</p>	<p>There is potential for collisions between recreational vessels and offshore energy infrastructure and supporting vessels, particularly during installation. However, given the height of wind turbines these would be highly visible during most conditions which should reduce collision risk.</p> <p>The presence of offshore wind turbines has the potential to displace some existing recreational activities, through limiting access to areas of the sea and potential disruption to perceived amenity value</p>	<p>Any collision could directly affect vessels and passengers, however it is not expected that wind developments would result in a significant increase in collisions.</p> <p>It is difficult to predict the precise impact of potential changes to amenity on recreational use of the area. Some displacement could be permanent leading to recreational activities being discontinued. However it is likely that most activities could continue within a smaller range or in other nearby locations.</p>	<p>Potential mitigation for collisions through the inclusion/mapping of offshore energy developments on navigational charts and the use of navigational aids (such as marker buoys and lighting, etc.) in the vicinity of the infrastructure.</p> <p>When planning projects, developers could work with the recreation sector to consider best how recreational activities might continue within the option boundary. Early consultation can also help to reduce impacts on important cruising routes.</p> <p>There may be the requirement for commercial shipping to be excluded from developed areas. This would be determined through further engagement between MS-LOT and the relevant navigation authorities at the project level.</p>
Water and the Marine Environment	The coastal waters within and to the east of the Draft Plan Option, were classified at being of high status under the WFD in 2011.	<p>Potential for adverse water quality impacts during installation, operation and decommissioning of the developments (e.g. increased turbidity caused by works on the seabed, contamination from installation and maintenance vessels).</p> <p>Wind turbines that use gravity based foundations that use sediment as fill, may carry a pollution risk depending on where the sediment is sourced.</p>	<p>Impacts associated with any contamination from seabed material disturbed during installation or potentially decommissioning is likely to be of localised and temporary nature, with the significance of effects dependant on the level of contamination. Impacts during operation and maintenance are considered less likely.</p> <p>The significance and characteristic of impacts associated with contamination from vessels is uncertain and cannot be described beyond the potential for it to occur.</p>	<p>Pollution risks associated with installation, maintenance and decommissioning of devices should be reduced and limited through building mitigation into construction procedures, to avoid discharges of harmful material and substances.</p> <p>Further assessment work may be required to reduce uncertainty regarding potential impacts on water quality, particularly on including shellfish waters. This includes a recommendation for hydrodynamic and water quality modelling as part of project level assessment.</p>
Climatic Factors	<p>Potential coastal flooding issues associated with surge threats at heads of estuaries (e.g. Solway Firth).</p> <p>Coastal erosion and accretion have been identified along soft coastal landforms in the Solway Firth, particularly in the eastern part of the Firth at the Upper Solway Flats and Marshes SPA, at heads of estuaries located along the coastline and along the Cumbrian Coast.</p>	<p>Potential for mixed effects on coastal erosion and accretion caused by changes to hydrodynamics and wave energy particularly in the vicinities of estuaries and the Upper Solway Flats and Marshes SPA.</p> <p>Likely contributions to achieving GHG reductions through replacing energy generation from non-renewable sources to renewable sources.</p>	<p>Significance and character of effects are unknown. Depending on how offshore infrastructure affects hydrodynamics the effects on coastal erosion and accretion could be positive or negative. However any effects that do occur are likely to depend on the specific nature and location of the proposed development.</p> <p>Effects on the coastline are likely to be indirect.</p>	Project level assessment of hydrodynamic changes, as a result of renewables development, should include any relevant climate related changes to the marine environment when assessing impacts.
Marine Geology and Coastal Processes ⁸	<p>The seabed in the vicinity of the Draft Plan Option is varied, ranging from mixed coarse sediments with finer sediments such as extensive sands and muddy sands located further into the Firth to the east of the River Dee, particularly at the mouths of rivers within the Inner Firth.</p> <p>The region has moderate wave and tidal resources across much of the Draft Plan Option, with higher resource in the north west and north</p>	<p>Some sediment disturbance and loss of seabed habitat is likely with the site preparation and placement of device foundations, although the significance of the effect will depend on the type and size of the device.</p> <p>Sediment disturbance caused during the installation process could also lead to secondary impacts such as increased turbidity during installation in areas with fine sediments and release of existing</p>	<p>Direct effects such as disturbance of the seabed during installation are likely to be temporary and localised (e.g. increased turbidity in sediments with muddy components).</p> <p>While loss of seabed may be permanent (e.g. beneath foundations), some natural regeneration may occur upon decommissioning of devices.</p> <p>Changes in sediment dynamics and direct impacts</p>	<p>When projects are in the design process, consideration should be given to the location and arrangement of devices in order to build in mitigation to avoid potential impacts on marine geology and coastal processes, particularly given the proximity of the Draft Plan Option to the Inner Solway Firth.</p> <p>It is recommended that sediment dynamic modelling is undertaken at project level to demonstrate potential effects in order to consider appropriate</p>

⁸ Informed by the Wind, Wave and Tidal Regional Locational Guidance, British Geological Society datasets and European University Information Systems (EUNIS) data.

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
	east near to the Rhins Peninsula and Burrowhead respectively..	contaminants present in fine sediments. However, water quality impacts from installation works are considered to be less likely in areas of high wave or tidal energies, and where coarse seabed sediments are predominant. There is the potential for offshore developments within the Draft Plan Option to alter sediment dynamics and tidal flow fluxes in the vicinity of the site. This could lead to general effects such as scour and abrasion at the site, and deposition of sediments in nearby areas. This may be of particular concern for sites near to relatively sheltered areas and areas of high accretion located along the Solway Firth coastline. However, these systems are likely to be complex and, as such, the potential for impacts is likely to be site specific and dependent on factors such as the type and size of the devices and their foundations.	such as scour, deposition and abrasion of seabed sediments are likely to be limited during the installation and operation phases of developments. However, in some circumstances, the effects of such changes may have long-term effects in coastal areas such as those in the Inner Firth (e.g. the deposition of sediments in nearby coastal areas).	mitigation. Mitigation may include measures such as the design and use of rock scour protection around the base of gravity-based foundations, jacket and monopile devices placed on or into the seabed.
Historic Environment	The Dumfries and Galloway coastline to the Solway Firth is rich in historic features, particularly the south coast of Dumfries and Galloway nearest to the Draft Plan Option which contains various scheduled monuments, gardens and designed landscapes included on the Inventory (e.g. Barnhourie Milland Arbigland) and category A-listed buildings (e.g. Castle Muir and Southernness Lighthouse). Numerous historic wrecks have been identified in or near to OWSW2, and surrounding areas within the Solway Firth.	The proximity of the Draft Plan Option to the south coast of Dumfries and Galloway suggests that there is potential for impacts on the site and setting of historic environment assets located both within the marine environment and along the nearby coastline. Effects could be direct, caused by changes to coastal conditions (e.g. coastal processes, scour, sedimentation, etc.) or from the siting of devices and associated infrastructure, or indirect effects on the setting of features. There may also be the potential for impacts on historic wreck sites if devices were to be installed near to these sites.	Direct effects on historic environment assets e.g. loss of assets caused by changes to coastal processes or the siting of offshore developments, would likely be permanent. The significance of the effects would, depend on the significance of the receptor. Effects on the setting of historic environment features would be indirect, and last for the lifespan of the development.	Direct effects on historic environment features can be avoided through appropriate siting of devices away from vulnerable coastlines and known historic marine features. Project level assessments should consider the potential for impacts on the setting of sites and seek to mitigate accordingly.
Landscape / Seascape	Three NSAs are located along the Solway Coast (Fleet Valley, East Stewartry Coast and Nith Estuary) and one Area of Outstanding Natural beauty (Solway Coast AONB) in proximity to the Draft Plan Option. Local landscape designations extend over much of the Solway coastline, and there are several local designated landscapes in proximity to the Draft Plan Option. These include Burrowhead (Machars Coast RSA), Wigtown Bay (Galloway hills RSA) and along the Solway Coast (Solway Coast RSA). The Heritage Coast of St Bee's Head is located on the southern coast of the Solway Firth.	Wind energy developments in the Draft Plan Option are likely to be visible from the north and south coastlines of the Solway Firth. The majority of these coastlines are covered by national and local level landscape designations. There are a number of potential offshore receptors, including recreational boats that sail close to the Draft Plan Option. It is likely that construction and maintenance works, and navigational aids (e.g. marker buoys, lighting) will have some visual effects.	The wind devices will likely be visible from the mainland and Isle of Man, and will include areas designated for their landscape importance at a local level. Lighting of wind devices may result in visual effects during day and night, although the scale of any effects for onshore receptors is expected to decrease with greater distance from the light source. Development within the Draft Plan Option would likely alter the current seascape. Visual impacts would likely be greater for offshore receptors, such as recreational sea users, as their proximity to devices would be greater than onshore receptors.	Full visual impact assessment will be required at the project level (EIA) to establish the visual envelope and significance of any effects. However, the potential for visual impacts to onshore receptors could be limited by undertaking construction further from the mainland. Development that will affect NSA should avoid adverse effects on the integrity of the area or the qualities for which it has been designated.

OWW1

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
Biodiversity, Flora and Fauna	The plan option is located in proximity to the Rinns of Islay SPA and SSSI (designated for a number of bird species including Chough, Greenland white-fronted goose and Whooper	Given the presence of important sites for birds located in the vicinity of the site, the potential for collision and displacement impacts remains. However, the potential for these effects likely depend on a range of factors	Potential for collision for diving birds with wind devices and associated infrastructure both above and below the water surface, and potential for displacement of species. However, the	Project level assessment (EIA) that includes specific modelling and/or assessment will be required to demonstrate there will be no significant impacts on the birds, mobile species and

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
	<p>swan) and to the north east is the Oronsay and South Colonsay SPA and SSSI (with Corncrake and Chough qualifying features). The North Colonsay and Western Cliffs SPA is designated for breeding seabird assemblage (with Chough, Kittiwake and Guillemot present). The local area also contains a number of IBAs on Colonsay and Islay.</p> <p>The Draft Plan Option is also located south of the Skye to Mull MPA search area, considered to be important for its geodiversity and the presence of Basking shark and Minke whale.</p> <p>The seabird maps presented in the baseline indicate low vulnerability for collision and displacement from with wind energy devices in both winter and breeding seasons. However, this vulnerability may differ for individual species.</p> <p>The south east of Islay contains the South-East Islay Skerries SAC designated for Common seals. The identification of several Seal haul out areas located in Islay and Colonsay and high Seal densities in the vicinity of these areas indicates grey Seal interests in this region.</p> <p>The available distribution and sighting data also indicates that there are likely to be Cetacean, elasmobranchs and fish (e.g. Basking shark and Atlantic salmon, etc.) in the region, with important nursery grounds for a number of commercial fish species. While the Draft Plan Option is located some distance south of the Basking shark and Common skate 'hotspots' located in the vicinity of Tiree, Coll and Mull, it is expected that these species, and other elasmobranchs, may be encountered within the Draft Plan Option.</p> <p>The area is known to be used by fish species, including diadromous species, such as Atlantic salmon, and others including Sea trout and many commercially caught species. The region is known to contain important nursery grounds for several commercially important species of fish (including Spurdog, Herring, Whiting and Anglerfish, amongst others).</p> <p>Benthic habitats in the region are largely shallow and shelf subtidal coarse sediments (e.g. sands, gravelly sands, gravels, etc.) and may be susceptible to hydrodynamic change. Benthic habitats are likely to contain species used to strong tidal movements.</p>	<p>including the bird species considered (e.g. vulnerability varies for different bird species), and the size and design of wind energy devices (e.g. some species are known to be more susceptible to collision with larger devices, and others with devices with lower clearance above the water surface).</p> <p>Given the likely presence of marine mammals and fish, particularly Basking sharks and other elasmobranchs, Cetaceans and Seals in the vicinity of the Draft Plan Option, there may potential effects such as barriers to movement, collision with the devices and associated infrastructure, and above and below water noise impacts during construction and operation, and aggregation effects (e.g. aggregation of predators near structures). However, there are currently gaps in research knowledge which mean it is difficult to establish the likelihood of impact.</p> <p>The review of technologies identified potential effects from EMF on fish and elasmobranchs although research into the magnitude of effects demonstrates that this is uncertain.</p> <p>There is potential for impacts on benthic habitats such as scouring, smothering, deposition and abrasion of seabed in areas with coarse sediments as a result of placing devices within this area. There will likely be some direct localised effect on benthic habitats from installation (e.g. habitat loss with placement of device base, etc.).</p>	<p>significance of such impacts is uncertain as effects on the population viability of individual species are not known.</p> <p>Potential effects on Cetaceans, Seals, elasmobranchs and fish including barriers to movement, collision with infrastructure, and possible noise impacts as a result of piling activities associated with installing devices. These effects may range from changes to existing feeding behaviour to mortality, although precise effects on population cannot be ascertained at this strategic stage but should rather be a consideration at the project level (e.g. in monitoring).</p> <p>Effects associated with construction activities such as fauna disturbance from underwater noise associated with piling for monopile or jacket devices, would be temporary but longer term effects (e.g. collision risk) from wind devices with underwater infrastructure remain.</p> <p>Potential for EMF impacts on fish and elasmobranchs from electricity cables associated with wind energy devices. Indirect effects may include altered migratory pathways with unknown energetic/biological consequences.</p> <p>Potential for direct benthic effects associated with the siting and construction of devices, and indirect effects including sediment movements (i.e. scouring, smothering, sediment deposition and abrasion). However, such effects may be limited as the existing environment is already dynamic.</p> <p>Potentially significant effects to designated areas, such as those on Islay, if grid infrastructure were to be sited in the vicinity of the Draft Plan Option.</p>	<p>important habitats in the vicinity as a result of collision with wind devices and effects during their installation. The results of monitoring from any licensed projects that are developed, has the potential to help provide greater certainty on the scale of these effects.</p> <p>Further research into the potential for collision, displacement and the effects on cetaceans, seals elasmobranchs and fish will help to identify the potential for significant effects.</p> <p>To date research has indicated that there are uncertain effects of EMF and noise on fish and elasmobranchs. The results of monitoring of existing and operational projects in this region have the potential to provide greater certainty on the scale of effects.</p> <p>Development to the west of the Draft Plan Option and further away from Islay may reduce the potential for impacts on some bird species.</p> <p>The potential for effects from grid infrastructure could be avoided if supporting onshore/offshore connections were located away from sensitive areas, such as Islay.</p>
Population and Human Health	The waters to west and north west of Islay are used for a number of industry and recreational activities including fishing, recreational sea angling, light recreational cruising, surfing and	There is potential for collisions between recreational vessels and offshore energy infrastructure and supporting vessels, particularly during installation. However, given the height of wind turbines these would	Any collision could directly affect vessels and passengers, however it is not expected that wind developments would result in a significant increase in collisions.	Potential mitigation for collisions through the inclusion/mapping of offshore energy developments on navigational charts and the use of navigational aids (such as marker buoys and

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
	diving.	<p>be highly visible during most conditions which should reduce collision risk.</p> <p>The presence of offshore wind turbines has the potential to displace some existing recreational activities, through limiting access to areas of the sea and potential disruption to perceived amenity value</p>	<p>It is difficult to predict the precise impact of potential changes to amenity on recreational use of the area. Some displacement could be permanent leading to recreational activities being discontinued. However it is likely that most activities could continue within a smaller range or in other nearby locations.</p>	<p>lighting, etc.) in the vicinity of the infrastructure.</p> <p>When planning projects, developers could work with the recreation sector to consider best how recreational activities might continue within the option boundary. Early consultation can also help to reduce impacts on important cruising routes.</p> <p>There may be the requirement for commercial shipping to be excluded from developed areas. This would be determined through further engagement between MS-LOT and the relevant navigation authorities at the project level.</p>
Water and the Marine Environment	<p>The coastal waters in the vicinity of the Draft Plan Option were classified at being of good status under the WFD in 2011.</p> <p>There are two designated shellfish waters within the vicinity of the Draft Plan Option off Jurra and Colonsay.</p>	<p>Potential for adverse water quality impacts during installation, operation and decommissioning of developments (e.g. increased turbidity during benthic works, contamination from installation and maintenance vessels).</p> <p>Wind turbines that use gravity based foundations that use sediment as fill, may carry a pollution risk depending on where the sediment is sourced.</p>	<p>Impacts associated with any contamination from seabed material disturbed during installation or potentially decommissioning is likely to be of localised and temporary nature, with the significance of effects dependant on the level of contamination. Impacts during operation and maintenance are considered less likely.</p> <p>The significance and characteristic of impacts associated with contamination from vessels is uncertain and cannot be described beyond the potential for it to occur.</p>	<p>Pollution risks associated with installation, maintenance and decommissioning of devices should be reduced and limited through building mitigation into construction procedures, to avoid discharges of harmful material and substances.</p> <p>Further assessment work may be required to reduce uncertainty regarding potential impacts on water quality, particularly on including shellfish waters. This includes a recommendation for hydrodynamic and water quality modelling as part of project level assessment</p>
Climatic Factors	<p>Broadly stable coastal areas with small sections of the coastline identified as potentially being vulnerable to erosion/accretion (e.g. sheltered beaches and bays on Islay, southern side of Colonsay and south west areas of Mull), particularly during storm events.</p>	<p>Potential for mixed effects on coastal erosion and accretion caused by changes to hydrodynamics and wave energy although much of the coastline near the Draft Plan Option is broadly stable.</p> <p>Likely contributions to achieving GHG reductions through replacing energy generation from non-renewable sources to renewable sources.</p>	<p>Significance and character of effects are unknown. Depending on how offshore infrastructure affects hydrodynamics the effects on coastal erosion and accretion could be positive or negative. However any effects that do occur are likely to depend on the specific nature and location of the proposed development.</p> <p>Effects on the coastline are likely to be indirect.</p>	<p>Project level assessment of hydrodynamic changes, as a result of renewables development, should include any relevant climate related changes to the marine environment when assessing impacts.</p>
Marine Geology and Coastal Processes	<p>The seabed in the vicinity of the Draft Plan Option is composed of predominantly coarse sediments (i.e. sandy gravels and gravelly sands) with coarser materials located to the west of Islay.</p> <p>While the region has relatively low wave and tidal energy across much of the Draft Plan Option, a high tidal energy zone is located immediately south of the option area, to the west and south west of Islay.</p>	<p>Although there are largely coarse sediments in the area, some sediment disturbance and loss of seabed habitat is still likely to occur during the site preparation and placement of device foundations. The scale of disturbance will depend on the type and size of the device.</p> <p>Sediment disturbance which occurs during the installation process could also lead to secondary impacts (e.g. smothering, release of existing contaminants).</p> <p>Increased turbidity is considered unlikely given the predominantly coarse sediments identified across the area.</p> <p>There is the potential for offshore developments within the Draft Plan Option to alter sediment dynamics and tidal flow fluxes in the vicinity of the site, with potential general impacts such as scour and abrasion at the development site, and deposition at the site or in surrounding areas. This may be of particular concern for sites near to relatively sheltered areas, and areas of high accretion (e.g. sheltered bays along the north coast of Islay). However, these systems are likely to be complex,</p>	<p>Direct impacts such as disturbance of the seabed during installation are likely to be temporary and localised.</p> <p>Loss of seabed area associated with installation may be permanent, although some natural regeneration may occur upon decommissioning of devices.</p> <p>Changes in sediment dynamics and direct impacts such as scour, deposition and abrasion of seabed sediments are likely to be limited to the installation and operation phases of developments. However, in some circumstances, the effects of such changes may have long-term effects in coastal areas (e.g. the deposition of sediments in nearby coastal areas).</p>	<p>When projects are in the design process, consideration should be given to the location and arrangement of devices in order to build in mitigation to avoid potential impacts on marine geology and coastal processes, particularly given the proximity to sensitive coastal areas on Islay.</p> <p>It is recommended that sediment dynamic modelling is undertaken at project level to demonstrate potential effects in order to consider appropriate mitigation.</p> <p>Mitigation measures should include the design and use of rock scour protection around the base of gravity-based foundations, jacket and monopile devices on or into the seabed.</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
		and as such, the potential for impacts is likely to be site specific and dependent on factors such as the type and size of the devices and their foundations.		
Historic Environment	<p>There are a number of marine and coastal wreck sites within this region, including small clusters located near the west coast of Tiree, the west and south coasts of Islay, and along the southern and south east coasts of Kintyre.</p> <p>Significant sections of coastal and marine areas in Tiree, Colonsay, Islay and Kintyre have been identified as being of potential interest for submerged archaeology.</p> <p>There are also a wide range of historical features located along the shorelines or which are of coastal relevance (e.g. designated sites such as lighthouses, listed buildings, and scheduled monuments, such as fortifications and early church sites).</p>	<p>The proximity of the Draft Plan Option to the coastline means there is the potential for impacts on the setting of coastal historic assets (e.g. Iona Abbey, numerous scheduled forts along the coast in Western Islay, Dhu Heartach Lighthouse in Colonsay).</p> <p>Potential impacts on historic wreck sites in the vicinity of the developments from installation and operation of offshore energy developments.</p> <p>The likely presence of submerged archaeology means that there is potential for direct effects on any remains. However, development which includes archaeological survey may also have some positive effects by contributing to knowledge/understanding about the marine historic environment.</p>	<p>Direct effects on historic assets e.g. loss of assets caused by changes to coastal processes or the siting of offshore developments, would likely be permanent. The significance of the effects would, depend on the significance of the receptor.</p> <p>Effects on the setting of historic environment features would be indirect, and last for the lifespan of the development.</p>	<p>Direct effects on historic environment features can be avoided through appropriate siting of devices away from vulnerable coastlines and known historic marine features.</p> <p>Project level assessments should consider the potential for impacts on the setting of sites and seek to mitigate accordingly.</p> <p>Where development is in an area considered likely to have submerged archaeology projects should seek to identify and avoid direct impacts on features.</p>
Landscape / Seascape	<p>The Draft Plan Option is located in proximity to the Islay coast, with the north part of the Draft Plan Option near to a local landscape designation area in north west Islay.</p> <p>The islands of Oronsay, Colonsay and Mull contain a number of landscape designations and areas of wild land along coastlines that may have views to the Draft Plan Option.</p>	<p>Given the proximity of the Draft Plan Option to the Islay coast, there is potential for wind turbines to be visible from areas of local landscape designations.</p> <p>Visibility effects may also occur during construction periods as well as operation. It is likely that construction / maintenance works and navigational aids (e.g. marker buoys, lighting) will have visual effects.</p> <p>There are a number of potential offshore receptors, including recreational boats that may sail close to the option area.</p>	<p>Devices and supporting infrastructure within the wind option may be visible from Islay which includes areas designated for their landscape importance.</p> <p>Impacts are likely to occur during construction, maintenance and operation periods.</p> <p>Lighting of wind devices may result in visual effects during day and night, although the scale of any effects for onshore receptors is expected to decrease with greater distance from the light source.</p> <p>Development within the Draft Plan Option would likely alter the current seascape.</p> <p>Visual impacts could be greater for offshore receptors, such as recreational sea users as their proximity to devices would be greater than onshore receptors.</p>	<p>Full visual impact assessment will be required at the project level (EIA) to establish the visual envelope and significance of effects. However, visual impacts to onshore receptors could potentially be limited by construction further from the mainland, in particular the west of the Draft Plan Option.</p> <p>Impacts to the landscape and seascape character of Islay, and potentially Oronsay, Colonsay and Mull would also need to form part of project level assessments.</p>

OWW2

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
Biodiversity, Flora and Fauna	<p>The Tiree Wetlands and Coast SPA, and Tiree, Coll and Sleibhtean agus Cladach Thiriodh SPAs are located close to the Draft Plan Option with features including Corncrake, Oystercatcher, Polver and Geese, amongst others.</p> <p>There are SACs in the vicinity of the site are designated for dune habitats, whilst the Treshnish Isles SAC is designated for Grey Seals. The south east of the Draft Plan Option overlaps with the Stanton Banks marine SAC which is designated for reef, which could have</p>	<p>Vulnerability mapping identified potential vulnerability for collision and displacement of seabirds from wind energy. There are a number of bird interests that might be potentially affected, although the potential for such effects likely depend on a range of factors including the bird species considered (e.g. vulnerability varies for different bird species), and the size and design of wind energy devices (e.g. some species are known to be more susceptible to collision with larger devices, and others with devices with lower clearance above the water surface).</p>	<p>There is potential for collision between seabirds and wind devices and their supporting infrastructure above and below the water, and for the potential displacement of some species. However, the significance of the impact is uncertain as effects on the population viability of individual species are not known.</p> <p>Potential effects on cetaceans, seals, elasmobranchs and fish including barriers to movement, collision with infrastructure, and possible noise impacts as a result of piling activities</p>	<p>Project level assessment (EIA) that includes specific modelling and/or assessment will be required to demonstrate there will be no significant impacts on the birds and mobile species in the vicinity as a result of collision with wind devices. The result of monitoring from projects currently in the application process has the potential to help provide greater certainty on the scale of these effects.</p> <p>Given the proximity of the Draft Plan Option to important areas for birds, development in the</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
	<p>diverse benthic habitats that may be susceptible to change.</p> <p>Most of the Draft Plan Option is located within the Skye to Mull MPA search area. This area is considered important for its geodiversity and the presence of Basking shark and Minke whale species.</p> <p>The seabird maps presented in the baseline identifies a potential vulnerability for seabird collision and displacement with wind energy devices during breeding seasons, with a slightly higher vulnerability identified during winter seasons. However, this vulnerability may differ for individual species.</p> <p>Distribution data presented in the baseline indicates that cetaceans are likely to be present within the region and the Draft Plan Option is located near to Basking shark and Common skate 'hotspots' at Tiree and Coll. Other elasmobranch species are also considered likely to be encountered in the vicinity of the Draft Plan Option. Seal survey data and the presence of Seal haul out areas around Tiree, Coll and Mull indicates this is a well-used area for marine mammals, particularly Grey seals.</p> <p>The area is known to be used by fish species, including diadromous species, such as Atlantic salmon, and others including Sea trout and many commercially caught species. The region also contains important nursery grounds for several commercially important species of fish.</p> <p>The seabed in the region largely comprises shallow and shelf subtidal coarse sediments (e.g. sands, gravelly sands, gravels, etc.).</p>	<p>Given the likely presence of marine mammals and fish, particularly elasmobranchs such as Basking sharks and Common skate, Cetaceans and Seals in the vicinity of the Draft Plan Option, there may be the potential for effects such as barriers to movement, collision with the devices and associated infrastructure, above and below water noise impacts during construction and operation, and aggregation effects (e.g. aggregation of predators near structures). However, there are currently gaps in research knowledge which mean it is difficult to establish the likelihood of impact.</p> <p>The review of technologies identified potential effects from EMF on fish and elasmobranchs although research into the magnitude of effects demonstrates that this is uncertain.</p> <p>There is potential for impacts on benthic habitats as a result of scouring, smothering, deposition and abrasion of seabed in areas with coarse sediments. As a result of placing devices within this area. Also direct effects on benthic habitats from installation (e.g. habitat loss with placement of device base, etc.), and the significance of such effects could increase for development in the south west portion of the Draft Plan Option area that overlaps with the Stanton Banks marine cSAC. However, there are currently gaps in research knowledge which make it difficult to establish certainty of such effects.</p>	<p>associated with installing devices. These effects may range from changes to existing feeding behaviour to mortality, although the precise effects on population cannot be ascertained at this strategic stage but should be a consideration at the project level (e.g. in monitoring).</p> <p>Effects associated with construction activities, such as fauna disturbance from underwater noise associated with piling for monopile or jacket devices, would be temporary but longer term effects from wind devices with underwater infrastructure remain.</p> <p>Potential for EMF impacts on fish and elasmobranchs from electricity cables associated with wind energy devices. Indirect effects may include altered migratory pathways with unknown energetic/biological consequences.</p> <p>Potential for direct benthic effects associated with the siting and construction of devices, and indirect effects including sediment movements (i.e. scouring, smothering, sediment deposition and abrasion). However, such effects may be limited as the existing environment is already dynamic.</p> <p>Potential for significant effects to designated areas, including reef habitats at Stanton Banks SAC and important coastal SACs on Tiree, associated with wind developments and grid infrastructure if it were to be sited in the vicinity of the Draft Plan Option.</p>	<p>southern part of the Draft Plan Option may be preferred.</p> <p>Further research into the potential collision risks, displacement and the effects on Cetaceans, Seals elasmobranchs and fish will help to identify the potential for significant effects.</p> <p>To date research has indicated that there are uncertain effects of EMF and noise on fish and elasmobranchs. The result of monitoring of wind projects currently in the application process has the potential to help provide greater certainty on the scale of effects.</p> <p>It is recommended that the south west boundary of the Draft Plan Option is kept under review as part ascertaining whether the overlap with the Stanton Banks SAC would lead to adverse effects or whether co-location is possible. Project level HRA must demonstrate development does not adversely affect the integrity of the SAC.</p> <p>Furthermore, it is recommended that the boundary of the Draft Plan Option is kept under review as part ascertaining whether the overlap with the Skye to Mull MPA search area will remain and would lead to adverse effects, or whether co-location is possible. Projects will need to demonstrate through the EIA process that they are compatible with the conservation objectives of the MPA.</p> <p>Potential onshore effects from grid connections could be avoided if supporting onshore/offshore connections were located away from Tiree.</p>
Population and Human Health	<p>The waters to the west of Tiree are used for a number of industry and recreational activities including fishing, recreational sea angling, light recreational cruising, surfing and diving.</p>	<p>There is potential for collisions between recreational vessels and offshore energy infrastructure and supporting vessels, particularly during installation. However, given the height of wind turbines these would be highly visible during most conditions which should reduce collision risk.</p> <p>The presence of offshore wind turbines has the potential to displace some existing recreational activities, through limiting access to areas of the sea and potential disruption to perceived amenity value</p>	<p>Any collision could directly affect vessels and passengers, however it is not expected that wind developments would result in a significant increase in collisions.</p> <p>It is difficult to predict the precise impact of potential changes to amenity on recreational use of the area. Some displacement could be permanent leading to recreational activities being discontinued. However it is likely that most activities could continue within a smaller range or in other nearby locations.</p>	<p>Potential mitigation for collisions through the inclusion/mapping of offshore energy developments on navigational charts and the use of navigational aids (such as marker buoys and lighting, etc.) in the vicinity of the infrastructure.</p> <p>When planning projects, developers could work with the recreation sector to consider best how recreational activities might continue within the option boundary. Early consultation can also help to reduce impacts on important cruising routes.</p> <p>There may be the requirement for commercial shipping to be excluded from developed areas. This would be determined through further engagement between MS-LOT and the relevant navigation authorities at the project level.</p>
Water and the Marine	<p>The coastal waters in the vicinity of the draft plan area were classified at being of good status</p>	<p>Potential for adverse water quality impacts during installation, operation and decommissioning of the</p>	<p>Impacts associated with any contamination from seabed material disturbed during installation or</p>	<p>Pollution risks associated with installation, maintenance and decommissioning of devices</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
Environment	<p>under the WFD in 2011.</p> <p>There are some designated shellfish waters within the vicinity of the Draft Plan Option around the Isle of Mull.</p>	<p>developments (e.g. increased turbidity caused by works on the seabed, contamination from installation and maintenance vessels).</p> <p>Wind turbines that use gravity based foundations that use sediment as fill, may carry a pollution risk depending on where the sediment is sourced.</p>	<p>potentially decommissioning is likely to be of localised and temporary nature, with the significance of effects dependant on the level of contamination. Impacts during operation and maintenance are considered less likely.</p> <p>The significance and characteristic of impacts associated with contamination from vessels is uncertain and cannot be described beyond the potential for it to occur.</p>	<p>should be reduced and limited through building mitigation into construction procedures, to avoid discharges of harmful material and substances.</p> <p>Further assessment work may be required to reduce uncertainty regarding potential impacts on water quality, particularly on including shellfish waters. This includes a recommendation for hydrodynamic and water quality modelling as part of project level assessment</p>
Climatic Factors	<p>Broadly stable coastal areas although small sections of the coastline have been identified as potentially being vulnerable to erosion/accretion (e.g. beaches on Tiree, and sheltered bays on the west and southern sides of Colonsay), particularly during storm events.</p> <p>Potential increases in storm events and rising sea levels due to the effects of climate change.</p>	<p>Potential for mixed effects on coastal erosion and accretion caused by changes to hydrodynamics and wave energy although much of the coastline near the Draft Plan Option is considered to be broadly stable.</p> <p>Likely contributions to achieving GHG reductions through replacing energy generation from non-renewable sources to renewable sources.</p>	<p>Significance and character of effects are unknown. Depending on how offshore infrastructure affects hydrodynamics the effects on coastal erosion and accretion could be positive or negative. However any effects that do occur are likely to depend on the specific nature and location of the proposed development.</p> <p>Effects on the coastline are likely to be indirect.</p>	<p>Project level assessment of hydrodynamic changes, as a result of renewables development, should include any relevant climate related changes to the marine environment when assessing impacts.</p>
Marine Geology and Coastal Processes	<p>The seabed in the vicinity of the Draft Plan Option is composed of predominantly coarse sediments (i.e. sandy gravels and gravelly sands).</p> <p>There is generally low wave and tidal energy across much of the Draft Plan Option. However, stronger wave and tidal areas have been identified to the west of Tiree, immediately east of the Draft Plan Option.</p>	<p>While there are largely coarse sediments in the area, some sediment disturbance and loss of seabed habitat is still likely to occur during the site preparation and placement of device foundations. The scale of such disturbance is likely dependent on the type and size of the device.</p> <p>Sediment disturbance that occurs during the installation process could also lead to secondary impacts (e.g. smothering, release of existing contaminants).</p> <p>Increased turbidity is considered to be unlikely given the predominantly coarse sediments identified across the area.</p> <p>There is the potential for offshore developments within the Draft Plan Option to alter sediment dynamics and tidal flow fluxes in the vicinity of the site, with potential general impacts such as scour, abrasion and deposition at development sites. The potential for increased coastal erosion or deposition in surrounding areas due to the presence of devices has also been identified. However, these systems are likely to be complex, and as such, the potential for impacts is likely to be site specific and dependent on factors such as the type and size of the devices and their foundations.</p>	<p>Direct impacts such as disturbance of the seabed during installation are likely to be temporary and localised.</p> <p>Loss of seabed area from installation works may be permanent (e.g. beneath device foundations), although some natural regeneration may occur upon decommissioning of devices.</p> <p>Changes in sediment dynamics and direct impacts such as scour, deposition and abrasion of seabed sediments are likely to be limited to the installation and operation phases of developments. However, in some circumstances, the effects of such changes may have long-term effects in coastal areas (e.g. changes to local sediment dynamics and deposition of sediments in nearby coastal areas).</p>	<p>When projects are in the design process, consideration should be given to the location and arrangement of devices in order to build in mitigation to avoid potential impacts on marine geology and coastal processes.</p> <p>It is recommended that sediment dynamic modelling is undertaken at project level to demonstrate potential effects in order to consider appropriate mitigation.</p> <p>Mitigation measures should include the design and use of rock scour protection around the base of gravity-based foundations, jacket and monopile devices placed on or into the seabed.</p>
Historic Environment	<p>There are a number of marine and coastal wreck sites within this region, including small clusters of wreck sites located near the west coast of Tiree.</p> <p>Significant sections of coastal and marine areas in Tiree have been identified as being of potential interest for submerged archaeology.</p> <p>Coastal areas also contain a wide range of historical features located on the shoreline or which are of coastal relevance (e.g. lighthouses and numerous coastal scheduled monuments</p>	<p>The close proximity of the site footprint to the southern tip of Tiree would suggest there is the potential for impacts on the setting of a number of coastal historic assets including scheduled fortifications and early church sites.</p> <p>In particular sites in the Draft Plan Option may have the potential to impact on the setting of the Category A listed Skerryvore Lighthouse.</p> <p>Potential impacts on historic wreck sites in the vicinity of the developments from installation and operation of offshore energy developments.</p>	<p>Direct effects on historic assets e.g. loss of assets caused by changes to coastal processes or the siting of offshore developments, would likely be permanent. The significance of the effects would, depend on the significance of the receptor.</p> <p>Effects on the setting of historic environment features would be indirect, and last for the lifespan of the development.</p>	<p>Direct effects on historic environment features can be avoided through appropriate siting of devices away from vulnerable coastlines and known historic marine features.</p> <p>Project level assessments should consider the potential for impacts on the setting of sites and seek to mitigate accordingly.</p> <p>Where development is in an area considered likely to have submerged archaeology projects should seek to identify and avoid direct impacts on</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
	including fortifications and early church sites).	The likely presence of submerged archaeology means that there is potential for direct effects on any remains. However, development which includes archaeological survey may also have some positive effects by contributing to knowledge/understanding about the marine historic environment.		features.
Landscape / Seascape	<p>The Draft Plan Option is located in proximity the island of Tiree. Much of Tiree is covered by local landscape designations and some sections of the Draft Plan Option may be visible from the coastline.</p> <p>While the coastline of Tiree is not identified as an area of wild land, this could potentially indicate that there may be more receptors to offshore development (e.g. recreational sea users).</p> <p>The Loch na Keal NSA on the Isle of Mull may also need consideration.</p>	<p>Given the proximity of the Draft Plan Option to the Tiree coast there is potential for wind turbines to be visible from areas of local landscape designations.</p> <p>Visibility effects may also occur during construction periods as well as operation. It is likely that construction / maintenance works and navigational aids (e.g. marker buoys, lighting) will have visual effects.</p> <p>There are a number of potential offshore receptors, including recreational boats that sail close to the option area.</p>	<p>Devices and supporting infrastructure within the Draft Plan Option may be visible from Tiree which includes areas designated for their landscape importance. Development within the Draft Plan Option would likely alter the current seascape.</p> <p>Impacts are likely to occur during construction, maintenance and operation periods.</p> <p>Lighting of wind devices may result in visual effects during day and night, although the scale of any effects for onshore receptors is expected to decrease with greater distance from the light source.</p> <p>Visual impacts could be greater for offshore receptors, such as recreational sea users, as their proximity to devices would be greater than onshore receptors.</p>	<p>Full visual impact assessment will be required at the project level (EIA) to establish the visual envelope and significance of effects. However, visual impacts to onshore receptors could potentially be limited by construction further from the mainland, in particular, the south and east portions of the Draft Plan Option.</p> <p>Impacts to the landscape and seascape character of Tiree would also need to form part of project level assessments.</p> <p>Development that will affect NSA should avoid adverse effects on the integrity of the area or the qualities for which it has been designated.</p>

OWW3

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
Biodiversity, Flora and Fauna	<p>The north west of the Draft Plan Option overlaps with the Mingulay and Berneray SPA and SSSI which has a number of seabird assemblage interests (including Fulmar, Puffin, Kittiwake, Razorbill and Guillemot). To the east of WW4 is the East Mingulay marine SAC (designated for reefs), and Small Seal islands SSSI (Grey seal interests) and the Sound of Barra pSAC (marine habitat and Common seal interests) are located to the north west of the site. Several IBAs have also been identified amongst the islands immediately east and north east of WW4.</p> <p>The Draft Plan Option is also located outside and to the east of the Skye to Mull MPA search area. This area is considered important for its geodiversity and the presence of Basking shark and Minke whale.</p> <p>Seabird maps presented in the baseline indicates a potential vulnerability for collision and displacement of seabirds for wind energy devices, particularly during breeding periods and in the eastern part of the Draft Plan Option. However, this vulnerability may differ for individual species.</p> <p>The available distribution and sighting data also indicates that there are likely Cetaceans present in</p>	<p>The vulnerability mapping included in the baseline identified a potential vulnerability for seabird collision and displacement during the winter and breeding seasons. There are several important sites for a number of bird species, However, the potential for such effects likely depend on a range of factors including the bird species considered (e.g. vulnerability varies for different bird species), and the size and design of wind energy devices (e.g. some species are known to be more susceptible to collision with larger devices, and others with devices with lower clearance above the water surface).</p> <p>Given the likely presence of marine mammals and fish, particularly elasmobranchs such as Basking sharks and skates, Cetaceans and Seals in the vicinity of the Draft Plan Option, there may be the potential for effects such as barriers to movement, collision with the devices and associated infrastructure, above and below water noise impacts during construction and operation, and aggregation effects (e.g. aggregation of predators near structures). However, there are currently gaps in research knowledge which mean it is difficult to establish the likelihood of impact.</p>	<p>There is the potential for seabird collision with wind devices and supporting infrastructure both above and below the water, and also potential for the displacement of bird species. However, the significance of such impacts is uncertain as effects on the population viability of individual species are not known.</p> <p>Potential effects on Cetaceans, Seals, elasmobranchs and fish including barriers to movement, collision with infrastructure, and possible noise impacts as a result of piling activities associated with installing devices. These effects may range from changes to existing feeding behaviour to mortality, although the precise effects on populations cannot be ascertained at this strategic stage but should rather be a consideration at the project level (e.g. in monitoring).</p> <p>Effects associated with construction activities, such as fauna disturbance from underwater noise associated with piling for monopile or jacket devices, would be temporary but longer term effects from wind devices with underwater infrastructure remain.</p> <p>Potential for EMF impacts on fish and elasmobranchs from electricity cables associated</p>	<p>Project level assessment (EIA) that includes specific modelling and/or assessment will be required to demonstrate there will be no significant impacts on the birds and mobile species in the vicinity as a result of collision with wind devices.</p> <p>Given the proximity of the Draft Plan Option to important areas for birds and uncertainty of effects, initial development within the westernmost portion of the Draft Plan Option is recommended.</p> <p>It is recommended that the boundary of the Draft Plan Option is kept under review as part ascertaining whether the overlap with the Mingulay and Berneray SPA would lead to adverse effects on the integrity of the designation or whether co-location is possible. Project level HRA must demonstrate development does not adversely affect the integrity of the SPA.</p> <p>Further research into the potential collision risks, displacement and the effects on cetaceans, seals elasmobranchs and fish will help to identify the potential for significant effects.</p> <p>To date research has indicated that there are uncertain effects of EMF and noise on fish and</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
	<p>the vicinity of the Draft Plan Option. Basking shark sightings have been recorded amongst the southern island of the outer Hebrides, with the area to the east of Mingulay and Barra known to be a Basking shark 'hotspot'. Other elasmobranchs are also known to use these areas. Seal density mapping, the presence of Seal haul outs and the proximity of the Draft Plan Option to an SAC designated for Common seal interests, demonstrates the importance of the area for Grey seals.</p> <p>The area is known to be used by fish species, including diadromous species, such as Atlantic salmon, and others including Sea trout and many commercially caught species. The region also contains important nursery grounds for several commercially important species of fish.</p> <p>Benthic habitats in the region are largely rocky outcrops near to Barra, and sandy and gravelly sediments further west and within the Draft Plan Option. These habitats may be susceptible to hydrodynamic change, and are likely to contain species used to strong tidal movements.</p>	<p>The review of technologies identified potential effects from EMF on fish and elasmobranchs although research into the magnitude of effects demonstrates that this is uncertain.</p> <p>There is potential for impacts on benthic habitats such as habitat loss, scouring, smothering, deposition and abrasion of seabed in areas with coarse sediments. However, there are currently gaps in research knowledge which make it difficult to establish certainty of such effects.</p>	<p>with wind energy devices. Indirect effects may include altered migratory pathways with unknown energetic/biological consequences.</p> <p>Potential for direct benthic effects associated with the siting and construction of devices, and indirect effects including sediment movements (e.g. scouring, smothering, sediment deposition and abrasion). However, such effects may be limited as the existing environment is dynamic.</p> <p>Potential for significant effects to designated areas, including SACs and SPAs located to the east and north east of the Draft Plan Option, associated with grid infrastructure if it were to be sited in this area.</p>	<p>elasmobranchs. The result of monitoring of wind projects currently in the application process has the potential to help provide greater certainty on the scale of effects.</p> <p>Potential onshore effects from grid connections could be avoided if supporting onshore/offshore connections were located away from Mingulay and Barra.</p> <p>Siting of developments in rocky seabed areas could limit the potential for benthic effects. However, the practicality of this mitigation measure may be influenced by other factors such as specific locations selected by developers and limitations associated with technology and engineering requirements.</p>
Population and Human Health	<p>The waters to the west of Barra and Mingulay are used for a number of industry activities including fishing, recreational sea angling and light recreational cruising.</p>	<p>There is potential for collisions between recreational vessels and offshore energy infrastructure and supporting vessels, particularly during installation. However, given the height of wind turbines these would be highly visible during most conditions which should reduce collision risk.</p> <p>The presence of offshore wind turbines has the potential to displace some existing recreational activities, through limiting access to areas of the sea and potential disruption to perceived amenity value</p>	<p>Any collision could directly affect vessels and passengers, however it is not expected that wind developments would result in a significant increase in collisions.</p> <p>It is difficult to predict the precise impact of potential changes to amenity on recreational use of the area. Some displacement could be permanent leading to recreational activities being discontinued. However it is likely that most activities could continue within a smaller range or in other nearby locations.</p>	<p>Potential mitigation for collisions through the inclusion/mapping of offshore energy developments on navigational charts and the use of navigational aids (such as marker buoys and lighting, etc.) in the vicinity of the infrastructure.</p> <p>When planning projects, developers could work with the recreation sector to consider best how recreational activities might continue within the option boundary. Early consultation can also help to reduce impacts on important cruising routes.</p> <p>There may be the requirement for commercial shipping to be excluded from developed areas. This would be determined through further engagement between MS-LOT and the relevant navigation authorities at the project level.</p>
Water and the Marine Environment	<p>The coastal waters in the vicinity of the draft plan area were classified as being of high status under the WFD in 2011.</p>	<p>Potential for adverse water quality impacts during installation, operation and decommissioning of the developments (e.g. increased turbidity caused by works on the seabed, contamination from installation and maintenance vessels).</p> <p>Wind turbines that use gravity based foundations that use sediment as fill, may carry a pollution risk depending on where the sediment is sourced.</p>	<p>Impacts associated with any contamination from seabed material disturbed during installation or potentially decommissioning is likely to be of localised and temporary nature, with the significance of effects dependant on the level of contamination. Impacts during operation and maintenance are considered less likely.</p> <p>The significance and characteristic of impacts associated with contamination from vessels is uncertain and cannot be described beyond the potential for it to occur.</p>	<p>Pollution risks associated with installation, maintenance and decommissioning of devices should be reduced and limited through building mitigation into construction procedures, to avoid discharges of harmful material and substances.</p> <p>Further assessment work may be required to reduce uncertainty regarding potential impacts on water quality, particularly on including shellfish waters. This includes a recommendation for hydrodynamic and water quality modelling as part of project level assessment</p>
Climatic Factors ⁹	<p>Western beaches of the Outer Hebrides Islands are dominated by wind and wave action. The western</p>	<p>Potential for mixed effects on coastal erosion and accretion caused by changes to hydrodynamics</p>	<p>Significance and character of effects are unknown. Depending on how offshore infrastructure affects</p>	<p>Project level assessment of hydrodynamic changes, as a result of renewables development, should</p>

⁹ Informed by Wallingford H.R. (1997) Coastal Cells in Scotland, SNH Research, Survey and Monitoring Report [online] Available at: <http://www.snh.org.uk/pdfs/publications/research/56.pdf> [accessed 10/04/2013]

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
	<p>coasts of the southern isles (e.g. Barra, Sandray, and Mingulay) have broadly rocky coastal areas with several self-contained pocket beaches, particularly along the western coastline of Barra.</p> <p>Wave erosion of the machair edge has been observed in sections of the west coast, and storm damage of the shingle edge has been observed on Vatersay. As such, some sections of the coastline have been identified as potentially being vulnerable to erosion/accretion, particularly during storm events.</p> <p>The potential for increases in storm events and rising sea levels have been identified, due to the effects of climate change.</p>	<p>and wave energy particularly from developments located near to the coastline.</p> <p>Likely contributions to achieving GHG reductions through replacing energy generation from non-renewable sources to renewable sources.</p>	<p>hydrodynamics the effects on coastal erosion and accretion could be positive or negative. However any effects that do occur are likely to depend on the specific nature and location of the proposed development.</p> <p>Effects on the coastline are likely to be indirect.</p>	<p>include any relevant climate related changes to the marine environment when assessing impacts.</p>
Marine Geology and Coastal Processes	<p>The seabed in the vicinity of the Draft Plan Option is of variable depth (ranging from 20 – 120m), consisting mainly of rock outcrops to the immediate west of Barra. Sandy and gravelly sediments are located further west, within the Draft Plan Option, and to the south of Barra within the adjacent tidal energy plan option area.</p> <p>While the region has low wave and tidal energy, it is located adjacent to and part overlaps a wave energy Draft Plan Option area to the southeast with higher energy resource.</p>	<p>While there are largely coarse sediments in the area, some sediment disturbance and loss of seabed habitat are still likely to occur during the site preparation and placement of device foundations. The scale of such disturbance is likely dependent on the type and size of the device.</p> <p>Sediment disturbance which occurs during the installation process could also lead to secondary impacts (e.g. smothering, release of existing contaminants). Significant increases in turbidity are considered unlikely given the predominantly coarse sediments identified across the area.</p> <p>There is the potential for offshore developments within the Draft Plan Option to alter sediment dynamics and tidal flow fluxes in the vicinity of the site, with potential general impacts such as scour, deposition and abrasion in the area and the potential for related impacts to vulnerable coastlines (e.g. Barra, Mingulay). However, these systems are likely to be complex, and as such, the potential for impacts is likely to be site specific and dependent on factors such as the type and size of the devices and their foundations.</p>	<p>Direct impacts such as disturbance of the seabed during installation are likely to be temporary and localised.</p> <p>Loss of seabed area beneath device foundations may be permanent, although some natural regeneration may occur upon decommissioning of devices.</p> <p>Changes in sediment dynamics and direct impacts such as scour, deposition and abrasion of seabed sediments are likely to be limited to the installation and operation phases of developments. However, in some circumstances, the effects of such changes may have long-term effects in coastal areas (e.g. the deposition of sediments in nearby coastal areas).</p>	<p>When projects are in the design process, consideration should be given to the location and arrangement of devices in order to build in mitigation to avoid potential impacts on marine geology and coastal processes, particularly along sensitive coastlines in the Outer Hebrides.</p> <p>It is recommended that sediment dynamic modelling is undertaken at project level to demonstrate potential effects in order to consider appropriate mitigation.</p> <p>Mitigation measures should include the design and use of rock scour protection around the base of gravity-based foundations, jacket and monopile devices placed on or into the seabed.</p>
Historic Environment	<p>There are a number of marine and coastal wreck sites in the Outer Hebrides, including several near Barra.</p> <p>The coastal areas of the islands also contain a wide range of historical features located either on the shoreline or which are of coastal relevance (e.g. Barra Head lighthouse and a cluster of coastal sites within the southern isles of the Outer Hebrides).</p>	<p>The close proximity of the site footprint to the southern tip of Barra would suggest there is the potential for impacts on the setting of a number of coastal historic assets including scheduled duns and Barra Head Lighthouse.</p> <p>Potential impacts on historic wreck sites in the vicinity of the developments from installation and operation of offshore energy developments.</p>	<p>Direct effects on historic assets e.g. loss of assets caused by changes to coastal processes or the siting of offshore developments, would likely be permanent. The significance of the effects would, depend on the significance of the receptor.</p> <p>Effects on the setting of historic environment features would be indirect, and last for the lifespan of the development.</p>	<p>Direct effects on historic environment features can be avoided through appropriate siting of devices away from vulnerable coastlines and known historic marine features.</p> <p>Project level assessments should consider the potential for impacts on the setting of sites and seek to mitigate accordingly.</p>
Landscape / Seascape	<p>The Draft Plan Option is located close to the coastline of the southern islands in the Outer Hebrides, many of which are considered important for their natural environment and landscape qualities. The Draft Plan Option may also be visible from South Uist Machair NSA, located to the north east.</p>	<p>Given the proximity of the Draft Plan Option to these islands, there is the potential for visual effects on the local environment, wild land and potentially the South Uist Machair NSA.</p> <p>Given the potential visibility of wind structures and turbine blades, there is also potential for changes to the character of the area and to the seascape.</p>	<p>Devices and, in particular, supporting infrastructure within the Draft Plan Option may be visible from local islands, including areas designated for their landscape importance and are areas of wildness.</p> <p>Impacts are likely during construction, maintenance and operation phases.</p>	<p>Full visual impact assessment will be required at the project level (EIA) to establish the visual envelope and significance of effects. However visual impacts to onshore receptors could potentially be limited by construction further from the mainland, in particular the west of the Draft Plan Option.</p> <p>Impacts to the landscape and seascape character</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
	Several coastlines of the islands in this region are identified as areas of wildness value.	<p>Visual effects will occur both during construction, maintenance and operation phases. It is likely that navigational aids (e.g. marker buoys, lighting) will have visual effects.</p> <p>There are a number of potential offshore receptors including recreational boats that sail close to the option area.</p>	<p>Lighting of wind devices may result in visual effects during day and night, although the scale of any effects for onshore receptors is expected to decrease with greater distance from the light source.</p> <p>Development within the Draft Plan Option would likely alter the current seascape. However, the number of human receptors in this remote area may be few.</p> <p>Visual impacts could be greater for offshore receptors, such as recreational sea users as their proximity to devices would be greater than onshore receptors.</p>	<p>would also need to form part of project level assessments. Development that will affect NSA should avoid adverse effects on the integrity of the area or the qualities for which it has been designated.</p> <p>Given the high quality landscape in the vicinity of the Draft Plan Option, any development in this area should only be undertaken where significant effects can be avoided.</p> <p>Development of the western parts of the Draft Plan Option could potentially reduce visual and landscape/ seascape impacts.</p>

