



BERWICK BANK WIND FARM OFFSHORE ENVIRONMENTAL IMPACT ASSESSMENT

APPENDIX 21, ANNEX A: IN-COMBINATION CLIMATE IMPACTS (ICCI) ASSESSMENT

Document Status

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1. IN-COMBINATION CLIMATE IMPACTS

1. In accordance with the Institute of Environmental Management and Assessment (IEMA) Environmental Impact Assessment Guide to: Climate Change Resilience & Adaptation, June 2020 (IEMA, 2020), this annex contains an in-combination climate impact (ICCI) assessment to complement the Climate Vulnerability assessment of the Project (see Appendix 21 of the Offshore EIA Report).
2. **Table 1.2** and **Table 1.4** present the effects of the Project in combination with anticipated future climate change on environmental receptors, i.e. it assesses the extent to which anticipated future climate change exacerbates the effects of the Project on an identified environmental receptor (IEMA, 2020). **Table 1.2** sets out the in-combination climate impacts for the offshore Proposed Development and **Table 1.4** those for the onshore Proposed Development.
3. Each table sets out:
 - climate hazards as described in section 4.2.3 of the Climate Vulnerability assessment of the Project for the Climate Vulnerability study area defined in section 4.1.1 of the assessment (see Appendix 21);
 - receptors that are likely to be sensitive to the projected climate hazard during the construction and operation and maintenance phases of the offshore Proposed Development and onshore Proposed Development respectively, as screened in **Table 1.1** and **Table 1.3**, based on professional judgement or/and literature reviews as noted in volume 2, chapters 7 to 19 and in appendix 20.1 of the offshore Environmental Impact Assessment (EIA) Report, and based on professional judgement with regards to the onshore EIA Report. The receptors are those within the study area defined for each EIA topic in the offshore EIA Report, volume 2, chapters 7 to 19, and in the onshore EIA Report, volume 1, chapters 6 to 14;
 - a qualitative description of the identified potential in-combination climate impacts (ICCI);
 - statement on whether the ICCI is likely to be significant based on expert judgement, i.e. whether the predicted climate change hazard exacerbates the effects on an environmental receptor to such a degree that effects identified in topic-specific assessment as not significant are now considered to be potentially significant, or effects identified in the topic-specific assessment as significant are found to have an exacerbated significance; and
 - an explanation of the approach to mitigation measures for predicted likely significant ICCI.

Offshore Proposed Development

Table 1.1: Screening of Offshore EIA Receptor Groups Likely to be Sensitive to Projected Future Climate Hazards (green: not likely sensitive, i.e. screened out; orange: likely sensitive, i.e. screened in)

Climate Hazard	Receptor Groups Likely to be Sensitive to Climate Hazards (per Relevant Offshore EIA Report Topic)												
	Physical Processes	Benthic Subtidal and Intertidal Ecology	Fish and Shellfish Ecology	Marine Mammals	Offshore and Intertidal Ornithology	Commercial Fisheries	Shipping and Navigation	Aviation, Military and Communications	Seascape, Landscape, Visual Resources	Cultural Heritage	Infrastructure and Other Users	Offshore Socio-Economics and Tourism	Water Quality
Increase in air temperatures (across all months)	Orange	Orange	Orange	Orange	Orange	Orange	Orange	Green	Green	Orange	Orange	Green	Green
Increase in heat wave frequency	Orange	Orange	Orange	Orange	Orange	Orange	Orange	Green	Green	Orange	Orange	Green	Green
Increase in winter precipitation	Orange	Orange	Indirect	Indirect	Green	Indirect	Green	Orange	Green	Orange	Orange	Green	Orange
Decrease in summer precipitation	Green	Green	Green	Green	Green	Green	Green	Green	Green	Orange	Orange	Green	Green
Increase in summer storm intensity due to heavy rainfall events	Orange	Orange	Indirect	Indirect	Orange	Orange	Orange	Green	Green	Orange	Orange	Green	Orange
Increase in mean sea level /flooding	Orange	Orange	Indirect	Indirect	Orange	Indirect	Green	Green	Green	Orange	Orange	Green	Green
Increase in winter wind speeds	Orange	Orange	Indirect	Indirect	Orange	Orange	Orange	Green	Green	Orange	Orange	Green	Green
Decrease in summer wind speeds	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green

Table 1.2: Offshore In-combination Climate Impacts

Climate Hazard	Sensitive Receptor Group	In-combination Climate Impacts (ICCI)	ICCI Significance	Mitigation Measures
Increase in air and sea temperatures (across all months)	Ornithology	Projected Climate Change impacts have been considered in the future baseline scenario for the Proposed Development undertaken in the offshore and intertidal ornithology chapter (offshore EIA Report, volume 2, chapter 11) and in the Technical Appendix to the inter-related effects chapter (appendix 20). As highlighted in volume 2, chapter 9 and volume 3, appendix 20, changes in sea temperature will have	Not significant	No further mitigation measures are required in addition to those appropriate designed in and mitigation measures proposed in the offshore and intertidal ornithology chapter (refer to the offshore EIA Report, volume 11).

