CHAPTER 18: MITIGATION AND MONITORING

INTRODUCTION

18.1. This chapter of the Environmental Impact Assessment (EIA) Report presents a summary of the mitigation measures identified within each of the technical assessments, to remove or reduce potential significant impacts of the optimised Seagreen Project. For completeness, mitigation measures are summarised for all technical topics, including those scoped out of this EIA Report (refer to Chapter 7 [Scope of EIA Report]). This ensures that all mitigation measures identified are presented for the project for which consent is being sought, including those from the originally consented projects. Monitoring proposals are also identified (as appropriate) for each of the technical assessments.

18.2. As set out in Chapter 6 (EIA Process) two types of mitigation measures are considered; design embedded mitigation measures and additional mitigation measures:

- Design embedded mitigation: Mitigation measures that are embedded into the design of the project are referred to as 'environmental measures incorporated into the Project' and are intended to prevent, reduce and where possible offset any significant adverse impacts on the environment; and
- Additional mitigation: In some instances the EIA process may identify impacts that are considered significant and for which additional mitigation is required, to remove or reduce impacts identified. These are referred to as 'additional mitigation measures'.

18.3. Within each of the Technical Chapters (Chapters 8 to 15) of this EIA Report and Chapters 7 to 20 of the 2012 Offshore Environmental Statement (ES) for the originally consented Project, both design embedded and additional mitigation measures have been identified as appropriate. A number of mitigation measures have been identified which are applicable to a variety of chapters, these are summarised as 'general measures'. Both receptor specific and general mitigation measures identified are summarised by technical topic within the sections below. Those technical topics scoped into the 2018 assessment are presented first with those topics scoped out presented below. For further information and additional detail on the mitigation measures, or monitoring proposed, the appropriate technical chapter should be referred to.

18.4. Various consent conditions were applied to the consents and licences received for the originally consented project and MS-LOT could apply similar consent conditions to the optimised Seagreen Project. Consent conditions relevant to the management of environmental risk for the originally consented project are set out in Chapter 7 (Scope of EIA Report) and these are considered within each of the technical chapter assessments (Chapters 8 to 15 of this EIA Report). Therefore, consent conditions are not repeated within this chapter which provides a summary of mitigation measures and monitoring proposed for both the 2012 Offshore ES and this EIA Report.

GENERAL MITIGATION MEASURES

18.5. Some mitigation commitments identified within the 2012 Offshore ES for the originally consented Project and the 2018 EIA Report, prevent or reduce potential impacts for a range of topics. These include, for example, best practice or adherence to management procedures and protocols. These general mitigation measures are summarised in Table 18.1 below.

Table 18.1 Project wide mitigation measures

Mitigation Measure	Description	Parameter
Development of an Environmental Management Plan (EMP) throughout construction, operation and maintenance and decommissioning phases.	The Environmental Management Plan for the project provides the overarching framework for on-site environmental management during construction, operation and decommissioning. The plan considers the topic areas assessed within the EIA Report, as well as other considerations such as management of non- native invasive species.	All technical topics
Development and adherence to a Marine Pollution and Contingency Plan (MPCP) throughout construction, operation and maintenance and decommissioning phases.	Measures will be adopted to ensure that the potential for release of pollutants is minimised. In this manner, accidental release of contaminants from rigs and supply/service vessels will be strictly controlled.	All technical topics

ORNITHOLOGY

Mitigation

18.6. A number of embedded mitigation measures were identified for ornithological receptors within the 2012 Offshore ES and carried through to the 2018 EIA Report and these are set out below.

18.7. Mitigation measures include:

- Commitment to the use of best practice guidance and development of a vessel management plan (VMP) to determine vessel routing and therefore reduce disturbance impacts to avoid areas of high risk (rafting and feeding aggregates); and
- Commitment to the use of best practice piling procedures and adherence to soft start procedures to reduce potential piling noise disturbance.