OWNW1

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
Biodiversity, Flora and Fauna	<p>The Draft Plan Option sits between the isles of Lewis and Cape Wrath, to the north of the North Minch. There are a number of important designations in the areas, including the Cape Wrath and Handa SPAs on the Scottish mainland, and the Lewis Peatlands SPA designated for seabird assemblage interests (including Fulmar, Puffin, Kittiwake, Razorbill, and Guillemot). The Ness and Barvas SPA on Lewis is designated for Corncrakes, and Foinaven SPA on the mainland and Lewis Peatlands SPA on Lewis are also designated for Golden Eagles. Several IBAs have been identified in proximity to the Draft Plan Option.</p> <p>A range of other sites, including Cape Wrath SAC, Oldshoremore and Sandwood SAC, Loch Laxford SAC and Southern Parphe SSSI are designated for coastal habitat features. In the marine environment, North Rona and Sula Sgeir SPA (designated for a number of seabird interests), and Solan Bank Reef cSAC (designated for offshore reefs) are located close to the Draft Plan Option. An SAC has also been designated at North Rona SAC for Grey seal interests. SACs on Lewis (Langavat and North Harris) and at Little Gruinard River have been designated for their Atlantic salmon interests.</p> <p>The Draft Plan Option is located in close proximity to the north of the Eye Peninsula to Butt of Lewis MPA search area, proposed for Rissos dolphin, White-beaked dolphin and Sand eel interests.</p> <p>The potential vulnerability for collision and displacement of seabirds from wind energy was identified, particularly during the winter in the south east corner of OOWNW1 and during the breeding season in the south and north east of the Draft Plan Option. However, this vulnerability may differ for</p>	<p>The vulnerability mapping included in the baseline identified the potential for collision and displacement of seabirds, both during the winter and breeding seasons and in areas, particularly in the south, south east and north east sections of the Draft Plan Option. However, the potential for such effects likely depend on a range of factors including the bird species considered (e.g. vulnerability varies for different bird species), and the size and design of wind energy devices (e.g. some species are known to be more susceptible to collision with larger devices, and others with devices with lower clearance above the water surface).</p> <p>Given the likely presence of marine mammals and fish, particularly Cetaceans and Seals in this region, there may be the potential for effects such as barriers to movement, collision with the devices and associated infrastructure, above and below water noise impacts during construction and operation, and aggregation effects (e.g. aggregation of predators near structures). However, there are currently gaps in research knowledge which mean it is difficult to establish the likelihood of impact.</p> <p>Whilst the area is not identified as a hot spot for Basking sharks they and other elasmobranchs (including priority marine features) are known to have used this area, and there remains the potential for the same impacts as listed above for Seals and Cetaceans.</p> <p>The review of technologies identified potential effects from EMF on fish and elasmobranchs although research into the magnitude of effects demonstrates that this is uncertain.</p> <p>There is potential for impacts on benthic habitats</p>	<p>There is potential for collision between seabirds and wind devices and associated infrastructure, and the potential for displacement of bird species. However, the exact significance of the impact is uncertain as effects on the population viability of individual species are not known.</p> <p>Potential effects on Cetaceans, Seals, elasmobranchs and fish including barriers to movement, collision with infrastructure, and possible noise impacts as a result of piling activities associated with installing devices. These effects may range from changes to existing feeding behaviour to mortality, although the precise effects on populations cannot be ascertained at this strategic stage but should rather be a consideration at the project level (e.g. in monitoring).</p> <p>Effects associated with construction activities, such as fauna disturbance from underwater noise associated with piling for monopile or jacket devices, would be temporary but longer term effects from wind devices with underwater infrastructure remain.</p> <p>Potential for EMF impacts on fish and elasmobranchs from electricity cables associated with wind energy devices. Indirect effects may include altered migratory pathways with unknown energetic/biological consequences.</p> <p>Potential for direct benthic effects associated with the siting and construction of devices, and indirect effects including sediment movements (e.g. scouring, smothering, sediment deposition and abrasion). However, such effects may be limited as the existing environment is already dynamic.</p> <p>Potentially significant effects to designated areas, particularly those in northern Lewis and remote</p>	<p>Project level assessment (EIA) that includes specific modelling and/or assessment will be required to demonstrate that there will be no significant impacts on the birds and mobile species in the vicinity as a result of collision with wind devices and associated infrastructure.</p> <p>Further research into the potential collision risks, displacement and the effects on Cetaceans, Seals elasmobranchs and fish will help to identify the potential for significant effects.</p> <p>To date research has indicated that there are uncertain effects of EMF and noise on fish and elasmobranchs. The results of monitoring of wind projects currently in the application process have the potential to help provide greater certainty on the scale of effects.</p> <p>Potential effects of supporting onshore/offshore grid connections will need to be considered to avoid adverse effects on coastal areas.</p> <p>It is recommended that the boundary of the Draft Plan Option is kept under review as part of ascertaining whether proximity to the Eye Peninsula to Butt of Lewis proposed MPA would lead to adverse effects or whether co-location is possible. Projects will need to demonstrate through the EIA process that they are compatible with the conservation objectives of the MPA.</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
	<p>individual species.</p> <p>The distribution of Cetaceans is considered to be high near the North Minch, particularly in the southern part of the Draft Plan Option area.</p> <p>While no Basking shark sightings have been recorded in the Draft Plan Option, several have been recorded along the Lewis and Cape Wrath coastlines indicating the potential for encounter in this area. Other elasmobranch species are known to use these waters.</p> <p>Seal density mapping and the presence of Seal haul out areas on the mainland and North Rona indicates the likely use of the area by Grey seals.</p> <p>The area is known to be used by fish species, including diadromous species, such as Atlantic salmon, and others including Sea trout and many commercially caught species. A number of high intensity nursery grounds have been identified within the region for commercially fish species such as herring, whiting and mackerel, amongst others.</p> <p>Seabed sediments in the vicinity of the Draft Plan Option are described as coarse sediments (e.g. sands, gravelly sands and sandy gravels).</p>	<p>including the loss of habitat and scouring, smothering, deposition and abrasion of seabed in areas with coarse sediments from the placement of devices in this area. The potential for impacts on the Solan Bank Reef cSAC reef site has also been identified as a result of sediment movement from the installation of wind devices. However, there are currently gaps in research knowledge which make it difficult to establish certainty of such effects.</p>	<p>areas near Cape Wrath, associated with grid infrastructure if it were to be sited near this location.</p>	
Population and Human Health	<p>The waters at the North Minch and nearby coastal areas are used for a number of industry and recreational activities including fishing, recreational sea angling, light recreational cruising and surfing. The areas remoteness is considered to be a key attraction for many recreational visitors.</p>	<p>There is potential for collisions between recreational vessels and offshore energy infrastructure and supporting vessels, particularly during installation. However, given the height of wind turbines these would be highly visible during most conditions which should reduce collision risk. The presence of offshore wind turbines has the potential to displace some existing recreational activities, through limiting access to areas of the sea and potential disruption to perceived amenity value</p>	<p>Any collision could directly affect vessels and passengers, however it is not expected that wind developments would result in a significant increase in collisions.</p> <p>It is difficult to predict the precise impact of potential changes to amenity on recreational use of the area. Some displacement could be permanent leading to recreational activities being discontinued. However it is likely that most activities could continue within a smaller range or in other nearby locations.</p>	<p>Potential mitigation for collisions through the inclusion/mapping of offshore energy developments on navigational charts and the use of navigational aids (such as marker buoys and lighting, etc.) in the vicinity of the infrastructure.</p> <p>When planning projects, developers could work with the recreation sector to consider best how recreational activities might continue within the option boundary. Early consultation can also help to reduce impacts on important cruising routes.</p> <p>There may be the requirement for commercial shipping to be excluded from developed areas. This would be determined through further engagement between MS-LOT and the relevant navigation authorities at the project level.</p>
Water and the Marine Environment ¹⁰	<p>The coastal waters in the vicinity of the Draft Plan Option were classified at being of good status under the WFD in 2011.</p>	<p>Potential for adverse water quality impacts during installation, operation and decommissioning of the developments (e.g. increased turbidity caused by works on the seabed, contamination from installation and maintenance vessels).</p> <p>Wind turbines that use gravity based foundations that use sediment as fill, may carry a pollution risk depending on where the sediment is sourced.</p>	<p>Impacts associated with any contamination from seabed material disturbed during installation or potentially decommissioning is likely to be of localised and temporary nature, with the significance of effects dependant on the level of contamination. Impacts during operation and maintenance are considered less likely.</p> <p>The significance and characteristic of impacts associated with contamination from vessels is uncertain and cannot be described beyond the</p>	<p>Pollution risks associated with installation, maintenance and decommissioning of devices should be reduced and limited through building mitigation into construction procedures, to avoid discharges of harmful material and substances.</p> <p>Further assessment work may be required to reduce uncertainty regarding potential impacts on water quality, particularly on including shellfish waters. This includes a recommendation for hydrodynamic and water quality modelling as part</p>

¹⁰ Informed by SEPA (2012) Water Classification report: 2007 – 2011 [online] Available at: http://www.sepa.org.uk/water/monitoring_and_classification/classification.aspx [accessed 10/04/2013]

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Climatic Factors	<p>The coastline of the Butt of Lewis is dominated by cliffs with no significant beaches. This alters to the south, where sheltered sandy beaches are located amongst sandstone and soft conglomerate cliffs.</p> <p>As such, several areas of potential erosion and accretion have been identified on the north east coast, with accretion observed within several sheltered and sandy bays. Erosion is largely occurring due to wave action, although is limited to high water times at several locations.</p> <p>The coastline to the east and south of Cape Wrath consists largely of high cliffs separating sheltered sandy bay and loch-head beaches. Several of these beaches have been identified as being potentially vulnerable to erosion/accretion, with wave action having been identified as causing some erosion on most beach systems</p> <p>The potential for increases in storm events and rising sea levels have been identified, due to the effects of climate change.</p>	<p>Potential for mixed effects on coastal erosion and accretion caused by changes to hydrodynamics and wave energy particularly from those developments located near to potentially vulnerable coastlines (e.g. accretion at nearby Lewis coastlines and potential for erosion of sandy beaches located in the north west Scottish mainland).</p> <p>Likely contributions to achieving GHG reductions through replacing energy generation from non-renewable sources to renewable sources.</p>	<p>potential for it to occur.</p> <p>Significance and character of effects are unknown. Depending on how offshore infrastructure affects hydrodynamics the effects on coastal erosion and accretion could be positive or negative. However any effects that do occur are likely to depend on the specific nature and location of the proposed development. Effects on the coastline are likely to be indirect.</p>	<p>of project level assessment</p> <p>Project level assessment of hydrodynamic changes, as a result of renewables development, should include any relevant climate related changes to the marine environment when assessing impacts.</p>
Marine Geology and Coastal Processes	<p>The seabed at the North Minch bordered by Cape Wrath to the south east and Lewis to the south west, consists largely of coarse sediments (e.g. sands, gravelly sands and sandy gravels).</p> <p>Depths vary from 50 – 140m across the area, with the deeper areas generally located within the western part of the Draft Plan Option and in the central and western parts of the North Minch.</p> <p>The area has generally moderate wave and tidal energies.</p>	<p>Some seabed disturbance and loss of habitat are likely to occur during the site preparation and placement of device foundations. The scale of such disturbance is likely dependent on the type and size of the device.</p> <p>Sediment disturbance which occurs during the installation process could also lead to secondary impacts (e.g. smothering, release of existing contaminants), particularly in areas of fine sediments. However, significant increases in turbidity are considered unlikely given the largely coarse sediments and rock seabed formations within the option area.</p> <p>There is the potential for offshore developments within the Draft Plan Option to alter sediment dynamics and tidal flow fluxes in the vicinity of the site, with potential general impacts such as scour, deposition and abrasion identified. However, these systems are likely to be complex, and as such, the potential for impacts is likely to be site specific and dependent on factors such as the type and size of the devices and their foundations.</p>	<p>Direct impacts such as disturbance of the seabed during installation are likely to be temporary and localised.</p> <p>Loss of seabed area beneath device foundations may be permanent, although some natural regeneration may occur upon decommissioning of devices and removal of infrastructure.</p> <p>Changes in sediment dynamics and direct impacts such as scour, deposition and abrasion of seabed sediments are likely to be limited to the installation and operation phases of developments. However, in some circumstances, the effects of such changes may have long-term effects in coastal areas (e.g. the deposition of sediments in nearby coastal areas).</p>	<p>When projects are in the design process, consideration should be given to the location and arrangement of devices in order to build in mitigation to avoid potential impacts on marine geology and coastal processes.</p> <p>It is recommended that sediment dynamic modelling is undertaken at project level to demonstrate potential effects in order to consider appropriate mitigation.</p> <p>Mitigation measures should include the design and use of rock scour protection around the base gravity-based foundations, jacket and monopile devices placed on or into the seabed.</p>
Historic Environment	<p>There are a number of marine wreck sites within the Draft Plan Option, and coastal wreck sites have been identified to the south east and south west of it. This includes several wrecks on the north west coast of the Scottish mainland, including one designated wreck site which is also classified as an HMPA, and another which is a proposed HMPA.</p> <p>There are also a significant number of concentrated scheduled monuments, (including duns, cairns and</p>	<p>The close proximity of the site footprint to Lewis and Barra, and the general remoteness of this region would suggest there is the potential for impacts on the setting of a number of coastal historic assets.</p> <p>Potential impacts on historic wreck sites in the vicinity of the developments from installation and operation of offshore energy developments.</p>	<p>Direct effects on historic assets e.g. loss of assets caused by changes to coastal processes or the siting of offshore developments, would likely be permanent. The significance of the effects would, depend on the significance of the receptor.</p> <p>Effects on the setting of historic environment features would be indirect, and last for the lifespan of the development.</p>	<p>Direct effects on historic environment features can be avoided through appropriate siting of devices away from vulnerable coastlines and known historic marine features.</p> <p>Project level assessments should consider the potential for impacts on the setting of sites and seek to mitigate accordingly.</p>

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	forts in Port Nis, the scheduled early monastic site of St Ronan's Church and the Butt of Lewis Lighthouse) to the south west, and the A-listed Cape Wrath lighthouse is located on the Scottish Mainland to the east.			
Landscape / Seascape	<p>The Draft Plan Option is located close to a number of landscape designations near Cape Wrath and along the northern and western coasts of the mainland. These include the Assynt – Coigach NSA, North West Sutherland NSA and Wester Ross NSA. The Sutherland coast is also designated as part of the North West Highlands Geopark.</p> <p>Large parts of the Sutherland and Lewis coastlines have a high wildness level.</p>	<p>The Draft Plan Option is likely to be visible from the isle of Lewis to the south west and the Scottish mainland to the east and south. Large sections of the coastline are designated at local and NSA level, with many areas also noted as being wild land.</p> <p>There is potential for changes to the character of the seascape and potentially on the setting of these designations, particularly the NSAs.</p> <p>Visibility effects may occur during construction and maintenance periods as well as during operation. It is also likely that navigational aids (e.g. marker buoys, lighting) will also have visual effects.</p> <p>There are a number of potential offshore receptors including recreational boats that sail close to the option area.</p>	<p>Wind devices within the wind option may be visible from both Lewis and the mainland, including areas designated for landscape importance at a national level and areas of wildness.</p> <p>Impacts are likely during construction, maintenance and operation phases.</p> <p>Lighting of wind devices may result in visual effects during day and night, although the scale of any effects for onshore receptors is expected to decrease with greater distance from the light source.</p> <p>Development within the Draft Plan Option would likely alter the current seascape. However the number of human receptors in these areas may be low.</p> <p>Visual impacts could be greater for offshore receptors, such as recreational sea users, as their proximity to devices would be greater than onshore receptors.</p>	<p>Full visual impact assessment will be required at the project level (EIA) to establish the visual envelope and significance of effects. Impacts to the landscape and seascape character would also need to form part of project level assessments.</p> <p>However visual impacts to onshore receptors could potentially be limited by construction further from the mainland, in particular to the north of the Draft Plan Option.</p> <p>Given the high quality landscape identified, any development in this area should only be undertaken where significant effects can be avoided.</p> <p>Development of the northern parts of the plan option could reduce visual and landscape/ seascape impacts.</p> <p>Development that will affect NSA should avoid adverse effects on the integrity of the area or the qualities for which it has been designated.</p>

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SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
Biodiversity, Flora and Fauna	<p>The Draft Plan Option covers a large section of the waters immediately north west of the Orkney Isles, and there are a number of important designations in this area. Coastal SPAs on the Orkney isles include Hoy SPA, Marwick Head SPA, Rousay SPA, West Westray SPA, Papa Westray (North Hill and Holm) SPA, Calf of Eday SPA, all designated for their seabird assemblage interests (including Fulmar, Skua, Puffin, Kittiwake, Razorbill, Guillemot, Red Throated Diver, Cormorant, Gull, Tern, and Peregrine). Located between Orkney and Shetland is Fair Isle SPA, which has been designated for similar species.</p> <p>Orkney also contains the Sanday SAC (designated for sandflats, reefs and Common seal), Faray and Holm of Faray SAC (designated for Grey Seal) and Stromness Heaths and Coast SAC (designated for its vegetated cliffs).</p> <p>The Draft Plan Option is almost completely within the North West Orkney proposed MPA, designated for sand eels and marine geomorphology of the Scottish shelf seabed.</p>	<p>Vulnerability mapping indicates that there is the potential for collision and displacement impacts for birds, particularly during the breeding season. However, the potential for such effects likely depend on a range of factors including the bird species considered (e.g. vulnerability varies for different bird species), and the size and design of wind energy devices (e.g. some species are known to be more susceptible to collision with larger devices, and others with devices with lower clearance above the water surface).</p> <p>Given the likely presence of marine mammals and fish, particularly Cetaceans and Seals in Scotland's northern waters, there may be the potential for effects such as barriers to movement, collision with the devices and associated infrastructure, above and below water noise impacts during construction and operation, and aggregation effects (e.g. aggregation of predators near structures). However, there are currently gaps in research knowledge which mean it is difficult to establish the likelihood of impact.</p> <p>Whilst the area is not identified as a hot spot for Basking sharks they and other elasmobranchs (including priority marine features) are known to have used this area of the sea. Therefore there remains potential for the same</p>	<p>There is potential for collision between seabirds and wind devices and their supporting infrastructure, and potential for displacement of bird species. However, the significance of the impact is uncertain as effects on the population viability of individual species are not known.</p> <p>Potential effects on Cetaceans, Seals, elasmobranchs and fish including barriers to movement, collision with infrastructure, and possible noise impacts as a result of piling activities associated with installing devices. These effects may range from changes to existing feeding behaviour to mortality, although the precise effect on populations cannot be ascertained at this strategic stage but should be a consideration at the project level (e.g. in monitoring).</p> <p>Effects associated with construction activities, such as fauna disturbance from underwater noise associated with piling for monopile or jacket devices, would be temporary but longer term effects from wind devices with underwater infrastructure remain.</p> <p>Potential for EMF impacts on fish and</p>	<p>Project level assessment (EIA) that includes specific modelling and/or assessment, will be required to demonstrate that there will be no significant impacts on the birds and mobile species in the vicinity as a result of collision with wind devices.</p> <p>Further research into the potential collision risks, displacement and the effects on Cetaceans, Seals elasmobranchs and fish will help to identify the potential for significant effects.</p> <p>To date research has indicated that there are uncertain effects of EMF and noise on fish and elasmobranchs. The result of monitoring of wind projects currently in the application process has the potential to help provide greater certainty on the scale of effects.</p> <p>There is considered to be a potential risk to Seals in this area, particularly the potential for cumulative effects, and future developments should seek to demonstrate avoidance of effects.</p> <p>Potential effects of supporting onshore/offshore grid connections will need to be considered to</p>

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	<p>The seabird maps indicated a potential vulnerability for seabird collision and displacement from wind energy devices during breeding season, particularly in the south and east portions of the Draft Plan Option. However, this vulnerability may differ for individual species.</p> <p>Cetacean distribution is high in a portion of the Draft Plan Option. Several Basking shark sightings have been recorded in the Orkney Islands, indicating the potential for encounters within the Draft Plan Option. Other elasmobranch species are also known to use these waters. The importance of the area for Seals is demonstrated by the presence of numerous Seal haul out areas located amongst the islands, and density mapping showing the presence of both Grey and Common seals in this area.</p> <p>While having no designated sites for Atlantic salmon in Orkney, the area is known to be used by a wide range of fish species, including diadromous species such as Atlantic salmon, and many commercially caught species. The region also contains important nursery grounds for several commercially important species of fish.</p> <p>The seabed in the vicinity of the Draft Plan Option consists mainly of coarse sediments such as sandy gravels and gravelly sands. These benthic habitats are likely to contain species used to strong wave and tidal movements.</p>	<p>impacts as listed above for Seals and Cetaceans.</p> <p>The review of technologies identified potential effects from EMF on fish and elasmobranchs although research into the magnitude of effects demonstrates that this is uncertain.</p> <p>There is potential for impacts on benthic habitats including loss of habitat, scouring, smothering, deposition and abrasion of seabed in areas with coarse sediments as a result of placing devices and their supporting infrastructure within this area. Of particular note is the potential for impacts to SACs in the area designated for their valued and vulnerable coastal and reef habitats.</p> <p>While the potential for sediment movement from the installation of wind devices has been identified, this will likely depend on the type of foundation and installation technologies used.</p>	<p>elasmobranchs from electricity cables associated with wind energy devices. Indirect effects may include altered migratory pathways with unknown energetic/biological consequences.</p> <p>Potential for direct benthic effects associated with the siting and construction of devices, and indirect effects including sediment movements (e.g. scouring, smothering, sediment deposition and abrasion). However, it is expected sedimentation impacts may be limited as the existing environment is already dynamic.</p> <p>Potential for significant effects to designated areas associated with grid infrastructure if it were to be sited in the vicinity of the Draft Plan Option.</p>	<p>avoid effects on valued marine and coastal areas.</p> <p>Impacts on important coastal and reef habitats should be monitored.</p> <p>It is recommended that the boundary of the Draft Plan Option is kept under review as part of ascertaining whether overlap with the North West Orkney proposed MPA would lead to adverse effects or whether co-location is possible. Projects will need to demonstrate through the EIA process that they are compatible with the conservation objectives of the MPA.</p>
Population and Human Health	<p>The waters to the north west of Orkney and nearby coastal areas are used for a number of industry and recreational activities including fishing, recreational sea angling, medium recreational cruising, sailing, diving and surfing.</p>	<p>There is potential for collisions between recreational vessels and offshore energy infrastructure and supporting vessels, particularly during installation. However, given the height of wind turbines these would be highly visible during most conditions which should reduce collision risk. The presence of offshore wind turbines has the potential to displace some existing recreational activities, through limiting access to areas of the sea and potential disruption to perceived amenity value</p>	<p>Any collision could directly affect vessels and passengers, however it is not expected that wind developments would result in a significant increase in collisions.</p> <p>It is difficult to predict the precise impact of potential changes to amenity on recreational use of the area. Some displacement could be permanent leading to recreational activities being discontinued. However it is likely that most activities could continue within a smaller range or in other nearby locations.</p>	<p>Potential mitigation for collisions through the inclusion/mapping of offshore energy developments on navigational charts and the use of navigational aids (such as marker buoys and lighting, etc.) in the vicinity of the infrastructure.</p> <p>When planning projects, developers could work with the recreation sector to consider best how recreational activities might continue within the option boundary. Early consultation can also help to reduce impacts on important cruising routes.</p> <p>There may be the requirement for commercial shipping to be excluded from developed areas. This would be determined through further engagement between MS-LOT and the relevant navigation authorities at the project level.</p>
Water and the Marine Environment	<p>The coastal waters in the vicinity of the draft plan area were classified as being of good status under the WFD in 2011.</p>	<p>Potential for adverse water quality impacts during installation, operation and decommissioning of the developments (e.g. increased turbidity caused by works on the seabed, contamination from installation and</p>	<p>Impacts associated with any contamination from seabed material disturbed during installation or potentially decommissioning, is likely to be of localised and temporary nature, with the</p>	<p>Pollution risks associated with installation, maintenance and decommissioning of devices should be reduced and limited through building mitigation into construction procedures, to avoid</p>

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		<p>maintenance vessels).</p> <p>Wind turbines that use gravity based foundations that use sediment as fill, may carry a pollution risk depending on where the sediment is sourced.</p>	<p>significance of effects dependant on the level of contamination. Impacts during operation and maintenance are considered less likely.</p> <p>The significance and characteristic of impacts associated with contamination from vessels is uncertain and cannot be described beyond the potential for it to occur.</p>	<p>discharges of harmful material and substances.</p> <p>Further assessment work may be required to reduce uncertainty regarding potential impacts on water quality, particularly on including shellfish waters. This includes a recommendation for hydrodynamic and water quality modelling as part of project level assessment</p>
Climatic Factors	<p>Long-term coastal retreat and cliff erosion is occurring around the Orkney coast, this is likely due to the high energy coastlines present. Several coastlines, largely sheltered beaches and soft coasts, have been identified as being vulnerable to coastal erosion.</p> <p>The potential for increases in storm events and rising sea levels have been identified, due to the effects of climate change.</p>	<p>Potential for mixed effects on coastal erosion and accretion caused by changes to hydrodynamics and wave energy. However it is unlikely that this would be significant given the high energy along coastlines and long term coastal retreat already observed.</p> <p>Likely contributions to achieving GHG reductions through replacing energy generation from non-renewable sources to renewable sources.</p>	<p>Significance and character of effects are unknown. Depending on how offshore infrastructure affects hydrodynamics the effects on coastal erosion and accretion could be positive or negative. However any effects that do occur are likely to depend on the specific nature and location of the proposed development.</p> <p>Effects on the coastline are likely to be indirect.</p>	<p>Project level assessment of hydrodynamic changes, as a result of renewables development, should include any relevant climate related changes to the marine environment when assessing impacts.</p>
Marine Geology and Coastal Processes	<p>The seabed in the vicinity of the Draft Plan Option consists mainly of coarse sediments such as sandy gravels and gravelly sands. The depth of the seabed varies from 30 – 170m within the option area, with deeper areas located further to the north west.</p> <p>The area has generally strong wave and tidal energy resources, particularly the northern portion of the option area.</p>	<p>Some seabed disturbance and loss of habitat are likely to occur during the site preparation and placement of device foundations. The scale of such disturbance is likely dependent on the type and size of the device.</p> <p>Sediment disturbance which occurs during the installation process could also lead to secondary impacts (e.g. smothering, release of existing contaminants), particularly in areas of fine sediments. However, significant increases in turbidity are considered unlikely given the largely coarse sediments within the Draft Plan Option.</p> <p>There may be the potential for offshore developments within the Draft Plan Option to alter sediment dynamics and tidal flow fluxes in the vicinity of the site, with potential general impacts such as scour, deposition and abrasion identified. Associated impacts to vulnerable coastlines, such as those in Orkney's northern islands may occur (e.g. coastal erosion, accretion). However, these systems are likely to be complex, and as such, the potential for impacts is likely to be site specific and dependent on factors such as the type and size of the devices and their foundations.</p>	<p>Direct impacts such as disturbance of the seabed during installation are likely to be temporary and localised.</p> <p>Loss of seabed area beneath device foundations may be permanent, although some natural regeneration may occur upon decommissioning of devices.</p> <p>Changes in sediment dynamics and direct impacts such as scour, deposition and abrasion of seabed sediments are likely to be limited to the installation and operation phases of developments. However, in some circumstances, the effects of such changes may have long-term effects in coastal areas (e.g. the deposition of sediments in nearby coastal areas).</p>	<p>When projects are in the design process, consideration should be given to the location and arrangement of devices in order to build in mitigation to avoid potential impacts on marine geology and coastal processes, particularly given the proximity to several eroding coasts in Orkney.</p> <p>It is recommended that sediment dynamic modelling is undertaken at project level to demonstrate potential effects in order to consider appropriate mitigation.</p> <p>Mitigation measures should include the design and use of rock scour protection around the base of gravity-based foundations, jacket and monopile devices placed on or into the seabed.</p>
Historic Environment	<p>There are a significant number of concentrated scheduled monuments, including numerous wrecks, brochs, cairns and fortification, within marine and coastal areas located near to the Draft Plan Option.</p> <p>The most notable site is the Heart of Neolithic Orkney World Heritage Site which is located to the south of the area, however, much of the Orkney's coastal waters have been identified for their potential for submerged archaeology.</p>	<p>There is a potential for impacts on the setting of historic features including the Heart of Neolithic Orkney World Heritage Site.</p> <p>The likely presence of submerged archaeology means that there is potential for direct effects on any remains. However, development which includes archaeological survey may also have some positive effects by contributing to knowledge/understanding about the marine historic environment.</p>	<p>Direct effects on historic assets e.g. loss of assets caused by changes to coastal processes or the siting of offshore developments, would likely be permanent. The significance of the effects would, depend on the significance of the receptor.</p> <p>Effects on the setting of historic environment features would be indirect, and last for the lifespan of the development.</p>	<p>Direct effects on historic environment features can be avoided through appropriate siting of devices away from vulnerable coastlines and known historic marine features.</p> <p>Project level assessments should consider the potential for impacts on the setting of sites and seek to mitigate accordingly.</p> <p>Where development is in an area considered likely to have submerged archaeology projects should seek to identify and avoid direct impacts on features.</p> <p>Development in this area must demonstrate no adverse effects on the Heart of Neolithic Orkney World Heritage Site.</p>

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Landscape / Seascape	<p>The southern end of the Draft Plan Option is likely to be visible from the Hoy and West Mainland NSA, from locally designated landscapes, and from the coastal edge of the Heart of Neolithic Orkney WHS. Parts of the the Draft Plan Option may also be visible from the Shetland NSA.</p> <p>Large parts of the Hoy coastline have a high wildness level, and the coastal edges of the Scottish mainland, while located well south of the Draft Plan Option, also have sections of wild land.</p>	<p>The Draft Plan Option, particularly in the south, is likely to be visible from designated and wild parts of the Orkney coastline.</p> <p>There is the potential for changes to the character of the seascape in this area, and also on the setting of the identified designations, particularly the NSA and WHS.</p> <p>Visibility effects may occur during construction and maintenance periods as well as during operation. It is likely that navigational aids (e.g. marker buoys, lighting) will also have visual effects.</p> <p>There are a number of potential offshore receptors including recreational boats that sail close to the option area.</p>	<p>Wind energy devices and supporting infrastructure within the Draft Plan Option is likely to be visible from Orkney, including from areas designated for its landscape importance at a national level, and as areas of wildness. The significance of potential visual effects in these areas can be greater than for other parts of the coastline.</p> <p>Lighting of wind devices may result in visual effects during day and night, although the scale of any effects for onshore receptors is expected to decrease with greater distance from the light source.</p> <p>Development in the plan option would alter the current seascape and potentially affect its character in some areas.</p> <p>Visual impacts could be greater for offshore receptors, such as recreational sea users, as their proximity to devices would be greater than onshore receptors.</p>	<p>Full visual impact assessment will be required at the project level (EIA) to establish the visual envelope and significance of effects. However visual impacts to onshore receptors could potentially be limited by construction further from the Orkney coastline, in particular to the west and north of the Draft Plan Option.</p> <p>Impacts to the landscape and seascape character would also need to form part of project level assessments.</p> <p>Development that will affect NSA should avoid adverse effects on the integrity of the area or the qualities for which it has been designated.</p> <p>Development of the western and northern parts of the Draft Plan Option could reduce potential visual and landscape/ seascape impacts.</p>

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SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
Biodiversity, Flora and Fauna	<p>The Draft Plan Option covers a large section of the waters to the south east of the Shetland Isles. There are a number of important designations in the area including coastal sites such as Noss SPA, Fetlar SPA and Sumburgh Head SPA, which are all designated for seabird assemblage (including Fulmar, Skua, Puffin, Kittiwake, Guillemot). Between Shetland and Orkney lies Fair Isle SPA, designated for similar bird species to these sites. Mousa SPA, located west of OWN2 is designated for Storm petrel and Arctic tern.</p> <p>Other designations near to the area include Mousa SAC (designated for reefs, caves and Common seal), Yell Sound Coast SAC (designated for otter and Common seal) and Pobie Bank cSAC which overlaps the northern boundary of OWN2 (proposed for its reef habitats).</p> <p>There is a large amount of bird interests in the area, and hence some seabird vulnerability for collision and displacement with wind energy. However, this vulnerability may differ for individual species.</p> <p>Cetacean distribution is considered high, particularly to the west of the draft plan area. A number of Basking shark sightings have been recorded along the eastern coast of Shetland</p>	<p>Vulnerability mapping indicates that there may be the potential for collision and displacement of birds during both winter and breeding seasons. The potential for such effects likely depend on a range of factors including the bird species considered (e.g. vulnerability varies for different bird species), and the size and design of wind energy devices (e.g. some species are known to be more susceptible to collision with larger devices, and others with devices with lower clearance above the water surface).</p> <p>Given the likely presence of marine mammals and fish, particularly Cetaceans and Seals in Scotland's northern waters, there may be the potential for effects such as barriers to movement, collision with the devices and associated infrastructure, above and below water noise impacts during construction and operation, and aggregation effects (e.g. aggregation of predators near structures). However, there are currently gaps in research knowledge which mean it is difficult to establish the likelihood of impact.</p> <p>Whilst the area is not identified as a hot spot for Basking sharks they and other elasmobranchs (including PMFs) are known to have used this area of the sea. Therefore, there remains potential for the same impacts as those listed above for Seals and Cetaceans.</p> <p>The review of technologies identified potential</p>	<p>There is potential for collision between seabirds and wind devices, and also for the displacement of bird species. However, the exact significance of the impact is uncertain as effects on the population viability of individual species are not known.</p> <p>Potential effects on Cetaceans, Seals, elasmobranchs and fish including barriers to movement, collision with infrastructure, and possible noise impacts as a result of piling activities associated with installing devices. These effects may range from changes to existing feeding behaviour to mortality, although the precise effect on populations cannot be ascertained at this strategic stage but should be a consideration at the project level (e.g. in monitoring).</p> <p>Effects associated with construction activities, such as fauna disturbance from underwater noise associated with piling for monopile or jacket devices, would be temporary but longer term effects from wind devices with underwater infrastructure remain.</p> <p>Potential for EMF impacts on fish and elasmobranchs from electricity cables associated with wind energy devices. Indirect effects may include altered migratory pathways with unknown energetic/biological consequences.</p> <p>Potential for direct benthic effects associated with the siting and construction of devices, and indirect effects including sediment movements (e.g. scouring,</p>	<p>Project level assessment (EIA) that includes specific modelling and/or assessment will be required to demonstrate that there will be no significant impacts on the birds and mobile species in the vicinity as a result of collision with wind devices.</p> <p>Further research into the potential collision risks, displacement and the effects on Cetaceans, Seals elasmobranchs and fish will help to identify the potential for significant effects.</p> <p>To date research has indicated that there are uncertain effects of EMF and noise on fish and elasmobranchs. The results of monitoring of wind projects currently in the application process have the potential to help provide greater certainty on the scale of effects.</p> <p>It is recommended that the northern boundary of the Draft Plan Option is kept under review as part ascertaining whether the overlap with the Pobie Bank cSAC would lead to adverse effects on its integrity or whether co-location is possible. Project level HRA must demonstrate development does not adversely affect the integrity of the cSAC.</p> <p>The potential effects of supporting onshore/offshore grid connections will need to be considered to avoid impacts on coastal areas.</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
	<p>indicating the potential for encounters in this area. Other elasmobranch species are known to use this area.</p> <p>The importance of the area for both Grey and Common seals is demonstrated by the presence of Seal haul out areas located amongst the islands, and the findings of Seal density surveys undertaken in the area indicating their use of waters around the Draft Plan Option.</p> <p>While there are no SAC sites designated for Atlantic salmon in Shetland, the area is known to be used by a wide range of fish species, including diadromous species, and by many commercially caught species. The region also contains important nursery grounds for several commercially important species of fish.</p> <p>The seabed surrounding Shetland consists mainly of gravelly sands and circallittoral coarse sediments. These benthic habitats are likely to contain species used to strong wave and tidal movements, particularly in the south west portion of OWN2.</p>	<p>effects from EMF on fish and elasmobranchs although research into the magnitude of effects demonstrates that this is uncertain.</p> <p>There is potential for impacts on benthic habitats including habitat loss, scouring, smothering, deposition and abrasion of seabed in areas with coarse sediments as a result of placing devices and their supporting infrastructure within this area.</p> <p>The potential for impacts to features of the cSAC, designated for reef habitats, overlapping with the Draft Plan Option. Direct impacts from activities such as installing devices in the north of the Draft Plan Option, and indirect effects from sediment movement on benthic habitats are have been identified. However, this will likely depend on factors including the type of foundations and installation technologies used. There are currently gaps in research knowledge which make it difficult to establish certainty of such effects.</p>	<p>smothering, sediment deposition and abrasion). It is expected sedimentation impacts may be limited as the existing environment is already dynamic.</p> <p>Potential for significant effects to designated areas associated with installation of grid infrastructure if it were to be sited in the vicinity of the Draft Plan Option.</p>	<p>Impacts on important coastal and reef habitats should be monitored.</p>
Population and Human Health	<p>The waters to the south east of Shetland and nearby coastal areas are used for a number of industry and recreational activities including fishing, recreational sea angling, medium recreational cruising and sailing.</p>	<p>There is potential for collisions between recreational vessels and offshore energy infrastructure and supporting vessels, particularly during installation. However, given the height of wind turbines these would be highly visible during most conditions which should reduce collision risk.</p> <p>The presence of offshore wind turbines has the potential to displace some existing recreational activities, through limiting access to areas of the sea and potential disruption to perceived amenity value.</p>	<p>Any collision could directly affect vessels and passengers, however it is not expected that wind developments would result in a significant increase in collisions.</p> <p>It is difficult to predict the precise impact of potential changes to amenity on recreational use of the area. Some displacement could be permanent leading to recreational activities being discontinued. However it is likely that most activities could continue within a smaller range or in other nearby locations.</p>	<p>Potential mitigation for collisions through the inclusion/mapping of offshore energy developments on navigational charts and the use of navigational aids (such as marker buoys and lighting, etc.) in the vicinity of the infrastructure.</p> <p>When planning projects, developers could work with the recreation sector to consider best how recreational activities might continue within the option boundary. Early consultation can also help to reduce impacts on important cruising routes.</p> <p>There may be the requirement for commercial shipping to be excluded from developed areas. This would be determined through further engagement between MS-LOT and the relevant navigation authorities at the project level.</p>
Water and the Marine Environment	<p>The coastal waters in the vicinity of the draft plan area were classified at being of good status under the WFD in 2011.</p> <p>There are a number of designated shellfish waters within the vicinity of the Draft Plan Option around the isles of Shetland.</p>	<p>Potential for adverse water quality impacts during installation, operation and decommissioning of the developments (e.g. increased turbidity caused by works on the seabed, contamination from installation and maintenance vessels).</p> <p>Wind turbines that use gravity based foundations that use sediment as fill, may carry a pollution risk depending on where the sediment is sourced.</p>	<p>Impacts associated with any contamination from seabed material disturbed during installation or potentially decommissioning is likely to be of localised and temporary nature, with the significance of effects dependant on the level of contamination. Impacts during operation and maintenance are considered less likely.</p> <p>The significance and characteristic of impacts associated with contamination from vessels is uncertain and cannot be described beyond the potential for it to occur.</p>	<p>Pollution risks associated with installation, maintenance and decommissioning of devices should be reduced and limited through building mitigation into construction procedures, to avoid discharges of harmful material and substances.</p> <p>Further assessment work may be required to reduce uncertainty regarding potential impacts on water quality, particularly on including shellfish waters. This includes a recommendation for hydrodynamic and water quality modelling as part of project level assessment</p>
Climatic Factors	<p>While littoral processes in Shetland are dominated by wave action, few areas within the south east of the Isles are considered vulnerable to coastal erosion or accretion, with the exception</p>	<p>Potential for mixed effects on coastal erosion and accretion caused by changes to hydrodynamics and wave energy particularly to soft and sandy coastlines located north of Aberdeen.</p>	<p>Significance and character of effects are unknown. Depending on how offshore infrastructure affects hydrodynamics the effects on coastal erosion and accretion could be positive or negative. However any</p>	<p>Project level assessment of hydrodynamic changes, as a result of renewables development, should include any relevant climate related changes to the marine environment when</p>

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	<p>of a small number of sheltered beaches identified at the southern tip of the isles.</p> <p>The potential for increases in storm events and rising sea levels have been identified, due to the effects of climate change.</p>	<p>Likely contributions to achieving GHG reductions through replacing energy generation from non-renewable sources to renewable sources.</p>	<p>effects that do occur are likely to depend on the specific nature and location of the proposed development.</p> <p>Effects on the coastline are likely to be indirect.</p>	<p>assessing impacts.</p>
Marine Geology and Coastal Processes	<p>The seabed in the vicinity of the Draft Plan Option consists mainly of coarse sediments (i.e. sandy gravels, gravelly sands and sands). The depth of the seabed is generally constant across the Draft Plan Option, ranging between 100 – 140m in depth.</p> <p>While the area, has generally low wave and tidal energy resources, a moderate tidal area is located off Sumburgh Head at the southern point of the Shetland Islands.</p>	<p>Some seabed disturbance and loss of habitat are likely to occur during the site preparation and placement of device foundations. The scale of such disturbance is likely dependent on the type and size of the device.</p> <p>Sediment disturbance which occurs during the installation process could also lead to secondary impacts (e.g. smothering, release of existing contaminants), particularly in areas of fine sediments. Significant increases in turbidity are unlikely given the largely coarse sediments within the Draft Plan Option.</p> <p>There is the potential for offshore developments within the Draft Plan Option to alter sediment dynamics and tidal flow fluxes in the vicinity of the site, with potential general impacts such as scour, deposition and abrasion identified at the site. There may be the potential for adverse impacts to coastal areas (e.g. erosion of vulnerable coasts, accretion). However, these systems are likely to be complex, and as such, the potential for impacts is likely to be site specific and dependent on factors such as the type and size of the devices and their foundations.</p>	<p>Direct impacts such as disturbance of the seabed during installation are likely to be temporary and localised.</p> <p>Loss of seabed area beneath device foundations may be permanent, although some natural regeneration may occur upon decommissioning of devices.</p> <p>Changes in sediment dynamics and direct impacts such as scour, deposition and abrasion of seabed sediments are likely to be limited to the installation and operation phases of developments. However, in some circumstances, the effects of such changes may have long-term effects in coastal areas (e.g. the deposition of sediments in nearby coastal areas).</p>	<p>When projects are in the design process, consideration should be given to the location and arrangement of devices in order to build in mitigation to avoid potential impacts on marine geology and coastal processes.</p> <p>It is recommended that sediment dynamic modelling is undertaken at project level to demonstrate potential effects in order to consider appropriate mitigation.</p> <p>Mitigation measures should include the design and use of rock scour protection around the base of gravity-based foundations, jacket and monopile devices placed on or into the seabed.</p>
Historic Environment	<p>The Draft Plan Option is close to the southern part of mainland Shetland, Mousa and Bressay, areas which are particularly rich in historic assets including scheduled prehistoric houses, brochs and settlements. In general terms, the coastline of Shetland is particularly sensitive with many scheduled brochs, forts and other sites along its coast. The most notable is the A-listed Sumburgh Head Lighthouse at the southern tip of the islands.</p> <p>Numerous SSMEI protected wrecks are located along the south east coastline of the islands</p>	<p>There is the potential for impacts on the setting of a number of coastal historic assets including the Sumburgh Head Lighthouse.</p> <p>Potential impacts on historic wreck sites in the vicinity of the developments from installation and operation of offshore energy developments.</p>	<p>Direct effects on historic assets e.g. loss of assets caused by changes to coastal processes or the siting of offshore developments, would likely be permanent. The significance of the effects would, depend on the significance of the receptor.</p> <p>Effects on the setting of historic environment features would be indirect, and last for the lifespan of the development.</p>	<p>Direct effects on historic environment features can be avoided through appropriate siting of devices away from vulnerable coastlines and known historic marine features.</p> <p>Project level assessments should consider the potential for impacts on the setting of sites including the Sumburgh Head Lighthouse and seek to mitigate accordingly.</p>
Landscape / Seascape	<p>There are a limited number of landscape features on the south west coastline of Shetland. The Draft Plan Options location off the western Shetland coast would mean that a large portion of this would not be visible from the Shetland NSA. Views of the southern plan option from the south of the NSA are possible but may be too be minimal. The Draft Plan Option may however be visible from the Shetland NSA.</p> <p>Parts of the Shetland coastline have a high wildness level.</p>	<p>Whilst there is potential for changes to the character of the seascape, there are few landscape designations in proximity to the Draft Plan Option. However, the option may be visible from some coastal communities between Lerwick and Sumburgh airport.</p> <p>Visibility effects may occur during construction and maintenance periods as well as operation. It is likely that navigational aids (e.g. marker buoys, lighting) will also have visual effects.</p> <p>There are a number of potential offshore receptors</p>	<p>Wind devices and their supporting infrastructure in this area may be visible from the Shetland coastline.</p> <p>Impacts are likely during construction, maintenance and operational phases.</p> <p>Development in the plan option would alter the current seascape and potentially affect its character in some areas.</p> <p>Lighting of wind devices may result in visual effects during day and night, although the scale of any effects for onshore receptors is expected to decrease with</p>	<p>Full visual impact assessment will be required at the project level (EIA) to establish the visual envelope and significance of effects, however visual impacts to onshore receptors could potentially be limited by construction further from the coast, in particular the south and east of the Draft Plan Option.</p> <p>Impacts to the landscape and seascape character would also need to form part of project level assessment.</p> <p>Development that will affect NSA should avoid</p>

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		including recreational boats that sail close to the option area.	greater distance from the light source. Visual impacts could be greater for offshore receptors, such as recreational sea users.	adverse effects on the integrity of the area or the qualities for which it has been designated.