Climate Hazard	Sensitive Receptor Group	In-combination Climate Impacts (ICCI)	ICCI Significance	Mitigation Measures
		<p>an effect on fish at all biological levels (cellular, individual, population, species, community and ecosystem) both directly and indirectly. As sea temperatures rise, species adapted to cold water (e.g., cod and herring) will begin to disappear while warm water adapted species will become more established. These changes will lead to changes in prey distribution and availability, which in turn will affect the seabird species that prey on these fish species, ultimately resulting in ecosystem and population level effects. However, indirect impacts on seabirds as a result of changes to prey availability or distribution arising from the Proposed Development were predicted to be of negligible to minor significance (offshore EIA Report, volume 2, chapter 11), therefore this identified ICCI effect is assessed as not significant.</p>		
Increase in heat wave frequency	Ornithology	<p>Projected Climate Change impacts have been considered in the future baseline scenario for the Proposed Development undertaken in the offshore and intertidal ornithology chapter (offshore EIA Report, volume 2, chapter 11) and in the Technical Appendix to the inter-related effects chapter (appendix 20).</p> <p>Abnormally hot weather can cause stress to seabirds through issues with heat dissipation. For example, great skuas have been found to spend more time bathing in higher temperatures, meaning less time is spent foraging and tending to chicks (Oswald et al., 2008). Diving species may have significant heat loss to the water during diving, however this also generates metabolic heat (Oswald and Arnold, 2012). Puffins are thought to use their relatively large bills to dissipate excess metabolic heat, and so may be more resilient to hot weather than other species (Schraft, Whelan and Elliott, 2019). When combined with indirect effects of climate change, such as reduced prey availability, this can have critical effects on chick survival (Oswald et al., 2008; Hakkinen et al., 2022). However, in-combination effects of the Proposed Development with this climate change impact are not predicted, therefore this identified ICCI effect is assessed as not significant.</p>	Not significant	No further mitigation measures are required in addition to those appropriate designed in and mitigation measures proposed in the offshore and intertidal ornithology chapter (refer to the offshore EIA Report, volume 11).
Increase in summer storm intensity due to heavy rainfall events	Ornithology	<p>Projected Climate Change impacts have been considered in the future baseline scenario for the Proposed Development undertaken in the offshore and intertidal ornithology chapter (offshore EIA Report, volume 2, chapter 11) and in the Technical Appendix to the inter-related effects chapter (appendix 20).</p> <p>Strong winds and heavy rainfall during the breeding season can chill eggs, kill nestlings, and prevent adults foraging adequately to feed chicks, which can result in widespread breeding failures (Mallory et al., 2009; Mitchell et al., 2020). Flying and diving under high wind speeds can also impact body condition, by requiring greater energy expenditure (Kogure et al., 2016), and reducing foraging success. Storm conditions can reduce the availability of prey at the water surface and can increase water turbidity which reduces the ability of visual hunting seabirds, such as cormorants and shags, to find food. This can contribute to mass mortality events, which are further discussed in appendix 20. Gannet may be able to take advantage of strong winds during adverse weather by modulating their flight height, giving them some resilience to storms (Lan, Spracklen and Hamer, 2019). For guillemot, the negative demographic impact of storms and adverse weather may be buffered to some extent by their large population size (Johnson et al., 2021). However, in-combination effects of the Proposed Development with this climate change impact are not predicted, therefore this identified ICCI effect is assessed as not significant.</p>	Not significant	No further mitigation measures are required in addition to those appropriate designed in and mitigation measures proposed in the offshore and intertidal ornithology chapter (refer to the offshore EIA Report, volume 11).
Increase in mean sea level /flooding	Ornithology	<p>Projected Climate Change impacts have been considered in the future baseline scenario for the Proposed Development undertaken in the offshore and intertidal ornithology chapter (offshore EIA Report, volume 2, chapter 11) and in the Technical Appendix to the inter-related effects chapter (appendix 20).</p> <p>Seabirds are typically either ground nesting (e.g., herring gull, lesser black-backed gull, Arctic tern), burrowing (e.g., puffin), or cliff nesting (e.g. gannet, guillemot, kittiwake, razorbill). Flooding from heavy rain and storm surges can flood or wash away nests, and high winds can damage or destroy nests. Additionally, rising sea levels may reduce the habitat availability of low-lying nesting species, such as terns (Ratcliffe et al., 2008), with an estimated mean sea level increase of 4cm (likely range between 1 and 7cm) in 2018, when compared with the 1981-2000 average in the Forth and Tay region (Marine Scotland, 2020). For example, low productivity of Scotland's puffins in 2007 has been partially</p>	Not significant	No further mitigation measures are required in addition to those appropriate designed in and mitigation measures proposed in the offshore and intertidal ornithology chapter (refer to the offshore EIA Report, volume 11).