18.8. Potentially significant impacts were identified for the originally consented Project, from mortality through collision with wind turbine blades for kittiwake, gannet, great black-backed gull and herring gull for either Project Alpha or Project Bravo in isolation. Potentially significant impacts were also predicted from collision mortality for lesser black-backed gull and barrier effects for kittiwake, when considering the projects in combination. In addition, potentially significant cumulative impacts were predicted through collision with turbine blades for kittiwake, gannet, lesser black-backed gull, great black-backed gull; and from displacement for kittiwake, guillemot, razorbill, puffin, gannet, lesser black-backed gull and herring gull.

18.9. Following submission of the 2012 Offshore ES, Seagreen committed to an increase in the minimum blade tip clearance from 25.8m above Lowest Astronomical Tide (LAT), to reduce potential collision mortality, and an increase in the minimum WTG spacing to 1000m to reduce potential displacement impacts. No additional mitigation was able to be identified, however, Seagreen committed to consideration of micro-siting wind turbine generators (WTGs) within Project Alpha and Project Bravo, following detailed design, to avoid high density areas and reduce collision risk and barrier effects.

18.10. Potentially significant impacts were also identified through indirect effects of noise from construction on prey species for guillemot, razorbill and puffin for the Projects in isolation and in addition for kittiwake and Arctic tern when considered cumulatively with other plans and projects. Mitigation for these effects are set out in Natural Fish and Shellfish Resource below.

18.11. Through design optimisation to support this EIA Report, a number of additional embedded mitigation measures were proposed for the optimised Seagreen Project including:

- Reduction in the number of Wind Turbine Generators (WTGs) from 150 in the 2012 Offshore ES to 120 for the optimised Seagreen Project. The reduced turbine numbers were proposed to reduce the risk of collision impacts on birds;
- Increase in minimum blade tip clearance from 29.8m above Lowest Astronomical Tide (LAT), in the 2012 Offshore ES, to 32.5m for the optimised Seagreen Project, to reduce the risk of collision impacts on birds; and
- Increase in minimum WTG separation from 610m in the 2012 Offshore ES, to 1000m in the 2014 consents and the optimised Seagreen Project, to reduce potential displacement impacts.

18.12. The impact assessment has been repeated for the optimised Seagreen Project, incorporating further design embedded mitigation, as well as updates to assessment methodologies and baseline information as appropriate. No significant impacts are predicted for ornithological receptors and therefore no additional mitigation measures are proposed.

Monitoring

18.13. A Project Environmental Monitoring Plan (PEMP) will be developed and agreed with MS-LOT, in discussion with the Forth and Tay Regional Advisory Group (FTRAG). Monitoring will be required to validate the findings of the EIA.

18.14. An ornithology sub-group for the FTRAG has been established, comprising representatives from Seagreen, Neart na Gaoithe Offshore Windfarm (OWF), Inch Cape OWF, Marine Scotland, Scottish Natural Heritage (SNH), Joint Nature Conservation Committee (JNCC) and the Royal Society for the Protection of Birds (RSPB). Initial discussions considered where monitoring should focus, in terms of research questions, key species, Special Protection Areas (SPAs) and effects to be addressed. Seagreen will continue to engage in discussions with relevant stakeholders to inform the selection of the most appropriate monitoring methods for ornithological receptors.

NATURAL FISH AND SHELLFISH RESOURCE

18.15. A number of embedded mitigation measures were identified for fish and shellfish receptors within the 2012 Offshore ES and these were carried through and further developed, and added to, for the optimised Seagreen Project. Mitigation measures include:

- Implementation of a soft start piling protocol which is anticipated to reduce the potential for injury or mortality of fish from high levels of underwater noise associated with pin pile (jackets) and monopile installation;
- Subsea cables will be shielded to meet industry standards and will be buried to a minimum of 0.5m where ground conditions permit, or protected, to reduce potential for Electromagnetic Field (EMF) effects;
- Adherence to best practice guidance, to ensure that potential habitat loss is minimised for example, the amount of cable protection will be kept to the minimum amount necessary to ensure cable protection;
- Consideration of the use of scour protection to reduce levels of suspended sediment concentrations; and
- Good practice procedures will be incorporated into an Environmental Management Plan as set out in Table 18.1.