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Biodiversity, Flora and Fauna	<p>The Draft Plan Option is in proximity to a number of designated sites, including Buchan Ness to Collieston SPA, Fowlsheugh SPA, Loch of Strathbeg SPA, and Ythan Estuary, Sands of Forvie and Meikle Loch SPA, all of which are designated for seabird assemblages (including Guillemot, Kittiwake, Fulmar, Terns, Gulls and Geese, amongst others).</p> <p>Furthermore it is likely that seabirds originating from the Firth of Tay and Eden Estuary SPA and, Troup, Pennan and Lion's Head SPA, Firth of Forth SPA, and Common Seals originating from the Firth of Tay and Eden Estuary SAC may travel to use these offshore waters. SACs at the Rivers Spey, Dee and South Esk located within the north east region have all been designated for Atlantic salmon interests.</p> <p>A number of important coastal sites are also located in proximity to the site, including Foveran Links SSSI known for sand dunes and coastal geomorphology.</p> <p>The Draft Plan Option overlaps with the Southern Trench MPA search area, which has Minke whale, White-beaked dolphin and geodiversity interests.</p> <p>The seabird maps in the baseline show a potential a collision and displacement vulnerability for seabirds from wind energy devices, particularly in the west and east of the Draft Plan Option during breeding season. However, this vulnerability may differ for individual species.</p> <p>The distribution of Cetaceans is considered to be high in the southern portion of the Draft Plan Option. While no Basking shark sightings have been recorded in the Draft Plan Option, several have been recorded along the north east coast, indicating the potential for encounters in this area. Other elasmobranch species are also known to use this area. Seal density mapping indicates the likely use of the area Seals, particularly Grey seals. There are seal haul out areas located along the coast to the west in the Inner Moray Firth.</p> <p>The area is known to be used by fish species, including diadromous species, such as Atlantic</p>	<p>Vulnerability mapping indicates there is the potential for collision and displacement of birds, particularly during the breeding season and in areas to the west and east of the Draft Plan Option. The potential for such effects will depend on a range of factors including the bird species considered (e.g. vulnerability varies for different bird species), and the size and design of wind energy devices (e.g. some species are known to be more susceptible to collision with larger devices, and others with devices with lower clearance above the water surface).</p> <p>Given the likely presence of marine mammals and fish, particularly Cetaceans, Seals and Atlantic salmon along Scotland's north-east coastline, there may be the potential for effects such as barriers to movement, collision with the devices and associated infrastructure, above and below water noise impacts during construction and operation, and aggregation effects (e.g. aggregation of predators near structures). However, there are currently gaps in research knowledge which mean it is difficult to establish the likelihood of impact.</p> <p>Whilst the area is not identified as a hot spot for Basking sharks they and other elasmobranchs (including priority marine features) are known to have used these waters. As such, there remains potential for the same impacts as listed above for Seals and Cetaceans.</p> <p>The review of technologies identified potential effects from EMF on fish and elasmobranchs although research into the magnitude of effects demonstrates that this is uncertain.</p> <p>There is potential for impacts on benthic habitats including loss of habitat as a result of placing devices on the seabed and from scouring, smothering, deposition and abrasion of seabed in areas with muddy sediments. However, there are currently gaps in research knowledge which make it difficult to establish certainty of such effects.</p>	<p>There is potential for collision between seabirds and wind devices, and also the potential for displacement of bird species. There is also the potential for cumulative effects for highly mobile birds and mammals as a result of developing the Draft Plan Options and planned infrastructure. However, the significance of the impact is uncertain as effects on the population viability of individual species are not known.</p> <p>Potential effects on Cetaceans, Seals, elasmobranchs and fish include barriers to movement, collision with infrastructure, and possible noise impacts as a result of piling activities associated with installing devices. These effects may range from changes to existing feeding behaviour to mortality, although the precise effect on populations cannot be ascertained at this strategic stage but should be a consideration at the project level (e.g. in monitoring).</p> <p>Effects associated with construction activities, such as fauna disturbance from underwater noise associated with piling for monopile or jacket devices, would be temporary but longer term effects from wind devices with underwater infrastructure remain.</p> <p>Potential for EMF impacts on fish and elasmobranchs from electricity cables associated with wind energy devices. Indirect effects may include altered migratory pathways with unknown energetic/biological consequences.</p> <p>Potential for direct benthic effects associated with the siting and construction of devices, and indirect effects including sediment movements (e.g. scouring, smothering, sediment deposition and abrasion).</p> <p>Potential for significant effects to designated areas associated with the installation of grid infrastructure if it were to be sited in the vicinity of the Draft Plan Option.</p>	<p>Project level assessment (EIA) that includes specific modelling and/or assessment will be required to demonstrate that there will be no significant impacts on the birds and mobile species in the vicinity as a result of collision with wind devices.</p> <p>Further research into the potential collision risks, displacement and the effects on Cetaceans, Seals elasmobranchs and fish will help to identify the potential for significant effects.</p> <p>To date research has indicated that there are uncertain effects of EMF and noise on fish and elasmobranchs. The results of monitoring of wind projects currently in the application process have the potential to help provide greater certainty on the scale of effects.</p> <p>Monitoring and information to inform the developing Southern Trench MPA search area status could also add greater clarity to potential effects as the consultation process on MPAs develops.</p> <p>It is recommended that the southern edge of the Draft Plan Option is kept under review as part ascertaining whether the overlap with the Southern Trench MPA search area would lead to adverse effects or whether co-location is possible. Projects will need to demonstrate through the EIA process that they are compatible with the conservation objectives of the MPA.</p> <p>Potential onshore effects of supporting grid connections will need to be considered to avoid effects on the sensitive coastal areas.</p>

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	<p>salmon, and others including Sea trout and many commercially caught species. The region also contains important nursery grounds for several commercially important species of fish.</p> <p>Benthic habitats in the region largely consist of sand near to the coast, with coarser sediments including gravelly sands further offshore. These habitats may be susceptible to hydrodynamic change.</p>			
Population and Human Health	<p>The waters to the north east of Aberdeenshire and nearby coastal areas are used for a number of industry and recreational activities including fishing, recreational sea angling, medium recreational cruising, bathing and surfing.</p>	<p>There is potential for collisions between recreational vessels and offshore energy infrastructure and supporting vessels, particularly during installation. However, given the height of wind turbines these would be highly visible during most conditions which should reduce collision risk.</p> <p>The presence of offshore wind turbines has the potential to displace some existing recreational activities, through limiting access to areas of the sea and potential disruption to perceived amenity value</p>	<p>Any collision could directly affect vessels and passengers, however it is not expected that wind developments would result in a significant increase in collisions.</p> <p>It is difficult to predict the precise impact of potential changes to amenity on recreational use of the area. Some displacement could be permanent leading to recreational activities being discontinued. However it is likely that most activities could continue within a smaller range or in other nearby locations.</p>	<p>Potential mitigation for collisions through the inclusion/mapping of offshore energy developments on navigational charts and the use of navigational aids (such as marker buoys and lighting, etc.) in the vicinity of the infrastructure.</p> <p>When planning projects, developers could work with the recreation sector to consider best how recreational activities might continue within the option boundary. Early consultation can also help to reduce impacts on important cruising routes.</p> <p>There may be the requirement for commercial shipping to be excluded from developed areas. This would be determined through further engagement between MS-LOT and the relevant navigation authorities at the project level.</p>
Water and the Marine Environment	<p>The coastal waters in the vicinity of the draft plan area were classified at being of good (off Aberdeen and to the south) to high status (north of Aberdeen) under the WFD in 2011.</p>	<p>Potential for adverse water quality impacts during installation, operation and decommissioning of the developments (e.g. increased turbidity caused by works on the seabed, contamination from installation and maintenance vessels).</p> <p>Wind turbines that use gravity based foundations that use sediment as fill, may carry a pollution risk depending on where the sediment is sourced.</p>	<p>Impacts associated with any contamination from seabed material disturbed during installation or potentially decommissioning is likely to be of localised and temporary nature, with the significance of effects dependant on the level of contamination. Impacts during operation and maintenance are considered less likely.</p> <p>The significance and characteristic of impacts associated with contamination from vessels is uncertain and cannot be described beyond the potential for it to occur.</p>	<p>Pollution risks associated with installation, maintenance and decommissioning of devices should be reduced and limited through building mitigation into construction procedures, to avoid discharges of harmful material and substances.</p> <p>Further assessment work may be required to reduce uncertainty regarding potential impacts on water quality, particularly on including shellfish waters. This includes a recommendation for hydrodynamic and water quality modelling as part of project level assessment</p>
Climatic Factors	<p>Significant sections of the Aberdeenshire coastline near the draft plan area have been identified as being potentially vulnerable to erosion or accretion, particularly to the north of Aberdeen between the city and Newburgh. Erosion has been observed in this area, with accretion observed further to the north (River Ythan), although the sediment transport patterns are complex around the Don and Ythan Estuaries. Dune erosion has also been observed along sections of the coastline.</p> <p>The potential for increases in storm events and rising sea levels have been identified, due to the effects of climate change.</p>	<p>Potential for mixed effects on coastal erosion and accretion caused by changes to hydrodynamics and wave energy particularly to soft and sandy coastlines located north of Aberdeen.</p> <p>Likely contributions to achieving GHG reductions through replacing energy generation from non-renewable sources to renewable sources.</p>	<p>Significance and character of effects are unknown. Depending on how offshore infrastructure affects hydrodynamics the effects on coastal erosion and accretion could be positive or negative. However any effects that do occur are likely to depend on the specific nature and location of the proposed development.</p> <p>Effects on the coastline are likely to be indirect.</p>	<p>Project level assessment of hydrodynamic changes, as a result of renewables development, should include any relevant climate related changes to the marine environment when assessing impacts.</p>
Marine Geology and Coastal Processes	<p>The seabed off the east Aberdeenshire coast consists predominantly of sand near to the coast, with coarser sediments such as gravelly sands further offshore. Depths vary from with depths</p>	<p>Some seabed disturbance and loss of habitat are likely during the site preparation and placement of device foundations. The scale of such disturbance is likely dependent on the type and size of the</p>	<p>Direct impacts such as disturbance of the seabed during installation are likely to be temporary and localised.</p>	<p>When projects are in the design process, consideration should be given to the location and arrangement of devices in order to build in mitigation to avoid potential impacts on marine geology and</p>

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	<p>ranging from around 60 – 110m offshore.</p> <p>The area has generally low to moderate wave and tidal energy resources, increasing nearer to the north east part of the Scottish Mainland.</p>	<p>device.</p> <p>Sediment disturbance which occurs during the installation process could also lead to secondary impacts (e.g. smothering, release of existing contaminants), particularly in areas of fine sediments. Significant increases in turbidity are unlikely given the largely coarse sediments within the option area, and moderate wave and tidal energies present.</p> <p>There is the potential for offshore developments within the Draft Plan Option to alter sediment dynamics and tidal flow fluxes in the vicinity of the site. The potential for general impacts such as scour, deposition and abrasion have been identified in the area, and also related impacts to vulnerable coastlines (e.g. between Aberdeen and the River of Don). However, these systems are likely to be complex, and as such, the potential for impacts is likely to be site specific and dependent on factors such as the type and size of the devices and their foundations.</p>	<p>Loss of seabed area may be permanent beneath device foundations, although some natural regeneration may occur upon decommissioning of devices and removal of infrastructure.</p> <p>Changes in sediment dynamics and direct impacts such as scour, deposition and abrasion of seabed sediments are likely to be limited to the installation and operation phases of developments. However, in some circumstances, the effects of such changes may have long-term effects in coastal areas (e.g. the deposition of sediments in nearby coastal areas).</p>	<p>coastal processes, particularly along important sections of the Aberdeenshire coastline (e.g. Ythan Estuary, etc.).</p> <p>It is recommended that sediment dynamic modelling is undertaken at project level to demonstrate potential effects in order to consider appropriate mitigation.</p> <p>Mitigation measures should include the design and use of rock scour protection around the base of gravity-based foundations, jacket and monopile devices placed on or into the seabed.</p>
Historic Environment	<p>There are a number of sensitive coastal sites in the vicinity of the Draft Plan Option, including the A-listed Girdle Ness Lighthouse, Castle Cowie and Dunnottar Castle amongst others.</p> <p>Numerous wrecks sites are located around the north east coastline of the Scottish mainland, both within the Draft Plan Option, between the area and the coast, and in nearby areas to the north. However, none of these wrecks have been designated.</p>	<p>There is the potential for impacts on the setting of a number of coastal historic assets including Girdle Ness Lighthouse and several castles located along the coastline.</p> <p>Potential impacts on historic wreck sites in the vicinity of the developments from installation and operation of offshore energy developments, particularly those in benthic areas susceptible to erosion or accretion.</p>	<p>Direct effects on historic assets e.g. loss of assets caused by changes to coastal processes or the siting of offshore developments, would likely be permanent. The significance of the effects would, depend on the significance of the receptor.</p> <p>Effects on the setting of historic environment features would be indirect, and last for the lifespan of the development.</p>	<p>Direct effects on historic environment features can be avoided through appropriate siting of devices away from vulnerable coastlines and known historic marine features.</p> <p>Project level assessments should consider the potential for impacts on the setting of the sites identified in the baseline and seek to mitigate accordingly.</p>
Landscape / Seascape	<p>There are no national level designations in the vicinity of the Draft Plan Option. While the Draft Plan Option is located near to a number of important local landscape areas along the Aberdeenshire coast¹¹.</p> <p>The wilderness value of the coastline near the Draft Plan Option is considered to be low.</p>	<p>The Draft Plan Option is potentially visible from several settlements along the coastline including areas around Aberdeen city.</p> <p>There is potential for changes to the character of the seascape and potentially on the setting of important local landscape areas. However, the coastline has a number of existing shipping movements and infrastructure, and as a result, the scale of any effect may be reduced.</p> <p>Visibility effects may occur during construction and maintenance periods as well as during operation. It is likely that navigational aids (e.g. marker buoys, lighting) will also have visual effects.</p> <p>There are a number of potential offshore receptors including recreational boats that sail close to the option area.</p>	<p>Wind devices within the Draft Plan Option may be visible from local landscape quality areas. However much of the area is undesignated, has very little wild land and is already busy in terms of shipping movements. Whilst plan option would alter the current seascape and potentially the character of seascape the significance of effects is considered to be limited as a result.</p> <p>Impacts are likely during both the construction and operation.</p> <p>Lighting of wind devices may result in visual effects during day and night, although the scale of any effects for onshore receptors is expected to decrease with greater distance from the light source.</p> <p>Visual impacts could be greater for offshore receptors, such as recreational sea users as their proximity to devices would be greater than onshore receptors.</p>	<p>Full visual impact assessment will be required at the project level (EIA) to establish the visual envelope and significance of effects, however visual impacts to onshore receptors could potentially be limited by construction further from the mainland, in particular the east of the Draft Plan Option.</p> <p>Impacts to the landscape and seascape character would also need to form part of project level assessment.</p>

¹¹ The recently adopted Aberdeenshire LDP does not identify local landscape designations. The Aberdeenshire Council intends producing further planning advice on landscape character areas which will highlight areas of increased landscape sensitivity, reflecting those areas formerly designated as Areas of Landscape Significance (ALS) in the previous Aberdeenshire Local Plan.

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
<p>Biodiversity, Flora and Fauna</p>	<p>The Draft Plan Option is located in proximity to a number of designated sites, including Buchan Ness to Collieston SPA, Loch of Strathbeg SPA, and Troup, Pennan and Lion's Heads SPA; all of which are designated for seabird assemblages (including Guillemot, Kittiwake, Fulmar, terns, gulls and geese amongst others). Far to the west is a number of designated sites, including the Moray Firth SAC which is designated for mobile Bottle-nosed dolphins amongst other features. SACs at the Rivers Spey, Dee and South Esk located within the north east region have all been designated for Atlantic salmon interests.</p> <p>A number of important coastal sites are also located in proximity to the site, including Rosehearty to Fraserburgh Coast SSSI and Gamrie and Pennan Coast SSSI, with bird and/or coastal geological interests.</p> <p>Furthermore, it is likely that seabirds originating from the Firth of Tay and Eden Estuary SPA and; and Common seals originating from the Firth of Tay and Eden Estuary SAC may travel to use these offshore waters.</p> <p>The Draft Plan Option overlaps with the Southern Trench MPA search area, which has Minke whale, White-beaked dolphin and geodiversity interests.</p> <p>A potential vulnerability for seabirds to collision and displacement from wind energy was identified in the south west portion of the plan option, particularly during breeding season. However, this vulnerability may differ for individual species.</p> <p>Cetacean distribution data indicates the possibility of Cetacean encounters in the Draft Plan Option, particularly in the southern part of the area. Several Basking shark sightings have been recorded along the northern Aberdeenshire coastline, indicating the potential for encounters in this area. Other elasmobranch species are also known to use this area. Seal density mapping and the presence of Seal haul out areas to the west of OWNE2 in the Inner Moray Firth, indicates the importance of the area to Grey seals and their likely presence in the vicinity of the Draft Plan Option.</p> <p>The area is known to be used by fish species, including diadromous species, such as Atlantic salmon, and others including Sea trout and many commercially caught species. The region also contains important nursery grounds for several</p>	<p>Vulnerability mapping included in the baseline indicates there is the potential for collision and displacement for birds, particularly in south west portion of the plan option and particularly during breeding season. However, the potential for such effects likely depend on a range of factors including the bird species considered (e.g. vulnerability varies for different bird species), and the size and design of wind energy devices (e.g. some species are known to be more susceptible to collision with larger devices, and others with devices with lower clearance above the water surface). Given the likely presence of marine mammals and fish, particularly Cetaceans, Seals and Atlantic salmon along Scotland's north-east coastline, there may be the potential for effects such as barriers to movement, collision with the devices and associated infrastructure, above and below water noise impacts during construction and operation, and aggregation effects (e.g. aggregation of predators near structures). However, there are currently gaps in research knowledge which mean it is difficult to establish the likelihood of impact.</p> <p>Whilst the area is not identified as a hot spot for Basking sharks they and other elasmobranchs (including priority marine features) are known to have used this area of the sea. Therefore, there remains potential for the same impacts as those listed above for Seals and Cetaceans.</p> <p>The review of technologies identified potential effects from EMF on fish and elasmobranchs although research into the magnitude of effects demonstrates that this is uncertain.</p> <p>There is potential for impacts on benthic habitats including loss of habitat from placement of devices on the seabed, and from scouring, smothering, deposition and abrasion of seabed. However, there are currently gaps in research knowledge which make it difficult to establish certainty of such effects.</p>	<p>There is potential for collision between seabirds and wind devices, and potential for displacement of bird species. There is also the potential for cumulative effects for highly mobile birds and mammals as a result of developing the Draft Plan Options and planned infrastructure. However, the significance of the impact is uncertain as effects on the population viability of individual species are not known.</p> <p>Potential effects on Cetaceans, Seals, elasmobranchs and fish including barriers to movement, collision with infrastructure, and possible noise impacts as a result of piling activities associated with installing devices. These effects may range from changes to existing feeding behaviour to mortality, although the precise effect on populations cannot be ascertained at this strategic stage but should be a consideration at the project level (e.g. in monitoring).</p> <p>Effects associated with construction activities, such as fauna disturbance from underwater noise associated with piling for monopile or jacket devices, would be temporary but longer term effects from wind devices with underwater infrastructure remain.</p> <p>Potential for EMF impacts on fish and elasmobranchs from electricity cables associated with wind energy devices. Indirect effects may include altered migratory pathways with unknown energetic/biological consequences.</p> <p>Potential for direct benthic effects associated with the siting and construction of devices, and indirect effects including sediment movements (e.g. scouring, smothering, sediment deposition and abrasion).</p> <p>Potentially significant effects to designated areas associated with grid infrastructure if it were to be sited in the vicinity of the Draft Plan Option.</p>	<p>Project level assessment (EIA) that includes specific modelling and/or assessment, will be required to demonstrate that there will be no significant impacts on the birds and mobile species in the vicinity as a result of collision with wind devices. The result of monitoring from projects in this region currently in the application process has the potential to help provide greater certainty on the scale of these effects.</p> <p>Further research into the potential collision risks, displacement and the effects on Cetaceans, Seals elasmobranchs and fish will help to identify the potential for significant effects.</p> <p>To date research has indicated that there are uncertain effects of EMF and noise on fish and elasmobranchs. The result of monitoring of wind projects currently in the application process has the potential to help provide greater certainty on the scale of effects.</p> <p>Monitoring and information to inform the developing Southern Trench MPA status could also add greater clarity to potential effects as the consultation process on MPAs develops.</p> <p>It is recommended that the southern edge of the Draft Plan Option is kept under review as part ascertaining whether the overlap with the Southern Trench MPA search area would lead to adverse effects or whether co-location is possible. Projects will need to demonstrate through the EIA process that they are compatible with the conservation objectives of the MPA.</p> <p>Potential onshore effects of supporting onshore/offshore grid connections will need to be considered to avoid effects on areas on sensitive coastal areas.</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
	commercially important species of fish. Benthic habitats in the region are largely sandy or gravelly based.			
Population and Human Health	The waters to the east of Aberdeenshire and nearby coastal areas are used for a number of industry and recreational activities including fishing, recreational sea angling, medium recreational cruising, bathing and surfing. During adverse conditions recreational craft are recommended to stay 2-3 miles offshore of Kinnaird Head and Rattray Head which might bring craft closer to the boundary of this option.	There is potential for collisions between recreational vessels and offshore energy infrastructure and supporting vessels, particularly during installation. However, given the height of wind turbines these would be highly visible during most conditions which should reduce collision risk. The presence of offshore wind turbines has the potential to displace some existing recreational activities, through limiting access to areas of the sea and potential disruption to perceived amenity value.	Any collision could directly affect vessels and passengers, however it is not expected that wind developments would result in a significant increase in collisions. It is difficult to predict the precise impact of potential changes to amenity on recreational use of the area. Some displacement could be permanent leading to recreational activities being discontinued. However it is likely that most activities could continue within a smaller range or in other nearby locations.	Potential mitigation for collisions through the inclusion/mapping of offshore energy developments on navigational charts and the use of navigational aids (such as marker buoys and lighting, etc.) in the vicinity of the infrastructure. When planning projects, developers could work with the recreation sector to consider best how recreational activities might continue within the option boundary. Early consultation can also help to reduce impacts on important cruising routes. There may be the requirement for commercial shipping to be excluded from developed areas. This would be determined through further engagement between MS-LOT and the relevant navigation authorities at the project level.
Water and the Marine Environment	The coastal waters in the vicinity of the draft plan area were classified as being of high status under the WFD in 2011, with the exception of waters off the Fraserburgh coast (moderate status) and off Peterhead (good status).	Potential for adverse water quality impacts during installation, operation and decommissioning of the developments (e.g. increased turbidity caused by works on the seabed, contamination from installation and maintenance vessels). Wind turbines that use gravity based foundations that use sediment as fill, may carry a pollution risk depending on where the sediment is sourced.	Impacts associated with any contamination from seabed material disturbed during installation or potentially decommissioning is likely to be of localised and temporary nature, with the significance of effects dependant on the level of contamination. Impacts during operation and maintenance are considered less likely. The significance and characteristic of impacts associated with contamination from vessels is uncertain and cannot be described beyond the potential for it to occur.	Pollution risks associated with installation, maintenance and decommissioning of devices should be reduced and limited through building mitigation into construction procedures, to avoid discharges of harmful material and substances. Further assessment work may be required to reduce uncertainty regarding potential impacts on water quality, particularly on including shellfish waters. This includes a recommendation for hydrodynamic and water quality modelling as part of project level assessment
Climatic Factors	Significant sections of the north east Scottish coastlines northern have been identified as being potentially vulnerable to erosion or accretion, particularly between Fraserburgh and Peterhead Combs. Both erosion and accretion has been observed in this area, with wave action also identified eroding dune systems near St Combs. The potential for increases in storm events and rising sea levels have been identified, due to the effects of climate change.	Potential for mixed effects on coastal erosion and accretion caused by changes to hydrodynamics and wave energy particularly for soft coastlines between Fraserburgh and St. Combs. Likely contributions to achieving GHG reductions through replacing energy generation from non-renewable sources to renewable sources.	Significance and character of effects are unknown. Depending on how offshore infrastructure affects hydrodynamics the effects on coastal erosion and accretion could be positive or negative. However any effects that do occur are likely to depend on the specific nature and location of the proposed development. Effects on the coastline are likely to be indirect.	Project level assessment of hydrodynamic changes, as a result of renewables development, should include any relevant climate related changes to the marine environment when assessing impacts.
Marine Geology and Coastal Processes	The seabed off the north east Aberdeenshire coast is more variable than that to the south, consisting of sandy gravel near the coastline, interspersed with large pockets of slightly gravelly sand and gravelly sand near to the tip, and sandy gravel, sand and muddy sand areas to the west towards the Moray Firth. There is a sharp increase in depth to the north of the Draft Plan Option, ranging between 60 – 200m at its deepest due to the presence of the Moray Firth trench. The area has generally moderate wave and tidal energy resources, particularly off the coast	Some seabed disturbance and loss of habitat is likely during the site preparation and placement of device foundations. The scale of such disturbance is likely dependent on the type and size of the device. Sediment disturbance which occurs during the installation process could also lead to secondary impacts (e.g. smothering, release of existing contaminants), particularly in areas of fine sediments. Significant increases in turbidity are unlikely given the largely coarse sediments within the Draft Plan Option. There is the potential for offshore developments	Direct impacts such as disturbance of the seabed during installation are likely to be temporary and localised. Loss of seabed area may be permanent beneath device foundations, although some natural regeneration may occur upon decommissioning of devices and removal of infrastructure. Changes in sediment dynamics and direct impacts such as scour, deposition and abrasion of seabed sediments are likely to be limited to the installation and operation phases of developments. However, in some circumstances, the effects of such changes may have long-term effects in coastal areas (e.g. the	When projects are in the design process, consideration should be given to the location and arrangement of devices in order to build in mitigation to avoid potential impacts on marine geology and coastal processes, particularly given the proximity to important and eroding dune systems in the North East region. It is recommended that sediment dynamic modelling is undertaken at project level to demonstrate potential effects in order to consider appropriate mitigation. Mitigation measures should include the design and use of rock scour protection around the base of

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
	between Fraserburgh and Peterhead.	within the Draft Plan Option to alter sediment dynamics and tidal flow fluxes in the vicinity of the site. The potential for general impacts such as scour, deposition and abrasion have been identified in the area, and also related impacts to vulnerable coastlines (e.g. Fraserburgh and St Combs). However, these systems are likely to be complex, and as such, the potential for impacts is likely to be site specific and dependent on factors such as the type and size of the devices and their foundations.	deposition of sediments in nearby coastal areas).	gravity-based foundations, jacket and monopile devices placed on or into the seabed.
Historic Environment	<p>There are a number of important coastal sites in the vicinity of the Draft Plan Option, including a range of listed castles and churches. These sites include the scheduled Kinnaird Head Castle and Lighthouse, and a various castles and churches located near Fraserburgh.</p> <p>Numerous wrecks sites are located around the north east coastline of the Scottish mainland, both within the Draft Plan Option, between the area and the coast, and in nearby areas to the south and south east. However, none of these wrecks have been designated.</p>	<p>There is the potential for impacts on the setting of a number of coastal historic assets including Kinnaird Head Castle and Lighthouse, and important castles and churches located near Fraserburgh.</p> <p>Potential impacts on historic wreck sites in the vicinity of the developments from installation and operation of offshore energy developments, particularly those in benthic areas susceptible to erosion or accretion.</p>	<p>Direct effects on historic assets e.g. loss of assets caused by changes to coastal processes or the siting of offshore developments, would likely be permanent. The significance of the effects would, depend on the significance of the receptor.</p> <p>Effects on the setting of historic environment features would be indirect, and last for the lifespan of the development.</p>	<p>Direct effects on historic environment features can be avoided through appropriate siting of devices away from vulnerable coastlines and known historic marine features.</p> <p>Project level assessments should consider the potential for impacts on the setting of the sites identified in the baseline and seek to mitigate accordingly.</p>
Landscape / Seascape	<p>There are no national level designations in the vicinity of the Draft Plan Option. While the Draft Plan Option is located near to a number of important local landscape areas along the Aberdeenshire coast¹².</p> <p>The wilderness value of the coastline near the Draft Plan Option is low.</p>	<p>The Draft Plan Option is potentially visible from several settlements along the coastline.</p> <p>There is potential for changes to the character of the seascape and potentially on the setting of important local landscape areas. However, the coastline has a number of existing shipping movements and infrastructure, and as a result, the scale of any effect may be reduced.</p> <p>Visibility effects may occur during construction and maintenance periods as well as during operation. It is likely that navigational aids (e.g. marker buoys, lighting) will also have visual effects.</p> <p>There are a number of potential offshore receptors including recreational boats that sail close to the option area.</p>	<p>Wind devices within the Draft Plan Option may be visible from local landscape quality areas. However much of the area is undesignated, has very little wild land and is already busy in terms of shipping movements. Whilst plan option would alter the current seascape and potentially the character of seascape the significance of effects is considered to be limited as a result.</p> <p>Impacts are likely during both the construction and operation.</p> <p>Lighting of wind devices may result in visual effects during day and night, although the scale of any effects for onshore receptors is expected to decrease with greater distance from the light source.</p> <p>Visual impacts could be greater for offshore receptors, such as recreational sea users as their proximity to devices would be greater than onshore receptors.</p>	<p>Full visual impact assessment will be required at the project level (EIA) to establish the visual envelope and significance of effects. However visual impacts to onshore receptors could potentially be limited by construction further from the mainland, in particular to the north and east of the Draft Plan Option.</p> <p>Impacts to the landscape and seascape character would also need to form part of project level assessments.</p>

¹² The recently adopted Aberdeenshire LDP does not identify local landscape designations. The Aberdeenshire Council intends producing further planning advice on landscape character areas which will highlight areas of increased landscape sensitivity, reflecting those areas formerly designated as Areas of Landscape Significance (ALS) in the previous Aberdeenshire Local Plan.

2 Wave Draft Plan Options

WW1

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
Biodiversity, Flora and Fauna	<p>The Draft Plan Option is located in proximity to the Rinns of Islay SPA and SSSI (designated for a number of bird species including Chough, Greenland white-fronted goose and Whooper swan) and to the north west is the Oronsay and South Colonsay SPA and SSSI (with Corncrake and Chough qualifying features). The North Colonsay and Western Cliffs SPA is designated for breeding seabird assemblage (with Chough, Kittiwake and Guillemot present).</p> <p>The Draft Plan Option is also located south of the Skye to Mull MPA search area, considered to be important for its geodiversity and the presence of Basking shark and Minke whale species.</p> <p>The seabird maps presented in the baseline indicates a potential vulnerability for diving birds in both winter and breeding seasons, although this vulnerability is slightly higher in the winter season. However, this vulnerability may differ for individual species.</p> <p>The south east of Islay contains the South-East Islay Skerries SAC designated for Common seals. The identification of several Seal haul out areas located in Islay and Colonsay and high Seal densities in the vicinity of these areas demonstrates Grey seal interests in this region.</p> <p>The available distribution and sighting data also indicates that likely to be Cetacean, elasmobranch and fish (i.e. Basking shark, Atlantic salmon, etc.) interests in the region. While the Draft Plan Option is located some distance south of the Basking shark and Common skate 'hotspots' located in the vicinity of Tiree, Coll and Mull, these species and other elasmobranch species may be encountered within the Draft Plan Option.</p> <p>The area is known to be used by fish species, including diadromous species, such as Atlantic salmon, and others including Sea trout and many commercially caught species. The region also contains important nursery grounds for several commercially important species of fish.</p> <p>The seabed in the vicinity of the Draft Plan Option is composed of predominantly coarse sediments (i.e. sandy gravels and gravelly sands) with coarser materials to the west of Islay and south of the option area. These habitats are likely to contain species used to strong wave and tidal movements.</p>	<p>Potential vulnerabilities for collision and displacement of diving birds were identified in relation to the Draft Plan Option, particularly during winter periods. The potential for impacts likely depends on a range of factors including the bird species considered (e.g. diving depth can vary markedly between species), the size and design of wind energy devices (e.g. some diving birds may rest on surface piercing infrastructure during foraging), and the presence or absence of underwater mooring cables.</p> <p>Given the likely presence of marine mammals and fish, particularly elasmobranchs such as Basking sharks, Cetaceans and Seals in the vicinity of the Draft Plan Option, there may be the potential for effects such as barriers to movement, collision with the devices and associated infrastructure, above and below water noise impacts during construction and operation, and aggregation effects (e.g. aggregation of predators near surface-piercing structures). While avoidance may be possible for some species in some circumstances, there are currently gaps in research knowledge creating difficulty in establishing the likelihood of impacts.</p> <p>The review of current wave technologies identified potential effects from EMF on fish and elasmobranchs although research into the magnitude of effects demonstrates that this is uncertain.</p> <p>There is potential for impacts on benthic habitats as a result of scouring, smothering, deposition and abrasion of seabed in areas with coarse sediments as a result of placing devices and supporting infrastructure (e.g. mooring cables, piling) within this area.</p>	<p>The potential remains for collision and displacement of diving birds with the presence of wave devices. However, the significance of the impact is uncertain as effects on the population viability of individual species are not known.</p> <p>Potential effects on Cetaceans, Seals, elasmobranchs and fish include barriers to movement, collision with infrastructure, and possible noise impacts as a result of activities associated with installing devices or their anchors. These effects may range from changes to existing feeding behaviour to mortality, although the precise effect on populations cannot be ascertained at this strategic stage but should be a consideration at the project level (e.g. in monitoring).</p> <p>Potential for EMF impacts on fish and elasmobranchs from electricity cables associated with wave energy devices. Indirect effects may include altered migratory pathways with unknown energetic/biological consequences.</p> <p>Effects associated with construction activities would be largely temporary, but the potential for longer term effects from wave devices with underwater infrastructure remain. The western edge of the plan area in particular may coincide with areas used by Basking sharks and Cetaceans.</p> <p>There is the potential for direct benthic effects associated with the siting and installation of wave devices, and for indirect effects including sediment movements (i.e. scouring, smothering, sediment deposition and abrasion) from their presence in the marine environment. However, it is expected sediment deposition impacts at this location will be limited as the existing environment is already dynamic.</p> <p>There may be the potential for significant effects to designated areas associated with installation of grid infrastructure if it were to be sited in the vicinity of the Draft Plan Option.</p>	<p>Project level assessment (EIA) that includes specific modelling and/or assessment will be required to demonstrate that there would be no significant impacts on diving birds and mobile marine species in the vicinity as a result of collision with wave devices.</p> <p>Further research into the potential collision, displacement and the effects on cetaceans, seals elasmobranchs and fish will help to identify the potential for significant effects.</p> <p>To date research has indicated that there are uncertain effects of EMF and noise on fish and elasmobranchs. The results of monitoring of existing and operational projects in this region have the potential to provide greater certainty on the scale of effects.</p> <p>Development to the west of the Draft Plan Option and further away from Islay may reduce the potential for impacts on bird species.</p> <p>The potential for effects from grid infrastructure could be avoided if supporting onshore/offshore connections were located away from sensitive areas, such as Islay.</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
Population and Human Health	The waters to west and north west of Islay are used for a number of industry and recreational activities including fishing, recreational sea angling, light recreational cruising, surfing and diving.	<p>There is potential for collisions between recreational vessels and offshore energy infrastructure and supporting vessels, particularly during installation. Wave devices that sit low either above or below the water line, and in certain sea conditions could make them harder to see for small craft.</p> <p>The presence of wave devices has the potential to displace some existing recreational activities, through limiting access to areas of the sea and potential disruption to perceived amenity value.</p>	<p>Any collision could affect vessels and passengers. There remains a potentially significant collision risk for small vessels and wave devices in certain conditions with large waves. In calmer conditions this risk will reduce.</p> <p>It is difficult to predict the precise impact of potential changes to amenity on recreational use of the area. Some displacement could be permanent leading to recreational activities being discontinued. However it is likely that most activities could continue within a smaller range or in other nearby locations. Some established routes for recreational craft could be required to be diverted.</p>	<p>Potential mitigation for collisions through the inclusion/mapping of offshore energy developments on navigational charts and the use of navigational aids (such as marker buoys and lighting, etc.) in the vicinity of the infrastructure.</p> <p>When planning projects, developers could work with the recreation sector to consider best how recreational activities might continue within the option boundary. Early consultation can also help to reduce impacts on important cruising routes.</p> <p>There may be the requirement for commercial shipping to be excluded from developed areas. This would be determined through further engagement between MS-LOT and the relevant navigation authorities at the project level.</p>
Water and the Marine Environment	<p>The coastal waters in the vicinity of the draft plan area were classified as being of good status under the WFD in 2011.</p> <p>There are two designated shellfish waters within the vicinity of the Draft Plan Option off Jurra and Colonsay.</p>	<p>Potential for adverse water quality impacts during installation, operation and decommissioning of the developments (e.g. increased turbidity caused by works on the seabed associated with anchoring of devices, contamination from their installation and maintenance vessels).</p> <p>Some wave devices can use gravity based anchors that will use sediment as fill, and which may carry a pollution risk depending on where the sediment is sourced.</p>	<p>Impacts associated with any contamination from seabed material disturbed during installation or potentially decommissioning is likely to be of localised and temporary nature, with the significance of effects dependant on the level of contamination. Impacts during operation and maintenance are considered less likely.</p> <p>The significance and characteristic of impacts associated with contamination from vessels is uncertain and cannot be described beyond the potential for it to occur.</p>	<p>Pollution risks associated with installation, maintenance and decommissioning of devices should be reduced and limited through building mitigation into construction procedures, to avoid discharges of harmful material and substances.</p> <p>Further assessment work may be required to reduce uncertainty regarding potential impacts on water quality, particularly on including shellfish waters. This includes a recommendation for hydrodynamic and water quality modelling as part of project level assessment</p>
Climatic Factors	Broadly stable coastal areas with small sections of the coastline identified as potentially being vulnerable to erosion/accretion (e.g. sheltered beaches and bays on Islay, southern side of Colonsay and south west areas of Mull), particularly during storm events.	<p>Potential for mixed effects on coastal erosion and accretion caused by changes to hydrodynamics although much of the coastline near the Draft Plan Option is broadly stable.</p> <p>Likely contributions to achieving GHG reductions through replacing energy generation from non-renewable sources to renewable sources.</p>	<p>Significance and character of effects are unknown. Depending on how offshore infrastructure affects hydrodynamics the effects on coastal erosion and accretion could be positive or negative. However any effects that do occur are likely to depend on the specific nature and location of the proposed development.</p> <p>Effects on the coastline are likely to be indirect.</p>	Project level assessment of hydrodynamic changes, as a result of renewables development, should include any relevant climate related changes to the marine environment when assessing impacts.
Marine Geology and Coastal Processes	<p>The seabed in the vicinity of the Draft Plan Option is composed of predominantly coarse sediments (i.e. sandy gravels and gravelly sands) with coarser materials to the west of Islay and south of the option area.</p> <p>The area has moderate wave and tidal energy, a high tidal energy zone is located immediately south of the area, to the west and south west of Islay.</p>	<p>While there are largely coarse sediments in the area, some sediment disturbance and loss of seabed habitat is still likely during site preparation and placement of device foundations. The scale of such disturbance will depend on the type and size of the device.</p> <p>Sediment disturbance caused during the installation process could also lead to secondary impacts such as increased turbidity during installation in areas with fine sediments and release of existing contaminants present in fine sediments. However, water quality impacts from installation works are considered to be less likely in areas of high wave or tidal energies, and where coarse seabed sediments are predominant.</p>	<p>Direct impacts such as disturbance of the seabed during installation are likely to be temporary and localised.</p> <p>Loss of small areas of seabed associated with the installation of foundations/anchors may occur, although some natural regeneration may occur upon decommissioning of devices and removal of anchors.</p> <p>Changes in sediment dynamics and direct impacts such as scour, deposition and abrasion of seabed sediments are likely to be limited to the installation and operation phases of developments. However, in some circumstances, the effects of such changes</p>	<p>When projects are in the design process, consideration should be given to the location and arrangement of devices in order to build in mitigation to avoid potential impacts on marine geology and coastal processes, particularly given the proximity to sensitive coastal areas on Islay.</p> <p>It is recommended that sediment dynamic modelling is undertaken at project level to demonstrate potential effects in order to consider appropriate mitigation.</p> <p>Mitigation measures could include the design</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
		<p>There is the potential for offshore developments within the Draft Plan Option to alter sediment dynamics and tidal flow fluxes in the vicinity of the site. This could lead to general effects such as scour and abrasion at the site, and deposition of sediments in nearby areas. This may be of particular concern for sites near to relatively sheltered areas, and areas of high accretion (e.g. sheltered bays along the north coast of Islay) However, these systems are likely to be complex, and as such, the potential for impacts is likely to be site specific and dependent on factors such as the type and size of the devices and their foundations/anchors.</p>	<p>may have long-term effects in coastal areas (e.g. the deposition of sediments in nearby coastal areas).</p>	<p>and use of rock scour protection (if required) around the base of any anchors or foundations used.</p>
Historic Environment	<p>There are a number of marine and coastal wreck sites within this region, including small clusters of wreck sites located near the west coast of Tiree, the west and south coasts of Islay, and along the southern and south east coasts of Kintyre.</p> <p>Significant sections of coastal and marine areas in Tiree, Colonsay, Islay and Kintyre have been identified as being of potential interest for submerged archaeology.</p> <p>Nearby coastal areas also contain a wide range of historical features located either on the shoreline or which are of coastal relevance (e.g. designated lighthouses, listed buildings, and scheduled monuments such as fortifications and early church sites). Colonsay and Oronsay in particular have range of sensitive coastal sites including the Nave Island Chapel and Viking House.</p>	<p>The proximity of the Draft Plan Option to the coastline means there is the potential for effects on the setting of coastal assets (e.g. Iona Abbey, the numerous scheduled forts along the coast in Western Islay, Dhu Heartach Lighthouse and Nave Island Chapel) particularly from devices with large visible above water components</p> <p>Potential for impacts on historic wreck sites in the vicinity of the developments from their installation and operation.</p> <p>The likely presence of submerged archaeology means that there is potential for direct effects on any remains. However, development which includes archaeological survey may also have some positive effects by contributing to knowledge/understanding about the marine historic environment.</p>	<p>Direct effects on historic assets e.g. loss of assets caused by changes to coastal processes or the siting of offshore developments, would likely be permanent. The significance of the effects would, depend on the significance of the receptor.</p> <p>Effects on the setting of historic environment features would be indirect, and long-term; for the lifespan of the development.</p>	<p>Direct effects on historic environment features can be avoided through appropriate siting of devices away from vulnerable coastlines and known historic marine features.</p> <p>Project level assessments should consider the potential for impacts on the setting of sites and seek to mitigate accordingly.</p>
Landscape / Seascape	<p>The Draft Plan Option is in proximity to the Islay coast, with the south eastern part of the Draft Plan Option particularly near to a local landscape designation area located in the north west of Islay.</p> <p>The islands of Oronsay, Colonsay and Mull have a number of landscape designations and areas of wild land along the coast that may have views to the Draft Plan Option.</p> <p>The Jura NSA might be a relevant consideration for development within the Draft Plan Option.</p>	<p>Given the proximity of the Draft Plan Option to the Islay coast in particular, there is potential for visual effects from wave devices and supporting infrastructure on the local designations and areas of wild land.</p> <p>The majority of the wave energy device and its supporting infrastructure will likely be below the water surface, and as a result, visual impacts may be minimised.</p> <p>Visibility may be greater during construction periods rather than operation, depending on the technologies used. It is likely that construction / maintenance works and navigational aids (e.g. marker buoys, lighting) will have visual effects.</p> <p>There are a number of potential offshore receptors including recreational boats that sail close to the option area.</p>	<p>Devices and, in particular, supporting infrastructure, within the wave option may be visible from the mainland which includes areas designated for their landscape importance and areas considered as wild land.</p> <p>However, as the majority of the device infrastructure will be below the surface, the significance of effects may be lower than for other technologies (e.g. wind). Impacts will also therefore be more likely during construction / maintenance than the operational phase.</p> <p>The Draft Plan Option would alter the current seascape but the significance of this effect can depend on the technology used and the type of visual receptor (e.g. human or designation). Residual visual effects for some technologies could be minimal once constructed.</p> <p>Lighting of wave devices and marker buoys will likely result in some visual effects during day and night, particularly those with a high above water profile or in near shore waters. The significance of effects will depend on the visibility of devices which needs to be established at the project level.</p>	<p>Full visual impact assessment will be required at the project level (EIA) to establish the visual envelope and significance of effects, however visual impacts to onshore receptors could potentially be limited by construction further from the mainland, in particular the east of the Draft Plan Option.</p> <p>Impacts to the landscape and seascape character of Islay, Oronsay and Colonsay would also need to form part of project level assessments.</p> <p>Development that will affect NSA should avoid adverse effects on the integrity of the area or the qualities for which it has been designated.</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
			Visual impacts could be greater for offshore receptors, such as recreational sea users, as their proximity to devices would be greater than onshore receptors.	