Climate Hazard	Sensitive Receptor Group	In-combination Climate Impacts (ICCI)	ICCI Significance	Mitigation Measures
Increase in winter wind speeds	Ornithology	<p>attributed to unprecedented rainfall which flooded their burrows (Newell et al, 2013). However, in-combination effects of the Proposed Development with this climate change impact are not predicted, therefore this identified ICCI effect is assessed as not significant.</p> <p>Projected Climate Change impacts have been considered in the future baseline scenario for the Proposed Development undertaken in the offshore and intertidal ornithology chapter (offshore EIA Report, volume 2, chapter 11) and in the Technical Appendix to the inter-related effects chapter (appendix 20).</p> <p>Flying and diving under high wind speeds can also impact body condition, by requiring greater energy expenditure (Kogure et al., 2016), and reducing foraging success. Storm conditions can reduce the availability of prey at the water surface and can increase water turbidity which reduces the ability of visual hunting seabirds, such as cormorants and shags, to find food. This can contribute to mass mortality events, such as the mass auk strandings recorded in the winter of 2021/2022, where large numbers of auks, particularly guillemots, washed up on coasts across the North Atlantic (Fullick et al., 2022), which are further discussed in appendix 20. Gannet may be able to take advantage of strong winds during adverse weather by modulating their flight height, giving them some resilience to storms (Lane, Spracklen and Hamer, 2019). For guillemot, the negative demographic impact of storms and adverse weather may be buffered to some extent by their large population size (Johnson et al., 2021). However, in-combination effects of the Proposed Development with this climate change impact are not predicted, therefore this identified ICCI effect is assessed as not significant.</p>	Not significant	No further mitigation measures are required in addition to those appropriate designed in and mitigation measures proposed in the offshore and intertidal ornithology chapter (refer to the offshore EIA Report, volume 11).
Increase in air temperatures (across all months)	Physical processes receptors – low to negligible sensitivity: Tidal elevations and currents; waves, bathymetry; seabed sediments; sediment transport pathways; bank morphology; and beach morphology.	<p>Operation and maintenance phase only</p> <p>Potential ICCI from increased air temperatures (and possibly rainfall events) that increase the extent and frequency of stratification, where differences in temperature (and chemical properties) between ocean layers cause them to diverge. This could enhance the impact of the Proposed Development from changes to hydrodynamics due to underwater infrastructure (effects on waves, currents and sediment transport) and/ or enhance impacts on secondary receptors, through changes to primary productivity (reduced upwelling, nutrient mixing and ecological characteristics). The impact of the influence of the Proposed Development within the water column has been considered as part of the physical processes assessment in volume 3, appendix 7.1. Effects on stratification and mixing were found to be limited by the highly localised influence of the Proposed Development on tidal currents. These small, localised impacts of minor or negligible adverse significance are not likely to be increased. This identified ICCI effect is assessed as not significant.</p>	Not significant	No further mitigation measures are required in addition to the designed in measures proposed in the physical processes chapter (refer to the offshore EIA Report, volume 2, chapter 7).
Increase in heat wave frequency				
Increase in winter precipitation				
Increase in summer storm intensity due to heavy rainfall events	Physical processes receptors – low to negligible sensitivity: Tidal elevations and currents; waves, bathymetry; seabed sediments; sediment transport pathways; bank morphology; and beach morphology.	<p>Operation and maintenance phase only</p> <p>Potential ICCI from increased storm intensity and /or stronger waves and / or rising sea-levels that compound the impacts of the influence of the Proposed Development on physical processes and resultant impacts (e.g. reduced wave energy, increased scour). The impact of the influence of the Proposed Development including during storm conditions has been modelled as part of the physical processes assessment in volume 3, appendix 7.1. The presence of the Proposed Development infrastructure for its operational life was predicted to result in small, localised changes that will not extend outside the site or to the coast. These small reduction in tidal flow, currents and wave climate are within natural variation and insufficient to influence the hydrodynamic regime. The storm conditions did not materially alter the findings. These small, localised impacts of minor or negligible adverse significance are not likely to be increased. This identified ICCI effect is assessed as not significant.</p>	Not significant	No further mitigation measures are required in addition to the designed in measures proposed in the physical processes chapter (refer to the offshore EIA Report, volume 2, chapter 7).
Increase in winter wind speeds				
Increase in mean sea level /flooding				
Increase in winter precipitation	Physical processes receptors – low to negligible sensitivity: Tidal elevations and currents; waves, bathymetry; seabed sediments; sediment transport pathways; bank morphology; and beach morphology.	<p>Operation and maintenance phase only</p> <p>Potential ICCI from projected increased rainfall and/or higher instances of flooding and /or larger waves resulting from increased wind speeds that accelerate erosion (e.g. beach lowering) and the effects of the Proposed Development at the coast. The impact of the influence of the Proposed Development on intertidal receptors and sediment transport was considered as part of the physical processes assessment in volume 3, appendix 7.1. The predicted effects from the Proposed Development are very limited and insufficient to influence sediment transport or coastal and intertidal receptors. Project Design (i.e. cables installed at landfall via trenchless techniques and scour protection) will limit impacts and ensure future resilience of Project infrastructure (cables) to erosion. The small, localised impacts of minor or negligible adverse significance are not likely to be increased. This identified ICCI effect is assessed as not significant.</p>	Not significant	No further mitigation measures are required in addition to the designed in measures proposed in the physical processes chapter (refer to the offshore EIA Report, volume 2, chapter 7).
Increase in mean sea level /flooding				
Increase in winter wind speeds				

Climate Hazard	Sensitive Receptor Group	In-combination Climate Impacts (ICCI)	ICCI Significance	Mitigation Measures
Increase in air temperatures (across all months) Increase in heat wave frequency	Benthic subtidal and intertidal ecology receptors: Various subtidal habitats – medium to high sensitivity MPA features habitats – medium to high sensitivity	Construction and decommissioning / operation and maintenance phases Potential ICCI from warming trends that alter living environments and diversity and composition of benthic communities which enhance impacts from habitat disturbance/loss during construction, SSC, invasive non-native species (INNS) and colonisation. Impacts on benthic and intertidal ecology were considered in volume 2, chapter 8. During construction and decommissioning, effects of moderate adverse significance were identified for four receptors, related to habitat loss/disturbance of moderate significance in the short term decreasing to minor adverse significance in the long-term as communities recover. Intertidal habitats and shallow subtidal communities are most vulnerable to temperature increases. As trenchless techniques will avoid interactions with (and impacts on) intertidal receptors, the potential for combined effects is limited in spatial extent. As rapid recovery from the moderate impacts predicted for offshore, deeper-water communities during construction is expected as well as resilience to this impact. Impacts of minor or negligible adverse significance through operation are not likely to be increased by incremental or acute temperature increases. This identified ICCI effect is not significant .	Not significant	No further mitigation measures are required in addition to designed in measures proposed in the benthic an intertidal ecology chapter (refer to the offshore EIA Report, volume 2, chapter 8).
Increase in air temperatures (across all months) Increase in heat wave frequency	Benthic subtidal and intertidal ecology receptors: Various subtidal habitats – medium to high sensitivity MPA features habitats – medium to high sensitivity:	Operation and maintenance Potential ICCI from INNS which could become more prevalent in warmer sea temperatures and together with the colonisation of hard structures out-compete native species alter local ecology. This could compound the negative impacts predicted for the Proposed Development from INNS. Impacts on benthic and intertidal ecology was considered in volume 2, chapter 8. This impact will be managed as far as practicably possible via procedures to prevent invasive species introduction, including an INNS Management Plan (see volume 3, appendix 23.1). As this impact will be controlled through designed in measures and noting the aversion of invasive species to soft sediment habitats, effects of minor or negligible adverse significance would not combine to result in an effect of greater significance. This identified ICCI effect is not significant .	Not significant	No further mitigation measures are required in addition to designed in measures proposed in the benthic an intertidal ecology chapter (refer to the offshore EIA Report, volume 2, chapter 8). Note: Monitoring commitment to engage with MSS, NatureScot and other relevant key stakeholders to identify and deliver proportionate measures for contributing to strategic monitoring to understand the impact of hard structure colonisation and change in community structure and local species diversity in the immediate vicinity of hard structures.
Increase in winter precipitation Increase in mean sea level /flooding Increase in winter wind speeds	Benthic subtidal and intertidal ecology receptors: Various subtidal habitats – medium to high sensitivity MPA features habitats – medium to high sensitivity	Construction and decommissioning / operation and maintenance phases Potential ICCI from projected climate hazards that result in an increase SSC in the water environment (e.g. heavy rain and/ or incidents of flooding and /or, high winds (larger waves)) which increase the risk of smothering and abrasions. Species mortality and injury could enhance impacts from the Proposed Development from habitat disturbances. Impacts on benthic and intertidal ecology have been considered in volume 2, chapter 8. The most severe disturbances would occur from these hazards in shallow coastal areas. As Project Design limits impacts to intertidal receptors, the potential for interactions is limited in spatial extent. As full recovery from the construction impacts of the Proposed Development is predicted by the operation phase and in view of the predicted effects of minor or negligible adverse significance for the Proposed Development there is very limited potential for significant in-combination effects. This identified ICCI effect is not significant .	Not significant	No further mitigation measures are required in addition to designed in measures proposed in the benthic an intertidal ecology chapter (refer to the offshore EIA Report, volume 2, chapter 8).
Increase in summer storm intensity due to heavy rainfall events	Benthic subtidal and intertidal ecology receptors: Various subtidal habitats – medium to high sensitivity MPA features habitats – medium to high sensitivity	Construction and decommissioning / operation and maintenance phases Potential ICCI from increased storm intensity whereby larger waves impact benthic habitats through dislodgements, breakages and abrasions and compound the habitat disturbance impacts predicted for the Proposed Development. Impacts on benthic and intertidal ecology have been considered in volume 2, chapter 8. During construction and decommissioning, effects of moderate adverse significance were identified for four receptors, related to habitat loss/disturbance of moderate significance in the short term decreasing to minor adverse significance in the long-term as communities recover. The most severe disturbances would occur from this hazard in shallow coastal areas. As Project Design prevents impacts to intertidal receptors, the potential for interactions is limited in spatial extent. Offshore deeper-water communities are considered less vulnerable to smothering and siltation rate changes and demonstrate rapid recovery after storms (weeks to months). As full recovery from the construction impacts of the Proposed Development is predicted by the operation phase, the effects of minor or negligible adverse significance predicted would not combine to result in an effect of greater significance. This identified ICCI effect is not significant .	Not significant	No further mitigation measures are required in addition to those appropriate mitigation measures proposed in the benthic an intertidal ecology chapter (refer to the offshore EIA Report, volume 2, chapter 9).
Increase in air temperatures (across all months)	Fish and shellfish receptors Marine fish – medium to low sensitivity	Construction and decommissioning / operation and maintenance phases Potential ICCI from projected warming trends and increased frequency of acute climate events that create unfavourable/intolerable conditions that affect distribution, abundance, health, reproductive	Not significant	No further mitigation measures are required in addition to the designed in measures proposed in the fish and shellfish chapter (refer to the