WW2

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
Biodiversity, Flora and Fauna	<p>The Draft Plan Option is located close to numerous designated areas, including Oronsay and South Colonsay SPA (with Corncrake and Chough qualifying features), North Colonsay and Western Cliffs SPA (designated for breeding seabird assemblage including Chough, Kittiwake and Guillemot) and the Treshnish Isles SPA, SAC and SSSI (designated for Storm petrel, Greenland barnacle goose, reefs and Grey Seals amongst others). The Cnuic agus Cladach Mhuile SPA and the Jura, Scarba and the Garvellachs SPA (Slightly further to the east) are designated for Golden eagle.</p> <p>The Draft Plan Option is also partly located within the Skye to Mull MPA search area. This area is considered important for its geodiversity and the presence of Basking shark and Minke whale.</p> <p>The seabird maps presented in the baseline indicate potential collision vulnerability for diving birds in breeding periods. However, this vulnerability may differ for individual species.</p> <p>The presence of several Seal haul out areas near to WW2 on Mull and to the north on Coll confirms Seal density information showing that this is an important area for marine mammals, particularly Common seals. While distribution data indicates that low Cetacean movements and relatively few sighting of Basking sharks near the Draft Plan Option, the area is considered likely to be frequented by both, particularly Basking sharks given the proximity to a 'hotspot' identified to the north around Mull and Tiree. Other elasmobranchs are also known to use this area.</p> <p>The area is used by a range of fish species, including diadromous species such as Atlantic salmon, and others including Sea trout and many commercially caught species. The region also contains important nursery grounds for several commercially important species of fish.</p> <p>Benthic habitats in the region are largely coarse sediments (e.g. sands and gravelly sands) and may be susceptible to hydrodynamic change. These habitats are likely to contain species used</p>	<p>Potential vulnerabilities for collision and displacement of diving birds was identified in relation to the Draft Plan Option, particularly for collision impacts in breeding periods. The potential for impacts likely depends on a range of factors including the bird species considered (e.g. diving depth can vary markedly between species), the size and design of wind energy devices (e.g. some diving birds may rest on surface piercing infrastructure during foraging), and the presence or absence of underwater mooring cables. For example, above water infrastructure may not be sufficiently great to significantly impact on Golden eagles.</p> <p>Given the likely presence of marine mammals and fish, particularly elasmobranchs such as Basking sharks and Common skate, Cetaceans and Seals in the vicinity of the Draft Plan Option, there may be the potential for effects such as barriers to movement, collision with the devices and associated infrastructure, above and below water noise impacts during construction and operation, and aggregation effects (e.g. aggregation of predators near surface-piercing structures). However, avoidance may be possible for some species in some circumstances, and there are currently gaps in research knowledge creating difficulty in establishing the likelihood of impacts.</p> <p>The review of current wave technologies identified potential effects from EMF on fish and elasmobranchs although research into the magnitude of effects demonstrates that this is uncertain.</p> <p>There is potential for impacts on benthic habitats as a result of scouring, smothering, deposition and abrasion of seabed in areas with coarse sediments as a result of placing devices and supporting infrastructure (e.g. mooring cables, piling) within this area.</p>	<p>The potential remains for collision and displacement of diving birds with the presence of with wave devices. However, the significance of the impact is uncertain as effects on the population viability of individual species are not known.</p> <p>Potential effects on Cetaceans, Seals, elasmobranchs and fish include barriers to movement, collision with infrastructure, and possible noise impacts as a result of activities associated with installing devices or their anchors. These effects may range from changes to existing feeding behaviour to mortality, although the precise effect on populations cannot be ascertained at this strategic stage but should be a consideration at the project level (e.g. in monitoring).</p> <p>Potential for EMF impacts on fish and elasmobranchs from electricity cables associated with wave energy devices. Indirect effects may include altered migratory pathways with unknown energetic/biological consequences.</p> <p>Effects associated with construction activities would be largely temporary, but the potential for longer term effects from wave devices with underwater infrastructure remain. The Draft Plan Option may coincide with areas used by Basking sharks, Common skate, Seals and Cetaceans.</p> <p>There is the potential for direct benthic effects associated with the siting and installation of wave devices, and for indirect effects including sediment movements (i.e. scouring, smothering, sediment deposition and abrasion) from their presence in the marine environment. However, it is expected sediment deposition impacts at this location will be limited as the existing environment is already dynamic.</p> <p>There may be the potential for significant effects to designated areas associated with installation of grid infrastructure if it were to be sited in the vicinity of the Draft Plan Option.</p>	<p>Project level assessment (EIA) that includes specific modelling and/or assessment will be required to demonstrate that there will be no significant impacts on diving birds and mobile species in the vicinity as a result of collision with wave devices. The result of monitoring of wave projects currently in the application process has the potential to help provide greater certainty on the scale of these effects.</p> <p>Further research into the potential collision, displacement and the effects on Cetaceans, Seals elasmobranchs and fish will help to identify the potential for significant effects.</p> <p>To date research has indicated that there are uncertain effects of EMF and noise on fish and elasmobranchs. The results of monitoring of existing and operational projects in this region have the potential to provide greater certainty on the scale of effects.</p> <p>The potential for effects from grid infrastructure could be avoided if supporting onshore/offshore grid connections were located away from sensitive areas, such as Mull and Iona.</p> <p>It is recommended that the boundary of the Draft Plan Option is kept under review as part of ascertaining whether the overlap with the Skye to Mull MPA search area will remain and would lead to adverse effects, or whether co-location is possible. Projects will need to demonstrate through the EIA process that they are compatible with the conservation objectives of the MPA.</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
	to strong wave movements.			
Population and Human Health	The waters to the south west of Mull and Iona are used for a number of industry and recreational activities including fishing, recreational sea angling and medium recreational cruising.	<p>There is potential for collisions between recreational vessels and offshore energy infrastructure and supporting vessels, particularly during installation. Wave devices that sit low either above or below the water line, and in certain sea conditions could make them harder to see for small craft.</p> <p>The presence of wave devices has the potential to displace some existing recreational activities, through limiting access to areas of the sea and potential disruption to perceived amenity value.</p>	<p>Any collision could affect vessels and passengers. There remains a potentially significant collision risk for small vessels and wave devices in certain conditions with large waves. In calmer conditions this risk will reduce.</p> <p>It is difficult to predict the precise impact of potential changes to amenity on recreational use of the area. Some displacement could be permanent leading to recreational activities being discontinued. However it is likely that most activities could continue within a smaller range or in other nearby locations. Some established routes for recreational craft could be required to be diverted.</p>	<p>Potential mitigation for collisions through the inclusion/mapping of offshore energy developments on navigational charts and the use of navigational aids (such as marker buoys and lighting, etc.) in the vicinity of the infrastructure.</p> <p>When planning projects, developers could work with the recreation sector to consider best how recreational activities might continue within the option boundary. Early consultation can also help to reduce impacts on important cruising routes.</p> <p>There may be the requirement for commercial shipping to be excluded from developed areas. This would be determined through further engagement between MS-LOT and the relevant navigation authorities at the project level.</p>
Water and the Marine Environment	<p>The coastal waters in the vicinity of the draft plan area were classified as being of good status under the WFD in 2011.</p> <p>There are a number of designated shellfish waters within the vicinity of the Draft Plan Option around the isle of Mull.</p>	<p>Potential for adverse water quality impacts during installation, operation and decommissioning of the developments (e.g. increased turbidity caused by works on the seabed associated with anchoring of devices, contamination from their installation and maintenance vessels).</p> <p>Some wave devices can use gravity based anchors that will use sediment as fill, and which may carry a pollution risk depending on where the sediment is sourced.</p>	<p>Impacts associated with any contamination from seabed material disturbed during installation or potentially decommissioning is likely to be of localised and temporary nature, with the significance of effects dependant on the level of contamination. Impacts during operation and maintenance are considered less likely.</p> <p>The significance and characteristic of impacts associated with contamination from vessels is uncertain and cannot be described beyond the potential for it to occur.</p>	<p>Pollution risks associated with installation, maintenance and decommissioning of devices should be reduced and limited through building mitigation into construction procedures, to avoid discharges of harmful material and substances.</p> <p>Further assessment work may be required to reduce uncertainty regarding potential impacts on water quality, particularly on including shellfish waters. This includes a recommendation for hydrodynamic and water quality modelling as part of project level assessment</p>
Climatic Factors	Broadly stable coastal areas with small sections of the coastline identified as potentially being vulnerable to erosion/accretion (e.g. sheltered beaches and bays on the southern side of Colonsay, and south and south west coasts of Mull), particularly during storm events.	<p>Potential for mixed effects on coastal erosion and accretion caused by changes to hydrodynamics although much of the coastline near the Draft Plan Option is broadly stable.</p> <p>Likely contributions to achieving GHG reductions through replacing energy generation from non-renewable sources to renewable sources.</p>	<p>Significance and character of effects are unknown. Depending on how offshore infrastructure affects hydrodynamics the effects on coastal erosion and accretion could be positive or negative. However any effects that do occur are likely to depend on the specific nature and location of the proposed development.</p> <p>Effects on the coastline are likely to be indirect.</p>	Project level assessment of hydrodynamic changes, as a result of renewables development, should include any relevant climate related changes to the marine environment when assessing impacts.
Marine Geology and Coastal Processes	<p>The seabed in the vicinity of the Draft Plan Option is composed of predominantly coarse sediments (i.e. sands and gravelly sands) and seabed depth can range up to 80m.</p> <p>The region has moderate wave and low tidal resources across much of the Draft Plan Option.</p>	<p>While there are largely coarse sediments in the area, some sediment disturbance and loss of seabed habitat is still likely during site preparation and placement of device foundations. The scale of such disturbance is likely dependent on the type and size of the device.</p> <p>Sediment disturbance caused during the installation process could also lead to secondary impacts such as increased turbidity during installation in areas with fine sediments and release of existing contaminants present in fine sediments. However, water quality impacts from installation works are considered to be less likely in areas of high wave or tidal energies, and where coarse seabed sediments are predominant.</p> <p>There is the potential for offshore developments within the Draft Plan Option to alter sediment dynamics and tidal flow fluxes in the vicinity of the site. This could lead to general effects such as scour and abrasion at the site,</p>	<p>Direct impacts such as disturbance of the seabed during installation are likely to be temporary and localised.</p> <p>Loss of small areas of seabed associated with the installation of foundations/anchors may occur, although some natural regeneration may occur upon decommissioning of devices and removal of anchors.</p> <p>Changes in sediment dynamics and direct impacts such as scour, deposition and abrasion of seabed sediments are likely to be limited to the installation and operation phases of developments. However, in some circumstances, the effects of such changes may have long-term effects in coastal areas (e.g. the deposition of sediments in nearby coastal areas).</p>	<p>When projects are in the design process, consideration should be given to the location and arrangement of devices in order to build in mitigation to avoid potential impacts on marine geology and coastal processes.</p> <p>It is recommended that sediment dynamic modelling is undertaken at project level to demonstrate potential effects in order to consider appropriate mitigation.</p> <p>Mitigation measures could include the design and use of rock scour protection (if required) around the base of any anchors or foundations used.</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
		and deposition of sediments in nearby areas. The potential for increased coastal erosion of deposition in surrounding areas due to the presence of devices has also been identified. However, these systems are likely to be complex, and as such, the potential for impacts is likely to be site specific and dependent on factors such as the type and size of the devices and their foundations/anchors.		
Historic Environment	<p>There are a number of marine and coastal wreck sites within this region, including small clusters of wreck sites located near the west coast of Tiree, the west and south coasts of Islay, and along the west coast of Mull.</p> <p>Significant sections of coastal and marine areas in Tiree, Colonsay, Mull and Islay have been identified as being of potential interest for submerged archaeology.</p> <p>Nearby coastal areas also contain a wide range of historical assets located either on the shoreline or which are of coastal relevance (e.g. designated sites such as lighthouses, listed buildings, and scheduled monuments including fortifications, early church sites). In particular the boundaries of the Draft Plan Option fall close to A-listed Dhu Heartach Lighthouse, and a range of historic environment features on Iona and Ross of Mull.</p> <p>The historic Iona Abbey dates from AD 563 and is one of Scotland's most sacred religious sites.</p>	<p>The proximity of the Draft Plan Option to the coastline means there is the potential for impacts on the setting of historic environment assets (e.g. Iona Abbey and Dhu Heartach Lighthouse).</p> <p>Potential for impacts on historic wreck sites in the vicinity of the developments from their installation and operation.</p> <p>The likely presence of submerged archaeology means that there is potential for direct effects on any remains. However, development which includes archaeological survey may also have some positive effects by contributing to knowledge/understanding about the marine historic environment.</p>	<p>Direct effects on historic assets e.g. loss of assets caused by changes to coastal processes or the siting of offshore developments, would likely be permanent. The significance of the effects would, depend on the significance of the receptor.</p> <p>Effects on the setting of historic environment features would be indirect, and last for the lifespan of the development.</p>	<p>Direct effects on historic environment features can be avoided through appropriate siting of devices away from vulnerable coastlines and known historic marine features.</p> <p>Project level assessments should consider the potential for impacts on the setting of sites and seek to mitigate accordingly.</p> <p>Given the importance of Iona Abbey and potential impacts on the setting of cultural assets any development in this area should only be developed where significant effects can be demonstrated to be avoided.</p>
Landscape / Seascape	<p>The Draft Plan Option is located in proximity to the Mull coast, much of which is covered by a local landscape designation. The northern and western part of this area may be particularly visible from the Mull and Iona coastline, the northern edge of the site may be seen from areas within the Loch na Keal NSA, and the western part from Colonsay.</p> <p>Much of the southern edge of Mull is designated as wild land and the setting of Iona is considered to be important for Christian cultural heritage features.</p>	<p>Given the proximity of the Draft Plan Option to Mull coast in particular, there is potential for visual effects on the local designations, the NSA and areas of wild land across Mull and Iona.</p> <p>The majority of the device and supporting infrastructure will be submerged, and as a result, visual impacts may be minimised.</p> <p>Visibility may be greater during construction periods than during operation, depending on the technologies used. It is likely that construction / maintenance works and navigational aids (e.g. marker buoys, lighting) will have visual effects.</p> <p>There are a number of potential offshore receptors including recreational boats that sail close to the option area.</p>	<p>Devices and, in particular, supporting infrastructure within the wave option may be visible from the islands which includes areas designated for their landscape importance and areas considered as wild land.</p> <p>However, as the majority of the device infrastructure will be below the water surface the significance of effects may be lower than for other technologies (e.g. wind). Impacts will also therefore be more likely during construction than the operational phase.</p> <p>The Draft Plan Option would alter the current seascape but the significance of this effect can depend on the technology used. Residual visual effects for some technologies could be minimal once constructed.</p> <p>Lighting of wave devices and marker buoys will likely result in some visual effects during day and night, particularly those with a high above water profile or in near shore waters. The significance of effects will depend on the visibility of devices which needs to be established at the project level.</p>	<p>Full visual impact assessment will be required at the project level (EIA) to establish the visual envelope and significance of effects. However visual impacts to onshore receptors could potentially be limited by construction further from the mainland, in particular the east of the Draft Plan Option.</p> <p>Impacts to the landscape and seascape character of Mull, Iona, and potentially Colonsay, would also need to form part of project level assessments.</p> <p>Given the high quality landscape and areas of importance for the setting of cultural assets any development in this area should only be undertaken where significant effects can be avoided. Development that will affect NSA should avoid adverse effects on the integrity of the area or the qualities for which it has been designated.</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
			Visual impacts could be greater for offshore receptors, such as recreational sea users as their proximity to devices would be greater than onshore receptors.	

WW3

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
Biodiversity, Flora and Fauna	<p>The Tiree Wetlands and Coast SPA, and Tiree, Coll and Sleibhtean agus Cladach Thiriodh SPAs are located close to the Draft Plan Option with features including Corncrake, Oystercatcher, Polver and Geese, amongst others. Other SACs in the vicinity of the site are designated for dune habitats, whilst the Treshnish Isles SAC is designated for Grey seals. The south east of the Draft Plan Option overlaps with the Stanton Banks marine SAC which is designated for reef, which could have diverse benthic habitats that may be susceptible to change. IBAs have also been identified on many islands within this region.</p> <p>The Draft Plan Option is also located within the Skye to Mull MPA. This area is considered important for its geodiversity and the presence of Basking shark and Minke whale.</p> <p>The seabird maps presented in the baseline indicate that diving birds may be vulnerable to collision during the winter season in particular. However, this vulnerability may differ for individual species.</p> <p>Distribution data presented in the baseline indicates that Cetaceans are likely to be present within the region and the Draft Plan Option is located near to Basking shark and Common skate 'hotspots' located near to Tiree and Coll, and numerous sightings in the vicinity of WW3 indicates the presence of this species in this area. Other elasmobranchs are also known to use these waters. Seal survey data and the presence of Seal haul out areas around Tiree, Coll and Mull indicates this is a well-used area for marine mammals, particularly Grey seals.</p> <p>The area is known to be used by fish species, including diadromous species, such as Atlantic salmon, and others including Sea trout and many commercially caught species. The region also contains important nursery grounds for several commercially important species of fish.</p> <p>Benthic habitats in the region are largely shallow and shelf subtidal coarse sediments (e.g. sands, gravelly sands, gravels, etc.) and may be</p>	<p>Potential vulnerabilities for collision and displacement of diving birds has been identified in relation to the Draft Plan Option, particularly in winter periods. The potential for impacts likely depends on a range of factors including the bird species considered (e.g. diving depth can vary markedly between species), the size and design of wind energy devices (e.g. some diving birds may rest on surface piercing infrastructure during foraging), and the presence or absence of underwater mooring cables.</p> <p>Seals and Basking sharks are likely to be present within the Draft Plan Option and could be potentially affected. Given the likely presence of marine mammals and fish, particularly elasmobranchs such as Basking sharks, Cetaceans and Seals in the vicinity of the Draft Plan Option, there may be the potential for effects such as barriers to movement, collision with the devices and associated infrastructure, above and below water noise impacts during construction and operation, and aggregation effects (e.g. aggregation of predators near surface-piercing structures). While avoidance may be possible for some species in some circumstances, there are currently gaps in research knowledge creating difficulty in establishing the likelihood of impacts.</p> <p>The review of current wave technologies identified potential effects from EMF on fish and elasmobranchs although research into the magnitude of effects demonstrates that this is uncertain.</p> <p>There is potential for impacts on benthic habitats as a result of scouring, smothering, deposition and abrasion of seabed in areas with coarse sediments as a result of placing devices and supporting infrastructure (e.g. mooring cables, piling) within this area.</p>	<p>The potential remains for collision and displacement of diving birds with the presence of wave devices. However, the significance of the impact is uncertain as effects on the population viability of individual species are not known.</p> <p>Potential effects on Cetaceans, Seals, elasmobranchs and fish include barriers to movement, collision with infrastructure, and possible noise impacts as a result of activities associated with installing devices or their anchors. These effects may range from changes to existing feeding behaviour to mortality, although the precise effect on populations cannot be ascertained at this strategic stage but should be a consideration at the project level (e.g. in monitoring).</p> <p>Potential for EMF impacts on fish and elasmobranchs from electricity cables associated with wave energy devices. Indirect effects may include altered migratory pathways with unknown energetic/biological consequences. Effects associated with construction activities would be largely temporary, but the potential for longer term effects from wave devices with underwater infrastructure remain.</p> <p>There is the potential for direct benthic effects associated with the siting and installation of wave devices, and for indirect effects including sediment movements (i.e. scouring, smothering, sediment deposition and abrasion) from their presence in the marine environment. However, it is expected sediment deposition impacts at this location will be limited as the existing environment is already dynamic.</p> <p>There may be the potential for significant effects to designated areas associated with installation of grid infrastructure if it were to be sited in the vicinity of the Draft Plan Option.</p>	<p>Project level assessment (EIA) that includes specific modelling and/or assessment will be required to demonstrate that there would be no significant impacts on diving birds and mobile marine species in the vicinity as a result of collision with wave devices.</p> <p>Further research into the potential collision, displacement and the effects on Cetaceans, Seals elasmobranchs and fish will help to identify the potential for significant effects.</p> <p>To date research has indicated that there are uncertain effects of EMF and noise on fish and elasmobranchs. The results of monitoring of existing and operational projects in this region have the potential to provide greater certainty on the scale of effects.</p> <p>Development to the west of the Draft Plan Option and further away from Islay may reduce the potential for impacts on bird species.</p> <p>The potential for effects from grid infrastructure could be avoided if supporting onshore/offshore connections were located away from sensitive areas, such as Tiree.</p> <p>It is recommended that the boundary of the Draft Plan Option is kept under review as part of ascertaining whether the overlap with the Skye to Mull MPA search area will remain and would lead to adverse effects, or whether co-location is possible. Particular issues to consider would be the collision risk with priority marine features. Projects will need to demonstrate through the EIA process that they are compatible with the conservation objectives of the MPA.</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
	susceptible to hydrodynamic change. These habitats are likely to contain species used to strong wave and tidal movements.			
Population and Human Health	The waters to the south west of Tiree are used for a number of industry and recreational activities including fishing, recreational sea angling, light recreational cruising, surfing and diving.	<p>There is potential for collisions between recreational vessels and offshore energy infrastructure and supporting vessels, particularly during installation. Wave devices that sit low either above or below the water line, and in certain sea conditions could make them harder to see for small craft.</p> <p>The presence of wave devices has the potential to displace some existing recreational activities, through limiting access to areas of the sea and potential disruption to perceived amenity value.</p>	<p>Any collision could affect vessels and passengers. There remains a potentially significant collision risk for small vessels and wave devices in certain conditions with large waves. In calmer conditions this risk will reduce.</p> <p>It is difficult to predict the precise impact of potential changes to amenity on recreational use of the area. Some displacement could be permanent leading to recreational activities being discontinued. However it is likely that most activities could continue within a smaller range or in other nearby locations. Some established routes for recreational craft could be required to be diverted.</p>	<p>Potential mitigation for collisions through the inclusion/mapping of offshore energy developments on navigational charts and the use of navigational aids (such as marker buoys and lighting, etc.) in the vicinity of the infrastructure.</p> <p>When planning projects, developers could work with the recreation sector to consider best how recreational activities might continue within the option boundary. Early consultation can also help to reduce impacts on important cruising routes.</p> <p>There may be the requirement for commercial shipping to be excluded from developed areas. This would be determined through further engagement between MS-LOT and the relevant navigation authorities at the project level.</p>
Water and the Marine Environment	<p>The coastal waters in the vicinity of the draft plan are, were classified as being of good status under the WFD in 2011.</p> <p>There are some designated shellfish waters within the vicinity of the Draft Plan Option around the Isle of Mull.</p>	<p>Potential for adverse water quality impacts during installation, operation and decommissioning of the developments (e.g. increased turbidity caused by works on the seabed associated with anchoring of devices, contamination from their installation and maintenance vessels).</p> <p>Some wave devices can use gravity based anchors that will use sediment as fill, and which may carry a pollution risk depending on where the sediment is sourced.</p>	<p>Impacts associated with any contamination from seabed material disturbed during installation or potentially decommissioning is likely to be of localised and temporary nature, with the significance of effects dependant on the level of contamination. Impacts during operation and maintenance are considered less likely.</p> <p>The significance and characteristic of impacts associated with contamination from vessels is uncertain and cannot be described beyond the potential for it to occur.</p>	<p>Pollution risks associated with installation, maintenance and decommissioning of devices should be reduced and limited through building mitigation into construction procedures, to avoid discharges of harmful material and substances.</p> <p>Further assessment work may be required to reduce uncertainty regarding potential impacts on water quality, particularly on including shellfish waters. This includes a recommendation for hydrodynamic and water quality modelling as part of project level assessment</p>
Climatic Factors	<p>The draft plan area is located near to the coastline of Tiree, consisting of broadly stable rock coasts and small sheltered beaches. The coastline is considered broadly stable, although the sandy sections of the coastline have been identified as being potentially vulnerable to erosion/accretion (e.g. particularly those on the southwest and west coasts).</p> <p>Accretion has been identified in several Bays located in the east and north east of the Tiree.</p>	<p>Potential for mixed effects on coastal erosion and accretion caused by changes to hydrodynamics although much of the coastline near the Draft Plan Option is broadly stable.</p> <p>Likely contributions to achieving GHG reductions through replacing energy generation from non-renewable sources to renewable sources.</p>	<p>Significance and character of effects are unknown. Depending on how offshore infrastructure affects hydrodynamics the effects on coastal erosion and accretion could be positive or negative. However any effects that do occur are likely to depend on the specific nature and location of the proposed development.</p> <p>Effects on the coastline are likely to be indirect.</p>	<p>Project level assessment of hydrodynamic changes, as a result of renewables development, should include any relevant climate related changes to the marine environment when assessing impacts.</p>
Marine Geology and Coastal Processes	<p>The seabed in the vicinity of the Draft Plan Option is composed of predominantly coarse sediments (i.e. sandy gravels, gravelly sands and gravels).</p> <p>The region has moderate wave and low tidal resources across much of the Draft Plan Option, with stronger tidal areas to the west of Tiree, and immediately north of the Draft Plan Option.</p>	<p>While there are largely coarse sediments in the area, some sediment disturbance and loss of seabed habitat is still likely during site preparation and placement of device foundations. The scale of such disturbance is likely dependent on the type and size of the device.</p> <p>Sediment disturbance caused during the installation process could also lead to secondary impacts such as increased turbidity during installation in areas with fine sediments and release of existing contaminants present in fine sediments. However, water quality impacts from installation works are considered to be less likely in areas of high wave or tidal energies, and where coarse seabed sediments are predominant.</p>	<p>Direct impacts such as disturbance of the seabed during installation are likely to be temporary and localised.</p> <p>Loss of small areas of seabed associated with the installation of foundations/anchors may occur, although some natural regeneration may occur upon decommissioning of devices and removal of anchors.</p> <p>Changes in sediment dynamics and direct impacts such as scour, deposition and abrasion of seabed sediments are likely to be limited to the installation and operation phases of developments. However, in some circumstances, the effects of such changes</p>	<p>When projects are in the design process, consideration should be given to the location and arrangement of devices in order to build in mitigation to avoid potential impacts on marine geology and coastal processes.</p> <p>It is recommended that sediment dynamic modelling is undertaken at project level to demonstrate potential effects in order to consider appropriate mitigation.</p> <p>Mitigation measures could include the design and use of rock scour protection (if required) around the base of any anchors or foundations used</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
		There is the potential for offshore developments within the Draft Plan Option to alter sediment dynamics and tidal flow fluxes in the vicinity of the site. This could lead to general effects such as scour and abrasion at the site, and deposition of sediments in nearby areas. The potential for increased coastal erosion or deposition in surrounding areas due to the presence of devices and their foundations has also been identified (e.g. southern coastline of Tiree). However, these systems are likely to be complex, and as such, the potential for impacts is likely to be site specific and dependent on factors such as the type and size of the devices and their foundations/anchors.	may have long-term effects in coastal areas (e.g. the deposition of sediments in nearby coastal areas).	
Historic Environment	<p>There are a number of marine and coastal wreck sites within this region, including small clusters of wreck sites located near the west coast of Tiree.</p> <p>Coastal areas also contain a wide range of historical features located either on the shoreline or which are of coastal relevance (e.g. lighthouses, and scheduled monuments such as fortifications and early church sites). Significant sections of coastal and marine areas in Tiree have been identified as being of potential interest for submerged archaeology.</p>	<p>Adoption of sites in the Draft Plan Option may have the potential to impact on the setting of the Category A listed Skerryvore Lighthouse.</p> <p>Furthermore, the close proximity of the site footprint to the southern tip of Tiree would suggest potential setting impacts on a number of coastal scheduled fortifications and early church sites.</p> <p>Potential for impacts on historic wreck sites from installation and operation of these sites.</p> <p>The likely presence of submerged archaeology means that there is potential for direct effects on any remains. However, development which includes archaeological survey may also have some positive effects by contributing to knowledge/understanding about the marine historic environment.</p>	<p>Direct effects on historic assets e.g. loss of assets caused by changes to coastal processes or the siting of offshore developments, would likely be permanent. The significance of the effects would, depend on the significance of the receptor.</p> <p>Effects on the setting of historic environment features would be indirect, and last for the lifespan of the development.</p>	<p>Direct effects on historic environment features can be avoided through appropriate siting of devices away from vulnerable coastlines and known historic marine features.</p> <p>Project level assessments should consider the potential for impacts on the setting of historic sites and seek to mitigate accordingly.</p>
Landscape / Seascape	<p>The Draft Plan Option is in proximity to south and west of the island of Tiree, much of which is covered by local landscape designations. The north west part of the Draft Plan Option may be visible from the coastline, and the eastern edge of the option may be visible from areas within the Loch na Keal NSA.</p> <p>The coastline of Tiree is not identified as an area of wild land, although this may potentially indicate that there could be more receptors to offshore development in this region (e.g. recreational sea users).</p>	<p>Given the proximity of the Draft Plan Option to the Tiree coast there is potential for visual effects on areas with local landscape designations..</p> <p>The majority of the device and supporting infrastructure will be below the water surface, and as a result, visual impacts may be minimised.</p> <p>Visibility may be greater during construction periods than operation, although this will likely depend on the technologies used. It is likely that construction works and navigational aids (e.g. marker buoys, lighting) will have visual effects.</p> <p>There are a number of potential offshore receptors including recreational boats that sail close to the option area.</p>	<p>Devices, and in particular supporting infrastructure, within the wave option may be visible from Tiree which includes areas designated for their landscape importance.</p> <p>However, as the majority of the device infrastructure will be below the water surface, the significance of effects may be lower than for wind energy technologies. Impacts are also more likely to occur during construction and maintenance than in the operational phase.</p> <p>The Draft Plan Option would alter the current seascape but the significance of this effect can depend on the technology used. Residual visual effects for some technologies could be minimal once constructed.</p> <p>Lighting of wave devices and marker buoys will likely result in some visual effects during day and night, particularly those with a high above water profile or in near shore waters. The significance of effects will depend on the visibility of devices which needs to be established at the project level.</p> <p>Visual impacts are likely to be greater for offshore receptors, such as recreational sea users.</p>	<p>Full visual impact assessment will be required at the project level (EIA) to establish the visual envelope and significance of effects. However visual impacts to onshore receptors could potentially be limited by construction further from the mainland, in particular the west of the Draft Plan Option.</p> <p>Impacts to the landscape and seascape character of Tiree would also need to form part of project level assessments.</p> <p>Given the high quality landscape present in this region, any development in this area should only be undertaken where significant effects can be avoided. Development that will affect NSA should avoid adverse effects on the integrity of the area or the qualities for which it has been designated.</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for Effects	Characteristics	Mitigation Available and Potential Residual Effects
<p>Biodiversity, Flora and Fauna</p>	<p>The north west of the Draft Plan Option overlaps with the Mingulay and Berneray SPA and SSSI which has a number of seabird assemblage interests (including Fulmar, Puffin, Kittiwake, Razorbill and Guillemot). To the east of WW4 is the East Mingulay marine SAC (designated for reefs), and Small Seal islands SSSI (Grey seal interests) and the Sound of Barra pSAC (marine habitat and Common seal interests) are located to the north west of the site.</p> <p>The Draft Plan Option is located to the east of the Skye to Mull MPA search area, being considered for its importance for its geodiversity and the presence of Basking shark and Minke whale.</p> <p>Seabird maps presented in the baseline indicate there may be potential collision vulnerability for diving birds during the breeding season, particularly in the northern part of the Draft Plan Option. However, this vulnerability may differ for individual species.</p> <p>The available distribution and sighting data also indicates that there are likely Cetaceans present in the vicinity of the Draft Plan Option. Basking shark sightings have been recorded amongst the southern islands of the outer Hebrides, with the area to the east of Mingulay and Barra considered to be a Basking shark 'hotspot'. Other elasmobranchs are also known to use these waters. Seal density mapping, the presence of seal haul outs and the proximity of the Draft Plan Option to an SAC designated for Common seal interests, illustrates the importance of the area for these Seals.</p> <p>The area is known to be used by fish species, including diadromous species, such as Atlantic salmon, and others including Sea trout and many commercially caught species. The region also contains important nursery grounds for several commercially important species of fish.</p> <p>Benthic habitats in the region are largely coarse sediments (e.g. sands, gravelly sands, gravels, etc.) becoming finer northwards (e.g. muddy sandy gravel) and with rocky outcrops covering much of the remainder of the region. These sediment-based habitats may be susceptible to hydrodynamic change, and likely contain species used to strong wave movements.</p>	<p>Potential vulnerabilities for collision and displacement of diving birds was identified in relation to the Draft Plan Option, particularly for collision potential during breeding periods and in areas closer to the coastline. The potential for impacts likely depends on a range of factors including the bird species considered (e.g. diving depth can vary markedly between species), the size and design of wind energy devices (e.g. some diving birds may rest on surface piercing infrastructure during foraging), and the presence or absence of underwater mooring cables.</p> <p>Given the likely presence of marine mammals and fish, particularly Cetaceans and Seals in the vicinity of the Draft Plan Option, there may be the potential for effects such as barriers to movement, collision with the devices and associated infrastructure, above and below water noise impacts during construction and operation, and aggregation effects (e.g. aggregation of predators near surface-piercing structures). However, avoidance may be possible for some species in some circumstances, and there are currently gaps in research knowledge creating difficulty in establishing the likelihood of impacts.</p> <p>There is potential for impacts on benthic habitats as a result of scouring, smothering, deposition and abrasion of seabed in areas with coarse sediments as a result of placing devices and supporting infrastructure (e.g. mooring cables, piling) within this area. However, location of developments in rocky areas could limit these effects, but this will likely be influenced by factors such as the specific locations selected by developers and the engineering requirements of wave energy technologies.</p>	<p>The potential remains for collision and displacement of diving birds with the presence of wave devices. However, the significance of the impact is uncertain as effects on the population viability of individual species are not known.</p> <p>Potential effects on Cetaceans, Seals, elasmobranchs and fish include barriers to movement, collision with infrastructure, and possible noise impacts as a result of activities associated with installing devices or their anchors. These effects may range from changes to existing feeding behaviour to mortality, although the precise effect on populations cannot be ascertained at this strategic stage but should be a consideration at the project level (e.g. in monitoring).</p> <p>Potential for EMF impacts on fish and elasmobranchs from electricity cables associated with wave energy devices. Indirect effects may include altered migratory pathways with unknown energetic/biological consequences.</p> <p>Effects associated with construction activities would be largely temporary, but the potential for longer term effects from wave devices with underwater infrastructure remain.</p> <p>There is the potential for direct benthic effects associated with the siting and installation of wave devices, and for indirect effects including sediment movements (i.e. scouring, smothering, sediment deposition and abrasion) from their presence in the marine environment. However, it is expected sediment deposition impacts at this location will be limited as the existing environment is already dynamic.</p> <p>There may be the potential for significant effects to designated areas associated with installation of grid infrastructure if it were to be sited in the vicinity of the Draft Plan Option.</p>	<p>Project level assessment (EIA) that includes specific modelling and/or assessment will be required to demonstrate that there would be no significant impacts on diving birds and mobile marine species in the vicinity as a result of collision with wave devices.</p> <p>Further research into the potential collision, displacement and the effects on Cetaceans, Seals elasmobranchs and fish will help to identify the potential for significant effects.</p> <p>To date research has indicated that there are uncertain effects of EMF and noise on fish and elasmobranchs. The results of monitoring of existing and operational projects in this region have the potential to provide greater certainty on the scale of effects.</p> <p>Given proximity of the draft plan area to several important areas for birds, development to the south of the Draft Plan Option is would be preferred.</p> <p>It is recommended that the boundary of the Draft Plan Option is kept under review as part ascertaining whether the overlap with the Mingulay and Berneray SPA would lead to adverse effects or whether co-location is possible. Project level HRA must demonstrate development does not adversely affect the integrity of the SPA.</p> <p>The potential for effects from grid infrastructure could be avoided if supporting onshore/offshore connections were located away from sensitive areas, such as Barra and Mingulay.</p>
<p>Population and Human Health</p>	<p>The waters to the west of Barra and Mingulay are used for a number of industry activities including fishing, recreational sea angling and light recreational cruising.</p>	<p>There is potential for collisions between recreational vessels and offshore energy infrastructure and supporting vessels, particularly during installation. Wave devices that sit low either above or below the</p>	<p>Any collision could affect vessels and passengers. There remains a potentially significant collision risk for small vessels and wave devices in certain conditions with large waves. In calmer conditions</p>	<p>Potential mitigation for collisions through the inclusion/mapping of offshore energy developments on navigational charts and the use of navigational aids (such as marker buoys and</p>

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		<p>water line, and in certain sea conditions could make them harder to see for small craft.</p> <p>The presence of wave devices has the potential to displace some existing recreational activities, through limiting access to areas of the sea and potential disruption to perceived amenity value.</p>	<p>this risk will reduce.</p> <p>It is difficult to predict the precise impact of potential changes to amenity on recreational use of the area. Some displacement could be permanent leading to recreational activities being discontinued. However it is likely that most activities could continue within a smaller range or in other nearby locations. Some established routes for recreational craft could be required to be diverted.</p>	<p>lighting, etc.) in the vicinity of the infrastructure.</p> <p>When planning projects, developers could work with the recreation sector to consider best how recreational activities might continue within the option boundary. Early consultation can also help to reduce impacts on important cruising routes.</p> <p>There may be the requirement for commercial shipping to be excluded from developed areas. This would be determined through further engagement between MS-LOT and the relevant navigation authorities at the project level.</p>
Water and the Marine Environment	<p>The coastal waters in the vicinity of the draft plan area were classified as being of either good or high status under the WFD in 2011.</p>	<p>Potential for adverse water quality impacts during installation, operation and decommissioning of the developments (e.g. increased turbidity caused by works on the seabed associated with anchoring of devices, contamination from their installation and maintenance vessels).</p> <p>Some wave devices can use gravity based anchors that will use sediment as fill, and which may carry a pollution risk depending on where the sediment is sourced.</p>	<p>Impacts associated with any contamination from seabed material disturbed during installation or potentially decommissioning is likely to be of localised and temporary nature, with the significance of effects dependant on the level of contamination. Impacts during operation and maintenance are considered less likely.</p> <p>The significance and characteristic of impacts associated with contamination from vessels is uncertain and cannot be described beyond the potential for it to occur</p>	<p>Pollution risks associated with installation, maintenance and decommissioning of devices should be reduced and limited through building mitigation into construction procedures, to avoid discharges of harmful material and substances.</p> <p>Further assessment work may be required to reduce uncertainty regarding potential impacts on water quality, particularly on including shellfish waters. This includes a recommendation for hydrodynamic and water quality modelling as part of project level assessment</p>
Climatic Factors	<p>The western beaches of the Outer Hebridean Islands are dominated by wind and wave action. The western coasts of the southern isles (e.g. Barra, Sandray, and Mingulay) have broadly rocky coastal areas with several self-contained pocket beaches, particularly along the western coastline of Barra.</p> <p>Wave erosion of the machair edge has been observed in sections of the west coast, and storm damage of the shingle edge has been observed on Vatersay. As such, some sections of the coastline have been identified as potentially being vulnerable to erosion/accretion, particularly during storm events.</p> <p>The potential for increases in storm events and rising sea levels have been identified, due to the effects of climate change.</p>	<p>Potential for mixed effects on coastal erosion and accretion caused by changes to hydrodynamics particularly where developments are located near to potentially vulnerable coastlines.</p> <p>Given the high levels of wave action on the west coast of the Outer Hebrides and the erosion issues associated with this, developments may in some instances aid the protection of vulnerable coastlines</p> <p>Likely contributions to achieving GHG reductions through replacing energy generation from non-renewable sources to renewable sources.</p>	<p>Significance and character of effects are unknown. Depending on how offshore infrastructure affects hydrodynamics the effects on coastal erosion and accretion could be positive or negative. However any effects that do occur are likely to depend on the specific nature and location of the proposed development.</p> <p>Effects on the coastline are likely to be indirect.</p>	<p>Project level assessment of hydrodynamic changes, as a result of renewables development, should include any relevant climate related changes to the marine environment when assessing impacts.</p>
Marine Geology and Coastal Processes	<p>The seabed in the vicinity of the Draft Plan Option is of variable depth (ranging from 20 – 120m) and consists mainly of rock outcrops to the immediate west of Barra. Sandy and gravelly sediments are located further west and muddy sandy sediments in the south east portion of the option area, to the south and south east of Mingulay.</p> <p>The Draft Plan Option has moderate wave and tidal resources, with extensive areas of stronger wave energy further to the west, north west and south west of Mingulay.</p>	<p>While there are largely coarse sediments in much of the area, some sediment disturbance and loss of seabed habitat is still likely during site preparation and placement of device foundations. The scale of such disturbance is likely dependent on the type and size of the device.</p> <p>Sediment disturbance caused during the installation process could also lead to secondary impacts such as increased turbidity during installation in areas with fine sediments and release of existing contaminants present in fine sediments. However, water quality impacts from installation works are considered to be less likely in areas of high wave or tidal energies, and</p>	<p>Direct impacts such as disturbance of the seabed during installation are likely to be temporary and localised.</p> <p>Loss of small areas of seabed associated with the installation of foundations/anchors may occur, although some natural regeneration may occur upon decommissioning of devices and removal of anchors.</p> <p>Changes in sediment dynamics and direct impacts such as scour, deposition and abrasion of seabed sediments are likely to be limited to the installation and operation phases of developments. However, in some circumstances, the effects of such changes</p>	<p>When projects are in the design process, consideration should be given to the location and arrangement of devices in order to build in mitigation to avoid potential impacts on marine geology and coastal processes, particularly given the sensitive coastlines of the southern islands within the Outer Hebrides.</p> <p>It is recommended that sediment dynamic modelling is undertaken at project level to demonstrate potential effects in order to consider appropriate mitigation.</p> <p>Mitigation measures could include the design and</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for Effects	Characteristics	Mitigation Available and Potential Residual Effects
		<p>where coarse seabed sediments are predominant.</p> <p>As such significant increases in turbidity may occur for developments within the south east portion of the Draft Plan Option.</p> <p>There is the potential for offshore developments within the Draft Plan Option to alter sediment dynamics and tidal flow fluxes in the vicinity of the site, with potential general impacts such as scour, deposition and abrasion in the area and related impacts to vulnerable coastlines (e.g. Barra, Mingulay). However, these systems are likely to be complex, and as such, the potential for impacts will be site specific and dependent on factors such as the type and size of the devices and their foundations/anchors.</p>	<p>may have long-term effects in coastal areas (e.g. the deposition of sediments in nearby coastal areas).</p>	<p>use of rock scour protection (if required) around the base of any anchors or foundations used</p>
Historic Environment	<p>There are a number of marine and coastal wreck sites in the Outer Hebrides, including several near Barra.</p> <p>These coastal areas of these islands also contain a wide range of historical features located either on the shoreline or which are of coastal relevance (e.g. Barra Head lighthouse and a cluster of coastal sites within the southern isles of the Outer Hebrides).</p>	<p>The proximity of the site to the southern tip of Barra would suggest there is potential for effects on the setting of a number of sites, including coastal scheduled monuments and Barra Head Lighthouse. This is particularly the case where devices have large visible above water components.</p> <p>There may be the potential for impacts on historic wreck sites from installation and operation of these sites.</p>	<p>Direct effects on historic assets e.g. loss of assets caused by changes to coastal processes or the siting of offshore developments, would likely be permanent. The significance of the effects would, depend on the significance of the receptor.</p> <p>Effects on the setting of historic environment features would be indirect, and last for the lifespan of the development.</p>	<p>Direct effects on historic environment features can be avoided through appropriate siting of devices away from vulnerable coastlines and known historic marine features.</p> <p>Project level assessments should consider the potential for impacts on the setting of sites identified in the baseline and seek to mitigate accordingly.</p>
Landscape / Seascape	<p>The Draft Plan Option is located near to the coastline of the Southern islands in the Outer Hebrides, many of which are considered important for their natural environmental value and landscape features. The Draft Plan Option may be visible from South Uist Machair NSA.</p> <p>Many of the coastlines in this region are identified for their wildness value.</p>	<p>Given the proximity of the Draft Plan Option to the islands there is potential for visual effects on the local environment and areas of wild land.</p> <p>There is the potential for changes to the seascape character of the area. However, as the majority of the wave devices and supporting infrastructure will be below the water surface, visual impacts may be reduced. As such, visibility may be greater during construction and maintenance periods than during operation, although this will depend on the technologies used.</p> <p>It is likely that construction works and navigational aids (e.g. marker buoys, lighting) will have visual effects.</p> <p>There are a number of potential offshore receptors including recreational boats that sail close to the option area.</p>	<p>Wave energy devices, and in particular any supporting infrastructure, within the Draft Plan Option may be visible from nearby islands including areas designated for their landscape importance and/or for their wildness.</p> <p>However, as the majority of the device infrastructure will be below the water surface, the significance of effects may be lower than for wind technologies. Impacts will also be more likely during construction and maintenance phase, rather than during operation.</p> <p>Development in the plan option would likely alter the current seascape and, therefore, potentially affect its character. However, this will depend on the technology used, and the number of human receptors in this remote area may be few. For example, residual visual effects for some technologies could be minimal once constructed.</p> <p>Lighting of wave devices and marker buoys will likely result in some visual effects during day and night, particularly those with a high above water profile or in near shore waters. The significance of effects will depend on the visibility of devices which needs to be established at the project level.</p> <p>Visual impacts could be greater for offshore receptors, such as recreational sea users.</p>	<p>Full visual impact assessment will be required at the project level (EIA) to establish the visual envelope and significance of effects. However visual impacts to onshore receptors could potentially be limited by construction further from the mainland, in particular the west of the Draft Plan Option.</p> <p>Impacts to the landscape and seascape character would also need to form part of project level assessments.</p> <p>Given the high quality landscape identified in this area, any development should only be undertaken where significant effects can be avoided. Development that will affect NSA should avoid adverse effects on the integrity of the area or the qualities for which it has been designated.</p> <p>Development of the southern and western parts of the plan option could potentially reduce visual and landscape/seascape impacts.</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
<p>Biodiversity, Flora and Fauna</p>	<p>The Draft Plan Option covers a large area of marine waters off Scotland's Western Isles, and is located near to a wide range of designated sites. Just west of the South eastern tip of the Draft Plan Option is St Kilda SPA and SAC designated for coastal habitats and seabird assemblages (including Fulmar, Puffin, Kittiwake, Razorbill, Skua and Guillemot). Sites to the east include the North Harris SAC and SSSI and North Harris Mountains SPA (designated for habitat and Golden eagle interests), and North Harris and Langavat SACs (for Atlantic salmon interests) amongst others. Several IBAs have also been identified in the vicinity of the Draft Plan Option.</p> <p>To the south or south east of the Draft Plan Option is the Monach Isles SPA and SAC (designated for dune habitats, Grey Seal, Common tern, Little tern and Greenland Barnacle goose) and several SPAs and SSSI including the North Uist Machair and Islands SPA (designated for Ringed plover, Redshank, Corncrake, Dunlin, Oystercatcher, Purple sandpiper, Turnstone, and Greenland Barnacle goose) and Small Seal Islands SSSI (with Grey seal interests).</p> <p>The Flannan Isles SPA is located within the Draft Plan Option, and is designated for similar bird assemblages to other nearby SPAs.</p> <p>Potential collision vulnerability for diving birds from wave energy was identified in the winter season in the south east corner of the Draft Plan Option, and during the breeding season, particularly in the south and north east parts of the Draft Plan Option. However, this vulnerability may differ for individual species.</p> <p>The Cetacean distribution maps indicate that Cetaceans are likely to be present around the Draft Plan Option.</p> <p>Basking shark sightings have been recorded along the western coast of Lewis and Harris, including several in offshore areas within WNW1, indicating the potential for encounters in this vicinity. Other elasmobranchs are also known to use this area.</p> <p>Seal density mapping and the presence of seal haul out areas near to WNW1 illustrates the importance of this area for Grey seals.</p> <p>The north east part of the Draft Plan Option is located close to the top of the Eye Peninsula to Butt of Lewis MPA search area, proposed for Rissos dolphin, white-beaked dolphin, and sand</p>	<p>Potential vulnerabilities for collision and displacement of diving birds was identified in relation to the Draft Plan Option. The potential for impacts likely depends on a range of factors including the bird species considered (e.g. diving depth can vary markedly between species), the size and design of wind energy devices (e.g. some diving birds may rest on surface piercing infrastructure during foraging), and the presence or absence of underwater mooring cables.</p> <p>Given the likely presence of marine mammals and fish, particularly Cetaceans and Seals in this region, there may be the potential for effects such as barriers to movement, collision with the devices and associated infrastructure, above and below water noise impacts during construction and operation, and aggregation effects (e.g. aggregation of predators near surface-piercing structures). While avoidance may be possible for some species in some circumstances, there are currently gaps in research knowledge creating difficulty in establishing the likelihood of impacts.</p> <p>The review of current wave technologies identified potential effects from EMF on fish and elasmobranchs although research into the magnitude of effects demonstrates that this is uncertain.</p> <p>There is potential for impacts on benthic habitats as a result of scouring, smothering, deposition and abrasion of seabed in areas with coarse sediments as a result of placing devices and supporting infrastructure (e.g. mooring cables, piling) within this area.</p> <p>There is potential for impacts on benthic habitats as a result of scouring, smothering, deposition and abrasion of seabed in areas with coarse sediments. As a result of placing devices and supporting infrastructure (e.g. mooring cables, piling) within this area. However, location of developments in rocky areas could limit these effects, but this will likely be influenced by factors such as the specific locations selected by developers and the engineering requirements of wave energy technologies.</p> <p>Potential impacts to MPA search area sites noted for geodiversity interests from sediment movements are not considered to be significant due to distance between these areas and the Draft Plan Option.</p>	<p>The potential remains for collision and displacement of diving birds with the presence of wave devices. However, the significance of the impact is uncertain as effects on the population viability of individual species are not known.</p> <p>Potential effects on Cetaceans, Seals, elasmobranchs and fish include barriers to movement, collision with infrastructure, and possible noise impacts as a result of activities associated with installing devices or their anchors. These effects may range from changes to existing feeding behaviour to mortality, although the precise effect on populations cannot be ascertained at this strategic stage but should be a consideration at the project level (e.g. in monitoring).</p> <p>Potential for EMF impacts on fish and elasmobranchs from electricity cables associated with wave energy devices. Indirect effects may include altered migratory pathways with unknown energetic/biological consequences.</p> <p>Effects associated with construction activities would be largely temporary, but the potential for longer term effects from wave devices with underwater infrastructure remain. The western edge of the plan area in particular may coincide with areas used by Basking sharks and Cetaceans.</p> <p>There is the potential for direct benthic effects associated with the siting and installation of wave devices, and for indirect effects including sediment movements (i.e. scouring, smothering, sediment deposition and abrasion) from their presence in the marine environment. However, it is expected sediment deposition impacts at this location will be limited as the existing environment is already dynamic.</p> <p>There may be the potential for significant effects to designated areas associated with installation of grid infrastructure if it were to be sited in the vicinity of the Draft Plan Option.</p> <p>Impacts to seabed geodiversity will likely be limited to the direct effects of installation of devices. Impacts from piling effects could be greater than for the use of gravity based devices.</p>	<p>Project level assessment (EIA) that includes specific modelling and/or assessment will be required to demonstrate that there would be no significant impacts on diving birds and mobile marine species in the vicinity as a result of collision with wave devices. The results of monitoring from projects currently in the application process have the potential to help provide greater certainty on the scale of these effects.</p> <p>Further research into the potential collision, displacement and the effects on Cetaceans, Seals elasmobranchs and fish will help to identify the potential for significant effects.</p> <p>To date research has indicated that there are uncertain effects of EMF and noise on fish and elasmobranchs. The results of monitoring of existing and operational projects in this region have the potential to provide greater certainty on the scale of effects.</p> <p>Given proximity of the draft plan area to important areas for birds, development to the west and north west of the site is recommended.</p> <p>It is recommended that the boundary of the Draft Plan Option is kept under review as part of ascertaining whether the fact that the Flannan Isles SPA are contained within the Draft Plan Option would lead to adverse effects on the integrity of the designation or whether co-location is possible. Furthermore the distance between the boundary of the Draft Plan Option and the St Kilda SPA and SAC is recommended if adverse effects on its integrity are determined. Project level HRA must demonstrate development does not adversely affect the integrity of the SAC and SPA.</p> <p>Furthermore, it is recommended that the boundary of the Draft Plan Option is kept under review as part of ascertaining whether the overlap with the Eye Peninsula to Butt of Lewis MPA search area will remain and would lead to adverse effects, or whether co-location is possible. Projects will need to demonstrate through the EIA process that they are compatible with the conservation objectives of the MPA.</p> <p>Potential effects of supporting onshore/offshore grid connections will need to be considered to avoid effects on areas on the western isles if the grid connection is to the islands.</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
	<p>eels. To the west of WNW1 are two further MPA search areas, proposed for seabed and geodiversity features.</p> <p>The area is known to be used by fish species, including diadromous species, such as Atlantic salmon, and others including Sea trout and many commercially caught species. The region also contains important nursery grounds for several commercially important species of fish.</p> <p>Seabed sediments are described as rocky with areas of coarse sediments. These benthic habitats are likely to contain species used to strong tidal movements and currents, such as the kelp forests within the Draft Plan Option which provides important services for marine fauna and coastal protection.</p>			
Population and Human Health	<p>The waters and coastal areas to the west of Lewis and the Sound of Harris are used for a number of industry and recreational activities including fishing, recreational sea angling, recreational cruising, sailing and surfing.</p> <p>There are a number of well-established sailing and marine tourism routes through the Draft Plan Option to and from Saint Kilda and locations along the Hebrides including those within the Sound of Harris, and the north west coast of Lewis.</p>	<p>There is potential for collisions between recreational vessels and offshore energy infrastructure and supporting vessels, particularly during installation. Wave devices that sit low either above or below the water line, and in certain sea conditions could make them harder to see for small craft.</p> <p>The presence of wave devices has the potential to displace some existing recreational activities, through limiting access to areas of the sea and potential disruption to perceived amenity value.</p>	<p>Any collision could affect vessels and passengers. There remains a potentially significant collision risk for small vessels and wave devices in certain conditions with large waves. In calmer conditions this risk will reduce.</p> <p>It is difficult to predict the precise impact of potential changes to amenity on recreational use of the area. Some displacement could be permanent leading to recreational activities being discontinued. However it is likely that most activities could continue within a smaller range or in other nearby locations. Some established routes for recreational craft could be required to be diverted.</p>	<p>Potential mitigation for collisions through the inclusion/mapping of offshore energy developments on navigational charts and the use of navigational aids (such as marker buoys and lighting, etc.) in the vicinity of the infrastructure.</p> <p>When planning projects, developers could work with the recreation sector to consider best how recreational activities might continue within the option boundary. Early consultation can also help to reduce impacts on important cruising routes.</p> <p>There may be the requirement for commercial shipping to be excluded from developed areas. This would be determined through further engagement between MS-LOT and the relevant navigation authorities at the project level.</p>
Water and the Marine Environment	<p>The coastal waters in the vicinity of the draft plan area were classified as being of high status under the WFD in 2011.</p> <p>There is one area defined as shellfish waters within the vicinity of the Draft Plan Option off the northern coast of Lewis.</p>	<p>Potential for adverse water quality impacts during installation, operation and decommissioning of the developments (e.g. increased turbidity caused by works on the seabed associated with anchoring of devices, contamination from their installation and maintenance vessels).</p> <p>Some wave devices can use gravity based anchors that will use sediment as fill, and which may carry a pollution risk depending on where the sediment is sourced.</p>	<p>Impacts associated with any contamination from seabed material disturbed during installation or potentially decommissioning is likely to be of localised and temporary nature, with the significance of effects dependant on the level of contamination. Impacts during operation and maintenance are considered less likely.</p> <p>The significance and characteristic of impacts associated with contamination from vessels is uncertain and cannot be described beyond the potential for it to occur.</p>	<p>Pollution risks associated with installation, maintenance and decommissioning of devices should be reduced and limited through building mitigation into construction procedures, to avoid discharges of harmful material and substances.</p> <p>Further assessment work may be required to reduce uncertainty regarding potential impacts on water quality, particularly on including shellfish waters. This includes a recommendation for hydrodynamic and water quality modelling as part of project level assessment</p>
Climatic Factors	<p>The western coastline of the outer Hebrides is dominated by wind and wave action. The western coast of the Lewis is largely stable and rocky, while north Uist, immediately south east of the draft plan area, contains several sandy beaches that have been identified as being potentially vulnerable to erosion/accretion, particularly during storm events.</p> <p>Wave erosion of the western Lewis coastline (e.g. soft till cliffs) is mainly confined to storm conditions, although there is slight erosion of the</p>	<p>Potential for mixed effects on coastal erosion and accretion caused by changes to hydrodynamics particularly where developments are located near to potentially vulnerable coastlines.</p> <p>Given the high levels of wave action on the west coast of the Outer Hebrides and the erosion issues associated with this, developments may in some instances aid the protection of vulnerable coastlines</p> <p>Likely contributions to achieving GHG reductions through replacing energy generation from non-</p>	<p>Significance and character of effects are unknown. Depending on how offshore infrastructure affects hydrodynamics the effects on coastal erosion and accretion could be positive or negative. However any effects that do occur are likely to depend on the specific nature and location of the proposed development.</p> <p>Effects on the coastline are likely to be indirect.</p>	<p>Project level assessment of hydrodynamic changes, as a result of renewables development, should include any relevant climate related changes to the marine environment when assessing impacts.</p>

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	<p>coastal edge at several locations and several areas of erosion and accretion have been identified along the coastline (e.g. Luskamol, Sound of Harris, North Uist. And sheltered bays along the western Lewis coast).</p> <p>The potential for increases in storm events and rising sea levels have been identified, due to the effects of climate change.</p>	<p>renewable sources to renewable sources.</p>		
Marine Geology and Coastal Processes	<p>The seabed across this large Draft Plan Option area is of widely varying depth (ranging from 30 – 140m) and consists mainly of sandy and gravelly sediments, with large areas of undifferentiated solid rock outcrops to the west of Lewis and to the north west of Uist.</p> <p>The Draft Plan Option has strong wave and low tidal resources, increasing in a westerly direction from Lewis and Harris.</p>	<p>Some seabed disturbance and loss of habitat is likely with the site preparation and placement of device foundations. The scale of such disturbance is likely dependent on the type and size of the device.</p> <p>Sediment disturbance caused during the installation process could also lead to secondary impacts such as increased turbidity during installation in areas with fine sediments and release of existing contaminants present in fine sediments. However, water quality impacts from installation works are considered to be less likely in areas of high wave or tidal energies, and where coarse seabed sediments are predominant.</p> <p>As such significant increases in turbidity are unlikely given the largely coarse sediments and rock seabed formations within the option area.</p> <p>There is the potential for offshore developments within the Draft Plan Option to alter sediment dynamics and tidal flow fluxes in the vicinity of the site, with potential general impacts such as scour, deposition and abrasion in the area and the potential for related impacts to vulnerable coastlines (e.g. west coast of Lewis and Harris). However, these systems are likely to be complex, and as such, the potential for impacts will be site specific and dependent on factors such as the type and size of the devices and their foundations/anchors.</p>	<p>Direct impacts such as disturbance of the seabed during installation are likely to be temporary and localised.</p> <p>Loss of small areas of seabed associated with the installation of foundations/anchors may occur, although some natural regeneration may occur upon decommissioning of devices and removal of anchors.</p> <p>Changes in sediment dynamics and direct impacts such as scour, deposition and abrasion of seabed sediments are likely to be limited to the installation and operation phases of developments. However, in some circumstances, the effects of such changes may have long-term effects in coastal areas (e.g. the deposition of sediments in nearby coastal areas).</p>	<p>When projects are in the design process, consideration should be given to the location and arrangement of devices in order to build in mitigation to avoid potential impacts on marine geology and coastal processes, particularly given the important coastal areas on the west side of Lewis and Harris.</p> <p>It is recommended that sediment dynamic modelling is undertaken at project level to demonstrate potential effects in order to consider appropriate mitigation.</p> <p>Mitigation measures could include the design and use of rock scour protection (if required) around the base of any anchors or foundations used</p>
Historic Environment	<p>There are a number of marine and coastal wreck sites in the Outer Hebrides, including several near Barra.</p> <p>The Draft Plan Option sits very close to a number of sensitive coastal sites in the Isle of Lewis, Harris and North Uist. These sites include both scheduled and unscheduled monuments such as duns, cairns and forts, and a range of listed buildings located along the coastline. A particularly high density of sites has been identified along the north west coast of the Lewis.</p> <p>The eastern most portion of the Draft Plan Option is located adjacent to the St Kilda World Heritage Site.</p> <p>The coastal areas of these islands also contain a wide range of historical features located either at the shoreline or are of coastal relevance (i.e.</p>	<p>There may be the potential for impacts on historic wreck sites from installation and operation.</p> <p>As the draft option area sits very close to a number of sensitive coastal assets on Lewis, Harris and North Uist, there is potential for significant impacts on their settings. This is particularly the case where devices employed have large visible above water components.</p> <p>While there is some potential for developments to have an adverse impact on the setting of the St Kilda World Heritage Site, it is likely that developments would be located some distance from the site.</p> <p>Potential setting impacts on a number of sites, including coastal scheduled duns and Barra Head Lighthouse, and particularly for those devices with large visible above water components.</p>	<p>Direct effects on historic assets e.g. loss of assets caused by changes to coastal processes or the siting of offshore developments, would likely be permanent. The significance of the effects would, depend on the significance of the receptor.</p> <p>Effects on the setting of historic environment features would be indirect, and last for the lifespan of the development.</p>	<p>Direct effects on historic environment features can be avoided through appropriate siting of devices away from vulnerable coastlines and known historic marine features.</p> <p>Project level assessments should consider the potential for impacts on the setting of sites including the St Kilda WHS and seek to mitigate accordingly.</p>

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	Barra Head lighthouse and a cluster of coastal sites within the southern isles of the Outer Hebrides).			
Landscape / Seascape	<p>The Draft Plan Option covers a large area, with its eastern boundary located in close proximity to the coastline of the Western Isles, particularly Lewis and Harris. Much of this coastline is considered important for its natural environment and landscape features.</p> <p>Much of the eastern perimeter of the Draft Plan Option is bordered by the South Lewis, Harris and North Uist NSA, and much of this area is identified as possessing high wildness value.</p>	<p>Given the proximity of the Draft Plan Option to the islands there is potential for visual effects on the local environment, wild land and the NSA if development occurs within the eastern portion of the Draft Plan Option.</p> <p>There is the potential for changes to the character of the seascape and potentially on the setting of the NSA.</p> <p>The majority of the many wave device technologies and its supporting infrastructure will likely be below the water surface, and as a result, visual impacts may be minimised.</p> <p>Visibility may be greater during construction and maintenance periods more so than during operation, although this will depend on the technologies used.</p> <p>It is likely that construction works and navigational aids (e.g. marker buoys, lighting) will have visual effects.</p> <p>There are a number of potential offshore receptors including recreational boats that sail close to the option area.</p>	<p>Wave energy devices, and in particular any supporting infrastructure, within the draft plan option may be visible from nearby islands including areas designated for their landscape importance and/or for their wildness</p> <p>However, as the majority of the device infrastructure will be below the water surface, the significance of effects may be lower than for other technologies (e.g. wind). Impacts will also be more likely during construction and maintenance phase, rather than during operation.</p> <p>Development in the plan option would likely alter the current seascape and potentially affect its character. However, this will depend on the technology used, and the number of human receptors in this remote area may be few. For example, residual visual effects for some technologies could be minimal once constructed</p> <p>Lighting of wave devices and marker buoys will likely result in some visual effects during day and night, particularly those with a high above water profile or in near shore waters. The significance of effects will depend on the visibility of devices which needs to be established at the project level.</p> <p>Visual impacts could be greater for offshore receptors, such as recreational sea users.</p>	<p>Full visual impact assessment will be required at the project level (EIA) to establish the visual envelope and significance of effects. However visual impacts to onshore receptors could potentially be limited by construction further from the Lewis and Harris coastlines, in particular, in the west of the Draft Plan Option.</p> <p>Impacts to the landscape and seascape character would also need to form part of project level assessments. Given the high quality landscape identified in this area, any development should only be undertaken where significant effects can be avoided. Development that will affect NSA should avoid adverse effects on the integrity of the area or the qualities for which it has been designated.</p> <p>Development of the western parts of the plan option could potentially reduce visual and landscape/seascape impacts.</p>

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Biodiversity, Flora and Fauna	<p>The Draft Plan Option is in close proximity to the North Sutherland Coast, and is located to the west of Thurso. There are a number of important designations in its vicinity, both on the Scottish mainland and in Orkney, including the Hoy SPA, Caithness and Sutherland Peatlands SPA, North Caithness Cliffs SPA, Caithness and Sutherland Peatlands SPA (all designated for their seabird assemblage interest including Fulmar, Skua, Puffin, Kittiwake, Razorbill, Guillemot, Red Throated Diver, and Cormorant) amongst others. North Caithness Cliffs SPA is additionally designated for Peregrine and the North Sutherland Coastal Islands SPA is designated for Greenland barnacle goose. North of the mainland and the plan option are Sule Skerry and Sule Stack SPAs, both designated for similar seabird species. Other sites located in the vicinity of the Draft Plan Option include Hoy SAC (designated for its vegetated cliffs) and Invernaver SAC (for its dune habitats), Strathly Coast SSSI (for coastal and</p>	<p>Potential vulnerabilities for collision and displacement of diving birds were identified in relation to the Draft Plan Option in this area. The potential for impacts likely depends on a range of factors including the bird species considered (e.g. diving depth can vary markedly between species), the size and design of wind energy devices (e.g. some diving birds may rest on surface piercing infrastructure during foraging), and the presence or absence of underwater mooring cables.</p> <p>Given the likely presence of marine mammals and fish, particularly Cetaceans and Seals in Scotland's northern waters, there may be the potential for effects such as barriers to movement, collision with the devices and associated infrastructure, above and below water noise impacts during construction and operation, and aggregation effects (e.g. aggregation of predators near surface-piercing structures). While avoidance may be possible for some species in some circumstances, there are currently gaps in research</p>	<p>The potential remains for collision and displacement of diving birds with the presence of wave devices. However, the significance of the impact is uncertain as effects on the population viability of individual species are not known.</p> <p>Potential effects on Cetaceans, Seals, elasmobranchs and fish include barriers to movement, collision with infrastructure, and possible noise impacts as a result of activities associated with installing devices or their anchors. These effects may range from changes to existing feeding behaviour to mortality, although the precise effect on populations cannot be ascertained at this strategic stage but should be a consideration at the project level (e.g. in monitoring).</p> <p>Potential for EMF impacts on fish and elasmobranchs from electricity cables associated with wave energy devices. Indirect effects may include altered migratory pathways with unknown</p>	<p>Project level assessment (EIA) that includes specific modelling and/or assessment will be required to demonstrate that there would be no significant impacts on diving birds and mobile marine species in the vicinity as a result of collision with wave devices. The results of monitoring from projects currently in the application process have the potential to help provide greater certainty on the scale of these effects.</p> <p>Further research into the potential collision, displacement and the effects on Cetaceans, Seals elasmobranchs and fish will help to identify the potential for significant effects.</p> <p>To date research has indicated that there are uncertain effects of EMF and noise on fish and elasmobranchs. The results of monitoring of existing and operational projects in this region have the potential to provide greater certainty on the scale of effects.</p>

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	<p>geological interests) and River Naver, Thurso and Borgie SACs (for Atlantic salmon and Freshwater pearl mussel interests). The option overlaps with Strathy Point SAC.</p> <p>The baseline identifies potential some vulnerability of diving birds to collision with wave energy devices in breeding and winter season. However, this vulnerability may differ for individual species.</p> <p>The Cetacean distribution map presented in the baseline indicates that Cetaceans may be present in the Draft Plan Option. Basking shark sightings have been recorded along the North Sutherland coast, including several within WN1, indicating the potential for encounters within this area. Other elasmobranch species are known to use these waters.</p> <p>The Seal density maps and the presence of haul out sites to the west of WN1 and in the Pentland Firth, indicates the likely presence of Grey seals in the Draft Plan Option.</p> <p>The area is known to be used by fish species, including diadromous species, such as Atlantic salmon, and others including Sea trout and many commercially caught species. The wider northern region also contains important nursery grounds for several commercially important species of fish.</p> <p>The seabed off the North Sutherland Coast consists mainly of coarse sediments (i.e. sandy gravels and gravelly sands). These benthic habitats are likely to contain species used to strong wave conditions.</p>	<p>knowledge creating difficulty in establishing the likelihood of impacts.</p> <p>The review of current wave technologies identified potential effects from EMF on fish and elasmobranchs although research into the magnitude of effects demonstrates that this is uncertain.</p> <p>There is potential for impacts on benthic habitats as a result of scouring, smothering, deposition and abrasion of seabed in areas with coarse sediments as a result of placing devices and supporting infrastructure (e.g. mooring cables, piling) within this area. While the potential for sediment movement from the installation of wave devices and their associated infrastructure has been identified, this will likely depend on the type of devices and installation technologies used.</p>	<p>energetic/biological consequences.</p> <p>Effects associated with construction activities would be largely temporary, but the potential for longer term effects from wave devices with underwater infrastructure remain. The western edge of the plan area in particular may coincide with areas used by Basking sharks and Cetaceans.</p> <p>There is the potential for direct benthic effects associated with the siting and installation of wave devices, and for indirect effects including sediment movements (i.e. scouring, smothering, sediment deposition and abrasion) from their presence in the marine environment. However, it is expected sediment deposition impacts at this location will be limited as the existing environment is already dynamic.</p> <p>There may be the potential for significant effects to designated areas associated with installation of grid infrastructure if it were to be sited in the vicinity of the Draft Plan Option.</p>	<p>The potential for effects of supporting onshore/offshore grid connections will need to be considered to avoid effects on areas on sensitive coastal areas.</p> <p>The potential for impacts on important coastal and reef habitats should be monitored.</p> <p>It is recommended that the boundary of the Draft Plan Option is reviewed as part of ascertaining whether the overlap with the Strathy Point SAC would lead to adverse effects or whether co-location is possible. Project level HRA must demonstrate development does not adversely affect the integrity of the SAC.</p>
Population and Human Health	<p>The waters and coastal areas of the North Sutherland Coast are used for a number of industry and recreational activities including fishing, recreational sea angling, recreational cruising, bathing and surfing. Recreational vessels are known to travel along the Sutherland coast to the Pentland firth, and between Loch Eriboll and the Orkney Isles.</p>	<p>There is potential for collisions between recreational vessels and offshore energy infrastructure and supporting vessels, particularly during installation. Wave devices that sit low either above or below the water line, and in certain sea conditions could make them harder to see for small craft.</p> <p>The presence of wave devices has the potential to displace some existing recreational activities, through limiting access to areas of the sea and potential disruption to perceived amenity value.</p>	<p>Any collision could affect vessels and passengers. There remains a potentially significant collision risk for small vessels and wave devices in certain conditions with large waves. In calmer conditions this risk will reduce.</p> <p>It is difficult to predict the precise impact of potential changes to amenity on recreational use of the area. Some displacement could be permanent leading to recreational activities being discontinued. However it is likely that most activities could continue within a smaller range or in other nearby locations. Some established routes for recreational craft could be required to be diverted.</p>	<p>Potential mitigation for collisions through the inclusion/mapping of offshore energy developments on navigational charts and the use of navigational aids (such as marker buoys and lighting, etc.) in the vicinity of the infrastructure.</p> <p>When planning projects, developers could work with the recreation sector to consider best how recreational activities might continue within the option boundary. Early consultation can also help to reduce impacts on important cruising routes.</p> <p>There may be the requirement for commercial shipping to be excluded from developed areas. This would be determined through further engagement between MS-LOT and the relevant navigation authorities at the project level.</p>
Water and the Marine Environment	<p>The coastal waters in the vicinity of the draft plan area were classified as being of good status under the WFD in 2011.</p> <p>There are designated shellfish waters along the</p>	<p>Potential for adverse water quality impacts during installation, operation and decommissioning of the developments (e.g. increased turbidity caused by works on the seabed associated with anchoring of devices, contamination from their installation and</p>	<p>Impacts associated with any contamination from seabed material disturbed during installation or potentially decommissioning is likely to be of localised and temporary nature, with the significance of effects dependant on the level of contamination.</p>	<p>Pollution risks associated with installation, maintenance and decommissioning of devices should be reduced and limited through building mitigation into construction procedures, to avoid discharges of harmful material and substances.</p>

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	Sutherland coast although these are not directly adjacent to the Draft Plan Option.	<p>maintenance vessels).</p> <p>Some wave devices can use gravity based anchors that will use sediment as fill, and which may carry a pollution risk depending on where the sediment is sourced.</p>	<p>Impacts during operation and maintenance are considered less likely.</p> <p>The significance and characteristic of impacts associated with contamination from vessels is uncertain and cannot be described beyond the potential for it to occur.</p>	<p>Further assessment work may be required to reduce uncertainty regarding potential impacts on water quality, particularly on including shellfish waters. This includes a recommendation for hydrodynamic and water quality modelling as part of project level assessment</p>
Climatic Factors	<p>The coastline between Duncansby Head and Cape Wrath comprises largely rocky coastlines with pocket sandy beaches, and intertidal sand flats near river mouths. As such, the soft parts of this coastline have been identified as being potentially vulnerable to erosion/accretion, with some erosion having been identified (e.g. near to the Kyle of Tongue and the draft plan area). Little other continuous beach or coastal erosion is evident, other than under storm conditions. Some beach areas at the mouths of rivers have slight gains in material.</p> <p>The potential for increases in storm events and rising sea levels have been identified, due to the effects of climate change.</p>	<p>Potential for mixed effects on coastal erosion and accretion caused by changes to hydrodynamics particularly where developments are located near to intertidal sand flats at river mouths, such as those found near the Kyle of Tongue</p> <p>Likely contributions to achieving GHG reductions through replacing energy generation from non-renewable sources to renewable sources.</p>	<p>Significance and character of effects are unknown. Depending on how offshore infrastructure affects hydrodynamics the effects on coastal erosion and accretion could be positive or negative. However any effects that do occur are likely to depend on the specific nature and location of the proposed development.</p> <p>Effects on the coastline are likely to be indirect.</p>	<p>Project level assessment of hydrodynamic changes, as a result of renewables development, should include any relevant climate related changes to the marine environment when assessing impacts.</p>
Marine Geology and Coastal Processes	<p>The seabed across the North Sutherland Coast and the Draft Plan Option is up to around 100m in depth, and consists mainly of coarse sediments (i.e. sandy gravels and gravelly sands).</p> <p>The coastline has generally moderate wave and tidal energies.</p>	<p>Some seabed disturbance and loss of habitat is likely with the site preparation and placement of device foundations. The scale of such disturbance is likely dependent on the type and size of the device.</p> <p>Sediment disturbance caused during the installation process could also lead to secondary impacts such as increased turbidity during installation in areas with fine sediments and release of existing contaminants present in fine sediments. However, water quality impacts from installation works are considered to be less likely in areas of high wave or tidal energies, and where coarse seabed sediments are predominant.</p> <p>As such significant increases in turbidity are considered unlikely given the coarse sediments and rock seabed formations within the option area.</p> <p>There is the potential for offshore developments within the Draft Plan Option to alter sediment dynamics and tidal flow fluxes in the vicinity of the site, with potential general impacts such as scour, deposition and abrasion in the area and related impacts to vulnerable coastlines (e.g. inlets such as the Kyle of Tongue). However, these systems are likely to be complex, and as such, the potential for impacts will be site specific and dependent on factors such as the type and size of the devices and their foundations/anchors.</p>	<p>Direct impacts such as disturbance of the seabed during installation are likely to be temporary and localised.</p> <p>Loss of small areas of seabed associated with the installation of foundations/anchors may occur, although some natural regeneration may occur upon decommissioning of devices and removal of anchors.</p> <p>Changes in sediment dynamics and direct impacts such as scour, deposition and abrasion of seabed sediments are likely to be limited to the installation and operation phases of developments. However, in some circumstances, the effects of such changes may have long-term effects in coastal areas (e.g. the deposition of sediments in nearby coastal areas).</p>	<p>When projects are in the design process, consideration should be given to the location and arrangement of devices in order to build in mitigation to avoid potential impacts on marine geology and coastal processes.</p> <p>It is recommended that sediment dynamic modelling is undertaken at project level to demonstrate potential effects in order to consider appropriate mitigation.</p> <p>Mitigation measures could include the design and use of rock scour protection (if required) around the base of any anchors or foundations used</p>
Historic Environment	<p>There are a number of marine and coastal wreck sites off the North Sutherland Coast, including several in or close to the Draft Plan Option.</p> <p>There are a relatively low number of sensitive coastal historic environment assets located near</p>	<p>Although there are a low number of sensitive coastal sites in this region, there is potential for significant impacts on the setting of assets which have been identified, particularly Borge Castle. Setting impacts will be most significant where the devices employed have large visible above water components.</p>	<p>Direct effects on historic assets e.g. loss of assets caused by changes to coastal processes or the siting of offshore developments, would likely be permanent. The significance of the effects would, depend on the significance of the receptor.</p>	<p>Direct effects on historic environment features can be avoided through appropriate siting of devices away from vulnerable coastlines and known historic marine features.</p> <p>Project level assessments should consider the</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
	the option area. The most notable is Borve Castle which is situated near Farr on the North Sutherland Coast.	There may be the potential for impacts on historic wreck sites from installation and operation of these sites.	Effects on the setting of historic environment features would be indirect, and last for the lifespan of the development.	potential for impacts on the setting of sites identified in the baseline and seek to mitigate accordingly.
Landscape / Seascape	<p>The Draft Plan Option is located close the Kyle of Tongue NSA, and further afield the Hoy and West Mainland NSA on Orkney.</p> <p>Large parts of the Hoy coastline have a high wildness level. The coastal edges of the North Sutherland coast have small sections of wild land. However the A836 cuts along the coastline of the mainland, limiting the area of wildness.</p>	<p>The Draft Plan Option could be visible from cliffs and the Kyle of Tongue NSA on the northern coast of the mainland. The presence of the coastal A836 could potentially increase visibility for onshore receptors.</p> <p>There is the potential for changes to the character of the seascape and potentially on the setting of the NSA. However the majority of the device and supporting infrastructure will likely be below the water surface, and in such cases, visual impacts may be minimised.</p> <p>Visibility effects may occur during construction and maintenance periods more so that during operation. It is likely that navigational aids (e.g. marker buoys, lighting) will also have visual effects.</p> <p>There are a number of potential offshore receptors including recreational boats that sail close to the option area.</p>	<p>Wave devices, and in particular its supporting infrastructure, within the Draft Plan Option may be visible from the Scottish mainland which includes several areas designated for their landscape importance and their wildness.</p> <p>However, as the majority of the device infrastructure for many wave technologies will be below the water surface, the significance of effects may be lower than for wind devices. Visual impacts will also be more likely during construction and maintenance phase than during operation.</p> <p>The plan option could alter the current seascape and potentially affect its character. However, this will depend on the technology used and the number of receptors in this remote area may be few. Residual visual effects for some technologies could be minimal once constructed.</p> <p>Lighting of wave devices and marker buoys will likely result in some visual effects during day and night, particularly those with a high above water profile or in near shore waters. The significance of effects will depend on the visibility of devices which needs to be established at the project level.</p> <p>Visual impacts could be greater for offshore receptors, such as recreational sea users.</p>	<p>Full visual impact assessment will be required at the project level (EIA) to establish the visual envelope and significance of effects. However visual impacts to onshore receptors could potentially be limited by construction further from the mainland, in particular the west of the Draft Plan Option.</p> <p>Impacts to the landscape and seascape character would also need to form part of project level assessments. Given the high quality landscape identified in this area, any development should only be undertaken where significant effects can be avoided. Development that will affect NSA should avoid adverse effects on the integrity of the area or the qualities for which it has been designated.</p>

WN2

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
Biodiversity, Flora and Fauna	<p>The Draft Plan Option covers a large section of the waters to the north west of the Orkney Isles. There are a number of important designations in the area, including coastal SPAs such as Hoy SPA and Marwick Head SPA with which it overlaps, Rousay SPA, West Westray SPA, Papa Westray (North Hill and Holm) SPA, Calf of Eday SPA, all designated amongst others for seabird assemblages (including Fulmar, Skua, Puffin, Kittiwake, Razorbill, Guillemot, Red Throated Diver, Cormorant, Gulls Tern, but also Peregrine). Between Orkney and Shetland lies Fair Isle SPA, which has been designated for similar bird species.</p> <p>Orkney also contains the Sanday SAC (designated for sandflats, reefs and Common Seal), Faray and Holm of Faray SAC (designated for Grey Seal) and Stromness</p>	<p>Potential vulnerabilities for collision and displacement of diving birds was identified in relation to the Draft Plan Option, particularly in breeding season and along the south eastern perimeter of the Draft Plan Option. The potential for impacts likely depends on a range of factors including the bird species considered (e.g. diving depth can vary markedly between species), the size and design of wind energy devices (e.g. some diving birds may rest on surface piercing infrastructure during foraging), and the presence or absence of underwater mooring cables.</p> <p>Given the likely presence of marine mammals and fish, particularly Cetaceans and Seals in Scotland's northern waters, there may be the potential for effects such as barriers to movement, collision with the devices and associated infrastructure, above and below water noise impacts during construction and operation, and aggregation effects (e.g. aggregation of predators near surface-piercing structures). While avoidance may be</p>	<p>The potential remains for collision and displacement of diving birds with the presence of wave devices. However, the significance of the impact is uncertain as effects on the population viability of individual species are not known.</p> <p>Potential effects on Cetaceans, Seals, elasmobranchs and fish include barriers to movement, collision with infrastructure, and possible noise impacts as a result of activities associated with installing devices or their anchors. These effects may range from changes to existing feeding behaviour to mortality, although the precise effect on populations cannot be ascertained at this strategic stage but should be a consideration at the project level (e.g. in monitoring).</p> <p>Potential for EMF impacts on fish and elasmobranchs from electricity cables associated</p>	<p>Project level assessment (EIA) that includes specific modelling and/or assessment will be required to demonstrate that there would be no significant impacts on diving birds and mobile marine species in the vicinity as a result of collision with wave devices. The results of monitoring from projects currently in the application process and demonstrator sites in Orkney have the potential to help provide greater certainty on the scale of these effects.</p> <p>It is recommended that the boundary of the Draft Plan Option is kept under review as part ascertaining whether the overlap with the North West Orkney proposed MPA and the Papa Westray proposed MP will remain and would lead to adverse effects, or whether co-location is possible. Projects will need to demonstrate through the EIA process that they are compatible</p>

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	<p>Heaths and Coast SAC (designated for its vegetated cliffs). The Draft Plan Option overlaps with the latter.</p> <p>The Draft Plan Option is almost completely within the North West Orkney proposed MPA, designated for sand eels and marine geomorphology of the Scottish shelf seabed. Furthermore there is overlap with the Papa Westray proposed MPA, designated for Black guillemot and the marine geomorphology of the Scottish shelf seabed.</p> <p>The seabird maps presented in the baseline indicates the potential for seabird collision and displacement vulnerability during the breeding season, particularly along the south eastern perimeter of the Draft Plan Option as it skirts the islands. However, this vulnerability may differ for individual species.</p> <p>Cetacean distribution is likely higher in the western portion of the Draft Plan Option. While no Basking shark sightings have been recorded in WN2, several have been recorded in the Orkney Islands, indicating the potential for encounters within the Draft Plan Option. Other elasmobranch species are known to use this area. The importance of the area for both Grey and Common seals is demonstrated by the presence of Seal haul out areas located amongst the islands.</p> <p>The area is known to be used by fish species, including diadromous species, such as Atlantic salmon, and others including Sea trout and many commercially caught species. The northern region also contains important nursery grounds for several commercially important species of fish.</p> <p>The seabed in the vicinity of the Draft Plan Option consists mainly of coarse sediments such as sandy gravels and gravelly sands. These benthic habitats are likely to contain species used to strong wave and tidal movements.</p>	<p>possible for some species in some circumstances, there are currently gaps in research knowledge creating difficulty in establishing the likelihood of impacts.</p> <p>The review of current wave technologies identified potential effects from EMF on fish and elasmobranchs although research into the magnitude of effects demonstrates that this is uncertain.</p> <p>There is potential for impacts on benthic habitats as a result of scouring, smothering, deposition and abrasion of seabed in areas with coarse sediments as a result of placing devices and supporting infrastructure (e.g. mooring cables, piling) within this area.</p> <p>A number of SACs have been identified in the vicinity of the Draft Plan Option with valued and vulnerable coastal and reef habitats. While sediment movement from the installation of wave devices could potentially occur, this will likely depend on the type of device and on the installation technologies used.</p>	<p>with wave energy devices. Indirect effects may include altered migratory pathways with unknown energetic/biological consequences.</p> <p>Effects associated with construction activities would be largely temporary, but the potential for longer term effects from wave devices with underwater infrastructure remain. The western edge of the plan area in particular may coincide with areas used by Basking sharks and Cetaceans.</p> <p>There is the potential for direct benthic effects associated with the siting and installation of wave devices, and for indirect effects including sediment movements (i.e. scouring, smothering, sediment deposition and abrasion) from their presence in the marine environment. However, it is expected sediment deposition impacts at this location will be limited as the existing environment is already dynamic.</p> <p>There may be the potential for significant effects to designated areas associated with installation of grid infrastructure if it were to be sited in the vicinity of the Draft Plan Option.</p>	<p>with the conservation objectives of the MPAs.</p> <p>Further research into the potential collision, displacement and the effects on Cetaceans, Seals elasmobranchs and fish will help to identify the potential for significant effects.</p> <p>To date research has indicated that there are uncertain effects of EMF and noise on fish and elasmobranchs. The results of monitoring of existing and operational projects in this region have the potential to provide greater certainty on the scale of effects.</p> <p>There is likely a risk to Seals in this area, particularly cumulatively, and any offshore development should demonstrate the avoidance of effects on this and other marine fauna species. Similarly, potential impacts on important coastal and reef habitats should also be monitored.</p> <p>The potential for effects from grid infrastructure could be avoided if supporting onshore/offshore connections were located away from sensitive coastal areas,</p> <p>It is further recommended that the boundary of the Draft Plan Option is reviewed as part of ascertaining whether the overlap with the Hoy SPA, Marwick SPA and Stromness Heath and Coast SAC, would lead to adverse effects or whether co-location is possible. Project level HRA must demonstrate development does not adversely affect the integrity of the designations.</p>
Population and Human Health	<p>The waters and coastal areas to the east and north of Orkney are used for a number of industry and recreational activities including fishing, recreational sea angling, recreational cruising, sailing, diving and surfing.</p> <p>Recreational sailing is popular within this area, for example in and out of Stromness and established routes do cross this Draft Plan Option.</p>	<p>There is potential for collisions between recreational vessels and offshore energy infrastructure and supporting vessels, particularly during installation. Wave devices that sit low either above or below the water line, and in certain sea conditions could make them harder to see for small craft.</p> <p>The presence of wave devices has the potential to displace some existing recreational activities, through limiting access to areas of the sea and potential disruption to perceived amenity value.</p>	<p>Any collision could affect vessels and passengers. There remains a potentially significant collision risk for small vessels and wave devices in certain conditions with large waves. In calmer conditions this risk will reduce.</p> <p>It is difficult to predict the precise impact of potential changes to amenity on recreational use of the area. Some displacement could be permanent leading to recreational activities being discontinued. However it is likely that most activities could continue within a</p>	<p>Potential mitigation for collisions through the inclusion/mapping of offshore energy developments on navigational charts and the use of navigational aids (such as marker buoys and lighting, etc.) in the vicinity of the infrastructure.</p> <p>When planning projects, developers could work with the recreation sector to consider best how recreational activities might continue within the option boundary. Early consultation can also help to reduce impacts on important cruising routes.</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
			smaller range or in other nearby locations. Some established routes for recreational craft could be required to be diverted.	There may be the requirement for commercial shipping to be excluded from developed areas. This would be determined through further engagement between MS-LOT and the relevant navigation authorities at the project level.
Water and the Marine Environment	The coastal waters in the vicinity of the draft plan area were classified as being of good status under the WFD in 2011.	<p>Potential for adverse water quality impacts during installation, operation and decommissioning of the developments (e.g. increased turbidity caused by works on the seabed associated with anchoring of devices, contamination from their installation and maintenance vessels).</p> <p>Some wave devices can use gravity based anchors that will use sediment as fill, and which may carry a pollution risk depending on where the sediment is sourced.</p>	<p>Impacts associated with any contamination from seabed material disturbed during installation or potentially decommissioning is likely to be of localised and temporary nature, with the significance of effects dependant on the level of contamination. Impacts during operation and maintenance are considered less likely.</p> <p>The significance and characteristic of impacts associated with contamination from vessels is uncertain and cannot be described beyond the potential for it to occur.</p>	<p>Pollution risks associated with installation, maintenance and decommissioning of devices should be reduced and limited through building mitigation into construction procedures, to avoid discharges of harmful material and substances.</p> <p>Further assessment work may be required to reduce uncertainty regarding potential impacts on water quality, particularly on including shellfish waters. This includes a recommendation for hydrodynamic and water quality modelling as part of project level assessment</p>
Climatic Factors	<p>Long-term coastal retreat and cliff erosion is occurring around the Orkney coast, particularly along the western coastlines, likely due to the high energy waves present. Several sections along the west coastline have been identified as being vulnerable to coastal erosion (e.g. largely sheltered beaches and soft coasts). However, little significant or long-term erosion has been observed on the northern coastlines.</p> <p>The potential for increases in storm events and rising sea levels have been identified, due to the effects of climate change.</p>	<p>Potential for mixed effects on coastal erosion and accretion caused by changes to hydrodynamics particularly where developments are located near to potentially vulnerable coastlines.</p> <p>Given the high levels of wave action in this area and the erosion and long term retreat associated with this, developments may in some instances aid the protection of vulnerable coastlines.</p> <p>Likely contributions to achieving GHG reductions through replacing energy generation from non-renewable sources to renewable sources.</p>	<p>Significance and character of effects are unknown. Depending on how offshore infrastructure affects hydrodynamics the effects on coastal erosion and accretion could be positive or negative. However any effects that do occur are likely to depend on the specific nature and location of the proposed development.</p> <p>Effects on the coastline are likely to be indirect.</p>	Project level assessment of hydrodynamic changes, as a result of renewables development, should include any relevant climate related changes to the marine environment when assessing impacts.
Marine Geology and Coastal Processes	<p>The seabed in the vicinity of the Draft Plan Option consists mainly of coarse sediments such as sandy gravels and gravelly sands.</p> <p>The depth of the seabed varies from 30 – 170m within the option area, with deeper areas located further to the north west.</p> <p>The area has generally strong wave energy, particularly in the northern part of the option area, and low tidal energy.</p>	<p>Some seabed disturbance and loss of habitat is likely with the site preparation and placement of device foundations. The scale of such disturbance is likely dependent on the type and size of the device.</p> <p>Sediment disturbance caused during the installation process could also lead to secondary impacts such as increased turbidity during installation in areas with fine sediments and release of existing contaminants present in fine sediments. However, water quality impacts from installation works are considered to be less likely in areas of high wave or tidal energies, and where coarse seabed sediments are predominant.</p> <p>As such significant increases in turbidity are unlikely given the largely coarse sediments within the Draft Plan Option.</p> <p>There is the potential for offshore developments within the Draft Plan Option to alter sediment dynamics and tidal flow fluxes in the vicinity of the site. This may result in general impacts such as scour, deposition and abrasion in the area and the potential for related impacts to vulnerable coastlines (e.g. coastlines of Westray and Papa Westray). However, these systems are likely to be complex, and as such, the potential for impacts will be site specific and dependent on factors such as the type</p>	<p>Direct impacts such as disturbance of the seabed during installation are likely to be temporary and localised.</p> <p>Loss of small areas of seabed associated with the installation of foundations/anchors may occur, although some natural regeneration may occur upon decommissioning of devices and removal of anchors.</p> <p>Changes in sediment dynamics and direct impacts such as scour, deposition and abrasion of seabed sediments are likely to be limited to the installation and operation phases of developments. However, in some circumstances, the effects of such changes may have long-term effects in coastal areas (e.g. the deposition of sediments in nearby coastal areas).</p>	<p>When projects are in the design process, consideration should be given to the location and arrangement of devices in order to build in mitigation to avoid potential impacts on marine geology and coastal processes, particularly given the identified coastal erosion within nearby parts of Orkney.</p> <p>It is recommended that sediment dynamic modelling is undertaken at project level to demonstrate potential effects in order to consider appropriate mitigation.</p> <p>Mitigation measures could include the design and use of rock scour protection (if required) around the base of any anchors or foundations used</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
Historic Environment	There are a significant number of concentrated historic environment assets,(including numerous wrecks, scheduled monuments such as brochs, cairns, and fortifications) within marine and coastal areas near to the Draft Plan Option. The most notable site is the Heart of Neolithic Orkney World Heritage Site which is located to the south of the area. However, much of the Orkney's coastal waters have been identified for their potential for submerged archaeology.	and size of the devices and their foundations/anchors. There is the potential for effects on the setting of the Heart of Neolithic Orkney World Heritage Site, particularly from devices with large above water components. The likely presence of submerged archaeology means that there is potential for direct effects on any remains. However, development which includes archaeological survey may also have some positive effects by contributing to knowledge/understanding about the marine historic environment.	Direct effects on historic assets e.g. loss of assets caused by changes to coastal processes or the siting of offshore developments, would likely be permanent. The significance of the effects would, depend on the significance of the receptor. Effects on the setting of historic environment features would be indirect, and last for the lifespan of the development.	Direct effects on historic environment features can be avoided through appropriate siting of devices away from vulnerable coastlines and known historic marine features. Project level assessments should consider the potential for impacts on the setting of sites and seek to mitigate accordingly. Development in this area must demonstrate no adverse effects on the Heart of Neolithic Orkney World Heritage Site.
Landscape / Seascape	The southern end of the Draft Plan Option is likely to be visible from the Hoy and West Mainland NSA, and from both locally designated landscape areas and the coastal edge of the heart of Neolithic Orkney WHS. The Draft Plan Option may also be visible from the Shetland NSA, but this would likely depend on the scale of development and the height of surface-piercing components of renewables devices. Large parts of the Hoy coastline have a high wildness level.	The Draft Plan Option, particularly in the south and east, are likely to be visible from designated and wild parts of the Orkney coastline. There is potential for changes to the character of the seascape and potentially on the setting of these designations, including the NSA and WHS. Visibility effects may occur during construction and maintenance periods as well as during operation. It is likely that navigational aids (e.g. and marker buoys, lighting) will also have visual effects. There are a number of potential offshore receptors including recreational boats that sail close to the option area.	Wave devices at this location, and in particular their supporting infrastructure, may be visible from the Orkney coast, including from areas designated for their landscape importance and as areas of wildness. The significance of potential visual effects in these areas could be greater than for other parts of the coastline. However, for many wave technologies, the majority of the device infrastructure will be below the water surface and as such, the significance of effects may be lower than for wind technologies. Impacts will also therefore be more likely during construction and maintenance periods than during the operational phase. The plan option could likely alter the current seascape and potentially affect its character. However, this will depend on the technology used, and the number of human receptors in this remote area may be few. For example, residual visual effects for some technologies could be minimal once constructed. Lighting of wave devices and marker buoys will likely result in some visual effects during day and night, particularly those with a high above water profile or in near shore waters. The significance of effects will depend on the visibility of devices which needs to be established at the project level. Visual impacts could be greater for offshore receptors, such as recreational sea users.	Full visual impact assessment will be required at the project level (EIA) to establish the visual envelope and significance of effects. However visual impacts to onshore receptors could potentially be limited by construction further from the coast, in particular the west and north of the Draft Plan Option. Impacts to the landscape and seascape character would also need to form part of project level assessments. Development that will affect NSA should avoid adverse effects on the integrity of the area or the qualities for which it has been designated.

WN3

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
Biodiversity, Flora and Fauna	The Draft Plan Option covers a large section of the waters to the south west of the Shetland Isles. There are a number of important designations in the vicinity of the Draft Plan Option, including Sumburgh Head SPA, Foula SPA and Papa Stour SPA, all designated for a number of bird species (including Fulmar, Guillemot, and Kittiwake, Skua, Puffin, terns,	Potential vulnerabilities for collision and displacement of diving birds was identified in relation to the Draft Plan Option, particularly in the central and northern parts of the Draft Plan Option during breeding season. The potential for impacts likely depends on a range of factors including the bird species considered (e.g. diving depth can vary markedly between species), the size and design of wind energy devices (e.g. some diving birds may rest	The potential remains for collision and displacement of diving birds with the presence of wave devices. However, the significance of the impact is uncertain as effects on the population viability of individual species are not known. Potential effects on Cetaceans, Seals, elasmobranchs and fish include barriers to	Project level assessment (EIA) that includes specific modelling and/or assessment will be required to demonstrate that there would be no significant impacts on diving birds and mobile marine species in the vicinity as a result of collision with wave devices. Given the identified risk of bird collision, consideration to reducing the northern tip of the Draft Plan Option may reduce

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
	<p>Guillemot, and Ringed plover). Papa Stour has also been designated as an SAC for its reefs and sea caves. The Draft Plan Option overlaps with Sumburgh HeadSPA.</p> <p>A number of coastal SSSIs, including St Ninian's Tombolo (designated for coastal geomorphology features) have also been identified near to the Draft Plan Option.</p> <p>A potential vulnerability for collision for diving birds from wave energy devices was identified during breeding season. However, this vulnerability may differ for individual species.</p> <p>Cetacean distribution is considered high in the Draft Plan Option, particularly in the eastern part nearest to the Shetland coastline. The potential presence of Basking sharks in the vicinity of WN3 is demonstrated by the number of recorded sightings made around the Shetland coastline. Other elasmobranchs are known to use these waters. The importance of the area for both Seals is demonstrated by the presence of Seal haul out areas located amongst the islands. Seal density mapping indicates that Sumburgh Head in particular is regularly used by Common seals.</p> <p>The area is known to be used by fish species, including diadromous species, such as Atlantic salmon, and others including Sea trout and many commercially caught species. The northern region also contains important nursery grounds for several commercially important species of fish.</p> <p>The seabed surrounding Shetland consists of largely of gravelly sands and circallittoral coarse sediments. The benthic habitats in this area are likely to contain species used to strong tidal movements and currents, particularly those near to Sumburgh Head.</p>	<p>on surface piercing infrastructure during foraging), and the presence or absence of underwater mooring cables.</p> <p>Given the likely presence of marine mammals and fish, particularly Cetaceans and Seals in Scotland's northern waters, there may be the potential for effects such as barriers to movement, collision with the devices and associated infrastructure, above and below water noise impacts during construction and operation, and aggregation effects (e.g. aggregation of predators near surface-piercing structures). While avoidance may be possible for some species in some circumstances, there are currently gaps in research knowledge creating difficulty in establishing the likelihood of impacts.</p> <p>The review of current wave technologies identified potential effects from EMF on fish and elasmobranchs although research into the magnitude of effects demonstrates that this is uncertain.</p> <p>There is potential for impacts on benthic habitats as a result of scouring, smothering, deposition and abrasion of seabed in areas with coarse sediments as a result of placing devices and supporting infrastructure (e.g. mooring cables, piling) within this area.</p>	<p>movement, collision with infrastructure, and possible noise impacts as a result of activities associated with installing devices or their anchors. These effects may range from changes to existing feeding behaviour to mortality, although the precise effect on populations cannot be ascertained at this strategic stage but should be a consideration at the project level (e.g. in monitoring).</p> <p>Potential for EMF impacts on fish and elasmobranchs from electricity cables associated with wave energy devices. Indirect effects may include altered migratory pathways with unknown energetic/biological consequences.</p> <p>Effects associated with construction activities would be largely temporary, but the potential for longer term effects from wave devices with underwater infrastructure remain. The western edge of the plan area in particular may coincide with areas used by Basking sharks and Cetaceans.</p> <p>There is the potential for direct benthic effects associated with the siting and installation of wave devices, and for indirect effects including sediment movements (i.e. scouring, smothering, sediment deposition and abrasion) from their presence in the marine environment. However, it is expected sediment deposition impacts at this location will be limited as the existing environment is already dynamic.</p> <p>There may be the potential for significant effects to designated areas associated with installation of grid infrastructure if it were to be sited in the vicinity of the Draft Plan Option.</p>	<p>potential effects. The results of monitoring from projects currently in the application process have the potential to help provide greater certainty on the scale of these effects.</p> <p>Further research into the potential collision, displacement and the effects on Cetaceans, Seals elasmobranchs and fish will help to identify the potential for significant effects.</p> <p>To date research has indicated that there are uncertain effects of EMF and noise on fish and elasmobranchs. The results of monitoring of existing and operational projects in this region have the potential to provide greater certainty on the scale of effects.</p> <p>The potential for effects from grid infrastructure could be avoided if supporting onshore/offshore connections were located away from sensitive areas.</p> <p>It is recommended that the south west boundary of the Draft Plan Option is kept under review as part of ascertaining whether the overlap with the Sumburgh Head SPA would lead to adverse effects on its integrity or whether co-location is possible.</p>
Population and Human Health	<p>The waters and coastal areas to the south west of Shetland are used for a number of industry and recreational activities including fishing, recreational sea angling, recreational cruising, sailing and bathing.</p> <p>Sailing routes are popular within this area, particularly between Lerwick, Orkney or Aberdeen.</p>	<p>There is potential for collisions between recreational vessels and offshore energy infrastructure and supporting vessels, particularly during installation. Wave devices that sit low either above or below the water line, and in certain sea conditions could make them harder to see for small craft.</p> <p>The presence of wave devices has the potential to displace some existing recreational activities, through limiting access to areas of the sea and potential disruption to perceived amenity value.</p>	<p>Any collision could affect vessels and passengers. There remains a potentially significant collision risk for small vessels and wave devices in certain conditions with large waves. In calmer conditions this risk will reduce.</p> <p>It is difficult to predict the precise impact of potential changes to amenity on recreational use of the area. Some displacement could be permanent leading to recreational activities being discontinued. However it is likely that most activities could continue within a smaller range or in other nearby locations. Some established routes for recreational craft could be required to be diverted.</p>	<p>Potential mitigation for collisions through the inclusion/mapping of offshore energy developments on navigational charts and the use of navigational aids (such as marker buoys and lighting, etc.) in the vicinity of the infrastructure.</p> <p>When planning projects, developers could work with the recreation sector to consider best how recreational activities might continue within the option boundary. Early consultation can also help to reduce impacts on important cruising routes.</p> <p>There may be the requirement for commercial shipping to be excluded from developed areas. This would be determined through further</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
				engagement between MS-LOT and the relevant navigation authorities at the project level.
Water and the Marine Environment	<p>The coastal waters in the vicinity of the draft plan area were classified as being of good status under the WFD in 2011.</p> <p>There are a number of designated shellfish waters within the vicinity of the Draft Plan Option around the isles of Shetland.</p>	<p>Potential for adverse water quality impacts during installation, operation and decommissioning of the developments (e.g. increased turbidity caused by works on the seabed associated with anchoring of devices, contamination from their installation and maintenance vessels).</p> <p>Some wave devices can use gravity based anchors that will use sediment as fill, and which may carry a pollution risk depending on where the sediment is sourced.</p>	<p>Impacts associated with any contamination from seabed material disturbed during installation or potentially decommissioning is likely to be of localised and temporary nature, with the significance of effects dependant on the level of contamination. Impacts during operation and maintenance are considered less likely.</p> <p>The significance and characteristic of impacts associated with contamination from vessels is uncertain and cannot be described beyond the potential for it to occur.</p>	<p>Pollution risks associated with installation, maintenance and decommissioning of devices should be reduced and limited through building mitigation into construction procedures, to avoid discharges of harmful material and substances.</p> <p>Further assessment work may be required to reduce uncertainty regarding potential impacts on water quality, particularly on including shellfish waters. This includes a recommendation for hydrodynamic and water quality modelling as part of project level assessment</p>
Climatic Factors	<p>Littoral processes in Shetland are dominated by wave action, and several sections of the south west Shetland coastline have been identified as being potentially vulnerable to coastal erosion. In several of these areas, erosion processes have been identified previously (e.g. soft coasts and sandy beaches with beach drawdown and undercutting the coastal edge). Further, varying degrees of cliff erosion have been observed, although this appears to depend on rock type.</p> <p>The potential for increases in storm events and rising sea levels have been identified, due to the effects of climate change.</p>	<p>Potential for mixed effects on coastal erosion and accretion caused by changes to hydrodynamics from offshore wave developments, particularly for soft coastlines such as soft cliffs and sandy beaches like those in the south west of the Shetland Islands.</p> <p>Likely contributions to achieving GHG reductions through replacing energy generation from non-renewable sources to renewable sources.</p>	<p>Significance and character of effects are unknown. Depending on how offshore infrastructure affects hydrodynamics the effects on coastal erosion and accretion could be positive or negative. However any effects that do occur are likely to depend on the specific nature and location of the proposed development.</p> <p>Effects on the coastline are likely to be indirect.</p>	<p>Project level assessment of hydrodynamic changes, as a result of renewables development, should include any relevant climate related changes to the marine environment when assessing impacts.</p>
Marine Geology and Coastal Processes	<p>The seabed in the vicinity of the Draft Plan Option consists mainly of coarse sediments (i.e. sandy gravels and gravelly sands).</p> <p>The depth of the seabed is variable over the option area, generally increasing in a south east direction, and reach over 100m in depth in places.</p> <p>While the area has generally strong wave and low tidal energy resources, an area of stronger tidal resource is located off Sumburgh Head at the southern point of the Shetland Islands.</p>	<p>Some seabed disturbance and loss of habitat is likely with the site preparation and placement of device foundations. The scale of such disturbance is likely dependent on the type and size of the device.</p> <p>Sediment disturbance caused during the installation process could also lead to secondary impacts such as increased turbidity during installation in areas with fine sediments and release of existing contaminants present in fine sediments. However, water quality impacts from installation works are considered to be less likely in areas of high wave or tidal energies, and where coarse seabed sediments are predominant.</p> <p>As such significant increases in turbidity are unlikely given the largely coarse sediments within the Draft Plan Option.</p> <p>There is the potential for offshore developments within the Draft Plan Option to alter sediment dynamics and tidal flow fluxes in the vicinity of the site. This may result in general impacts such as scour, deposition and abrasion in the area and the potential for related impacts to vulnerable coastlines (e.g. soft coastlines on the south west of the Shetland Isles). However, these systems are likely to be complex, and as such, the potential for impacts is likely to be site specific and dependent on factors such as the type and size of the devices and their foundations/anchors.</p>	<p>Direct impacts such as disturbance of the seabed during installation are likely to be temporary and localised.</p> <p>Loss of small areas of seabed associated with the installation of foundations/anchors may occur, although some natural regeneration may occur upon decommissioning of devices and removal of anchors.</p> <p>Changes in sediment dynamics and direct impacts such as scour, deposition and abrasion of seabed sediments are likely to be limited to the installation and operation phases of developments. However, in some circumstances, the effects of such changes may have long-term effects in coastal areas (e.g. the deposition of sediments in nearby coastal areas).</p>	<p>When projects are in the design process, consideration should be given to the location and arrangement of devices in order to build in mitigation to avoid potential impacts on marine geology and coastal processes, particularly sections of Shetland's coastline sensitive to erosion.</p> <p>It is recommended that sediment dynamic modelling is undertaken at project level to demonstrate potential effects in order to consider appropriate mitigation.</p> <p>Mitigation measures could include the design and use of rock scour protection (if required) around the base of any anchors or foundations used.</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
Historic Environment	<p>This Draft Plan Option area sits close to the southern part of mainland Shetland, Mousa and Bressay, areas which are particularly rich in scheduled monuments such as prehistoric houses, forts, brochs and settlements. In general terms, the coastline of Shetland is particularly sensitive to the impacts of development with many scheduled brochs, and forts along its coast. The most notable is the A-listed Sumburgh Head Lighthouse at the southern tip of the islands.</p> <p>Several marine and coastal wrecks are located along the south west coastline of the islands, including a cluster immediately south of the Draft Plan Option.</p>	<p>There is the potential for impacts on the setting of coastal historic environment assets, including Sumburgh Head Lighthouse.</p> <p>The likely presence of submerged archaeology means that there is potential for direct effects on any remains. However, development which includes archaeological survey may also have some positive effects by contributing to knowledge/understanding about the marine historic environment.</p>	<p>Direct effects on historic assets e.g. loss of assets caused by changes to coastal processes or the siting of offshore developments, would likely be permanent. The significance of the effects would, depend on the significance of the receptor.</p> <p>Effects on the setting of historic environment features would be indirect, and last for the lifespan of the development.</p>	<p>Direct effects on historic environment features can be avoided through appropriate siting of devices away from vulnerable coastlines and known historic marine features.</p> <p>Project level assessments should consider the potential for impacts on the setting of sites and seek to mitigate accordingly.</p>
Landscape / Seascape	<p>The Draft Plan Option is likely to be visible from several of the component parts of the Shetland NSA. However, this would likely depend on the amount and height of above water infrastructure in any offshore developments.</p> <p>Much of the Shetland coastline has a high level of wildness.</p>	<p>The Draft Plan Option is likely to be visible from Shetland NSA, Foula NSA, and to the south Shetland NSA. This will depend on whether the devices are above the water surface or are submerged.</p> <p>It is likely development to the eastern edge of the Draft Plan Option would be the most visible.</p> <p>There is potential for changes to the character of the seascape and potentially on the setting of the Shetland NSA and Foula NSA.</p> <p>Effects may occur during construction and maintenance periods as well as during operation. It is likely that navigational aids (e.g. marker buoys, lighting) will also have visual effects.</p> <p>There are a number of potential offshore receptors including recreational boats that sail close to the Draft Plan Option.</p>	<p>Wave devices in this area, and in particular its supporting infrastructure, may be visible from the coast, including from areas designated for their landscape importance and as areas of wildness. This can increase the significance of potential visual effects. The significance of potential visual effects in these areas can be greater than for other parts of the coastline.</p> <p>However, for many wave technologies, the majority of the device infrastructure will be below the water surface and as such, the significance of effects may be lower than for other technologies (e.g. wind). Impacts will also therefore be more likely during construction and maintenance periods than during the operational phase.</p> <p>The plan option could be likely alter the current seascape and potentially affect its character. However, this will depend on the technology used, and the number of human receptors in this remote area may be few. For example, residual visual effects for some technologies could be minimal once constructed.</p> <p>Lighting of wave devices and marker buoys will likely result in some visual effects during day and night, particularly those with a high above water profile or in near shore waters. The significance of effects will depend on the visibility of devices which needs to be established at the project level.</p> <p>Visual impacts could be greater for offshore receptors, such as recreational sea users.</p>	<p>Full visual impact assessment will be required at the project level (EIA) to establish the visual envelope and significance of effects. However visual impacts to onshore receptors could potentially be limited by construction further from the coast, in particular to the west of the Draft Plan Option.</p> <p>Impacts to the landscape and seascape character would also need to form part of project level assessments.</p> <p>Development that will affect NSA should avoid adverse effects on the integrity of the area or the qualities for which it has been designated.</p>