Climate Hazard	Sensitive Receptor Group	In-combination Climate Impacts (ICCI)	ICCI Significance	Mitigation Measures
Increase in heat wave frequency	Diadromous fish - low sensitivity	success and species resilience This hazard could enhance the effects of the Proposed Development e.g. on habitat loss/disturbance of spawning habitat. Impacts on fish and shellfish ecology have been considered in volume 2, chapter 9. The sum of the effects of the Proposed Development in both phases are minor or negligible and temporary and reversible. Rapid recovery rates and the high resilience of receptors would limit the consequences from a gradual sea temperature rise that manifested over the long term or mortalities from acute events. Designed in measures will reduce the amount of long-term disturbance and benefits from reduced fishing or management measures (e.g. spatial closures) in the area may offset negative impacts. This leaves little potential for significant in-combination effects. The effects of minor or negligible adverse significance predicted would not combine to result in an effect of greater significance. This identified ICCI effect is not significant .		Offshore EIA Report, volume 2, chapter 9). Note: Monitoring commitment to engage with Marine Scotland and the SNCBs post consent to identify opportunities for contributing to proportionate and appropriate strategic monitoring of diadromous fish species
Increase in air temperatures (across all months)	Fish and shellfish receptors	<p>Construction and decommissioning / operation and maintenance phases</p> <p>Potential ICCI from projected warming trends and increased frequency of acute climate events that result in temperature variations that interfere with spawning or hatching periods or migratory cues¹ leading to altered/reduced species abundance and community composition. This could enhance the negative implications of the Proposed Development from habitat loss/disturbance in relation to spawning habitat. Impacts on fish and shellfish ecology were considered in volume 2, chapter 9. Habitats affected by the Proposed Development were not particularly important for diadromous fish and otherwise, were small in the context of the available habitats and expected to recover quickly. Pressures on some species may be increased, but this is uncertain and localised impacts that may be offset in the longer term by fishing or management measures (e.g. spatial closures) in the region. As adverse impacts to spawning habitat from the Proposed Development are minor or negligible, and given the uncertainty that this effect might occur, effects would not combine to result in an effect of greater significance. This identified ICCI effect is not significant.</p>	Not significant	No further mitigation measures are required in addition to the designed in measures proposed in the fish and shellfish chapter (refer to the Offshore EIA Report, volume 2, chapter 9). Note: Monitoring commitment to engage with Marine Scotland and the SNCBs post consent to identify opportunities for contributing to proportionate and appropriate strategic monitoring of diadromous fish species
Increase in heat wave frequency	Marine fish – medium to low sensitivity			
	Diadromous fish - low sensitivity			
Increase in summer storm intensity due to heavy rainfall events	Fish and shellfish receptors	<p>Construction and decommissioning / operation and maintenance phases</p> <p>Potential ICCI from hazards that influence sea conditions could negatively impact lower trophic levels (prey species) (e.g. heavy rain and/ or incidents of flooding and /or, high winds (larger waves)) and enhance the Proposed Development's impacts on prey species from disturbance, habitat loss, SSC and INNS. Impacts on fish and shellfish ecology were considered in volume 2, chapter 9. Designed in measures will reduce the amount of long-term disturbance. Effects of minor or negligible adverse significance are predicted in all phases for prey species and their habitats that are predicted to occur intermittently and recover quickly. In-combination impacts could manifest if the climate predictions play out. However, changes in sea conditions due to climate hazards are expected to remain localised and infrequent and not result in community scale declines in prey. As most fish could avoid effects due to their mobility and ecosystems are expected to adapt (with a decline in one prey species replaced by another) there is little potential to identify significant in-combination effects., which would not combine to result in an effect of greater significance. This identified ICCI effect is not significant.</p>	Not significant	No further mitigation measures are required in addition to the designed in measures proposed in the fish and shellfish chapter (refer to the Offshore EIA Report, volume 2, chapter 9).
Increase in winter precipitation	Marine fish – medium to low sensitivity			
Increase in mean sea level /flooding	Diadromous fish - low sensitivity			
Increase in winter wind speeds				
Increase in air temperatures (across all months)	Marine Mammals	<p>Construction and decommissioning / operation and maintenance phases</p> <p>Potential ICCI related to warming trends that result in direct exposure to higher SST and adverse changes in living environments (PH, salinity and dissolved oxygen levels and sediment and nutrient loads). These changes represent additional stresses that reduce species resilience to the predicted effects of the Proposed Development from collision (minor all phases), impacts on prey (minor all phases), UXO clearance and underwater noise (minor residual effects). Impacts on marine mammals were considered in volume 2, chapter 10. The hazard is expected to occur incrementally during the lifetime of the Proposed Development when construction effects are past. These species are likely to be affected. However, these effects are not considered a key impact. Due to the adaptive capacity and tolerance of marine mammals to a high range of variations, the impacts of ocean warming can be avoided and species may tolerate or acclimatise to variations. As the operational effects of the Proposed Development are very small (of minor adverse significance) or otherwise limited by designed in</p>	Not significant	No further mitigation measures are required in addition to the designed in measures proposed in the marine mammals chapter (refer to the Offshore EIA Report, volume 2, chapter 10).
	Harbour porpoise			
	Bottlenose dolphin			
	White-beaked dolphin			
	Minke whale			
	Harbour seal			
	Grey Seal			

¹ Migratory cues are environmental factors that trigger migration, such as day length or temperature changes.