3 Tidal Draft Plan Option

TSW1

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
<p>Biodiversity, Flora and Fauna</p>	<p>The Draft Plan Option overlaps with Luce Bay and Sands SAC (primarily designated for habitats and sediments) and the Mull of Galloway SAC. Furthermore it is located near Loch of Inch and Torrs Warren SPA (for non-breeding harriers and geese). Close to the Draft Plan Option, in Luce Bay, is Back Bay to Carghidown SSSI (for coastal and sediment features), Mull of Galloway SSSI (recognised for breeding birds) and Scare Rocks SSSI (recognised for breeding birds including an important Gannet Colony), amongst others.</p> <p>Further east is the Solway Firth SAC (with Sea and River Lamprey interests amongst others), Upper Solway Flats and Marshes SPA (with bird interests), and the River Bladnoch SAC (considered important for its Atlantic Salmon interests) amongst others. The implication is that the Solway Firth is an important area for a wide range of protected fish and bird species.</p> <p>The potential vulnerability for collision of diving birds was identified, particularly during the breeding season and in the north west part of TSW1 (near to the Rhins Peninsula). However, this vulnerability may differ for individual species.</p> <p>The available distribution data indicates that Cetaceans have been sighted within the Solway Firth area. Seal density surveys and the presence of Grey seal haul out sites within the area, particularly in Luce Bay and the Inner Solway Firth indicates the presence of Seals in this area. Basking sharks sightings are common around the Isle of Man and a number of recorded sightings have been made in the Firth, particularly in the vicinity of TSW1. It is believed that Basking sharks travel up the west coast of Scotland, and other species of elasmobranch are known to use this area.</p> <p>Fish species found in the area might include diadromous species, such as Atlantic salmon and Sea trout, Lamprey and many commercially caught species. The region also contains important nursery grounds for several commercially important species of fish.</p> <p>The coastline is a mix of intertidal rocks and sediments with the predominant habitat type shallow sub tidal sediments. Predominantly</p>	<p>Potential vulnerabilities are identified for diving bird collision and displacement with tidal energy devices in relation to the Draft Plan Option, particularly during the breeding season. Any potential risk is likely to vary by bird species and by device type. In general, collision risk will likely be greater for tidal devices with moving parts.</p> <p>Given the likely presence of marine mammals and fish, particularly Basking sharks and other elasmobranchs, cetaceans and fish within the Solway Firth, there may be the potential for effects such as creation of barriers to movement, collision with the device components and associated infrastructure, and below water noise impacts during construction and operation. However, there are gaps in present research knowledge to establish certainty of impact.</p> <p>The review of tidal technologies identified the potential effects from EMF on elasmobranchs and fish. However, the magnitude of these effects is unknown at this stage.</p> <p>While the presence of sub-tidal sediments indicates the potential for smothering of benthic habitats, the dynamic and turbid environment in the Solway would indicate that the benthos present will likely be conditioned to dynamic environments, and as a result, the magnitude of potential impacts may be reduced. However, there are gaps in present research knowledge to establish certainty of effect relating to sediment effects from tidal energy devices.</p>	<p>The potential for collision and displacement of diving birds with underwater tidal devices has been identified, particularly for important species such as Gannet. However, the significance of any impact is uncertain as effects on the population viability of individual species present in the area are not known.</p> <p>The western edge of the plan area in particular may coincide with routes used by Basking sharks and cetaceans.</p> <p>There is the potential for effects on cetaceans, seals, fish and elasmobranchs from the creation of barriers to movement, potential collision with infrastructure, and noise impacts during construction and operation.</p> <p>Elasmobranchs and fish may be impacted as a result of EMF associated with tidal energy devices and associated infrastructure. Indirect effects may include altered migratory pathways with unknown energetic/biological consequences.</p> <p>While effects associated with construction would likely be temporary, the potential for longer term effects from tidal devices with significant underwater infrastructure remains.</p> <p>There is the potential for direct benthic effects associated with the siting and installation of tidal devices, and for indirect effects including sediment movements (i.e. scouring, smothering, sediment deposition and abrasion) from their presence in the marine environment. However, it is expected sediment deposition impacts at this location will be limited as the existing environment is already dynamic.</p> <p>There may be the potential for significant effects to designated areas in locations such as Luce Bay, if associated grid infrastructure was to be sited in the Draft Plan Option.</p>	<p>Project level assessment (EIA) that includes specific modelling and/or assessment will be required to demonstrate that there is no significant impact on the Luce bay SAC habitats as a result of changes to hydrology and sedimentation from the construction of devices. Similar work may be required to demonstrate no significant risk to diving birds and other marine fauna from the presence of tidal devices in this Draft Plan Option area.</p> <p>The potential effects associated with grid infrastructure could be avoided if supporting onshore/offshore grid connections were located away from Luce Bay.</p> <p>Further research into the potential collision, displacement and the effects on cetaceans, seals elasmobranchs and fish will help to identify the potential for significant effects.</p> <p>To date research has indicated that there are uncertain effects of EMF and noise on fish and elasmobranchs. The results of monitoring of existing and operational projects in this region have the potential to provide greater certainty on the scale of effects.</p> <p>It is recommended that the boundary of the Draft Plan Option is kept under review as part of ascertaining whether the overlap with the Luce Bay and Sands SAC and the Mull of Galloway SAC would lead to adverse effects on its integrity or whether co-location is possible. Project level HRA must demonstrate development does not adversely affect the integrity of the SACs.</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
	coarse sediments are found in the vicinity of the Draft Plan Option. The benthos present is expected to be conditioned to the dynamic environment of the Solway.			
Population and Human Health	Solway Firth and surrounding waters are used for a number of recreational activities including salmon and sea trout fisheries, recreational sea angling, sailing, bathing and recreational tourism. Important shipping routes are identified in the Marine Atlas in this area.	<p>Whilst tidal devices will be constructed under the water surface there may be some elements of tidal devices that could be above the water. It is these elements that carry some collision risk both during operation and installation.</p> <p>The presence of tidal turbines and supporting infrastructure should have minimal impacts on recreational use, as vessels should be able to travel over the technology. If devices and supporting infrastructure pierce the surface there is some potential to displace some existing recreational activities, through limiting access to areas of the sea and potential disruption to perceived amenity value. However given the likely area of exclusion this effect is considered minimal.</p> <p>Commercial ships with bigger hulls could have a higher risk of collision with devices, and in particular with operational and maintenance vehicles and infrastructure.</p>	<p>Any collision could directly affect vessels and passengers, however it is not expected that tidal developments would result in a significant increase in collisions.</p> <p>It is difficult to predict the precise impact of potential changes to amenity on recreational use of the area. Some displacement could occur, however it is likely that most activities could continue within a smaller range or in other nearby locations.</p>	<p>Potential mitigation for collisions through the inclusion/mapping of offshore energy developments on navigational charts and the use of navigational aids (such as marker buoys and lighting, etc.) in the vicinity of the infrastructure.</p> <p>When planning projects, developers could work with the recreation sector to consider best how recreational activities might continue within the option boundary. Early consultation can also help to reduce impacts on important cruising routes. However, it is anticipated that in many instances tidal devices and recreational boating could collocate.</p> <p>There may be the requirement for commercial shipping to be excluded from developed areas. This would be determined through further engagement between MS-LOT and the relevant navigation authorities at the project level.</p>
Water and the Marine Environment	The coastal waters in the vicinity of the draft plan area and within Luce Bay to the north were classified as being of good status under the WFD in 2011.	Potential for adverse water quality impacts during installation, operation and decommissioning of the developments (e.g. increased turbidity caused by works on the seabed associated with anchoring of devices, contamination from their installation and maintenance vessels).	<p>Impacts associated with any contamination from seabed material disturbed during installation or potentially decommissioning is likely to be of localised and temporary nature, with the significance of effects dependant on the level of contamination. Impacts during operation and maintenance are considered less likely.</p> <p>The significance and characteristic of impacts associated with contamination from vessels is uncertain and cannot be described beyond the potential for it to occur.</p>	<p>Pollution risks associated with installation, maintenance and decommissioning of devices should be reduced and limited through building mitigation into construction procedures, to avoid discharges of harmful material and substances.</p> <p>Further assessment work may be required to reduce uncertainty regarding potential impacts on water quality, particularly on including shellfish waters. This includes a recommendation for hydrodynamic and water quality modelling as part of project level assessment</p>
Climatic Factors	<p>Potential coastal flooding issues associated with surge threats at heads of estuaries (e.g. Solway Firth).</p> <p>Coastal erosion and accretion has been identified in the soft coastal landforms in the Solway Firth, including in Luce Bay.</p>	<p>Potential for mixed effects on coastal erosion and accretion caused by changes to hydrodynamics and wave energy, particularly in vulnerable sections of coastline such as the Luce Bay Sands.</p> <p>Likely contributions to achieving GHG reductions through replacing energy generation from non-renewable sources to renewable sources.</p>	<p>Significance and character of effects are unknown. Depending on how offshore infrastructure affects hydrodynamics the effects on coastal erosion and accretion could be positive or negative. However any effects that do occur are likely to depend on the specific nature and location of the proposed development.</p> <p>Effects on the coastline are likely to be indirect.</p>	Project level assessment of hydrodynamic changes, as a result of renewables development, should include any relevant climate related changes to the marine environment when assessing impacts.
Marine Geology and Coastal Processes ¹³	<p>The seabed in the vicinity of the Draft Plan Option is varied, ranging from mixed coarse sediments (i.e. sandy gravels, gravelly sands and some gravelly muddy sands) to the south west of the Rhins Peninsula and to the south of Wigtown Bay, to coarser sediments in waters south of Luce Bay, and muddy sands and gravels within Luce Bay itself.</p> <p>The region has moderate wave and tidal</p>	<p>Some sediment disturbance and loss of seabed habitat is likely during the site preparation and placement of device foundations, although the scale is will depend on the type and size of the device.</p> <p>Sediment disturbance caused during the installation process could also lead to secondary impacts such as increased turbidity during installation in areas with fine sediments and release of existing contaminants present in fine sediments. However, water quality</p>	<p>Direct impacts such as disturbance of the seabed during installation are likely to be temporary and localised.</p> <p>Loss of small areas of seabed associated with the installation of foundations/anchors may occur, although some natural regeneration may occur upon decommissioning of devices and removal of anchors.</p> <p>Changes in sediment dynamics and direct impacts</p>	<p>When projects are in the design process, consideration should be given to the location and arrangement of devices in order to build in mitigation to avoid potential impacts on marine geology and coastal processes, particularly near and within Luce Bay.</p> <p>It is recommended that sediment dynamic modelling is undertaken at project level to demonstrate potential effects in order to consider</p>

¹³ Informed by the Wind, Wave and Tidal Regional Locational Guidance, British Geological Society datasets and European University Information Systems (EUNIS) data.

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
	energies across much of the Draft Plan Option, with higher resource in the north west and north east portions near to the Rhins Peninsula and Burrowhead respectively.	<p>impacts from installation works are considered to be less likely in areas of high wave or tidal energies, and where coarse seabed sediments are predominant.</p> <p>There is the potential for offshore developments within the Draft Plan Option to alter sediment dynamics and tidal flow fluxes in the vicinity of the site. This could lead to general impacts such as scour and abrasion at the site, and deposition of sediments in nearby areas and may particular concern for sites near to relatively sheltered areas such as Luce Bay. However, these systems are likely to be complex, and as such, the potential for impacts will be site specific and depend on factors such as the type and size of the devices and their foundations/anchors.</p>	such as scour, deposition and abrasion of seabed sediments are likely to be limited to the installation and operation phases of developments. However, in some circumstances, the effects of such changes may have long-term effects in coastal areas (e.g. the deposition of sediments in nearby coastal areas).	<p>appropriate mitigation.</p> <p>Mitigation measures could include the design and use of rock scour protection (if required) around the base of any anchors or foundations used.</p>
Historic Environment	<p>The Solway Firth and surrounding coastlines are rich in historic features, particularly the south coast of Dumfries and Galloway near the Mull of Galloway and Burrow Head where there are numerous scheduled monuments including coastal fortifications, chambered cairns and early church sites, including at Whitthorn Peninsula.</p> <p>Numerous historic wrecks have been identified in or near to draft plan area, and within the Solway Firth.</p>	<p>The proximity of the Draft Plan Option to the south coast of Dumfries and Galloway suggests that there is potential for impacts on the site and setting of historic environment assets located both within the marine environment and along the nearby coastline. Effects could be direct, caused by changes to coastal conditions (e.g. coastal processes, scour, sedimentation, etc.) or from the siting of devices and associated infrastructure, or indirect effects on the setting of features. Effects on the setting of historic assets will only arise where devices have visible above water components or support structures.</p> <p>There may also be the potential for impacts on historic wreck sites if devices and supporting infrastructure are installed near to these sites.</p>	<p>Direct effects on historic assets e.g. loss of assets caused by changes to coastal processes or the siting of offshore developments, would likely be permanent. The significance of the effects would, depend on the significance of the receptor.</p> <p>Effects on the setting of historic environment features would be indirect, and last for the lifespan of the development.</p>	<p>Effects on features of the historic environment can be avoided through appropriate siting of devices away from vulnerable coastlines and known historic marine features.</p> <p>Project level assessments should consider the potential for impacts on the setting of sites and seek to mitigate accordingly.</p>
Landscape / Seascape	<p>Three NSAs are located along the Solway Coast: Fleet Valley, East Stewartry Coast and Nith Estuary. However, direct views to the Draft Plan Option from these may be limited to its eastern edge only.</p> <p>The east and west parts of the Draft Plan Option are very close to the Dumfries and Galloway coastline, much of which is covered by local designated landscapes. These include the southern tip of the Rhins Peninsula (Rhins Coast RSA), Burrowhead (Machars Coast RSA) and within Luce Bay (Mochrum Lochs RSA).</p>	<p>The elements of tidal energy developments that pierce the water surface may be visible from the Luce Bay coastline and areas of local landscape designations.</p> <p>It is considered unlikely that some infrastructure associated with tidal devices within the Draft Plan Option has potential to be visible from coastal NSAs.</p> <p>There are a number of potential offshore receptors including recreational boats that sail close to the option area.</p> <p>It is likely that construction and maintenance works and navigational aids (e.g. marker buoys, lighting) could have some degree of visual effects.</p>	<p>The surface-piercing components of tidal devices within the plan option areas may be visible from the coast near Luce Bay, including from areas designated for their landscape importance. As the majority of the tidal energy device infrastructure will be submerged, the significance of effects may be lower than for other technologies (e.g. wind).</p> <p>Impacts will be more likely during construction and maintenance than in the operational phase.</p> <p>Development within the Draft Plan Option would alter the current seascape, although this may depend on the type of tidal technology adopted and the height of surface-piercing components above the water surface.</p> <p>Lighting of devices and marker buoys may result in some visual effects during day and night, particularly those in near shore waters. The significance of effects will depend on the visibility of devices which needs to be established at the project level.</p> <p>Visual impacts could be greater for offshore receptors, such as recreational sea users as their proximity to devices would be greater than onshore receptors.</p>	<p>Full visual impact assessment will be required at the project level (EIA) to establish the visual envelope and significance of landscape and seascape effects on nearby coastal areas (e.g. Luce Bay). However, the potential for visual impacts to onshore receptors could potentially be limited by undertaking construction further from the mainland and as a result of the majority of devices and development being below the water surface.</p> <p>Impacts to the landscape and seascape character of Luce Bay would also need to form part of project level assessments.</p> <p>Development that will affect NSA should avoid adverse effects on the integrity of the area or the qualities for which it has been designated.</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
<p>Biodiversity, Flora and Fauna</p>	<p>The plan option is located in proximity to several designated sites including the Rinns of Islay SPA (designated for a number of bird species including Chough, Greenland white-fronted goose and Whooper swan), the Oa SPA and SSSI (designated for Chough) and South-East Islay Skerries SAC (for Common seal interests).</p> <p>Vulnerability of collision for diving birds was identified in winter and breeding periods, the potential for slightly higher vulnerability was identified in the south east part of TW1. However, this vulnerability may differ for individual species.</p> <p>Seal density mapping and the presence of seal haul out areas indicate this is a well-used area for marine mammals, particularly for Grey seals in the north of TW1 and Common seals in the south east of TW1.</p> <p>While cetacean distribution is relatively low in the vicinity of the Draft Plan Option, these species may be present in the area. Furthermore the Skerries and Causeway SAC, in Northern Irish waters, is designated for Harbour porpoise. Basking sharks have also been sighted in the vicinity of TW1, and Given the likely presence of a known 'hotspot' around Tiree and Mull to the north, these species and other elasmobranchs may also be present in the Draft Plan Option area,</p> <p>The area is known to be used by fish species, including diadromous species, such as Atlantic salmon, and others including Sea trout and many commercially caught species. The region also contains important nursery grounds for several commercially important species of fish.</p> <p>Sediments in the region are largely coarse (e.g. sands, gravelly sands, gravels, etc.) and may be susceptible to hydrodynamic change. These benthic habitats are likely to contain species used to strong tidal movements.</p>	<p>Potential vulnerabilities were identified for diving bird collision and displacement with tidal energy devices in relation to the Draft Plan Option, particularly in the south east part of TW1. Any potential risk is likely to vary by bird species and by device type. In general, collision risk will likely be greater for tidal devices with moving parts.</p> <p>Given the likely presence of marine mammals and fish, particularly Basking sharks and other elasmobranchs, cetaceans and seals in the vicinity of the Draft Plan Option, there may be the potential for effects such as the creation of barriers to movement, collision with the device components and associated infrastructure, and below water noise impacts during construction and operation. This is particularly relevant for seals given the proximity to haul out areas and the nearby SAC. Furthermore, Harbour porpoise are likely to frequent this area. However, there are gaps in present research knowledge to establish certainty of impact.</p> <p>The review of tidal technologies identified the potential effects from EMF on elasmobranchs and fish. However, the magnitude of these effects is unknown at this stage.</p> <p>While the presence of sub-tidal sediments indicates the potential for smothering of benthic habitats, the dynamic and turbid environment in the Solway would indicate that the benthos present will likely be conditioned to dynamic environments, and as a result, the magnitude of potential impacts may be reduced. However, there are gaps in present research knowledge to establish certainty of effect relating to sediment effects from tidal energy devices.</p>	<p>The potential for collision and displacement of diving birds with underwater tidal devices has been identified, particularly for important species such as Gannet. However, the significance of any impact is uncertain as effects on the population viability of individual species present in the area are not known.</p> <p>There is the potential for effects on cetaceans, seals, fish and elasmobranchs from the creation of barriers to movement, potential collision with infrastructure, and noise impacts during construction and operation.</p> <p>Elasmobranchs and fish may be impacted as a result of EMF associated with tidal energy devices and associated infrastructure. Indirect effects may include altered migratory pathways with unknown energetic/biological consequences.</p> <p>While effects associated with construction would likely be temporary, the potential for longer term effects from tidal devices with significant underwater infrastructure remains.</p> <p>There is the potential for direct benthic effects associated with the siting and installation of tidal devices, and for indirect effects including sediment movements (i.e. scouring, smothering, sediment deposition and abrasion) from their presence in the marine environment. However, it is expected sediment deposition impacts at this location will be limited as the existing environment is already dynamic.</p> <p>There may be the potential for significant effects to designated areas in locations such as Islay, if associated grid infrastructure was to be sited in the Draft Plan Option.</p>	<p>Project level assessment (EIA) that includes specific modelling and/or assessment will be required to demonstrate that there will be no significant impacts on the SPAs and SACs in the vicinity as a result of changes to hydrology and sedimentation from the construction of devices, and from direct impacts on bird and seal species.</p> <p>The results of monitoring projects currently in the application process have the potential to help provide greater certainty on the scale of these effects.</p> <p>The potential effects associated with grid infrastructure could be avoided if supporting onshore/offshore grid connections were located away from Islay.</p> <p>Further research into the potential collision, displacement and the effects on cetaceans, seals elasmobranchs and fish will help to identify the potential for significant effects.</p> <p>To date research has indicated that there are uncertain effects of EMF and noise on fish and elasmobranchs. The results of monitoring of existing and operational projects in this region have the potential to provide greater certainty on the scale of effects.</p>
<p>Population and Human Health</p>	<p>The waters to west and south west of Islay are used for a number of industry and recreational activities including fishing, recreational sea angling, light recreational cruising, surfing and diving.</p> <p>Important shipping routes are identified in the Marine Atlas in this area.</p>	<p>Whilst tidal devices will be constructed under the water surface there may be some elements of tidal devices that could be above the water. It is these elements that carry some collision risk both during operation and installation.</p> <p>The presence of tidal turbines and supporting infrastructure should have minimal impacts on recreational use, as vessels should be able to travel over the technology. If devices and supporting infrastructure pierce the surface there is some potential to displace</p>	<p>Any collision could directly affect vessels and passengers, however it is not expected that tidal developments would result in a significant increase in collisions.</p> <p>It is difficult to predict the precise impact of potential changes to amenity on recreational use of the area. Some displacement could occur, however it is likely that most activities could continue within a smaller range or in other nearby locations.</p>	<p>Potential mitigation for collisions through the inclusion/mapping of offshore energy developments on navigational charts and the use of navigational aids (such as marker buoys and lighting, etc.) in the vicinity of the infrastructure.</p> <p>When planning projects, developers could work with the recreation sector to consider best how recreational activities might continue within the option boundary. Early consultation can also help</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
		<p>some existing recreational activities, through limiting access to areas of the sea and potential disruption to perceived amenity value. However given the likely area of exclusion this effect is considered minimal.</p> <p>Commercial ships with bigger hulls could have a higher risk of collision with devices, and in particular with operational and maintenance vehicles and infrastructure.</p>		<p>to reduce impacts on important cruising routes. However, it is anticipated that in many instances tidal devices and recreational boating could collocate.</p> <p>There may be the requirement for commercial shipping to be excluded from developed areas. This would be determined through further engagement between MS-LOT and the relevant navigation authorities at the project level.</p>
Water and the Marine Environment	<p>The coastal waters in the vicinity of the draft plan area were classified as being of good status under the WFD in 2011.</p> <p>There is one designated shellfish water within the vicinity of the Draft Plan Option off Jura.</p>	<p>Potential for adverse water quality impacts during installation, operation and decommissioning of the developments (e.g. increased turbidity caused by works on the seabed associated with anchoring of devices, contamination from their installation and maintenance vessels).</p>	<p>Impacts associated with any contamination from seabed material disturbed during installation or potentially decommissioning is likely to be of localised and temporary nature, with the significance of effects dependant on the level of contamination. Impacts during operation and maintenance are considered less likely.</p> <p>The significance and characteristic of impacts associated with contamination from vessels is uncertain and cannot be described beyond the potential for it to occur.</p>	<p>Pollution risks associated with installation, maintenance and decommissioning of devices should be reduced and limited through building mitigation into construction procedures, to avoid discharges of harmful material and substances.</p> <p>Further assessment work may be required to reduce uncertainty regarding potential impacts on water quality, particularly on including shellfish waters. This includes a recommendation for hydrodynamic and water quality modelling as part of project level assessment</p>
Climatic Factors	<p>Broadly stable coastal areas with sections of soft and sheltered beaches identified in the south west part of Islay as being potentially vulnerable to erosion and accretion. While no significant erosion has been identified, accretion has been identified in sheltered Laggan Bay on the south west coast, Machir Bay on the west coast and Loch Gruinard on the north coast of Islay.</p>	<p>Potential for mixed effects on coastal erosion and accretion caused by changes to hydrodynamics and wave energy although much of the coastline near the draft plan area appears to be broadly stable.</p> <p>Likely contributions to achieving GHG reductions through replacing energy generation from non-renewable sources to renewable sources.</p>	<p>Significance and character of effects are unknown. Depending on how offshore infrastructure affects hydrodynamics the effects on coastal erosion and accretion could be positive or negative. However any effects that do occur are likely to depend on the specific nature and location of the proposed development.</p> <p>Effects on the coastline are likely to be indirect.</p>	<p>Project level assessment of hydrodynamic changes, as a result of renewables development, should include any relevant climate related changes to the marine environment when assessing impacts.</p>
Marine Geology and Coastal Processes	<p>The seabed in the vicinity of the Draft Plan Option is largely composed of coarse sediments (i.e. sandy gravels and gravelly sands) and may be susceptible to hydrodynamic change.</p> <p>While the region has moderate to high wave and tidal energies across much of the Draft Plan Option, with several areas of strong tidal energy located immediately west and south west of Islay.</p>	<p>While there are largely coarse sediments in the area, some sediment disturbance and loss of seabed habitat is still likely during site preparation and placement of device foundations. The scale of such disturbance is likely to depend on the type and size of the device.</p> <p>Sediment disturbance caused during the installation process could also lead to secondary impacts such as increased turbidity during installation in areas with fine sediments and release of existing contaminants present in fine sediments. However, water quality impacts from installation works are considered to be less likely in areas of high wave or tidal energies, and where coarse seabed sediments are predominant.</p> <p>As such, increased turbidity is considered unlikely given the predominantly coarse sediments identified across the area.</p> <p>There is the potential for offshore developments within the Draft Plan Option to alter sediment dynamics and tidal flow fluxes in the vicinity of the site. This could lead to potential general impacts such as scour, deposition and abrasion in the area and the potential for related impacts to vulnerable coastlines (e.g. identified areas of accretion in West Islay). However, these systems are</p>	<p>Direct impacts such as disturbance of the seabed during installation are likely to be temporary and localised.</p> <p>Loss of small areas of seabed associated with the installation of foundations/anchors may occur, although some natural regeneration may occur upon decommissioning of devices and removal of anchors.</p> <p>Changes in sediment dynamics and direct impacts such as scour, deposition and abrasion of seabed sediments are likely to be limited to the installation and operation phases of developments. However, in some circumstances, the effects of such changes may have long-term effects in coastal areas (e.g. the deposition of sediments in nearby coastal areas).</p>	<p>When projects are in the design process, consideration should be given to the location and arrangement of devices in order to build in mitigation to avoid potential impacts on marine geology and coastal processes, particularly in coastal areas around Islay.</p> <p>It is recommended that sediment dynamic modelling is undertaken at project level to demonstrate potential effects in order to consider appropriate mitigation.</p> <p>Mitigation measures could include the design and use of rock scour protection (if required) around the base of any anchors or foundations used.</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
		likely to be complex and ,as such, the potential for impacts will be site specific and depend on factors such as the type and size of the devices and their foundations/anchors.		
Historic Environment	<p>There are a number of marine and coastal wreck sites within this region, including small clusters of wreck sites located near the west and south coasts of Islay.</p> <p>Nearby coastal areas also contain a wide range of historical features located either on the shoreline or which are of coastal relevance (e.g. designated sites such as lighthouses, listed buildings and, scheduled monuments such as fortifications, early church sites). Notable sites include the Rhinns of Islay Lighthouse in Orsay, and coastal chapel sites in the Oa.</p> <p>Significant sections of coastal and marine areas in Islay have also been identified as being of potential interest for submerged archaeology.</p>	<p>The proximity of the Draft Plan Option to the coastline suggests that there is potential for impacts on the site and setting of historic environment assets located both within the marine environment and along the nearby coast. Effects could be direct, caused by changes to coastal conditions (e.g. coastal processes, scour, sedimentation, etc.) or from the siting of devices and associated infrastructure, or indirect effects on the setting of features such as the Rhinns of Islay Lighthouse in Orsay or the coastal chapel sites in the Oa. Effects on the setting of historic assets will only arise where devices have visible above water components or support structures.</p> <p>There may also be the potential for impacts on historic wreck sites if devices and supporting infrastructure are installed near to these sites. The likely presence of submerged archaeology means that there is potential for direct effects on any remains. However, development which includes archaeological survey may also have some positive effects by contributing to knowledge/understanding about the marine historic environment.</p>	<p>Direct effects on historic assets e.g. loss of assets caused by changes to coastal processes or the siting of offshore developments, would likely be permanent. The significance of the effects would, depend on the significance of the receptor.</p> <p>Effects on the setting of historic environment features would be indirect, and last for the lifespan of the development.</p>	<p>Effects on features of the historic environment can be avoided through appropriate siting of devices away from vulnerable coastlines and known historic marine features.</p> <p>Project level assessments should consider the potential for impacts on the setting of sites and seek to mitigate accordingly.</p>
Landscape / Seascape	<p>The Draft Plan Option is in close proximity to the Islay coast, with the north part of the Draft Plan Option particularly close to a local landscape designation area located in north west Islay.</p> <p>Areas of the coastline in the vicinity of TW1 are considered to have a high wildness value.</p>	<p>Given the proximity of the Draft Plan Option to the Islay coast line there is potential for visual effects on the local Islay designation and areas of wild land.</p> <p>In terms of operation, the majority of tidal devices and supporting infrastructure will be below the water surface, and as a result, visual impacts may be minimised. However, this will depend on the type of tidal technologies taken forward.</p> <p>Visibility may be greater during construction and maintenance periods more than during the operational phase. It is likely that navigational aids (e.g. marker buoys, lighting) will also have visual effects.</p> <p>There are a number of potential offshore receptors including recreational boats that sail close to the Draft Plan Option.</p>	<p>The surface-piercing components of tidal devices and their supporting infrastructure (if any) within the plan option areas may be visible from the Islay coast. As the majority of the tidal energy device infrastructure is expected to be submerged, the significance of effects may be lower than for other technologies (e.g. wind and wave).</p> <p>The plan option could alter the current seascape and potentially affect its character. However, this will depend on the technology. For example residual visual effects for some technologies could be minimal once constructed.</p> <p>Lighting of tidal devices and marker buoys may result in some visual effects during day and night, particularly those in near shore waters. The significance of effects will depend on the visibility of devices which needs to be established at the project level.</p> <p>Visual impacts could be greater for offshore receptors, such as recreational sea users as their proximity to devices would be greater than onshore receptors.</p>	<p>Full visual impact assessment will be required at the project level (EIA) to establish the visual envelope and significance of landscape and seascape effects, particularly for parts of Islay. However visual impacts to onshore receptors could potentially be limited by construction further from the Islay coast, in particular to the west and south of the Draft Plan Option. In addition effects may be limited as a result of the majority of devices and development being below the water surface.</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
<p>Biodiversity, Flora and Fauna</p>	<p>The plan option is located in proximity to a number of coastal SSSIs including Sanda Islands, designated for a number of bird species including Black guillemot, Cormorant, Guillemot, Puffin, and Razorbill.</p> <p>The Draft Plan Option overlaps with a proposed MPA (Clyde Sea Sill) located at the southern tip of the Kintyre Peninsula. This area is proposed for its Black Guillemot and for geodiversity interests.</p> <p>The seabird maps presented in the baseline indicate potential vulnerability for diving bird collision with tidal energy devices in the Draft Plan Option, particularly during winter periods. However, this vulnerability may differ for individual species.</p> <p>The south east coast of Islay contains the South-East Islay Skerries SAC which is designated for common seals. Seal density mapping and the presence of a seal haul out area to the east of TW2 and the south of the Mull of Kintyre would indicate this is a well-used area for marine mammals.</p> <p>The available distribution and sighting data indicates that cetaceans may be present in this area. Several Basking shark sightings have been made within the Draft Plan Option itself, and the area is known to be used by other elasmobranch species. Furthermore the Skerries and Causeway SAC, to the west of TW2 in Northern Irish waters is designated for Harbour porpoise interests.</p> <p>The area is known to be used by fish species, including diadromous species such as Atlantic salmon, and others including Sea trout and many commercially caught species. The region also contains important nursery grounds for several commercially important species of fish.</p> <p>Seabed sediments in the region are largely coarse (e.g. sands, gravelly sands, gravels, etc.) with an area of muddy sandy gravel identified southwest of the Kintyre peninsula. These sediments may be susceptible to hydrodynamic change, and these habitats are likely to contain species used to strong tidal movements.</p>	<p>Potential vulnerabilities were identified for diving bird collision and displacement with tidal energy devices in relation to the Draft Plan Option, particularly during winter periods, at the southern edge of the Draft Plan Option. Any potential risk is likely to vary by bird species and by device type, with species such as the Black guillemot considered to be particularly at risk. In general, collision risk will likely be greater for tidal devices with moving parts.</p> <p>Given the potential presence of marine mammals and fish, particularly Basking sharks and other elasmobranchs, cetaceans and seals in the vicinity of the Draft Plan Option, there may be the potential for effects such as creation of barriers to movement, collision with the device components and associated infrastructure, and underwater noise impacts during construction and operation. This is particularly relevant for seals given the proximity to haul out areas. However, there are gaps in present research knowledge to establish certainty of impact.</p> <p>The review of tidal technologies identified the potential effects from EMF on elasmobranchs and fish. However, the magnitude of these effects is unknown at this stage.</p> <p>There is potential for impacts on benthic habitats as a result of scouring, smothering, deposition and abrasion of seabed in areas with coarse sediments as a result of placing devices within this area. However, such impacts may be limited given the dynamic nature of the Draft Plan Option. It is noted that there are gaps in present research knowledge in establishing certainty of effect relating to sediment effects from tidal energy devices.</p>	<p>The potential for collision and displacement of diving birds with underwater tidal devices has been identified. However, the significance of any impact is uncertain as effects on the population viability of individual species present in the area are not known.</p> <p>There is the potential for effects on cetaceans, seals, fish and elasmobranchs from the creation of barriers to movement, potential collision with infrastructure, and noise impacts during construction and operation.</p> <p>Elasmobranchs and fish may be impacted as a result of EMF associated with tidal energy devices and associated infrastructure. Indirect effects may include altered migratory pathways with unknown energetic/biological consequences.</p> <p>While effects associated with construction would likely be temporary, the potential for longer term effects from tidal devices with significant underwater infrastructure remains.</p> <p>There is the potential for direct benthic effects associated with the siting and installation of tidal devices, and for indirect effects including sediment movements (i.e. scouring, smothering, sediment deposition and abrasion) from their presence in the marine environment. However, it is expected sediment deposition impacts at this location will be limited as the existing environment is already dynamic.</p> <p>There may be the potential for significant effects to designated areas in locations such as Islay, if associated grid infrastructure was to be sited in the Draft Plan Option.</p>	<p>Project level assessment (EIA) that includes specific modelling and/or assessment will be required to demonstrate that there will be no significant impacts on priority marine species and designations in the vicinity as a result of changes to hydrology and sedimentation from the construction of devices, and from direct impacts on bird and mammal species. Monitoring from the existing tidal lease site within the Draft Plan Option help to identify potential adverse effects.</p> <p>Further research into the potential collision, displacement and the effects on cetaceans, seals elasmobranchs and fish (including Atlantic salmon) will help to identify the potential for significant effects.</p> <p>To date research has indicated that there are uncertain effects of EMF and noise on fish and elasmobranchs. The results of monitoring of existing and operational projects in this region have the potential to provide greater certainty on the scale of effects.</p> <p>It is recommended that the boundary of the Draft Plan Option is kept under review as part of ascertaining whether the overlap with the proposed Clyde Sea Sill MPA will remain and would lead to adverse effects, or whether co-location is possible. Projects will need to demonstrate through the EIA process that they are compatible with the conservation objectives of the MPA.</p>
<p>Population and Human Health</p>	<p>The waters to south west of Kintyre are used for a number of industry and recreational activities including fishing, recreational sea angling, medium recreational cruising, surfing and</p>	<p>Whilst tidal devices will be constructed under the water surface there may be some elements of tidal devices that could be above the water. It is these elements that carry some collision risk both during operation and</p>	<p>Any collision could directly affect vessels and passengers, however it is not expected that tidal developments would result in a significant increase in collisions.</p>	<p>Potential mitigation for collisions through the inclusion/mapping of offshore energy developments on navigational charts and the use of navigational aids (such as marker buoys and</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
	<p>bathing.</p> <p>Important shipping routes are identified in the Marine Atlas in this area.</p>	<p>installation.</p> <p>The presence of tidal turbines and supporting infrastructure should have minimal impacts on recreational use, as vessels should be able to travel over the technology. If devices and supporting infrastructure pierce the surface there is some potential to displace some existing recreational activities, through limiting access to areas of the sea and potential disruption to perceived amenity value. However given the likely area of exclusion this effect is considered minimal.</p> <p>Commercial ships with bigger hulls could have a higher risk of collision with devices, and in particular with operational and maintenance vehicles and infrastructure.</p>	<p>It is difficult to predict the precise impact of potential changes to amenity on recreational use of the area. Some displacement could occur, however it is likely that most activities could continue within a smaller range or in other nearby locations.</p>	<p>lighting, etc.) in the vicinity of the infrastructure.</p> <p>When planning projects, developers could work with the recreation sector to consider best how recreational activities might continue within the option boundary. Early consultation can also help to reduce impacts on important cruising routes. However, it is anticipated that in many instances tidal devices and recreational boating could collocate.</p> <p>There may be the requirement for commercial shipping to be excluded from developed areas. This would be determined through further engagement between MS-LOT and the relevant navigation authorities at the project level.</p>
Water and the Marine Environment	<p>The coastal waters in the vicinity of the draft plan area were classified as being of moderate (immediately south and east of the Kintyre Peninsula) to good status (north west of the Kintyre Peninsula) under the WFD in 2011.</p>	<p>Potential for adverse water quality impacts during installation, operation and decommissioning of the developments (e.g. increased turbidity caused by works on the seabed associated with anchoring of devices, contamination from their installation and maintenance vessels).</p>	<p>Impacts associated with any contamination from seabed material disturbed during installation or potentially decommissioning is likely to be of localised and temporary nature, with the significance of effects dependant on the level of contamination. Impacts during operation and maintenance are considered less likely.</p> <p>The significance and characteristic of impacts associated with contamination from vessels is uncertain and cannot be described beyond the potential for it to occur.</p>	<p>Pollution risks associated with installation, maintenance and decommissioning of devices should be reduced and limited through building mitigation into construction procedures, to avoid discharges of harmful material and substances.</p> <p>Further assessment work may be required to reduce uncertainty regarding potential impacts on water quality, particularly on including shellfish waters. This includes a recommendation for hydrodynamic and water quality modelling as part of project level assessment</p>
Climatic Factors	<p>While several sections of the western Kintyre coastline have been identified as being potentially vulnerable to erosion/accretion, the south west coast is largely rocky and broadly stable. No areas of significant erosion have been identified.</p> <p>However, small soft coastline areas have been identified to the east of the draft plan area at the southern tip of the peninsula near (e.g. beaches at Carskey, Dunaverty and Brunerican Bays).</p>	<p>Potential for mixed effects on coastal erosion and accretion caused by changes to hydrodynamics and wave energy, particularly along vulnerable sections of coastline near to the draft plan area such as beaches at Carskey, Dunaverty and Brunerican Bays.</p> <p>Likely contributions to achieving GHG reductions through replacing energy generation from non-renewable sources to renewable sources.</p>	<p>Significance and character of effects are unknown. Depending on how offshore infrastructure affects hydrodynamics the effects on coastal erosion and accretion could be positive or negative. However any effects that do occur are likely to depend on the specific nature and location of the proposed development.</p> <p>Effects on the coastline are likely to be indirect.</p>	<p>Project level assessment of hydrodynamic changes, as a result of renewables development, should include any relevant climate related changes to the marine environment when assessing impacts.</p>
Marine Geology and Coastal Processes	<p>The seabed in the vicinity of the Draft Plan Option is composed of predominantly coarser sediments such as sandy gravels, with a small area of muddy sandy gravel identified southwest of the Kintyre peninsula.</p> <p>While the region has moderate wave and tidal resources across much of the Draft Plan Option, with dynamic coastal zones adjacent to the Kintyre peninsula and within the option area.</p>	<p>Some sediment disturbance and loss of seabed habitat is likely during site preparation and placement of device foundations. The scale of such disturbance will depend on the type and size of the device.</p> <p>Sediment disturbance caused during the installation process could also lead to secondary impacts such as increased turbidity during installation in areas with fine sediments and release of existing contaminants present in fine sediments. However, water quality impacts from installation works are considered to be less likely in areas of high wave or tidal energies, and where coarse seabed sediments are predominant.</p> <p>There is the potential for offshore developments within the Draft Plan Option to alter sediment dynamics and tidal flow fluxes in the vicinity of the site. This could lead to general impacts such as scour, deposition and abrasion in the area and the potential for related impacts to vulnerable coastlines (e.g. southern tip of the Kintyre</p>	<p>Direct impacts such as disturbance of the seabed during installation are likely to be temporary and localised.</p> <p>Loss of small areas of seabed associated with the installation of foundations/anchors may occur, although some natural regeneration may occur upon decommissioning of devices and removal of anchors.</p> <p>Changes in sediment dynamics and direct impacts such as scour, deposition and abrasion of seabed sediments are likely to be limited to the installation and operation phases of developments. However, in some circumstances, the effects of such changes may have long-term effects in coastal areas (e.g. the deposition of sediments in nearby coastal areas).</p>	<p>When projects are in the design process, consideration should be given to the location and arrangement of devices in order to build in mitigation to avoid potential impacts on marine geology and coastal processes,</p> <p>It is recommended that sediment dynamic modelling is undertaken at project level to demonstrate potential effects in order to consider appropriate mitigation.</p> <p>Mitigation measures could include the design and use of rock scour protection (if required) around the base of any anchors or foundations used.</p>

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		Peninsula). However, these systems are likely to be complex, and as such, the potential for impacts will be site specific and depend on factors such as the type and size of the devices and their foundations/anchors.		
Historic Environment	<p>There are a number of marine and coastal wreck sites within this region, including small clusters of wreck sites located around the southern tip of the Kintyre peninsula.</p> <p>Nearby coastal areas also contain a wide range of historical environment sites located either on the shoreline or which have coastal relevance. These include scheduled monuments such as forts and duns. The most notable is the A-listed Mull of Kintyre Lighthouse, and the B-listed St. Ninian's Chapel located on Sanda Island.</p> <p>Significant sections of coastal areas around the Kintyre peninsula have also been identified as being of potential interest for submerged archaeology.</p>	<p>The proximity of the Draft Plan Option to the coastline means that there is the potential for impacts on the setting of coastal historic environment sites (e.g. Mull of Kintyre Lighthouse, and St. Ninian's Chapel).</p> <p>Potential for impacts on historic wreck sites in the vicinity of the developments from their installation and operation.</p> <p>The likely presence of submerged archaeology means that there is potential for direct effects on any remains. However, development which includes archaeological survey may also have some positive effects by contributing to knowledge/understanding about the marine historic environment.</p>	<p>Direct effects on historic assets e.g. loss of assets caused by changes to coastal processes or the siting of offshore developments, would likely be permanent. The significance of the effects would, depend on the significance of the receptor.</p> <p>Effects on the setting of historic environment features would be indirect, and last for the lifespan of the development.</p>	<p>Effects on features of the historic environment can be avoided through appropriate siting of devices away from vulnerable coastlines and known historic marine features.</p> <p>Project level assessments should consider the potential for impacts on the setting of the sites identified in the baseline and seek to mitigate accordingly.</p>
Landscape / Seascape	<p>The southern end of the Mull of Kintyre contains numerous local landscape designations, illustrating the high value attributed to landscapes in this part of Scotland.</p> <p>The eastern side of the Mull of Kintyre has a high wildness value.</p>	<p>The Draft Plan Option skirts close to the Mull of Kintyre local landscape designation and the wild land character of the peninsula. Tidal energy developments in the Draft Plan Option, at least those elements that pierce the water surface, may be visible from the coast.</p> <p>In terms of operation, the majority of tidal devices components and supporting infrastructure will likely be below the water surface, and as a result, visual impacts may be minimised. However, this will depend on the type of tidal technologies taken forward.</p> <p>Visibility may be greater during construction and maintenance periods more than during the operational phase. It is likely that navigational aids (e.g. marker buoys, lighting) may also have visual effects.</p> <p>There are a number of potential offshore receptors including recreational boats that sail close to the Draft Plan Option.</p>	<p>The surface-piercing components of tidal devices and their supporting infrastructure (if any) within the plan option areas may be visible from the Kintyre coast. As the majority of the tidal energy device infrastructure is expected to be submerged, the significance of effects may be lower than for other technologies (e.g. wind).</p> <p>The plan option could alter the current seascape and potentially affect its character. However, this will depend on the technology. For example, residual visual effects for some technologies could be minimal once constructed.</p> <p>Lighting of tidal devices and marker buoys may result in some visual effects during day and night, particularly those in near shore waters. The significance of effects will depend on the visibility of devices which needs to be established at the project level.</p> <p>Visual impacts could be greater for offshore receptors, such as recreational sea users as their proximity to devices would be greater than onshore receptors.</p>	<p>Full visual impact assessment will be required at the project level (EIA) to establish the visual envelope and significance of landscape and seascape effects, particularly for coastal areas on the Kintyre peninsula. However visual impacts to onshore receptors could potentially be limited by construction further from the mainland, for example, to the west and south. In addition effects may be limited as a result of the majority of devices and development being below the water surface.</p>

TN1

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
Biodiversity, Flora and Fauna	The Draft Plan Option is located in the Pentland Firth, to the east of Thurso. Key relevant designations in the area include a number of SSSI, IBA and SPA sites at Hoy, North Caithness Cliffs, Pentland Firth Islands, and Switha, amongst others. These sites are all designated for their seabird assemblage	Potential vulnerabilities were identified for diving bird collision and displacement with tidal energy devices in relation to the Draft Plan Option. Any potential risk is likely to vary by bird species and by device type. In general, collision risk will likely be greater for tidal devices with moving parts.	<p>The potential for collision and displacement of diving birds with underwater tidal devices has been identified. However, the significance of any impact is uncertain as effects on the population viability of individual species present in the area are not known.</p> <p>There is the potential for effects on marine</p>	Project level assessment (EIA) that includes specific modelling and/or assessment, will be required to demonstrate that there will be no significant impacts as a result of changes to hydrology and sedimentation from the construction of devices, and from direct impacts on bird and mammal species (particularly seals). Monitoring

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	<p>interest, demonstrating the presence of species such as Fulmar, Arctic Tern, Puffin, Kittiwake, Razorbill, Guillemot, Skua, and Greenland Barnacle goose in the area.</p> <p>Other designations, such as Hoy SAC (designated for its vegetated cliffs amongst other features) and River Thurso SAC (for Atlantic salmon interests) have also been identified in the vicinity of the Draft Plan Option.</p> <p>A small section of the boundary of the Draft Plan Option overlaps with Hoy SPA and North Caithness Cliffs SPA. The Pentland Firth Islands SPA is contained within the Draft Plan Option. There are bird interests within the area and potential collision vulnerability for diving birds was identified, particularly in the breeding season. However, this vulnerability may differ for individual species.</p> <p>Cetacean distribution in the region is considered to be low, although there is the potential for encounters within the Draft Plan Option. Several Basking shark sightings have been recorded within the Pentland Firth, indicating the potential for encounters in TN1. Other elasmobranch species are also known to use this area. Seal density mapping and the presence of seal haul out areas within the Pentland Firth and amongst the Orkney Islands, illustrates the importance of this area for both Grey and Common Seals.</p> <p>The north region is known to be used by a range of fish species, including diadromous species, such as Atlantic salmon, and others including many commercially caught species. The Orkney and Shetland region also contains important nursery grounds for several commercially important species of fish.</p> <p>The seabed within the Pentland Firth consists of undifferentiated rock in the narrow section of the Firth between Orkney and the mainland, with coarse sediments (e.g. sandy gravels, gravelly sands and sands) to the west along the North Sutherland Coast and to the east of the Pentland Firth. These benthic habitats are likely to contain species conditioned to strong tidal movements and currents.</p>	<p>Given the likely presence of marine mammals and fish, particularly cetaceans and seals in Scotland's northern waters, there may be the potential for effects such as creation of barriers to movement, collision with the device components and associated infrastructure, and underwater noise impacts during construction and operation. This is particularly relevant for Seals given the proximity to haul out areas in the Firth and in Orkney. However, there are gaps in present research knowledge to establish certainty of impact.</p> <p>The review of tidal technologies identified the potential effects from EMF on elasmobranchs and fish. However, the magnitude of these effects is unknown at this stage.</p> <p>Sediment movement from the installation of tidal devices could be possible although this will depend on the type of installation technology used.</p> <p>There is potential for impacts on benthic habitats as a result of scouring, smothering, deposition and abrasion of seabed in sections of the Firth underlain by coarse sediments as a result of placing devices and their supporting infrastructure within this area. These may be lower than in areas with more sandy sediments. The dynamic and turbid environment in the Pentland Firth would indicate that the benthos present will be conditioned to dynamic environments and as a result impact magnitude may be reduced. However, there are gaps in present research knowledge to establish certainty of effect.</p>	<p>mammals, particularly cetaceans and seals, such as the creation of barriers to movement, collision with infrastructure, and noise impacts.</p> <p>Elasmobranchs and fish may be impacted as a result of EMF associated with tidal energy devices and associated infrastructure. Indirect effects may include altered migratory pathways with unknown energetic/biological consequences.</p> <p>While effects associated with construction would likely be temporary, the potential for longer term effects from tidal devices with significant underwater infrastructure remains.</p> <p>There is the potential for direct benthic effects associated with the siting and installation of tidal devices, and for indirect effects including sediment movements (i.e. scouring, smothering, sediment deposition and abrasion) from their presence in the marine environment. However, it is expected sediment deposition impacts at this location will be limited as the existing environment is already dynamic.</p> <p>There may be the potential for significant effects to designated areas in locations such as Islay, if associated grid infrastructure was to be sited in the Draft Plan Option.</p>	<p>from the existing tidal lease sites within the Draft Plan Option help to identify potential adverse effects.</p> <p>Further research into the potential collision, displacement and the effects on cetaceans, seals elasmobranchs and fish (including Atlantic salmon) will help to identify the potential for significant effects. Monitoring should identify on the potential for devices to attract seals.</p> <p>To date research has indicated that there are uncertain effects of EMF and noise on fish and elasmobranchs. The results of monitoring of existing and operational projects in this region have the potential to provide greater certainty on the scale of effects.</p> <p>It is recommended that the boundary of the Draft Plan Option is kept under review as part of ascertaining whether the overlap with the Hoy, North Caithness Cliffs, and Pentland Firth Islands SPAs, would lead to adverse effects or whether co-location is possible. Project level HRA must demonstrate development does not adversely affect the integrity of the SPAs.</p> <p>Potential effects of supporting onshore/offshore grid connections will need to be considered to avoid effects on coastal areas.</p> <p>Siting of developments in rocky seabed areas within the Pentland Firth could limit the potential for benthic effects and impacts to sediment dynamics. However, the practicality of this mitigation measure may be influenced by other factors such as specific locations selected by developers and limitations associated with technology and engineering requirements.</p>
Population and Human Health	<p>The Pentland Firth and adjacent coastal regions in Orkney and the North Sutherland Coast are used for a number of industry and recreational activities including fishing, recreational sea angling, medium recreational cruising, sailing, surfing, diving and bathing.</p>	<p>Whilst tidal devices will be constructed under the water surface there may be some elements of tidal devices that could be above the water. It is these elements that carry some collision risk both during operation and installation.</p> <p>The presence of tidal turbines and supporting infrastructure should have minimal impacts on</p>	<p>Any collision could directly affect vessels and passengers, however it is not expected that tidal developments would result in a significant increase in collisions.</p> <p>It is difficult to predict the precise impact of potential changes to amenity on recreational use of the area.</p>	<p>Potential mitigation for collisions through the inclusion/mapping of offshore energy developments on navigational charts and the use of navigational aids (such as marker buoys and lighting, etc.) in the vicinity of the infrastructure.</p> <p>When planning projects, developers could work</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
	Important shipping routes are identified in the Marine Atlas in this area.	recreational use, as vessels should be able to travel over the technology. If devices and supporting infrastructure pierce the surface there is some potential to displace some existing recreational activities, through limiting access to areas of the sea and potential disruption to perceived amenity value. However given the likely area of exclusion this effect is considered minimal. Commercial ships with bigger hulls could have a higher risk of collision with devices, and in particular with operational and maintenance vehicles and infrastructure.	Some displacement could occur, however it is likely that most activities could continue within a smaller range or in other nearby locations.	with the recreation sector to consider best how recreational activities might continue within the option boundary. Early consultation can also help to reduce impacts on important cruising routes. However, it is anticipated that in many instances tidal devices and recreational boating could collocate. There may be the requirement for commercial shipping to be excluded from developed areas. This would be determined through further engagement between MS-LOT and the relevant navigation authorities at the project level.
Water and the Marine Environment	The coastal waters in the vicinity of the draft plan area were classified as being of good to high status under the WFD in 2011.	Potential for adverse water quality impacts during installation, operation and decommissioning of the developments (e.g. increased turbidity caused by works on the seabed associated with anchoring of devices, contamination from their installation and maintenance vessels).	Impacts associated with any contamination from seabed material disturbed during installation or potentially decommissioning is likely to be of localised and temporary nature, with the significance of effects dependant on the level of contamination. Impacts during operation and maintenance are considered less likely. The significance and characteristic of impacts associated with contamination from vessels is uncertain.	Pollution risks associated with installation, maintenance and decommissioning of devices should be reduced and limited through building mitigation into construction procedures, to avoid discharges of harmful material and substances. Further assessment work may be required to reduce uncertainty regarding potential impacts on water quality, particularly on including shellfish waters. This includes a recommendation for hydrodynamic and water quality modelling as part of project level assessment
Climatic Factors	Several sections of the Pentland Firth coastline, largely comprising sandy beaches between Gill's Bay and John O'Groats, and small sheltered inlets in the southern Orkney Isles, have been identified as being potentially vulnerable to coastal erosion. In some localised sections of this coastline near John O'Groats, erosion has been previously observed. The potential for increases in storm events and rising sea levels have been identified, due to the effects of climate change.	Potential for mixed effects on coastal erosion and accretion caused by changes to hydrodynamics and wave energy. However it is unlikely that this would be significant given the high energy coastlines and long term coastal retreat observed in this area. Likely contributions to achieving GHG reductions through replacing energy generation from non-renewable sources to renewable sources.	Significance and character of effects are unknown. Depending on how offshore infrastructure affects hydrodynamics the effects on coastal erosion and accretion could be positive or negative. However any effects that do occur are likely to depend on the specific nature and location of the proposed development. Effects on the coastline are likely to be indirect.	Project level assessment of hydrodynamic changes, as a result of renewables development, should include any relevant climate related changes to the marine environment when assessing impacts.
Marine Geology and Coastal Processes	The seabed in the vicinity of the Draft Plan Option consists of undifferentiated rock in the narrow section of the Firth between Orkney and the mainland, with coarse sediments (e.g. sandy gravels, gravelly sands and sands) to the west along the North Sutherland Coast and to the east of the Pentland Firth. Depths vary from 20 – 100m in the Pentland Firth and off the North Sutherland coast, although the narrows of the Firth provide the shallowest part of this area. The area has generally moderate wave and strong tidal energy resources, particularly within the Draft Plan Option in the narrowest part of the Firth.	Some seabed disturbance and loss of habitat is likely during site preparation and placement of device foundations. The scale of such disturbance will depend on the type and size of the device. Sediment disturbance caused during the installation process could also lead to secondary impacts such as increased turbidity during installation in areas with fine sediments and release of existing contaminants present in fine sediments. However, water quality impacts from installation works are considered to be less likely in areas of high wave or tidal energies, and where coarse seabed sediments are predominant. As such significant increases in turbidity are unlikely given the largely coarse sediments within the Draft Plan Option and the high tidal energies present within the Pentland Firth. There is the potential for offshore developments within the Draft Plan Option to alter sediment dynamics and	Direct impacts such as disturbance of the seabed during installation are likely to be temporary and localised. Loss of small areas of seabed associated with the installation of foundations/anchors may occur, although some natural regeneration may occur upon decommissioning of devices and removal of anchors. Changes in sediment dynamics and direct impacts such as scour, deposition and abrasion of seabed sediments are likely to be limited to the installation and operation phases of developments. However, in some circumstances, the effects of such changes may have long-term effects in coastal areas (e.g. the deposition of sediments in nearby coastal areas).	When projects are in the design process, consideration should be given to the location and arrangement of devices in order to build in mitigation to avoid potential impacts on marine geology and coastal processes, particularly for areas known to be susceptible to coastal erosion. It is recommended that sediment dynamic modelling is undertaken at project level to demonstrate potential effects in order to consider appropriate mitigation. Mitigation measures could include the design and use of rock scour protection (if required) around the base of any anchors or foundations used.

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		tidal flow fluxes in the vicinity of the site. This could lead to general impacts such as scour, deposition and abrasion in the area and the potential for related impacts to vulnerable coastlines (e.g. identified areas of accretion on the North Sutherland Coast). However, these systems are likely to be complex, and as such, the potential for impacts will be site specific and dependent on factors such as the type and size of the devices and their foundations/anchors.		
Historic Environment	<p>There are a number of marine wreck sites within the Pentland Firth, and near to the adjacent Orkney and North Sutherland coastlines. In particular there is a large cluster of wreck sites, including designated sites within Scapa Flow to the north of the Draft Plan Option.</p> <p>Both the Orkney and North Sutherland coastlines contain a number of sensitive coastal historic environment sites. The most notable are the A-listed Pentland Skerries Lighthouse, various scheduled monuments on the Island of Stroma, and the A-listed Castle of Mey together with its garden and designed landscape which is included on the national Inventory.</p> <p>Sections of these nearby coastlines have been identified as potentially containing submerged archaeology.</p>	<p>There is the potential for significant impacts on the setting of coastal historic environment sites, particularly for the Pentland Skerries Lighthouses, sites on the Island of Stroma, and the Castle of Mey. The significance of effects will depend on the location and type of technologies deployed, and will be more severe where devices have large visible above water components.</p> <p>There may be the potential for impacts on historic wreck sites from installation and operation of these sites.</p> <p>The likely presence of submerged archaeology means that there is potential for direct effects on any remains. However, development which includes archaeological survey may also have some positive effects by contributing to knowledge/understanding about the marine historic environment.</p>	<p>Direct effects on historic assets e.g. loss of assets caused by changes to coastal processes or the siting of offshore developments, would likely be permanent. The significance of the effects would, depend on the significance of the receptor.</p> <p>Effects on the setting of historic environment features would be indirect, and last for the lifespan of the development.</p>	<p>Effects on features of the historic environment can be avoided through appropriate siting of devices away from vulnerable coastlines and known historic marine features.</p> <p>Project level assessments should consider the potential for impacts on the setting of sites and seek to mitigate accordingly.</p>
Landscape / Seascape	<p>There are several local landscape designations close to the Draft Plan Option area, including Dunnet Head and Duncansby Head SLAs. The western portion of the Draft Plan Option may be visible from the Hoy and West Mainland NSA located in Orkney.</p> <p>While a valued landscape and heritage area, the wildness value of the mainland coast and the coastline of Hoy and South Ronaldsay is considered to be relatively low.</p>	<p>The Draft Plan Option skirts close to the mainland Hoy and South Ronaldsay and the Draft Plan Option will likely be visible from the coast. However, the area is unlikely to be visible from most areas designated for landscape quality, bar a small portion of the Hoy and West Mainland NSA.</p> <p>In terms of operation, the majority of tidal devices components and supporting infrastructure will be below the water surface, and as a result, visual impacts may be minimised. However, this will depend on the type of tidal technologies taken forward.</p> <p>Visibility may be greater during construction and maintenance periods more than during the operational phase. It is likely that navigational aids (e.g. marker buoys, lighting) will also have visual effects.</p> <p>There are a number of potential offshore receptors including ferries, recreational users and shipping that sail close to the Draft Plan Option.</p>	<p>The surface-piercing components of tidal devices and their supporting infrastructure (if any) within the plan option areas may be visible from the North Sutherland and Orkney coasts. As the majority of the tidal energy device infrastructure is expected to be submerged, the significance of effects may be lower than for other technologies (e.g. wind).</p> <p>The plan option could alter the current seascape and potentially affect its character. However, this will depend on the technology, for example, residual visual effects for some technologies could be minimal once constructed.</p> <p>Lighting of tidal devices and marker buoys may result in some visual effects during day and night, particularly those in near shore waters. The significance of effects will depend on the visibility of devices which needs to be established at the project level.</p> <p>Visual impacts could be greater for offshore receptors, such as recreational sea users as their proximity to devices would be greater than onshore receptors.</p>	<p>Full visual impact assessment will be required at the project level (EIA) to establish the visual envelope and significance of landscape and seascape effects on nearby coastal areas. However visual impacts to onshore receptors could potentially be limited by construction away from valued sites, in particular to the east of the Draft Plan Option. In addition effects may be limited as a result of the majority of devices and development being below the water surface.</p> <p>The Pentland Firth is a busy shipping channel and the development of additional infrastructure in this area will need to consider this in the context of landscape effects.</p> <p>Development that will affect NSA should avoid adverse effects on the integrity of the area or the qualities for which it has been designated.</p>

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<p>Biodiversity, Flora and Fauna</p>	<p>The Draft Plan Option is located in proximity to several designations in the area including a number of SSSI, IBA and a number of SPAs including Roussay, West Westray and Calf of Eday. These are all designated for their seabird assemblage interests (including Guillemot, Kittiwake, Arctic skua, Arctic tern, Fulmar, Razorbill and Great black-backed gull).</p> <p>Other designations, such as the Faray and Holm of Faray SAC (designated for Grey seal) are also located near to the Draft Plan Option, and Rousay SPA with which it overlaps. The Draft Plan Option overlaps with the proposed Wyre and Rousay Sounds MPA, designated for kelp and seaweed communities on sublittoral sediment, Maerl beds and marine geomorphology.</p> <p>While there are bird interests within the area, diving bird collision vulnerability to tidal energy devices is considered to be reasonably low. However, vulnerability may differ for individual species.</p> <p>Cetacean distribution in the region is considered to be low, although there is the potential for encounters within the Draft Plan Option. Several Basking shark sightings have been recorded within Orkney and in TN2, indicating the potential for encounters in this area. Other elasmobranch species are known to use this area. Seal density mapping and the presence of Seal haul out areas amongst the Orkney Islands illustrates the importance of this area for both Grey and Common Seals.</p> <p>The area is known to be used by fish species, including diadromous species, such as Atlantic salmon, and others including Sea trout and many commercially caught species. The region also contains important nursery grounds for several commercially important species of fish.</p> <p>The seabed surrounding Orkney consists largely of coarse sediments. These benthic habitats are likely to contain species conditioned to strong tidal movements and currents</p>	<p>Potential vulnerabilities were identified for collision and displacement of diving birds from tidal energy devices. However, any potential risk is likely to vary by bird species and by device type. In general, collision risk will likely be greater for tidal devices with moving parts.</p> <p>Given the likely presence of marine mammals and fish, particularly cetaceans and seals in Scotland's northern waters, there may be the potential for effects such as the creation of barriers to movement, collision with the device components and associated infrastructure, and underwater noise impacts during construction and operation. This is particularly relevant for seals given the proximity to haul out areas around Orkney. However, there are gaps in present research knowledge to establish certainty of impact.</p> <p>The review of tidal technologies identified the potential effects from EMF on elasmobranchs and fish. However, the magnitude of these effects is unknown at this stage.</p> <p>Sediment movement from the installation of tidal devices could be possible although this will depend on the type of installation technology used.</p> <p>There is potential for impacts on benthic habitats as a result of scouring, smothering, deposition and abrasion in seabed areas containing coarse sediments as a result of placing devices and their supporting infrastructure within this area. These may be lower than in areas with more sandy sediments.</p> <p>The dynamic and turbid environment in the area would indicate that the benthos present will be conditioned to dynamic environments and as a result impact magnitude may be reduced. However, there are gaps in present research knowledge to establish certainty of effect.</p>	<p>The potential for collision and displacement of diving birds with underwater tidal devices has been identified. However, the significance of any impact is uncertain as effects on the population viability of individual species present in the area are not known.</p> <p>There is the potential for effects on cetaceans, seals, fish and elasmobranchs from the creation of barriers to movement, potential collision with infrastructure, and noise impacts during construction and operation.</p> <p>Elasmobranchs and fish may be impacted as a result of EMF associated with tidal energy devices and associated infrastructure. Indirect effects may include altered migratory pathways with unknown energetic/biological consequences.</p> <p>While effects associated with construction would likely be temporary, the potential for longer term effects from tidal devices with significant underwater infrastructure remains.</p> <p>There is the potential for direct benthic effects associated with the siting and installation of tidal devices, and for indirect effects including sediment movements (i.e. scouring, smothering, sediment deposition and abrasion) from their presence in the marine environment. However, it is expected sediment deposition impacts at this location will be limited as the existing environment is already dynamic.</p> <p>There may be the potential for significant effects to designated areas in locations such as Islay, if associated grid infrastructure was to be sited in the Draft Plan Option.</p>	<p>Project level assessment (EIA) that includes specific modelling and/or assessment will be required to demonstrate that there will be no significant impacts on bird species. There is likely a potential risk to seals in this area (particularly cumulatively) and any tidal developments should demonstrate avoidance of adverse effects. The results of monitoring from existing tidal lease sites in this region currently in the application process have the potential to help provide greater certainty on the scale of these effects.</p> <p>Further research into the potential collision, displacement and the effects on cetaceans, seals elasmobranchs and fish (including Atlantic salmon) will help to identify the potential for significant effects.</p> <p>To date research has indicated that there are uncertain effects of EMF and noise on fish and elasmobranchs. The results of monitoring of existing and operational projects in this region have the potential to provide greater certainty on the scale of effects.</p> <p>Potential effects of supporting onshore/offshore grid connections will need to be considered to avoid effects on coastal areas.</p> <p>It is recommended that the boundary of the Draft Plan Option is kept under review as part of ascertaining whether the overlap with the proposed Wyre and Rousay Sounds MPA will remain and would lead to adverse effects on benthic habitats, or whether co-location is possible. Projects will need to demonstrate through the EIA process that they are compatible with the conservation objectives of the MPA.</p> <p>It is further recommended that the boundary of the Draft Plan Option is reviewed as part of ascertaining whether the overlap with the Rousay SPA, would lead to adverse effects or whether co-location is possible. Project level HRA must demonstrate development does not adversely affect the integrity of the SPA.</p>
<p>Population and Human Health</p>	<p>The draft plan area and surrounding waters and coastal areas in Orkney are used for a number of industry and recreational activities including fishing, recreational sea angling, medium recreational cruising, sailing, surfing and diving.</p>	<p>Whilst tidal devices will be constructed under the water surface there may be some elements of tidal devices that could be above the water. It is these elements that carry some collision risk both during operation and installation.</p> <p>The presence of tidal turbines and supporting infrastructure should have minimal impacts on</p>	<p>Any collision could directly affect vessels and passengers, however it is not expected that tidal developments would result in a significant increase in collisions.</p> <p>It is difficult to predict the precise impact of potential changes to amenity on recreational use of the area.</p>	<p>Potential mitigation for collisions through the inclusion/mapping of offshore energy developments on navigational charts and the use of navigational aids (such as marker buoys and lighting, etc.) in the vicinity of the infrastructure.</p> <p>When planning projects, developers could work</p>

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		<p>recreational use, as vessels should be able to travel over the technology. If devices and supporting infrastructure pierce the surface there is some potential to displace some existing recreational activities, through limiting access to areas of the sea and potential disruption to perceived amenity value. However given the likely area of exclusion this effect is considered minimal.</p> <p>Commercial ships with bigger hulls could have a higher risk of collision with devices, and in particular with operational and maintenance vehicles and infrastructure.</p>	<p>Some displacement could occur, however it is likely that most activities could continue within a smaller range or in other nearby locations.</p>	<p>with the recreation sector to consider best how recreational activities might continue within the option boundary. Early consultation can also help to reduce impacts on important cruising routes. However, it is anticipated that in many instances tidal devices and recreational boating could collocate.</p> <p>There may be the requirement for commercial shipping to be excluded from developed areas. This would be determined through further engagement between MS-LOT and the relevant navigation authorities at the project level.</p>
Water and the Marine Environment	<p>The coastal waters in the vicinity of the draft plan area were classified as being of good status under the WFD in 2011.</p> <p>There is one designated shellfish water within the vicinity of the draft plan off the coast of mainland Orkney.</p>	<p>Potential for adverse water quality impacts during installation, operation and decommissioning of the developments (e.g. increased turbidity caused by works on the seabed associated with anchoring of devices, contamination from their installation and maintenance vessels).</p>	<p>Impacts associated with any contamination from seabed material disturbed during installation or potentially decommissioning is likely to be of localised and temporary nature, with the significance of effects dependant on the level of contamination. Impacts during operation and maintenance are considered less likely.</p> <p>The significance and characteristic of impacts associated with contamination from vessels is uncertain and cannot be described beyond the potential for it to occur.</p>	<p>Pollution risks associated with installation, maintenance and decommissioning of devices should be reduced and limited through building mitigation into construction procedures, to avoid discharges of harmful material and substances.</p> <p>Further assessment work may be required to reduce uncertainty regarding potential impacts on water quality, particularly on including shellfish waters. This includes a recommendation for hydrodynamic and water quality modelling as part of project level assessment</p>
Climatic Factors	<p>The potential for coastal erosion and accretion has been identified along sheltered coastlines in the vicinity of the draft plan area. In several sections of coastline, erosion and accretion has been previously observed.</p> <p>The potential for increases in storm events and rising sea levels have been identified, due to the effects of climate change.</p>	<p>Potential for mixed effects on coastal erosion and accretion caused by changes to hydrodynamics and wave energy.</p> <p>Likely contributions to achieving GHG reductions through replacing energy generation from non-renewable sources to renewable sources.</p>	<p>Significance and character of effects are unknown. Depending on how offshore infrastructure affects hydrodynamics the effects on coastal erosion and accretion could be positive or negative. However any effects that do occur are likely to depend on the specific nature and location of the proposed development.</p> <p>Effects on the coastline are likely to be indirect.</p>	<p>Project level assessment of hydrodynamic changes, as a result of renewables development, should include any relevant climate related changes to the marine environment when assessing impacts.</p>
Marine Geology and Coastal Processes	<p>The seabed in the vicinity of the Draft Plan Option likely consists of coarse sediments (e.g. sandy gravels, gravelly sands and sands).</p> <p>Depths are reasonably shallow, reaching up to 40m in some parts of the strait between Eday and Orkney Islands.</p> <p>The area has generally moderate wave and strong tidal energy resources, particularly within the Draft Plan Option at the narrowest point between Eday and Orkney Islands.</p>	<p>Some seabed disturbance and loss of habitat is likely during the site preparation and placement of device foundations. The scale of such disturbance will depend on the type and size of the device.</p> <p>Sediment disturbance caused during the installation process could also lead to secondary impacts such as increased turbidity during installation in areas with fine sediments and release of existing contaminants present in fine sediments. However, water quality impacts from installation works are considered to be less likely in areas of high wave or tidal energies, and where coarse seabed sediments are predominant.</p> <p>As such, significant increases in turbidity are unlikely given the largely coarse sediments within the Draft Plan Option and the high tidal energies present within the area of search and surrounding waters.</p> <p>There is the potential for offshore developments within the Draft Plan Option to alter sediment dynamics and tidal flow fluxes in the vicinity of the site. This could lead to general impacts such as scour, deposition and abrasion in the area and the potential for related impacts</p>	<p>Direct impacts such as disturbance of the seabed during installation are likely to be temporary and localised.</p> <p>Loss of small areas of seabed associated with the installation of foundations/anchors may occur, although some natural regeneration may occur upon decommissioning of devices and removal of anchors.</p> <p>Changes in sediment dynamics and direct impacts such as scour, deposition and abrasion of seabed sediments are likely to be limited to the installation and operation phases of developments. However, in some circumstances, the effects of such changes may have long-term effects in coastal areas (e.g. the deposition of sediments in nearby coastal areas).</p>	<p>When projects are in the design process, consideration should be given to the location and arrangement of devices in order to build in mitigation to avoid potential impacts on marine geology and coastal processes, particularly for sheltered coastlines near to the plan option area.</p> <p>It is recommended that sediment dynamic modelling is undertaken at project level to demonstrate potential effects in order to consider appropriate mitigation.</p> <p>Mitigation measures could include the design and use of rock scour protection (if required) around the base of any anchors or foundations used.</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
		to vulnerable coastlines. However, these systems are likely to be complex, and as such, the potential for impacts will be site specific and depend on factors such as the type and size of the devices and their foundations/anchors.		
Historic Environment	<p>There are a number of coastal wreck sites located near to the Draft Plan Option.</p> <p>Nearby areas contain a variety of sensitive coastal historic environment sites, the most notable being various scheduled broch sites and Stackel Brae castle on Eday.</p> <p>Sections of nearby coastlines have also been identified as potentially containing submerged archaeology.</p>	<p>There is the potential for significant impacts on the setting of coastal historic environment sites, particularly for the Stackel Brae Castle. The significance of these effects will depend on the type and location of technologies deployed, and will be more severe where devices have large visible above water components.</p> <p>There may be the potential for impacts on nearby historic wreck sites from the installation and operation of these sites.</p> <p>The likely presence of submerged archaeology means that there is potential for direct effects on any remains. However, development which includes archaeological survey may also have some positive effects by contributing to knowledge/understanding about the marine historic environment.</p>	<p>Direct effects on historic assets e.g. loss of assets caused by changes to coastal processes or the siting of offshore developments, would likely be permanent. The significance of the effects would, depend on the significance of the receptor.</p> <p>Effects on the setting of historic environment features would be indirect, and last for the lifespan of the development.</p>	<p>Effects on features of the historic environment can be avoided through appropriate siting of devices away from vulnerable coastlines and known historic marine features.</p> <p>Project level assessments should consider the potential for impacts on the setting of sites identified and seek to mitigate accordingly.</p> <p>Development in this area must demonstrate no adverse effects on the Heart of Neolithic Orkney World Heritage Site</p>
Landscape / Seascape	<p>There are some local landscape designations in coastal areas near to the Draft Plan Option area.</p> <p>However, the wildness value of the surrounding area is considered to be relatively low.</p>	<p>The Draft Plan Option is located amongst several Orkney Islands, and as a result, is likely to be visible from nearby coastlines.</p> <p>In terms of operation, the majority of tidal devices components and supporting infrastructure will likely be below the water surface, and as a result, visual impacts may be minimised. However, this will depend on the type of tidal technologies taken forward.</p> <p>Visibility may be greater during construction and maintenance periods more than during the operational phase. It is likely that navigational aids (e.g. marker buoys, lighting) will also have visual effects.</p> <p>There are a number of potential offshore receptors including ferries and recreational boats that sail close to the option area.</p>	<p>The surface-piercing components of tidal devices and their supporting infrastructure (if any) within the plan option areas may be visible from nearby coastal areas. As the majority of the tidal energy device infrastructure is expected to be submerged, the significance of effects may be lower than for other technologies (e.g. wind).</p> <p>The plan option could alter the current seascape and potentially affect its character. However, this will depend on the technology, for example, residual visual effects for some technologies could be minimal once constructed.</p> <p>Lighting of tidal devices and marker buoys may result in some visual effects during day and night, particularly those in near shore waters. The significance of effects will depend on the visibility of devices which needs to be established at the project level.</p> <p>Visual impacts could be greater for offshore receptors, such as recreational sea users as their proximity to devices would be greater than onshore receptors.</p>	<p>Full visual impact assessment will be required at the project level (EIA) to establish the visual envelope and significance of landscape and seascape effects on nearby coastal areas. However, the potential for visual impacts on the settings of protected landscapes in this area is considered to be low. In addition effects may be limited as a result of the majority of devices and development being below the water surface.</p>

TN3

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
Biodiversity, Flora and Fauna	The Draft Plan Option is located in proximity to several designations in the area including a number of SSSI, and SPAs including West Westray, Calf of Eday, Papa Westray (North Hill and Holm), all designated for their seabird assemblage interests (including Guillemot,	Potential vulnerabilities were identified for collision and displacement for diving birds with tidal energy devices in relation to the Draft Plan Option. However, any potential risk is likely to vary by bird species and by device type. In general, collision risk will likely be greater for tidal devices with moving parts.	The potential for collision and displacement of diving birds with underwater tidal devices has been identified. However, the significance of any impact is uncertain as effects on the population viability of individual species present in the area are not known.	Project level assessment (EIA) that includes specific modelling and/or assessment will be required to demonstrate that there will be no significant impacts on bird species. There is potentially a risk to seals in this area (particularly cumulatively) and any tidal developments should

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	<p>Kittiwake, Arctic skua, Razor bill, Arctic tern, Fulmar, Cormorant and Great black-backed gull).</p> <p>Orkney also contains Faray and Holm of Faray SAC (designated for Grey Seal) and Sanday SAC (designated for Common Seal), amongst others. The Draft Plan Option overlaps with the Papa Westray (North Hill and Holm) SPA and the proposed Papa Westray MPA, designated for Black guillemot and the Marine Geomorphology of the Scottish Shelf Seabed.</p> <p>There are bird interests within the area, and collision vulnerability for diving birds with tidal energy devices is likely although currently considered reasonably lower than some locations. However, this vulnerability may differ for individual species.</p> <p>Cetacean distribution in the vicinity of the Draft Plan Option is relatively low, although they may be present in the Draft Plan Option. While no Basking shark sightings have been recorded in TN3, several have been recorded in the Orkney Islands, indicating the potential for encounters within the Draft Plan Option. Other elasmobranch species are known to use this area. The importance of the area for both Grey and Common seals is demonstrated by the presence of Seal haul out areas located amongst the islands.</p> <p>The northern region is known to be used by fish species, including diadromous species, such as Atlantic salmon, and others including many commercially caught species. The northern region also contains important nursery grounds for several commercially important species of fish.</p> <p>The seabed surrounding Orkney consists of largely coarse sediments. These benthic habitats are likely to contain species used to strong tidal movements and currents.</p>	<p>Given the likely presence of marine mammals and fish, particularly cetaceans and seals in Scotland's northern waters, there may be the potential for effects such as the creation of barriers to movement, collision with the device components and associated infrastructure, and underwater noise impacts during construction and operation. This is particularly relevant for Seals given the proximity to haul out areas located around Orkney. However, there are gaps in present research knowledge to establish certainty of impact.</p> <p>The review of tidal technologies identified the potential effects from EMF on elasmobranchs and fish. However, the magnitude of these effects is unknown at this stage.</p> <p>Sediment movement from the installation of tidal devices could be possible although this will depend on the type of installation technology used.</p> <p>There is potential for impacts on benthic habitats as a result of scouring, smothering, deposition and abrasion in seabed areas containing coarse sediments as a result of placing devices and their supporting infrastructure within this area. These may be lower than in areas with more sandy sediments.</p> <p>The dynamic and turbid environment in the area would indicate that the benthos present will be conditioned to dynamic environments and as a result impact magnitude may be reduced. However, there are gaps in present research knowledge to establish certainty of effect.</p>	<p>There is the potential for effects on cetaceans, seals, fish and elasmobranchs from the creation of barriers to movement, potential collision with infrastructure, and noise impacts during construction and operation.</p> <p>Elasmobranchs and fish may be impacted as a result of EMF associated with tidal energy devices and associated infrastructure. Indirect effects may include altered migratory pathways with unknown energetic/biological consequences.</p> <p>While effects associated with construction would likely be temporary, the potential for longer term effects from tidal devices with significant underwater infrastructure remains.</p> <p>There is the potential for direct benthic effects associated with the siting and installation of tidal devices, and for indirect effects including sediment movements (i.e. scouring, smothering, sediment deposition and abrasion) from their presence in the marine environment. However, it is expected sediment deposition impacts at this location will be limited as the existing environment is already dynamic.</p> <p>There may be the potential for significant effects to designated areas in locations such as Islay, if associated grid infrastructure was to be sited in the Draft Plan Option.</p>	<p>demonstrate avoidance of adverse effects.</p> <p>Further research into the potential collision, displacement and the effects on cetaceans, seals elasmobranchs and fish (including elasmobranchs and Atlantic salmon) will help to identify the potential for significant effects.</p> <p>To date research has indicated that there are uncertain effects of EMF and noise on fish and elasmobranchs. The results of monitoring of existing and operational projects in this region have the potential to provide greater certainty on the scale of effects.</p> <p>It is recommended that the boundary of the Draft Plan Option is kept under review as part of ascertaining whether the overlap with the proposed Papa Westray MPA will remain and would lead to adverse effects, or whether co-location is possible. Projects will need to demonstrate through the EIA process that they are compatible with the conservation objectives of the MPA.</p> <p>It is further recommended that the boundary of the Draft Plan Option is reviewed as part of ascertaining whether the overlap with the Papa Westray (North Hill and Holm) SPA would lead to adverse effects or whether co-location is possible. Project level HRA must demonstrate development does not adversely affect the integrity of the SPA.</p>
Population and Human Health	<p>The draft plan area in the northern Orkney Islands and surrounding coastal areas are used for a number of industry and recreational activities including fishing, recreational sea angling, medium recreational cruising and sailing.</p>	<p>Whilst tidal devices will be constructed under the water surface there may be some elements of tidal devices that could be above the water. It is these elements that carry some collision risk both during operation and installation.</p> <p>The presence of tidal turbines and supporting infrastructure should have minimal impacts on recreational use, as vessels should be able to travel over the technology. If devices and supporting infrastructure pierce the surface there is some potential to displace some existing recreational activities, through limiting access to areas of the sea and potential disruption to perceived amenity value. However given the likely area</p>	<p>Any collision could directly affect vessels and passengers, however it is not expected that tidal developments would result in a significant increase in collisions.</p> <p>It is difficult to predict the precise impact of potential changes to amenity on recreational use of the area. Some displacement could occur, however it is likely that most activities could continue within a smaller range or in other nearby locations.</p>	<p>Potential mitigation for collisions through the inclusion/mapping of offshore energy developments on navigational charts and the use of navigational aids (such as marker buoys and lighting, etc.) in the vicinity of the infrastructure.</p> <p>When planning projects, developers could work with the recreation sector to consider best how recreational activities might continue within the option boundary. Early consultation can also help to reduce impacts on important cruising routes. However, it is anticipated that in many instances tidal devices and recreational boating could</p>

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		<p>of exclusion this effect is considered minimal.</p> <p>Commercial ships with bigger hulls could have a higher risk of collision with devices, and in particular with operational and maintenance vehicles and infrastructure.</p>		<p>collocate.</p> <p>There may be the requirement for commercial shipping to be excluded from developed areas. This would be determined through further engagement between MS-LOT and the relevant navigation authorities at the project level.</p>
Water and the Marine Environment	The coastal waters in the vicinity of the draft plan area were classified as being of good status under the WFD in 2011.	<p>Potential for adverse water quality impacts during installation, operation and decommissioning of the developments (e.g. increased turbidity caused by works on the seabed associated with anchoring of devices, contamination from their installation and maintenance vessels).</p>	<p>Impacts associated with any contamination from seabed material disturbed during installation or potentially decommissioning is likely to be of localised and temporary nature, with the significance of effects dependant on the level of contamination. Impacts during operation and maintenance are considered less likely.</p> <p>The significance and characteristic of impacts associated with contamination from vessels is uncertain and cannot be described beyond the potential for it to occur.</p>	<p>Pollution risks associated with installation, maintenance and decommissioning of devices should be reduced and limited through building mitigation into construction procedures, to avoid discharges of harmful material and substances.</p> <p>Further assessment work may be required to reduce uncertainty regarding potential impacts on water quality, particularly on including shellfish waters. This includes a recommendation for hydrodynamic and water quality modelling as part of project level assessment</p>
Climatic Factors	<p>The potential for coastal erosion and accretion has been identified along soft and exposed coastlines in the vicinity of the draft plan area (e.g. Westray and Papa Westray). Little long-term erosion has been observed, it is likely that several localised sections of coastline have been observed to be subject to erosion.</p> <p>The potential for increases in storm events and rising sea levels have been identified, due to the effects of climate change.</p>	<p>Potential for mixed effects on coastal erosion and accretion caused by changes to hydrodynamics and wave energy.</p> <p>Likely contributions to achieving GHG reductions through replacing energy generation from non-renewable sources to renewable sources.</p>	<p>Significance and character of effects are unknown. Depending on how offshore infrastructure affects hydrodynamics the effects on coastal erosion and accretion could be positive or negative. However any effects that do occur are likely to depend on the specific nature and location of the proposed development.</p> <p>Effects on the coastline are likely to be indirect.</p>	<p>Project level assessment of hydrodynamic changes, as a result of renewables development, should include any relevant climate related changes to the marine environment when assessing impacts.</p>
Marine Geology and Coastal Processes	<p>The seabed in the vicinity of the Draft Plan Option likely consists of coarse sediments (e.g. sandy gravels and gravelly sands).</p> <p>Depths are shallow, near shore, reaching up to 50m to the north of Papa Westray, with greater depths found further offshore to the north of the option area.</p> <p>The area has generally moderate wave and tidal energies, particularly within the southern portion of the Draft Plan Option near to Papa Westray.</p>	<p>Some seabed disturbance and loss of habitat is likely during the site preparation and placement of device foundations. The scale of such disturbance will depend on the type and size of the device.</p> <p>Sediment disturbance caused during the installation process could also lead to secondary impacts such as increased turbidity during installation in areas with fine sediments and release of existing contaminants present in fine sediments. However, water quality impacts from installation works are considered to be less likely in areas of high wave or tidal energies, and where coarse seabed sediments are predominant.</p> <p>As such significant increases in turbidity are unlikely given the largely coarse sediments within the Draft Plan Option and the wave and tidal energies present within the area of search and in surrounding waters to the north.</p> <p>There is the potential for offshore developments within the Draft Plan Option to alter sediment dynamics and tidal flow fluxes in the vicinity of the site. This could lead to general impacts such as scour, deposition and abrasion in the area and the potential for related impacts to vulnerable coastlines (e.g. Westray and Papa Westray). However, these systems are likely to be</p>	<p>Direct impacts such as disturbance of the seabed during installation are likely to be temporary and localised.</p> <p>Loss of small areas of seabed associated with the installation of foundations/anchors may occur, although some natural regeneration may occur upon decommissioning of devices and removal of anchors.</p> <p>Changes in sediment dynamics and direct impacts such as scour, deposition and abrasion of seabed sediments are likely to be limited to the installation and operation phases of developments. However, in some circumstances, the effects of such changes may have long-term effects in coastal areas (e.g. the deposition of sediments in nearby coastal areas).</p>	<p>When projects are in the design process, consideration should be given to the location and arrangement of devices in order to build in mitigation to avoid potential impacts on marine geology and coastal processes, particularly for localised areas of erosion along nearby coastlines.</p> <p>It is recommended that sediment dynamic modelling is undertaken at project level to demonstrate potential effects in order to consider appropriate mitigation.</p> <p>Mitigation measures could include the design and use of rock scour protection (if required) around the base of any anchors or foundations used.</p>

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		complex, and as such, the potential for impacts will be site specific and dependent on factors such as the type and size of the devices and their foundations/anchors.		
Historic Environment	<p>There are no wreck sites located near to the Draft Plan Option.</p> <p>However, several scheduled monuments located in Papa Westray have coastal interests</p> <p>Sections of nearby coastlines have also been identified as potentially containing submerged archaeology.</p>	<p>There is the potential for significant impacts on the setting of coastal historic environment sites in Papa Westray. The significance of effects will depend on the location and type of technologies deployed, and will be more severe where devices have large visible above water components.</p> <p>There may be the potential for impacts on nearby historic wreck sites from the installation and operation of these sites.</p> <p>The likely presence of submerged archaeology means that there is potential for direct effects on any remains. However, development which includes archaeological survey may also have some positive effects by contributing to knowledge/understanding about the marine historic environment.</p>	<p>Direct effects on historic assets e.g. loss of assets caused by changes to coastal processes or the siting of offshore developments, would likely be permanent. The significance of the effects would, depend on the significance of the receptor.</p> <p>Effects on the setting of historic environment features would be indirect, and last for the lifespan of the development.</p>	<p>Effects on features of the historic environment can be avoided through appropriate siting of devices away from vulnerable coastlines and known historic marine features.</p> <p>Project level assessments should consider the potential for impacts on the setting of sites and seek to mitigate accordingly.</p> <p>Development in this area must demonstrate no adverse effects on the Heart of Neolithic Orkney World Heritage Site</p>
Landscape / Seascape	<p>There are some local landscape designations in coastal areas near to the Draft Plan Option area, the most notable being on Papa Westray.</p> <p>The wildness value of the surrounding area appears to be relatively low.</p>	<p>The Draft Plan Option is located off Papa Westray and is likely to be visible from nearby Westray and Papa Westray coastlines.</p> <p>In terms of operation, the majority of tidal devices components and supporting infrastructure are likely to be below the water surface, and as a result, visual impacts may be minimised. However, this will depend on the type of tidal technologies taken forward.</p> <p>Visibility may be greater during construction and maintenance periods more than during the operational phase. It is likely that navigational aids (e.g. marker buoys, lighting) will also have visual effects.</p> <p>There are a number of potential offshore receptors including ferries and recreational boats that sail close to the option area.</p>	<p>The surface-piercing components of tidal devices and their supporting infrastructure (if any) within the plan option areas may be visible from nearby coastal areas. As the majority of the tidal energy device infrastructure is expected to be submerged, the significance of effects may be lower than for other technologies (e.g. wind).</p> <p>The plan option could alter the current seascape and potentially affect its character. However, this will depend on the technology, for example, residual visual effects for some technologies could be minimal once constructed.</p> <p>Lighting of tidal devices and marker buoys may result in some visual effects during day and night, particularly those in near shore waters. The significance of effects will depend on the visibility of devices which needs to be established at the project level.</p> <p>Visual impacts could be greater for offshore receptors, such as recreational sea users as their proximity to devices would be greater than onshore receptors.</p>	<p>Full visual impact assessment will be required at the project level (EIA) to establish the visual envelope and significance of effects, particularly for the locally designated site at Papa Westray. However, the potential for visual impacts on the settings of nationally designated landscapes are considered to be low in this area. In addition effects may be limited as a result of the majority of devices and development being below the water surface.</p> <p>Visual impacts to onshore receptors could potentially be limited by construction further from the coast, in particular the north of the Draft Plan Option.</p>

TN4

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
Biodiversity, Flora and Fauna	<p>The Draft Plan Option is located in proximity to several designations in the area including a number of SSSI, and SPAs including West Westray, Calf of Eday, Papa Westray (North Hill and Holm) and, to the east, Fair Isle SPA. These sites are all designated for their seabird assemblage interests (including Guillemot, Kittiwake, Arctic skua, Razor bill Arctic tern,</p>	<p>Potential vulnerabilities were identified for collision and displacement of diving birds with tidal energy devices in relation to the Draft Plan Option. However, any potential risk is likely to vary by bird species and by device type. In general, collision risk will likely be greater for tidal devices with moving parts.</p> <p>Given the likely presence of marine mammals and fish,</p>	<p>The potential for collision and displacement of diving birds with underwater tidal devices has been identified. However, the significance of any impact is uncertain as effects on the population viability of individual species present in the area are not known.</p> <p>There is the potential for effects on cetaceans,</p>	<p>Project level assessment (EIA) that includes specific modelling and/or assessment will be required to demonstrate that there will be no significant impacts on bird species. There is likely a potential risk to seals in this area (particularly cumulatively) and any tidal developments should demonstrate avoidance of adverse effects. The results of monitoring from existing tidal lease sites</p>

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	<p>Fulmar, Cormorant and Great black-backed gull).</p> <p>Orkney also contains Faray and Holm of Faray SAC (designated for Grey seal) and Sanday SAC (designated for Common seal), amongst others. The Draft Plan Option overlaps with the East Sanday Coast SPA and Ramsar and the Sanday SAC. Furthermore there is an overlap with the North West Orkney proposed MPA search area, designated for Black guillemot and the Marine Geomorphology of the Scottish Shelf Seabed.</p> <p>While there are bird interests within the area, diving bird collision vulnerability for diving birds with tidal energy devices have been identified as lower than some other locations. However, this vulnerability may differ for individual species.</p> <p>While cetacean distribution in the vicinity of the Draft Plan Option is relatively low they may still be present within the Draft Plan Option. While no Basking shark sightings have been recorded in TN4, several have been recorded in the Orkney Islands, indicating the potential for encounters within the Draft Plan Option. Other elasmobranchs are known to use these waters. The importance of the area for both Grey and Common seals is demonstrated by the presence of Seal haul out areas located amongst the islands.</p> <p>The area is known to be used by fish species, including diadromous species, such as Atlantic salmon, and others including many commercially caught species. The region also contains important nursery grounds for several commercially important species of fish.</p> <p>The seabed surrounding Orkney largely consists of coarse sediments. These benthic habitats are likely to contain species used to strong tidal movements and currents.</p>	<p>particularly cetaceans and seals in Scotland's northern waters, there may be the potential for effects such as the creation of barriers to movement, collision with the device components and associated infrastructure, and underwater noise impacts during construction and operation. This is particularly relevant for seals given the proximity to haul out areas located around Orkney. However, there are gaps in present research knowledge to establish certainty of impact.</p> <p>The review of tidal technologies identified the potential effects from EMF on elasmobranchs and fish. However, the magnitude of these effects is unknown at this stage.</p> <p>Sediment movement from the installation of tidal devices could be possible although this would likely depend on the type of installation technology used.</p> <p>There is potential for impacts on benthic habitats as a result of scouring, smothering, deposition and abrasion in seabed areas containing coarse sediments as a result of placing devices and their supporting infrastructure within this area. These may be lower than in areas with more sandy sediments.</p> <p>The dynamic and turbid environment in the area would indicate that the benthos present will be conditioned to dynamic environments and as a result impact magnitude may be reduced. However, there are gaps in present research knowledge to establish certainty of effect.</p>	<p>seals, fish and elasmobranchs from the creation of barriers to movement, potential collision with infrastructure, and noise impacts during construction and operation.</p> <p>Elasmobranchs and fish may be impacted as a result of EMF associated with tidal energy devices and associated infrastructure. Indirect effects may include altered migratory pathways with unknown energetic/biological consequences.</p> <p>While effects associated with construction would likely be temporary, the potential for longer term effects from tidal devices with significant underwater infrastructure remains.</p> <p>There is the potential for direct benthic effects associated with the siting and installation of tidal devices, and for indirect effects including sediment movements (i.e. scouring, smothering, sediment deposition and abrasion) from their presence in the marine environment. However, it is expected sediment deposition impacts at this location will be limited as the existing environment is already dynamic.</p> <p>There may be the potential for significant effects to designated areas in locations such as Islay, if associated grid infrastructure was to be sited in the Draft Plan Option.</p>	<p>in this region currently in the application process have the potential to help provide greater certainty on the scale of these effects.</p> <p>Further research into the potential collision, displacement and the effects on cetaceans, seals elasmobranchs and fish (including elasmobranchs and Atlantic salmon) will help to identify the potential for significant effects.</p> <p>To date research has indicated that there are uncertain effects of EMF and noise on fish and elasmobranchs. The results of monitoring of existing and operational projects in this region have the potential to provide greater certainty on the scale of effects.</p> <p>Potential effects of supporting onshore/offshore grid connections will need to be considered to avoid effects on coastal areas.</p> <p>It is recommended that the boundary of the Draft Plan Option is kept under review as part of ascertaining whether the overlap with the North West Orkney proposed MPA will remain and would lead to adverse effects, or whether co-location is possible. Projects will need to demonstrate through the EIA process that they are compatible with the conservation objectives of the MPA.</p> <p>It is further recommended that the boundary of the Draft Plan Option is reviewed as part of ascertaining whether the overlap with the East Sanday SPA and Ramsar site and Sanday SAC, would lead to adverse effects or whether co-location is possible. Project level HRA must demonstrate development does not adversely affect the integrity of the designations.</p>
Population and Human Health	<p>The draft plan area in the north east Orkney Islands and surrounding coastal areas are used for a number of industry and recreational activities including fishing, recreational sea angling, medium recreational cruising and sailing.</p> <p>Important shipping routes are identified in the Marine Atlas in this area.</p>	<p>Whilst tidal devices will be constructed under the water surface there may be some elements of tidal devices that could be above the water. It is these elements that carry some collision risk both during operation and installation.</p> <p>The presence of tidal turbines and supporting infrastructure should have minimal impacts on recreational use, as vessels should be able to travel over the technology. If devices and supporting infrastructure pierce the surface there is some potential to displace some existing recreational activities, through limiting access to areas of the sea and potential disruption to perceived amenity value. However given the likely area of exclusion this effect is considered minimal.</p>	<p>Any collision could directly affect vessels and passengers, however it is not expected that tidal developments would result in a significant increase in collisions.</p> <p>It is difficult to predict the precise impact of potential changes to amenity on recreational use of the area. Some displacement could occur, however it is likely that most activities could continue within a smaller range or in other nearby locations.</p>	<p>Potential mitigation for collisions through the inclusion/mapping of offshore energy developments on navigational charts and the use of navigational aids (such as marker buoys and lighting, etc.) in the vicinity of the infrastructure.</p> <p>When planning projects, developers could work with the recreation sector to consider best how recreational activities might continue within the option boundary. Early consultation can also help to reduce impacts on important cruising routes. However, it is anticipated that in many instances tidal devices and recreational boating could collocate.</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
		Commercial ships with bigger hulls could have a higher risk of collision with devices, and in particular with operational and maintenance vehicles and infrastructure.		There may be the requirement for commercial shipping to be excluded from developed areas. This would be determined through further engagement between MS-LOT and the relevant navigation authorities at the project level.
Water and the Marine Environment	The coastal waters in the vicinity of the draft plan area were classified as being of good status under the WFD in 2011.	Potential for adverse water quality impacts during installation, operation and decommissioning of the developments (e.g. increased turbidity caused by works on the seabed associated with anchoring of devices, contamination from their installation and maintenance vessels).	Impacts associated with any contamination from seabed material disturbed during installation or potentially decommissioning is likely to be of localised and temporary nature, with the significance of effects dependant on the level of contamination. Impacts during operation and maintenance are considered less likely. The significance and characteristic of impacts associated with contamination from vessels is uncertain and cannot be described beyond the potential for it to occur.	Pollution risks associated with installation, maintenance and decommissioning of devices should be reduced and limited through building mitigation into construction procedures, to avoid discharges of harmful material and substances. Further assessment work may be required to reduce uncertainty regarding potential impacts on water quality, particularly on including shellfish waters. This includes a recommendation for hydrodynamic and water quality modelling as part of project level assessment
Climatic Factors	The potential for coastal erosion and accretion has been identified along soft and exposed coastlines in the vicinity of the draft plan area (e.g. sections of coast in Sanday and North Ronaldsay). While little long-term erosion has been observed, it is likely that several localised sections of coastline have been previously subject to erosion. The potential for increases in storm events and rising sea levels have been identified, due to the effects of climate change.	Potential for mixed effects on coastal erosion and accretion caused by changes to hydrodynamics and wave energy, particularly in vulnerable areas of coastline. Likely contributions to achieving GHG reductions through replacing energy generation from non-renewable sources to renewable sources.	Significance and character of effects are unknown. Depending on how offshore infrastructure affects hydrodynamics the effects on coastal erosion and accretion could be positive or negative. However any effects that do occur are likely to depend on the specific nature and location of the proposed development. Effects on the coastline are likely to be indirect.	Project level assessment of hydrodynamic changes, as a result of renewables development, should include any relevant climate related changes to the marine environment when assessing impacts.
Marine Geology and Coastal Processes	The seabed in the vicinity of the Draft Plan Option likely consists of coarse sediments (e.g. sandy gravels and gravelly sands). Depths are shallow, near shore, reaching up to 100m to the north and east of North Ronaldsay. The area has generally moderate wave and tidal energy resources, particularly between North Ronaldsay and Sanday, and to the north of North Ronaldsay.	Some seabed disturbance and loss of habitat is likely during the site preparation and placement of device foundations. The scale of such disturbance will depend on the type and size of the device. Sediment disturbance caused during the installation process could also lead to secondary impacts such as increased turbidity during installation in areas with fine sediments and release of existing contaminants present in fine sediments. However, water quality impacts from installation works are considered to be less likely in areas of high wave or tidal energies, and where coarse seabed sediments are predominant. As such significant increases in turbidity are unlikely given the largely coarse sediments within the Draft Plan Option and the wave and tidal energies present within the area of search and in surrounding waters to the north. There is the potential for offshore developments within the Draft Plan Option to alter sediment dynamics and tidal flow fluxes in the vicinity of the site. This could result in general impacts such as scour, deposition and abrasion in the area, and the potential for related impacts to vulnerable coastlines (e.g. soft coastlines on North Ronaldsay and Sanday). However, these systems are	Direct impacts such as disturbance of the seabed during installation are likely to be temporary and localised. Loss of small areas of seabed associated with the installation of foundations/anchors may occur, although some natural regeneration may occur upon decommissioning of devices and removal of anchors. Changes in sediment dynamics and direct impacts such as scour, deposition and abrasion of seabed sediments are likely to be limited to the installation and operation phases of developments. However, in some circumstances, the effects of such changes may have long-term effects in coastal areas (e.g. the deposition of sediments in nearby coastal areas).	When projects are in the design process, consideration should be given to the location and arrangement of devices in order to build in mitigation to avoid potential impacts on marine geology and coastal processes. It is recommended that sediment dynamic modelling is undertaken at project level to demonstrate potential effects in order to consider appropriate mitigation. Mitigation measures could include the design and use of rock scour protection (if required) around the base of any anchors or foundations used.