Climate Hazard	Sensitive Receptor Group	In-combination Climate Impacts (ICCI)	ICCI Significance	Mitigation Measures
		measures, there is little potential to identify significant in-combination effects. This identified ICCI effect is assessed as not significant .		
Increase in air temperatures (across all months)	Marine Mammals Harbour porpoise Bottlenose dolphin White-beaked dolphin Minke whale Harbour seal Grey Seal	Construction and decommissioning / operation and maintenance phases Potential ICCI related to temperature increases that influence the distribution of fish and other prey (plankton, squid, etc). resulting in reduced foraging. This could enhance the predicted effects of the Proposed Development such as displacement due to underwater noise (minor residual effects) and impacts on prey species (minor all phases). Impacts on marine mammals were considered in volume 2, chapter 10. Impacts from the Proposed Development on prey would be small and intermittent with rapid recovery and local relative to their range. Designed in measures will reduce long-term disturbance. Any reduction in prey species could be offset in the long-term by increases in species that benefit from warming, fishing or management measures (e.g. spatial closures) in the vicinity or the aggregation effect of infrastructure (reef effect). If range shifts did occur, it would likely be attributable to temperature (to which the Proposed Development does not contribute). The limited contribution of the Proposed development provides limited potential to result in significant in-combination effects. This identified ICCI effect is assessed as not significant .	Not significant	No further mitigation measures are required in addition to the designed in measures proposed in the marine mammals chapter (refer to the Offshore EIA Report, volume 2, chapter 10).
Increase in air temperatures (across all months)	Marine Mammals Harbour porpoise Bottlenose dolphin White-beaked dolphin Minke whale Harbour seal Grey Seal	Construction and decommissioning / operation and maintenance phases Potential ICCI during construction, operation and maintenance, and decommissioning related to warming trends that could alter in migratory patterns. This could enhance the predicted effects of the Proposed Development such as displacement, if species travelled further or impacts on prey, if breeding or feeding opportunities were missed. The effects could equally be beneficial. Impacts on marine mammals were considered in volume 2, chapter 10. Impacts from the Proposed Development on prey and marine mammals would be small (minor) and intermittent with rapid recovery and local relative to their range. In-combination effects could manifest if the climate predictions play out. As effects of the Proposed Development during operation or limited by designed in measures, this complex and uncertain effect of climate change could not be held to cause the significance of the previously predicated effects to increase. This identified ICCI effect is assessed as not significant .	Not significant	No further mitigation measures are required in addition to the designed in measures proposed in the marine mammals chapter (refer to the Offshore EIA Report, volume 2, chapter 10).
Increase in air temperatures (across all months) Increase in heat wave frequency	Commercial fisheries Demersal trawlers Creelers Dredger Static gear fisheries Mobile fisheries	Construction and decommissioning / operation and maintenance phases Potential ICCI during construction, operation and maintenance, and decommissioning from trends / hazards that impact marine ecosystems and reduce the distribution and availability of commercially exploited species. This hazard could enhance potential impacts on commercially exploited species. Impacts on commercial fisheries were considered in volume 2, chapter 15. not exceeding minor significance that were identified during the assessment for commercial fisheries and impacts from restricted access to fishing grounds (negligible or minor significance), displacement of fishing activity (negligible or minor significance), and increased steaming times (negligible or minor significance). This ICCI effect is as assessed for impacts on fish and shellfish and the small, localised impacts of the Proposed Development on fish and shellfish, including commercially exploited species are uncertain, but considered unlikely to be increased to a significant effect in-combination. This identified ICCI effect is assessed as not significant.	Not significant	No further mitigation measures are required in addition to the designed in measures proposed in the commercial fisheries chapter (refer to the Offshore EIA Report, volume 2, chapter 14).
Increase in summer storm intensity due to heavy rainfall events Increase in heat wave frequency Increase in winter wind speeds	Commercial fisheries Demersal trawlers Creelers Dredger Static gear fisheries Mobile fisheries	Construction and decommissioning / operation and maintenance phases Potential ICCI from an increase in extreme weather events which hinder operations and reduce fishing opportunities where grounds or access to those grounds is limited. This could compound the identified effects of restricted access to fishing grounds (negligible or minor), displacement of fishing activity (negligible or minor), increased steaming times to ensure safe passage or find safe havens (negligible or minor) and impacts on biological resources (that do not exceed minor). Impacts on commercial fisheries were considered in volume 2, chapter 15. Due to the intermittency of extreme events and the potential for adaptation strategies to account for changing weather impacts on fishing availability, it is likely that despite increased disruption and changes in available fishing hours, fisheries production will not be affected. The small, localised impacts of the Proposed Development are not likely to be increased to significant effects in-combination. This identified ICCI effect is (negligible or minor significance).	Not significant	No further mitigation measures are required in addition to the designed in measures proposed in the commercial fisheries chapter (refer to the Offshore EIA Report, volume 2, chapter 15).
Increase in summer storm intensity due to heavy rainfall events	Shipping and navigation	Construction and decommissioning / operation and maintenance phases Potential ICCI from increased occurrences of adverse weather such as storms and heatwaves and strong winds which affect vessel distributions and access to local ports and increase the risk of vessel	Not significant	No further mitigation measures are required in addition to the designed in measures proposed