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		likely to be complex, and as such, the potential for impacts will be site specific and dependent on factors such as the type and size of the devices and their foundations/anchors.		
Historic Environment	<p>There are a number of coastal wreck sites located within and near to the Draft Plan Option.</p> <p>There are a significant number of scheduled monuments on nearby North Ronaldsay, including brochs, settlements and two lighthouses.</p> <p>Sections of nearby coastlines have also been identified as potentially containing submerged archaeology.</p>	<p>There is the potential for significant impacts on the setting of the coastal historic environment sites in North Ronaldsay. The significance of effects will depend on the location and type of technologies deployed, and will be more significant where devices have large visible above water components.</p> <p>There may be the potential for impacts on nearby historic wreck sites from the installation and operation of these sites.</p> <p>The likely presence of submerged archaeology means that there is potential for direct effects on any remains. However, development which includes archaeological survey may also have some positive effects by contributing to knowledge/understanding about the marine historic environment.</p>	<p>Direct effects on historic assets e.g. loss of assets caused by changes to coastal processes or the siting of offshore developments, would likely be permanent. The significance of the effects would, depend on the significance of the receptor.</p> <p>Effects on the setting of historic environment features would be indirect, and last for the lifespan of the development.</p>	<p>Effects on features of the historic environment can be avoided through appropriate siting of devices away from vulnerable coastlines and known historic marine features.</p> <p>Project level assessments should consider the potential for impacts on the setting of sites identified in the baseline and seek to mitigate accordingly.</p>
Landscape / Seascape	<p>There are several local landscape designations in coastal areas near to the Draft Plan Option area. However, Fair Isle (part of the Shetland NSA) is likely to be too great a distance from the Draft Plan Option for it to be visible.</p> <p>The wilderness value of the surrounding area appears to be relatively low.</p>	<p>The Draft Plan Option is likely to be visible from Sanday and from areas designated for local landscape quality on North Ronaldsay.</p> <p>In terms of operation, the majority of tidal devices components and supporting infrastructure will likely be below the water surface, and as a result, visual impacts may be minimised. However, this will depend on the type of tidal technologies taken forward.</p> <p>Visibility may be greater during construction and maintenance periods more than during the operational phase. It is likely that navigational aids (e.g. marker buoys, lighting) will also have visual effects.</p> <p>There are a number of potential offshore receptors including ferries, recreational boats and shipping that sail close to the Draft Plan Option.</p>	<p>The surface-piercing components of tidal devices and their supporting infrastructure (if any) within the plan option areas may be visible from nearby coastal areas. As the majority of the tidal energy device infrastructure is expected to be submerged, the significance of effects may be lower than for other technologies (e.g. wind).</p> <p>The plan option could alter the current seascape and potentially affect its character. However, this will depend on the technology, for example, residual visual effects for some technologies could be minimal once constructed.</p> <p>Lighting of tidal devices and marker buoys may result in some visual effects during day and night, particularly those in near shore waters. The significance of effects will depend on the visibility of devices which needs to be established at the project level.</p> <p>Visual impacts could be greater for offshore receptors, such as recreational sea users as their proximity to devices would be greater than onshore receptors.</p>	<p>Full visual impact assessment will be required at the project level (EIA) to establish the visual envelope and significance of landscape and seascape effects, particularly relating to Sanday and North Ronaldsay.</p> <p>However visual impacts to onshore receptors could potentially be limited by construction further from the coast, in particular the east of the Draft Plan Option. In addition effects may be limited as a result of the majority of devices and development being below the water surface.</p> <p>Development that will affect NSA should avoid adverse effects on the integrity of the area or the qualities for which it has been designated.</p>

TN5

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
Biodiversity, Flora and Fauna	The Draft Plan Option is located in proximity to number biodiversity designations such as SSSI, SACs and a number of SPAs. These include Fair Isle SPA, Foula SPA and Sumburgh Head SPA considered important for their bird interests (including Guillemot, Kittiwake, Arctic skua, Razor bill, Arctic tern, and Fulmar, amongst	The area contains important seabird interests, demonstrated by the presence of numerous designated sites near to the Draft Plan Option. Potential vulnerabilities were identified for diving bird collision and displacement with tidal energy devices in relation to the Draft Plan Option. However, any potential risk is likely to vary by bird species and by	<p>The potential for collision and displacement of diving birds with underwater tidal devices has been identified. However, the significance of any impact is uncertain as effects on the population viability of individual species present in the area are not known.</p> <p>There is the potential for effects on cetaceans, seals,</p>	Project level assessment (EIA) that includes specific modelling and/or assessment will be required to demonstrate that there will be no significant impacts on bird species. There is likely a potential risk to seals in this area (particularly cumulatively) and any tidal developments should demonstrate avoidance of adverse effects.

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
	<p>others). The Mousa SAC is also nearby and is designated for Common seal interests.</p> <p>The Draft Plan Option overlaps with the Sumburgh Head SPA.</p> <p>There are seabird and diving bird interests within the area, and vulnerability of diving birds to collision with tidal energy devices has been identified near the Draft Plan Option. However, this vulnerability may differ for individual species.</p> <p>Cetacean distribution in the vicinity of the Draft Plan Option is considered to be high, indicating their potential presence in this area. Similarly, several recorded Basking shark sightings near to the TN5 and around the Shetland coastline indicate the potential for encounters in this area. Other elasmobranch species are known to use this area. The importance of the area for both Grey and Common seals is demonstrated by the presence of Seal haul out areas around the Shetland Isles and by Seal density mapping, indicating the frequent use of this area by Common seals in particular.</p> <p>The area is known to be used by fish species, including diadromous species, such as Atlantic salmon, and others including many commercially caught species. The North region also contains important nursery grounds for several commercially important species of fish.</p> <p>The seabed surrounding Shetland consists of sandy gravels and gravelly sands. These benthic habitats are likely to contain species conditioned to strong tidal movements and currents.</p>	<p>device type. In general, collision risk will likely be greater for tidal devices with moving parts.</p> <p>Given the likely presence of marine mammals and fish, particularly cetaceans and seals in Scotland's northern waters, there may be the potential for effects such as the creation of barriers to movement, collision with the device components and associated infrastructure, and underwater noise impacts during construction and operation. This is particularly relevant for seals given the proximity to haul out areas located around Orkney. However, there are gaps in present research knowledge to establish certainty of impact.</p> <p>The review of tidal technologies identified the potential effects from EMF on elasmobranchs and fish. However, the magnitude of these effects is unknown at this stage.</p> <p>Sediment movement from the installation of tidal devices could be possible although this would likely depend on the type of installation technology used.</p> <p>There is potential for impacts on benthic habitats as a result of scouring, smothering, deposition and abrasion in seabed areas containing coarse sediments as a result of placing devices and their supporting infrastructure within this area. These may be lower than in areas with more sandy sediments.</p> <p>The dynamic and turbid environment in the area would indicate that the benthos present will be conditioned to dynamic environments and as a result impact magnitude may be reduced. However, there are gaps in present research knowledge to establish certainty of effect.</p>	<p>fish and elasmobranchs from the creation of barriers to movement, potential collision with infrastructure, and noise impacts during construction and operation.</p> <p>Elasmobranchs and fish may be impacted as a result of EMF associated with tidal energy devices and associated infrastructure. Indirect effects may include altered migratory pathways with unknown energetic/biological consequences.</p> <p>While effects associated with construction would likely be temporary, the potential for longer term effects from tidal devices with significant underwater infrastructure remains.</p> <p>There is the potential for direct benthic effects associated with the siting and installation of tidal devices, and for indirect effects including sediment movements (i.e. scouring, smothering, sediment deposition and abrasion) from their presence in the marine environment. However, it is expected sediment deposition impacts at this location will be limited as the existing environment is already dynamic.</p> <p>There may be the potential for significant effects to designated areas in locations such as Islay, if associated grid infrastructure was to be sited in the Draft Plan Option.</p>	<p>Further research into the potential collision, displacement and the effects on cetaceans, seals elasmobranchs and fish (including elasmobranchs and Atlantic salmon) will help to identify the potential for significant effects.</p> <p>To date research has indicated that there are uncertain effects of EMF and noise on fish and elasmobranchs. The results of monitoring of existing and operational projects in this region have the potential to provide greater certainty on the scale of effects.</p> <p>Potential effects of supporting onshore/offshore grid connections will need to be considered to avoid effects on coastal areas.</p> <p>It is recommended that the boundary of the Draft Plan Option is kept under review as part of ascertaining whether the overlap with the Sumburgh Head SPA would lead to adverse effects on its integrity or whether co-location is possible.</p>
Population and Human Health	<p>The draft plan area off Sumburgh Head and the nearby coastal areas are used for a number of industry and recreational activities including fishing, recreational sea angling, light recreational cruising, sailing and bathing.</p>	<p>Whilst tidal devices will be constructed under the water surface there may be some elements of tidal devices that could be above the water. It is these elements that carry some collision risk both during operation and installation.</p> <p>The presence of tidal turbines and supporting infrastructure should have minimal impacts on recreational use, as vessels should be able to travel over the technology. If devices and supporting infrastructure pierce the surface there is some potential to displace some existing recreational activities, through limiting access to areas of the sea and potential disruption to perceived amenity value. However given the likely area of exclusion this effect is considered minimal.</p> <p>Commercial ships with bigger hulls could have a higher risk of collision with devices, and in particular</p>	<p>Any collision could directly affect vessels and passengers, however it is not expected that tidal developments would result in a significant increase in collisions.</p> <p>It is difficult to predict the precise impact of potential changes to amenity on recreational use of the area. Some displacement could occur, however it is likely that most activities could continue within a smaller range or in other nearby locations.</p>	<p>Potential mitigation for collisions through the inclusion/mapping of offshore energy developments on navigational charts and the use of navigational aids (such as marker buoys and lighting, etc.) in the vicinity of the infrastructure.</p> <p>When planning projects, developers could work with the recreation sector to consider best how recreational activities might continue within the option boundary. Early consultation can also help to reduce impacts on important cruising routes. However, it is anticipated that in many instances tidal devices and recreational boating could collocate.</p> <p>There may be the requirement for commercial shipping to be excluded from developed areas. This would be determined through further engagement between MS-LOT and the relevant navigation</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
		with operational and maintenance vehicles and infrastructure.		authorities at the project level.
Water and the Marine Environment	<p>The coastal waters in the vicinity of the draft plan area were classified as being of good status under the WFD in 2011.</p> <p>There are a number of designated shellfish waters within the vicinity of the Draft Plan Option around the isles of Shetland.</p>	<p>Potential for adverse water quality impacts during installation, operation and decommissioning of the developments (e.g. increased turbidity caused by works on the seabed associated with anchoring of devices, contamination from their installation and maintenance vessels).</p>	<p>Impacts associated with any contamination from seabed material disturbed during installation or potentially decommissioning is likely to be of localised and temporary nature, with the significance of effects dependant on the level of contamination. Impacts during operation and maintenance are considered less likely.</p> <p>The significance and characteristic of impacts associated with contamination from vessels is uncertain and cannot be described beyond the potential for it to occur.</p>	<p>Pollution risks associated with installation, maintenance and decommissioning of devices should be reduced and limited through building mitigation into construction procedures, to avoid discharges of harmful material and substances.</p> <p>Further assessment work may be required to reduce uncertainty regarding potential impacts on water quality, particularly on including shellfish waters. This includes a recommendation for hydrodynamic and water quality modelling as part of project level assessment</p>
Climatic Factors	<p>Several sheltered beaches identified at the southern tip of the isles (i.e. Sumburgh Head) have been identified as being potentially vulnerable to coastal erosion or accretion. Wave erosion has been observed on most sand beaches in the isles, and varying degrees of cliff erosion depending on the rock type.</p> <p>The potential for increases in storm events and rising sea levels have been identified, due to the effects of climate change.</p>	<p>Potential for mixed effects on coastal erosion and accretion caused by changes to hydrodynamics and wave energy, particularly to soft and sandy coastlines like those near Sumburgh Head.</p> <p>Likely contributions to achieving GHG reductions through replacing energy generation from non-renewable sources to renewable sources.</p>	<p>Significance and character of effects are unknown. Depending on how offshore infrastructure affects hydrodynamics the effects on coastal erosion and accretion could be positive or negative. However any effects that do occur are likely to depend on the specific nature and location of the proposed development.</p> <p>Effects on the coastline are likely to be indirect.</p>	<p>Project level assessment of hydrodynamic changes, as a result of renewables development, should include any relevant climate related changes to the marine environment when assessing impacts.</p>
Marine Geology and Coastal Processes	<p>The seabed in the vicinity of the Draft Plan Option consists mainly of coarse sediments (i.e. sandy gravels and gravels).</p> <p>The depth of the seabed increases sharply from the shoreline near Sumburgh Head to the south west, south and south east. Depths reach up to around 90m within the option area.</p> <p>While the area has generally moderate wave and moderate tidal energy resources, the strongest tidal energies are found just offshore and south west of Sumburgh Head.</p>	<p>Some seabed disturbance and loss of habitat is likely during site preparation and placement of device foundations. The scale of such disturbance will depend on the type and size of the device.</p> <p>Sediment disturbance caused during the installation process could also lead to secondary impacts such as increased turbidity during installation in areas with fine sediments and release of existing contaminants present in fine sediments. However, water quality impacts from installation works are considered to be less likely in areas of high wave or tidal energies, and where coarse seabed sediments are predominant.</p> <p>As such significant increases in turbidity are unlikely given the coarse sediments within the Draft Plan Option and the wave and tidal energies within the Draft Plan Option.</p> <p>There is the potential for offshore developments within the Draft Plan Option to alter sediment dynamics and tidal flow fluxes in the vicinity of the site. This could result in potential general impacts such as scour, deposition and abrasion in the area and the potential for related impacts to vulnerable coastlines. However, these systems are likely to be complex, and as such, the potential for impacts will be site specific and dependent on factors such as the type and size of the devices and their foundations/anchors.</p>	<p>Direct impacts such as disturbance of the seabed during installation are likely to be temporary and localised.</p> <p>Loss of small areas of seabed associated with the installation of foundations/anchors may occur, although some natural regeneration may occur upon decommissioning of devices and removal of anchors.</p> <p>Changes in sediment dynamics and direct impacts such as scour, deposition and abrasion of seabed sediments are likely to be limited to the installation and operation phases of developments. However, in some circumstances, the effects of such changes may have long-term effects in coastal areas (e.g. the deposition of sediments in nearby coastal areas).</p>	<p>When projects are in the design process, consideration should be given to the location and arrangement of devices in order to build in mitigation to avoid potential impacts on marine geology and coastal processes.</p> <p>It is recommended that sediment dynamic modelling is undertaken at project level to demonstrate potential effects in order to consider appropriate mitigation.</p> <p>Mitigation measures could include the design and use of rock scour protection (if required) around the base of any anchors or foundations used.</p>
Historic Environment	<p>In general terms, the coastline of Shetland is particularly sensitive to development with many scheduled monuments including brochs and forts along its coast. This Draft Plan Option</p>	<p>There is the potential for impacts on the setting of coastal historic environment assets, including Sumburgh Head Lighthouse.</p>	<p>Direct effects on historic assets e.g. loss of assets caused by changes to coastal processes or the siting of offshore developments, would likely be permanent. The significance of the effects would, depend on the</p>	<p>Effects on features of the historic environment can be avoided through appropriate siting of devices away from vulnerable coastlines and known historic marine features.</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
	<p>area sits close to the southern part of the Shetland Isles, in an area containing numerous historic environment features. The most notable is the A-listed Sumburgh Head Lighthouse.</p> <p>Several marine and coastal wrecks are located in and adjacent to the Draft Plan Option, including a cluster immediately to the south east of the area.</p>	<p>There may be the potential for impacts on nearby historic wreck sites from the installation and operation of offshore energy sites.</p>	<p>significance of the receptor.</p> <p>Effects on the setting of historic environment features would be indirect, and last for the lifespan of the development.</p>	<p>Project level assessments should consider the potential for impacts on the setting of sites identified in the baseline and seek to mitigate accordingly.</p>
Landscape / Seascape	<p>The Draft Plan Option is likely to be visible from the Shetland NSA and the Sumburgh Peninsula. These areas are also considered to have a relatively high wildness value.</p> <p>Fair isle (part of the Shetland NSA) is likely to be too great a distance from the Draft Plan Option for it to be visible.</p>	<p>The site is likely to be visible from coastal areas designated for landscape quality, including the Shetland NSA and on areas considered to have wildness value.</p> <p>In terms of operation, the majority of tidal devices components and supporting infrastructure will likely be below the water surface, and as a result, visual impacts may be minimised. However, this will depend on the type of tidal technologies taken forward.</p> <p>Visibility may be greater during construction and maintenance periods more than during the operational phase. It is likely that navigational aids (e.g. marker buoys, lighting) will also have visual effects.</p> <p>There are a number of potential offshore receptors including, ferries, and recreational boats that sail close to the Draft Plan Option.</p>	<p>The surface-piercing components of tidal devices and their supporting infrastructure (if any) within the plan option areas may be visible from Sumburgh Head and nearby coastal areas. As the majority of the tidal energy device infrastructure is expected to be submerged, the significance of effects may be lower than for other technologies (e.g. wind).</p> <p>The plan option could alter the current seascape and potentially affect its character. However, this will depend on the technology, for example, residual visual effects for some technologies could be minimal once constructed.</p> <p>Lighting of tidal devices and marker buoys may result in some visual effects during day and night, particularly those in near shore waters. The significance of effects will depend on the visibility of devices which needs to be established at the project level.</p> <p>Visual impacts could be greater for offshore receptors, such as recreational sea users as their proximity to devices would be greater than onshore receptors.</p>	<p>Full visual impact assessment will be required at the project level (EIA) to establish the visual envelope and significance of landscape and seascape effects on nearby coastal areas. However visual impacts to onshore receptors could potentially be limited by construction further from the coast, in particular the south of the Draft Plan Option. In addition effects may be limited as a result of the majority of devices and development being below the water surface.</p> <p>Development that will affect NSA should avoid adverse effects on the integrity of the area or the qualities for which it has been designated.</p>

TN6

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
Biodiversity, Flora and Fauna	<p>The Draft Plan Option is located in proximity to a range of biodiversity designations including numerous SSSI, and SPAs. These include Otterswick and Graveland SPA, and Fetlar SPA which are considered important for seabird assemblage (including Red-necked phalarope, Whimbrel, Arctic skua, Arctic tern, Dunlin, Fulmar and Great skua, amongst others). Sullom Voe SAC, (designated for its reefs, lagoons, shallow inlets and bays). Yell Sound Coast SAC (includes Otter and Common seal features) and overlaps with the Draft Plan Option.</p> <p>There are bird interests within the area and the vulnerability of diving birds to collision with tidal energy devices has been identified. However, this vulnerability may differ for individual species.</p>	<p>The area contains important seabird interests, demonstrated by the presence of numerous designated sites near to the Draft Plan Option. Potential vulnerabilities were identified for diving bird collision and displacement with tidal energy devices. However, any potential risk is likely to vary by bird species and by device type. In general, collision risk will likely be greater for tidal devices with moving parts.</p> <p>Given the likely presence of marine mammals and fish, particularly cetaceans and seals in Scotland's northern waters, there may be the potential for effects such as the creation of barriers to movement, collision with the device components and associated infrastructure, and underwater noise impacts during construction and operation. This is particularly relevant for seals given the proximity to haul out areas located around Orkney. However, there are gaps in present research knowledge to establish certainty of impact.</p>	<p>The potential for collision and displacement of diving birds with underwater tidal devices has been identified. However, the significance of any impact is uncertain as effects on the population viability of individual species present in the area are not known.</p> <p>There is the potential for effects on cetaceans, seals, fish and elasmobranchs from the creation of barriers to movement, potential collision with infrastructure, and noise impacts during construction and operation.</p> <p>Elasmobranchs and fish may be impacted as a result of EMF associated with tidal energy devices and associated infrastructure. Indirect effects may include altered migratory pathways with unknown energetic/biological consequences.</p> <p>While effects associated with construction would likely be temporary, the potential for longer term</p>	<p>Project level assessment (EIA) that includes specific modelling and/or assessment will be required to demonstrate that there will be no significant impacts on bird species. There is likely a potential risk to Seals in this area (particularly cumulatively) and any tidal developments should demonstrate avoidance of adverse effects. The results of monitoring from existing tidal lease sites in this region currently in the application process have the potential to help provide greater certainty on the scale of these effects.</p> <p>Further research into the potential collision, displacement and the effects on cetaceans, seals elasmobranchs and fish (including elasmobranchs and Atlantic salmon) will help to identify the potential for significant effects.</p> <p>To date research has indicated that there are</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
	<p>The cetacean distribution maps for the area indicate their potential presence of near to TN6. Similarly, several recorded Basking shark sightings within the Draft Plan Option and around the Shetland coastline indicates there is the potential for encounters in this area. Other elasmobranch species are also known to use these waters. The importance of the area for seals and the likely presence of both Grey and Common seals is demonstrated in the location of several Seal haul out areas in close proximity to the Draft Plan Option.</p> <p>The area is known to be used by fish species, including diadromous species, such as Atlantic salmon, and others including many commercially caught species. The region also contains important nursery grounds for several commercially important species of fish.</p> <p>The seabed in the vicinity of the Draft Plan Option consists mainly of coarse sediments (i.e. sandy gravels and gravels) with some areas of muddy sands and gravels located within Yell Sound. The benthic habitats in this area are likely to contain species used to strong tidal movements and currents.</p>	<p>The review of tidal technologies identified the potential effects from EMF on elasmobranchs and fish. However, the magnitude of these effects is unknown at this stage.</p> <p>Sediment movement from the installation of tidal devices could be possible although this would likely depend on the type of installation technology used.</p> <p>There is potential for impacts on benthic habitats as a result of scouring, smothering, deposition and abrasion of seabed in seabed areas containing coarse sediments as a result of placing devices and their supporting infrastructure within this area. These may be lower than in areas with more sandy sediments.</p> <p>The dynamic and turbid environment in the area would indicate that the benthos present will be conditioned to dynamic environments and as a result impact magnitude may be reduced. However, there are gaps in present research knowledge to establish certainty of effect.</p>	<p>effects from tidal devices with significant underwater infrastructure remains.</p> <p>There is the potential for direct benthic effects associated with the siting and installation of tidal devices, and for indirect effects including sediment movements (i.e. scouring, smothering, sediment deposition and abrasion) from their presence in the marine environment. However, it is expected sediment deposition impacts at this location will be limited as the existing environment is already dynamic.</p> <p>There may be the potential for significant effects to designated areas in locations such as Islay, if associated grid infrastructure was to be sited in the Draft Plan Option.</p>	<p>uncertain effects of EMF and noise on fish and elasmobranchs. The results of monitoring of existing and operational projects in this region have the potential to provide greater certainty on the scale of effects.</p> <p>Potential effects of supporting onshore/offshore grid connections will need to be considered to avoid effects on coastal areas.</p> <p>It is recommended that the boundary of the Draft Plan Option is reviewed as part of ascertaining whether the overlap with the Yell Sounds Coast SAC, would lead to adverse effects or whether co-location is possible. Project level HRA must demonstrate development does not adversely affect the integrity of the SAC.</p>
Population and Human Health	<p>The draft plan area in Yell Sound and in nearby coastal areas are used for a number of industry and recreational activities including fishing, recreational sea angling and sailing.</p>	<p>Whilst tidal devices will be constructed under the water surface there may be some elements of tidal devices that could be above the water. It is these elements that carry some collision risk both during operation and installation.</p> <p>The presence of tidal turbines and supporting infrastructure should have minimal impacts on recreational use, as vessels should be able to travel over the technology. If devices and supporting infrastructure pierce the surface there is some potential to displace some existing recreational activities, through limiting access to areas of the sea and potential disruption to perceived amenity value. However given the likely area of exclusion this effect is considered minimal.</p> <p>Commercial ships with bigger hulls could have a higher risk of collision with devices, and in particular with operational and maintenance vehicles and infrastructure.</p>	<p>Any collision could directly affect vessels and passengers, however it is not expected that tidal developments would result in a significant increase in collisions.</p> <p>It is difficult to predict the precise impact of potential changes to amenity on recreational use of the area. Some displacement could occur, however it is likely that most activities could continue within a smaller range or in other nearby locations.</p>	<p>Potential mitigation for collisions through the inclusion/mapping of offshore energy developments on navigational charts and the use of navigational aids (such as marker buoys and lighting, etc.) in the vicinity of the infrastructure.</p> <p>When planning projects, developers could work with the recreation sector to consider best how recreational activities might continue within the option boundary. Early consultation can also help to reduce impacts on important cruising routes. However, it is anticipated that in many instances tidal devices and recreational boating could collocate.</p> <p>There may be the requirement for commercial shipping to be excluded from developed areas. This would be determined through further engagement between MS-LOT and the relevant navigation authorities at the project level.</p>
Water and the Marine Environment	<p>The coastal waters in the vicinity of the draft plan area were classified as being of good status under the WFD in 2011.</p> <p>There are a number of designated shellfish waters within the vicinity of the Draft Plan Option around the isles of Shetland.</p>	<p>Potential for adverse water quality impacts during installation, operation and decommissioning of the developments (e.g. increased turbidity caused by works on the seabed associated with anchoring of devices, contamination from their installation and maintenance vessels).</p>	<p>Impacts associated with any contamination from seabed material disturbed during installation or potentially decommissioning is likely to be of localised and temporary nature, with the significance of effects dependant on the level of contamination. Impacts during operation and maintenance are considered less likely.</p> <p>The significance and characteristic of impacts</p>	<p>Pollution risks associated with installation, maintenance and decommissioning of devices should be reduced and limited through building mitigation into construction procedures, to avoid discharges of harmful material and substances.</p> <p>Further assessment work may be required to reduce uncertainty regarding potential impacts on water quality, particularly on including shellfish</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
			associated with contamination from vessels is uncertain and cannot be described beyond the potential for it to occur.	waters. This includes a recommendation for hydrodynamic and water quality modelling as part of project level assessment
Climatic Factors	<p>Wave erosion has been observed on most sand beaches in the isles, and varying degrees of cliff erosion depending on the rock type. Several areas of coastline between Shetland and Yell Islands and along Yell Sound near to the draft plan area have been identified as potentially susceptible to coastal erosion. Coastal erosion has been observed along several sheltered sections of soft coast on the eastern side of Shetland Island, located to the south west of the draft plan area.</p> <p>The potential for increases in storm events and rising sea levels have been identified, due to the effects of climate change.</p>	<p>Potential for mixed effects on coastal erosion and accretion caused by changes to hydrodynamics and wave energy, particularly to soft and sandy coastlines like those located along the western (Shetland Island) side of Yell Sound.</p> <p>Likely contributions to achieving GHG reductions through replacing energy generation from non-renewable sources to renewable sources.</p>	<p>Significance and character of effects are unknown. Depending on how offshore infrastructure affects hydrodynamics the effects on coastal erosion and accretion could be positive or negative. However any effects that do occur are likely to depend on the specific nature and location of the proposed development.</p> <p>Effects on the coastline are likely to be indirect.</p>	Project level assessment of hydrodynamic changes, as a result of renewables development, should include any relevant climate related changes to the marine environment when assessing impacts.
Marine Geology and Coastal Processes	<p>The seabed in the vicinity of the Draft Plan Option consists mainly of coarse sediments (i.e. sandy gravels and gravels) with some areas of muddy sands and gravels located within Yell Sound near to or within the option area.</p> <p>The area has been included as a plan option area based on its tidal energy resources.</p>	<p>Some seabed disturbance and loss of habitat is likely with the site preparation and placement of device foundations. The scale of such disturbance is likely dependent on the type and size of the device.</p> <p>Sediment disturbance caused during the installation process could also lead to secondary impacts such as increased turbidity during installation in areas with fine sediments and release of existing contaminants present in fine sediments. However, water quality impacts from installation works are considered to be less likely in areas of high wave or tidal energies, and where coarse seabed sediments are predominant.</p> <p>As such significant increases in turbidity are unlikely given the coarse sediments within the Draft Plan Option and the tidal energies within the Draft Plan Option.</p> <p>There is the potential for offshore developments within the Draft Plan Option to alter sediment dynamics and tidal flow fluxes in the vicinity of the site. This could result in potential general impacts such as scour, deposition and abrasion in the area and related impacts to vulnerable coastlines within Yell Sound. However, these systems are likely to be complex, and as such, the potential for impacts will be site specific and dependent on factors such as the type and size of the devices and their foundations/anchors.</p>	<p>Direct impacts such as disturbance of the seabed during installation are likely to be temporary and localised.</p> <p>Loss of small areas of seabed associated with the installation of foundations/anchors may occur, although some natural regeneration may occur upon decommissioning of devices and removal of anchors.</p> <p>Changes in sediment dynamics and direct impacts such as scour, deposition and abrasion of seabed sediments are likely to be limited to the installation and operation phases of developments. However, in some circumstances, the effects of such changes may have long-term effects in coastal areas (e.g. the deposition of sediments in nearby coastal areas).</p>	<p>When projects are in the design process, consideration should be given to the location and arrangement of devices in order to build in mitigation to avoid potential impacts on marine geology and coastal processes, particularly within sheltered bays and areas near Yell Sound.</p> <p>It is recommended that sediment dynamic modelling is undertaken at project level to demonstrate potential effects in order to consider appropriate mitigation.</p> <p>Mitigation measures could include the design and use of rock scour protection (if required) around the base of any anchors or foundations used.</p>
Historic Environment	<p>There are a number of coastal wreck sites located within and near to the Draft Plan Option.</p> <p>There are a significant number of important historic environment assets, including several scheduled brochs and listed buildings, in coastal areas adjacent to the Draft Plan Option.</p> <p>Sections of nearby coastlines have also been identified as potentially containing submerged</p>	<p>There is the potential for significant impacts on the setting of the coastal historic environment assets adjacent to Yell Sound.</p> <p>There is also the potential for exacerbation of coastal erosion issues in the area caused by the installation and operation of tidal devices and their associated infrastructure.</p> <p>However in both cases, effects will depend on the technologies deployed. Effects on the setting of assets will be more significant where devices employed have</p>	<p>Direct effects on historic assets e.g. loss of assets caused by changes to coastal processes or the siting of offshore developments, would likely be permanent. The significance of the effects would, depend on the significance of the receptor.</p> <p>Effects on the setting of historic environment features would be indirect, and last for the lifespan of the development.</p>	<p>Effects on features of the historic environment can be avoided through appropriate siting of devices away from vulnerable coastlines and known historic marine features.</p> <p>Project level assessments should consider the potential for impacts on the setting of sites identified in the baseline and seek to mitigate accordingly.</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
	archaeology, with some sections of known coastal archaeology identified as being at risk of coastal erosion.	<p>visible above water components.</p> <p>There may be the potential for impacts on nearby historic wreck sites from the installation and operation of these sites.</p> <p>The likely presence of submerged archaeology means that there is potential for direct effects on any remains. However, development which includes archaeological survey may also have some positive effects by contributing to knowledge/understanding about the marine historic environment.</p>		
Landscape / Seascape	The Draft Plan Option is likely to be visible from the Shetland NSA component located at the top of Yell sound and along the coastlines within the sound itself. This region of the Shetland Islands also has a relatively high wildness value.	<p>The site is likely to be visible from areas designated for landscape quality including the Shetland NSA and on areas with wildness value.</p> <p>In terms of operation, the majority of tidal devices components and supporting infrastructure will likely be below the water surface, and as a result, visual impacts may be minimised. However, this will depend on the type of tidal technologies taken forward.</p> <p>Visibility may be greater during construction and maintenance periods more than during the operational phase. It is likely that navigational aids (e.g. marker buoys, lighting) will also have visual effects.</p> <p>There are a number of potential offshore receptors including, ferries, and recreational boats that sail close to the Draft Plan Option.</p>	<p>The surface-piercing components of tidal devices and their supporting infrastructure (if any) within the plan option areas may be visible from coastal areas within Yell Sound. As the majority of the tidal energy device infrastructure is expected to be submerged, the significance of effects may be lower than for other technologies (e.g. wind).</p> <p>The plan option could alter the current seascape and potentially affect its character. However, this will depend on the technology, for example, residual visual effects for some technologies could be minimal once constructed.</p> <p>Lighting of tidal devices and marker buoys may result in some visual effects during day and night, particularly those in near shore waters. The significance of effects will depend on the visibility of devices which needs to be established at the project level.</p> <p>Visual impacts could be greater for offshore receptors, such as recreational sea users as their proximity to devices would be greater than onshore receptors.</p>	<p>Full visual impact assessment will be required at the project level (EIA) to establish the visual envelope and significance of landscape and seascape effects on nearby coastal areas, particularly to the NSA located to the north west of the Draft Plan Option. However, the potential for visual impacts on settings of protected landscapes are likely to be low in this area. In addition effects may be limited as a result of the majority of devices and development being below the water surface.</p> <p>Development that will affect NSA should avoid adverse effects on the integrity of the area or the qualities for which it has been designated.</p>

TN7

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
Biodiversity, Flora and Fauna	<p>The Draft Plan Option is located in proximity to several biodiversity designations. It overlaps with the Hermaness, Saxa Vord and Valla Field SPA designated for Seabird assemblage (including, Guillemot, Kittiwake, Puffin, Red-throated diver, Shag, Fulmar, Great skua, and Gannet). This site is also designated as a SSSI. Fetlar SPA is also located in the general vicinity of TN7, and is designated for a similar range of bird species. South of the Draft Plan Option is Otterswick and Graveland SPA (designated for Red-throated diver).</p> <p>The Draft Plan Option TN7 overlaps with the Hermaness, Saxa Vord and Valla Field SPA.</p>	<p>The area contains important seabird interests, demonstrated by the presence of numerous designated sites near to the Draft Plan Option. Potential vulnerabilities were identified for diving bird collision and displacement with tidal energy devices. However, any potential risk is likely to vary by bird species and by device type. In general, collision risk will likely be greater for tidal devices with moving parts.</p> <p>Given the likely presence of marine mammals and fish, particularly Cetaceans and Seals in Scotland's northern waters, there may be the potential for effects such as the creation of barriers to movement, collision with the device components and associated infrastructure, and underwater noise impacts during construction and operation. This is particularly relevant for seals given the</p>	<p>The potential for collision and displacement of diving birds with underwater tidal devices has been identified. However, the significance of any impact is uncertain as effects on the population viability of individual species present in the area are not known.</p> <p>There is the potential for effects on cetaceans, seals, fish and elasmobranchs from the creation of barriers to movement, potential collision with infrastructure, and noise impacts during construction and operation.</p> <p>Elasmobranchs and fish may be impacted as a result of EMF associated with tidal energy devices and associated infrastructure. Indirect effects may include altered migratory pathways with unknown energetic/biological consequences.</p>	<p>Project level assessment (EIA) that includes specific modelling and/or assessment will be required to demonstrate that there will be no significant impacts on bird species. There is likely a potential risk to seals in this area (particularly cumulatively) and any tidal developments should demonstrate avoidance of adverse effects.</p> <p>Further research into the potential collision, displacement and the effects on cetaceans, seals elasmobranchs and fish (including elasmobranchs and Atlantic salmon) will help to identify the potential for significant effects.</p> <p>To date research has indicated that there are uncertain effects of EMF and noise on fish and</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
	<p>Clearly there are bird interests within the area and the vulnerability of diving birds to collision with tidal energy devices has been identified, particularly in winter. However, this vulnerability may differ for individual species.</p> <p>The Cetacean distribution maps for the area indicate the potential presence of Cetaceans near to TN7. Basking shark sightings within the Draft Plan Option and around the Shetland coastline indicates there is also the potential for encounters in this area. Other elasmobranch species are known to use these waters. The importance of the area for seals and the likely presence both Grey and Common seals is demonstrated by the seal density mapping and the presence of seal haul out areas around the Shetland Isles.</p> <p>The area is known to be used by fish species, including diadromous species such as Atlantic salmon, and others including many commercially caught species. The region also contains important nursery grounds for several commercially important species of fish.</p> <p>The seabed in the vicinity of the Draft Plan Option consists mainly of coarse sediments (i.e. sandy gravels and gravelly sands). These benthic habitats are likely to contain species used to strong tidal movements and currents.</p>	<p>proximity to haul out areas located around Orkney. However, there are gaps in present research knowledge to establish certainty of impact.</p> <p>The review of tidal technologies identified the potential effects from EMF on elasmobranchs and fish. However, the magnitude of these effects is unknown at this stage.</p> <p>Sediment movement from the installation of tidal devices could be possible although this would likely depend on the type of installation technology used.</p> <p>There is potential for impacts on benthic habitats as a result of scouring, smothering, deposition and abrasion of seabed in seabed areas containing coarse sediments as a result of placing devices and their supporting infrastructure within this area. These may be lower than in areas with more sandy sediments.</p> <p>The dynamic and turbid environment in the area would indicate that the benthos present will be conditioned to dynamic environments and as a result impact magnitude may be reduced. However, there are gaps in present research knowledge to establish certainty of effect.</p>	<p>While effects associated with construction would likely be temporary, the potential for longer term effects from tidal devices with significant underwater infrastructure remains.</p> <p>There is the potential for direct benthic effects associated with the siting and installation of tidal devices, and for indirect effects including sediment movements (i.e. scouring, smothering, sediment deposition and abrasion) from their presence in the marine environment. However, it is expected sediment deposition impacts at this location will be limited as the existing environment is already dynamic.</p> <p>There may be the potential for significant effects to designated areas in locations such as Islay, if associated grid infrastructure was to be sited in the Draft Plan Option.</p>	<p>elasmobranchs. The results of monitoring of existing and operational projects in this region have the potential to provide greater certainty on the scale of effects.</p> <p>Potential effects of supporting onshore/offshore grid connections will need to be considered to avoid effects on coastal areas.</p> <p>It is recommended that the boundary of the Draft Plan Option is kept under review as part of ascertaining whether the overlap with the Hermaness, Saxa Vord and Valla Field SPA would lead to adverse effects on its integrity or whether co-location is possible.</p>
Population and Human Health	<p>The Draft Plan Option is located at the northern tip of the Shetland Islands. Nearby coastal waters are used for a number of industry and recreational activities including fishing, recreational sea angling and sailing.</p>	<p>Whilst tidal devices will be constructed under the water surface there may be some elements of tidal devices that could be above the water. It is these elements that carry some collision risk both during operation and installation.</p> <p>The presence of tidal turbines and supporting infrastructure should have minimal impacts on recreational use, as vessels should be able to travel over the technology. If devices and supporting infrastructure pierce the surface there is some potential to displace some existing recreational activities, through limiting access to areas of the sea and potential disruption to perceived amenity value. However given the likely area of exclusion this effect is considered minimal.</p> <p>Commercial ships with bigger hulls could have a higher risk of collision with devices, and in particular with operational and maintenance vehicles and infrastructure.</p>	<p>Any collision could directly affect vessels and passengers, however it is not expected that tidal developments would result in a significant increase in collisions.</p> <p>It is difficult to predict the precise impact of potential changes to amenity on recreational use of the area. Some displacement could occur, however it is likely that most activities could continue within a smaller range or in other nearby locations.</p>	<p>Potential mitigation for collisions through the inclusion/mapping of offshore energy developments on navigational charts and the use of navigational aids (such as marker buoys and lighting, etc.) in the vicinity of the infrastructure.</p> <p>When planning projects, developers could work with the recreation sector to consider best how recreational activities might continue within the option boundary. Early consultation can also help to reduce impacts on important cruising routes. However, it is anticipated that in many instances tidal devices and recreational boating could collocate.</p> <p>There may be the requirement for commercial shipping to be excluded from developed areas. This would be determined through further engagement between MS-LOT and the relevant navigation authorities at the project level.</p>
Water and the Marine Environment	<p>The coastal waters in the vicinity of the draft plan area were classified as being of good status under the WFD in 2011.</p> <p>There are a number of designated shellfish waters within the vicinity of the Draft Plan Option around the isles of Shetland.</p>	<p>Potential for adverse water quality impacts during installation, operation and decommissioning of the developments (e.g. increased turbidity caused by works on the seabed associated with anchoring of devices, contamination from their installation and maintenance vessels).</p>	<p>Impacts associated with any contamination from seabed material disturbed during installation or potentially decommissioning is likely to be of localised and temporary nature, with the significance of effects dependant on the level of contamination. Impacts during operation and maintenance are considered less likely.</p>	<p>Pollution risks associated with installation, maintenance and decommissioning of devices should be reduced and limited through building mitigation into construction procedures, to avoid discharges of harmful material and substances.</p> <p>Further assessment work may be required to</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
			The significance and characteristic of impacts associated with contamination from vessels is uncertain and cannot be described beyond the potential for it to occur.	reduce uncertainty regarding potential impacts on water quality, particularly on including shellfish waters. This includes a recommendation for hydrodynamic and water quality modelling as part of project level assessment
Climatic Factors	<p>Wave erosion has been observed on most sand beaches in the isles, and varying degrees of cliff erosion depending on the rock type and coastal energies. However, no areas of coastline near to the draft plan area have been identified as being potentially susceptible to coastal erosion or accretion.</p> <p>The potential for increases in storm events and rising sea levels have been identified, due to the effects of climate change.</p>	<p>Potential for mixed effects on coastal erosion and accretion caused by changes to hydrodynamics and wave energy. However, based on the high energy coastlines and the absence of observed erosion in this area, it is unlikely that this would be significant.</p> <p>Likely contributions to achieving GHG reductions through replacing energy generation from non-renewable sources to renewable sources.</p>	<p>Significance and character of effects are unknown. Depending on how offshore infrastructure affects hydrodynamics the effects on coastal erosion and accretion could be positive or negative. However any effects that do occur are likely to depend on the specific nature and location of the proposed development.</p> <p>Effects on the coastline are likely to be indirect.</p>	Project level assessment of hydrodynamic changes, as a result of renewables development, should include climate related changes to the marine environment when assessing impacts on the coastal environment.
Marine Geology and Coastal Processes	<p>The seabed in the vicinity of the Draft Plan Option consists mainly of coarse sediments (i.e. sandy gravels and gravelly sands).</p> <p>The area has been included as a plan option area based on its tidal energy resources.</p>	<p>Some seabed disturbance and loss of habitat is likely during the site preparation and placement of device foundations. The scale of such disturbance will depend on the type and size of the device.</p> <p>Sediment disturbance caused during the installation process could also lead to secondary impacts such as increased turbidity during installation in areas with fine sediments and release of existing contaminants present in fine sediments. However, water quality impacts from installation works are considered to be less likely in areas of high wave or tidal energies, and where coarse seabed sediments are predominant.</p> <p>As such significant increases in turbidity are unlikely given the coarse sediments and the tidal energies within the Draft Plan Option.</p> <p>There is the potential for offshore developments within the Draft Plan Option to alter sediment dynamics and tidal flow fluxes in the vicinity of the site. This could result in potential general impacts such as scour, deposition and abrasion in the area and the potential for related impacts to vulnerable coastlines. However, these systems are likely to be complex, and as such, the potential for impacts will be site specific and dependent on factors such as the type and size of the devices and their foundations/anchors.</p>	<p>Direct impacts such as disturbance of the seabed during installation are likely to be temporary and localised.</p> <p>Loss of small areas of seabed associated with the installation of foundations/anchors may occur, although some natural regeneration may occur upon decommissioning of devices and removal of anchors.</p> <p>Changes in sediment dynamics and direct impacts such as scour, deposition and abrasion of seabed sediments are likely to be limited to the installation and operation phases of developments. However, in some circumstances, the effects of such changes may have long-term effects in coastal areas (e.g. the deposition of sediments in nearby coastal areas).</p>	<p>When projects are in the design process, consideration should be given to the location and arrangement of devices in order to build in mitigation to avoid potential impacts on marine geology and coastal processes.</p> <p>It is recommended that sediment dynamic modelling is undertaken at project level to demonstrate potential effects in order to consider appropriate mitigation.</p> <p>Mitigation measures could include the design and use of rock scour protection (if required) around the base of any anchors or foundations used.</p>
Historic Environment	<p>There are few coastal wreck sites located in the vicinity of the Draft Plan Option, however a SSMEI protected wreck is located to the south east.</p> <p>There are a number of important historic environment assets in coastal areas adjacent to the Draft Plan Option, including Muckle Flugga lighthouse and the scheduled monument, Inner Skaw houses and field system, which are located on North Unst.</p> <p>Sections of nearby coastlines and marine areas within and adjacent to this option area</p>	<p>There is potential for significant impacts on the setting of the coastal historic environment assets such as Muckle Flugga lighthouse and the scheduled monument, Inner Skaw houses and field system, in North Unst. Impacts on the setting of sites will be more significant where devices employed have visible above water components. There may be the potential for impacts on nearby historic wreck sites from the installation and operation of sites.</p> <p>The likely presence of submerged archaeology means that there is potential for direct effects on any remains. However, development which includes archaeological survey may also have some positive effects by contributing to knowledge/understanding about the</p>	<p>Direct effects on historic assets e.g. loss of assets caused by changes to coastal processes or the siting of offshore developments, would likely be permanent. The significance of the effects would, depend on the significance of the receptor.</p> <p>Effects on the setting of historic environment features would be indirect, and last for the lifespan of the development.</p>	<p>Effects on features of the historic environment can be avoided through appropriate siting of devices away from vulnerable coastlines and known historic marine features.</p> <p>Project level assessments should consider the potential for impacts on the setting of any valued sites, including the Muckle Flugga lighthouse, and seek to mitigate accordingly.</p>

SEA Topic	Summary of Key Baseline Evidence	Potential for effects	Characteristics	Mitigation available and potential residual effects
	have also been identified as potentially containing submerged archaeology.	marine historic environment.		
Landscape / Seascape	The Draft Plan Option is likely to be visible from the Shetland NSA component at the top of Unst. This part of the Shetland Isles also has a relatively high wildness value.	<p>The site is likely to be visible from areas designated for landscape quality including the adjacent NSA and on areas with wildness value.</p> <p>In terms of operation, the majority of tidal devices components and supporting infrastructure will likely be below the water surface, and as a result, visual impacts may be minimised. However, this will depend on the type of tidal technologies taken forward.</p> <p>Visibility may be greater during construction and maintenance periods more than during the operational phase. It is likely that navigational aids (e.g. marker buoys, lighting) will also have visual effects.</p> <p>There are a number of potential offshore receptors including recreational users and shipping that sail close to the Draft Plan Option.</p>	<p>The surface-piercing components of tidal devices and their supporting infrastructure (if any) within the plan option areas may be visible from nearby coastal areas (e.g. Unst). As the majority of the tidal energy device infrastructure is expected to be submerged, the significance of effects may be lower than for other technologies (e.g. wind).</p> <p>The plan option could alter the current seascape and potentially affect its character. However, this will depend on the technology, for example, residual visual effects for some technologies could be minimal once constructed.</p> <p>Lighting of tidal devices and marker buoys may result in some visual effects during day and night, particularly those in near shore waters. The significance of effects will depend on the visibility of devices which needs to be established at the project level.</p> <p>Visual impacts could be greater for offshore receptors, such as shipping and recreational sea users as their proximity to devices would be greater than onshore receptors.</p>	<p>Full visual impact assessment will be required at the project level (EIA) to establish the visual envelope and significance of landscape and seascape effects on nearby coastal areas. However visual impacts to onshore receptors could potentially be limited by construction further from the coast, in particular to the north east of the Draft Plan Option. In addition effects may be limited as a result of the majority of devices and development being below the water surface.</p> <p>Development that will affect NSA should avoid adverse effects on the integrity of the area or the qualities for which it has been designated.</p>



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ISBN: 978-1-78256-745-5 (web only)

The Scottish Government
St Andrew's House
Edinburgh
EH1 3DG

Produced for the Scottish Government by APS Group Scotland
DPPAS14476 (07/13)

Published by the Scottish Government, July 2013

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