Climate Hazard	Sensitive Receptor Group	In-combination Climate Impacts (ICCI)	ICCI Significance	Mitigation Measures
Increase in heat wave frequency Increase in winter wind speeds		to vessel collision risk, vessel to structure collision risk and reduce emergency response capability. Impacts on shipping were considered in volume 2, chapter 13. Interactions between shipping activities are regulated by designed-in measures and management plans which set out procedures to regulate all activities through operation and consequently, impacts were found to be extremely unlikely (negligible for the operation and maintenance phase) or remote. The small, localised impacts of the Proposed Development are not likely to be increased to significant effects in-combination. This identified ICCI effect is not significant .		in the shipping and navigation chapter (refer to the Offshore EIA Report, volume 2, chapter 13).
Increase in air temperatures (across all months) Decrease in summer precipitation Decrease in summer wind speeds	Infrastructure and Other Users and Tourism: Recreational sea users (water sports and beach users) Recreational vessels (sailing, recreational fishing and diving vessels)	Construction and decommissioning / operation and maintenance phases Potential ICCI from increased occurrences of favourable weather (increases in air and SST temperatures (in- heat wave frequency and decreases in summer precipitation and wind speeds) that affect public behaviour and patterns of use leading to an increase in recreational users and pressure on the available sea space (either intermittent, short-term influxes or a long-term trend). Increased use by recreational users could compound the displacement effects of the Proposed Development. As a vast extent of alternative resource will remain available and the impacts initially identified were small (of minor adverse significance). The small, localised impacts of the Proposed Development are not likely to be increased to significant effects in-combination. This identified ICCI effect is not significant .	Not significant	No further mitigation measures are required in addition to the designed in measures proposed in volume 2, chapter 17)
Increase in heat wave frequency Increase in summer storm intensity due to heavy rainfall events	Infrastructure and Other Users: Commercial operators of existing cables and pipelines	Construction and decommissioning / operation and maintenance phases Potential ICCI from projected increase in heatwaves and storm intensity could increase risks to coastal and offshore infrastructure (e.g. cable exposures). Requirements for repairs such as cable repair/reburial cause infrequent disruptions to commercial operations and personnel. Limited operations could compound the effects of restricted access to existing cables and pipelines from the Proposed Development. The Applicant trusts that good communication, planning and monitoring will reduce issues and disruptions would be intermittent and short-term and commercial operations able to continue. The small, localised impacts (minor adverse significance) of the Proposed Development are not likely to be increased to significant effects in-combination. This identified ICCI effect is not significant.	Not significant	No further mitigation measures are required in addition to the designed in measures proposed in volume 2, chapter 17)
Increase in winter precipitation Increase in mean sea level /flooding Decrease in summer wind speeds	Infrastructure and Other Users: Recreational sea users (water sports and beach users) Recreational vessels (sailing, recreational fishing and diving vessels)	Construction and decommissioning / operation and maintenance phases Potential ICCI from hazards that influence the distribution and frequency of recreational activities and reducing the suitability of conditions (e.g. for recreational sailing), the quality of bathing waters or the value of biological resources (the size, or prevalence of fish) that support recreation. The influence and significance of this ICCI is unpredictable (and could relieve or enhance the displacement effects of the Proposed Development) but is likely to be inconsequential, especially in winter and because the effects are limited in duration and extent and magnitude. The small, localised impacts of the Proposed Development are not likely to be increased to significant effects in-combination. This identified ICCI effect is not significant.	Not significant	No further mitigation measures are required in addition to the designed in measures proposed in volume 2, chapter 17)
Increase in winter precipitation Increase in summer storm intensity due to heavy rainfall events Increase in mean sea level /flooding	Water quality WFD water bodies Classified bathing waters	Construction and decommissioning / operation and maintenance phases Potential ICCI from projections of increased rainfall, storm intensity and intensity of flooding that could increase erosion of sediments into the water, reducing water quality and increasing pollutant load. Potential to exacerbate minor impacts on water quality from accidental releases, operational painting and cleaning of marine growth and offshore export cable works, as effected by changes to hydrodynamic and sediment transport. Potential effects on hydrodynamics have been considered as part of physical processes assessment and shown to have a very small influence that is not increased by storm events. Changes to water quality been considered in volume 2, chapter 19 and volume 3, appendix 19. Designed in measures to prevent, contain or manage the release of pollutants, regulate vessel activities and minimise seabed disturbance ensure limited impacts (minor or negligible) on water quality. Given the implementation of these measures and based upon the dispersive ability of the extensive and dynamic nature of the marine environment (i.e. wind, tidal processes, currents), only minor changes are expected in the future that would not increase localised effects of relatively low magnitude on water quality or the potential to enhance other impacts on benthic and fish and shellfish ecology. This identified ICCI effect is not significant	Not significant	No further mitigation measures are required in addition to the designed in measures proposed in volume 2, chapter 19)

Onshore Proposed Development

Table 1.3: Screening of Onshore EIA Receptor Groups Likely to be Sensitive to Projected Future Climate Hazards (green: not likely sensitive, i.e. screened out; orange: likely sensitive, i.e. screened in)

Climate Hazard	Receptor Groups likely to be Sensitive to Climate Hazards (per Relevant Onshore EIA Report Topic)									
	Landscape and Visual	Ecology	Ornithology	Noise and Vibration	Cultural Heritage	Geology, Hydrology, Soils and Flood Risk	Traffic and Transport	Onshore Socio-economics	Land Use, Tourism and Recreation	
Increase in air temperatures (across all months)	Green									
Increase in heat wave frequency	Green									
Increase in winter precipitation	Green					Orange		Green		Orange
Decrease in summer precipitation	Green					Orange		Green		Orange
Increase in summer storm intensity due to heavy rainfall events	Green		Orange	Green						
Increase in mean sea level /flooding	Green					Orange		Green		Orange
Increase in winter wind speeds	Green									
Decrease in summer wind speeds	Green									

Table 1.4: Onshore In-combination Climate Impacts

Climate Hazard	Sensitive Receptor Group	In-combination Climate Impacts (ICCI)	ICCI Significance	Mitigation Measures
Increase in winter precipitation	All hydrological receptors	Predicted increases in precipitation have been considered in the impact assessment for the onshore Proposed Development in the onshore Geology, Hydrology, Soils and Flood Risk chapter (Onshore EIA Report, Volume 1, Chapter 11).	Not significant	No further mitigation measures are required in addition to those appropriate mitigation measures proposed in the onshore Geology, Hydrology, Soils & Flood Risk chapter (Onshore EIA Report, Volume 1, Chapter 11) and the onshore Land Use, Tourism and Recreation chapter (Onshore EIA Report, Volume 1, Chapter 14).
	All land use receptors	Increases in precipitation over time resulting in reduced yields, in combination with reduction in land area under production. Impacts on agricultural productivity would be reduced as part of the land acquisition process, including continued engagement with landowners regarding the timing of acquisition and access.	Not significant	

Climate Hazard	Sensitive Receptor Group	In-combination Climate Impacts (ICCI)	ICCI Significance	Mitigation Measures
Decrease in summer precipitation	All hydrological receptors	Predicted decreases in precipitation have been considered in the impact assessment for the onshore Proposed Development in the onshore Geology, Hydrology, Soils and Flood Risk chapter (Onshore EIA Report, Volume 1, Chapter 11).	Not significant	No further mitigation measures are required in addition to those appropriate mitigation measures proposed in the onshore Geology, Hydrology, Soils & Flood Risk chapter (Onshore EIA Report, Volume 1, Chapter 11) and the onshore Land Use, Tourism and Recreation chapter (Onshore EIA Report, Volume 1, Chapter 14).
	All land use receptors	Decreases in precipitation over time resulting in reduced yields, in combination with reduction in land area under production. Impacts on agricultural productivity would be reduced as part of the land acquisition process, including continued engagement with landowners regarding the timing of acquisition and access.	Not significant	
Increase in summer storm intensity due to heavy rainfall events	Ornithology: Breeding bird assemblage	An increase in summer storms could lead to an increase in failed breeding attempts for nesting birds with heavy rain washing out nests or causing increased mortality in immature or unfledged individuals due to direct impacts of wet and cold or by a reduction in the times available for parent birds to search for food to feed young.	Not Significant	No further mitigation measures are required in addition to those appropriate mitigation measures proposed in the onshore Ornithology chapter (Onshore EIA Report, Volume 1, Chapter 8)).
Increase in mean sea level /flooding	All hydrological receptors	Predicted increases in mean sea level/flooding have been considered in the impact assessment for the onshore Proposed Development in the onshore Geology, Hydrology, Soils and Flood Risk chapter (Onshore EIA Report, Volume 1, Chapter 11).	Not significant	No further mitigation measures are required in addition to those appropriate mitigation measures proposed in the onshore Geology, Hydrology, Soils & Flood Risk chapter (Onshore EIA Report, Volume 1, Chapter 11) and the onshore Land Use, Tourism and Recreation chapter (Onshore EIA Report, Volume 1, Chapter 14).
	Recreational coastal path – John Muir Way Link	Erosion / flooding of the John Muir Way Link coastal path north of landfall. Should it be required, an alternative path on higher ground will be discussed and agreed with landowners, ensuring a suitable route is present.	Not significant	

2. SUMMARY

- An ICCI assessment has been undertaken for the offshore Proposed Development and onshore Proposed Development. The potential ICCI are not greater than the likely significant effects assessed in the relevant topic chapters of the Offshore EIA Report and Onshore EIA Report respectively, or have been assessed as not being significant.

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