18.16. Potentially significant impacts were identified for the originally consented Project, from underwater noise on herring behaviour, should pin piled (jacket) foundations be selected. Potentially significant impacts were predicted for Project Alpha and Project Bravo in isolation, both projects combined and cumulatively with other plans and projects.

18.17. Through design optimisation, a number of changes were proposed for the optimised Seagreen Project of relevance to fish and shellfish receptors, including:

- Introduction of a monopile foundation option in a sub-set of locations. This has the potential to change noise propagation extents and reduce durations; and
- Reduction in the number of WTGs from 150 (Project Alpha and Project Bravo combined) in the 2012 Offshore ES to 120 for the optimised Seagreen Project. The reduced turbine numbers will reduce the number of foundations required and therefore piling duration.

18.18. The impact assessment for potential noise impacts on fish and shellfish receptors has been repeated for the optimised Seagreen Project. The assessment utilises developments and improvements in approaches and methods for underwater noise modelling since the 2012 Offshore ES, and updates to the existing baseline for identified receptors. The assessment concluded no significant impacts on herring behaviour as a result of the installation of either pin piled (jacket) or monopile foundations.

18.19. In line with the 2017 Scoping Opinion, updated assessments also considered potential impacts on fish and shellfish receptors due to particle motion effects and potential impacts on important shellfish species (nephrops and scallops) through smothering effects. Further consideration demonstrated that these effects were unlikely to give rise to significant impacts.

18.20. No significant impacts are predicted for the optimised Seagreen Project and therefore no additional mitigation measures are proposed.

Monitoring

18.21. There is acknowledged to be some uncertainty relating to the assessment of disturbance impacts on fish, specifically herring spawning and the potential for cumulative impacts with Inch Cape OWF and Neart na Gaoithe OWF, if there are consecutive foundation piling installation programmes. Whilst it is relatively unlikely that there will be consecutive foundation installation programmes, should such a situation arise Seagreen would explore appropriate monitoring of herring spawning stocks. This is considered to be a regional issue and so a collaborative approach with other projects would be investigated.

MARINE MAMMALS

18.22. A number of embedded mitigation measures were identified for marine mammal receptors within the 2012 Offshore ES and these were carried through and further developed, or added to, for the optimised Seagreen Project. These are set out below:

- A Piling Strategy, incorporating a Marine Mammal Mitigation Plan, will be produced for approval by the Scottish Ministers prior to construction. The Piling Strategy will outline the piling approach, soft-start procedures, monitoring, and the detailed mitigation procedures to reduce the potential risk of injury or mortality to marine mammals in close proximity to piling operations. The mitigation strategy will be informed by emerging information from the Beatrice Offshore Wind Farm project;

- Soft-start/ramp-up in hammer energy and the use of ADDs are anticipated to be applied, in order to minimise the risk of mortality or injury to marine mammals;
- A vessel management plan (VMP) will be developed which will determine vessel routing to and from construction areas and ports, to increase awareness of areas of high risk. This will also include codes of conduct for vessel behaviour and for vessel operators, including advice to operators to not deliberately approach marine mammals and to avoid abrupt changes in course or speed, should marine mammals approach the vessel to bow-ride;
- Subsea cables will be shielded to meet industry standards and will be buried to a minimum of 0.5m, where ground conditions allow, or protected, to reduce potential for EMF effects;
- Seagreen will participate in any Forth and Tay Regional Advisory Group and Scottish Strategic Marine Environment Group (SSMEG) (if formed); and
- Good practice procedures will be incorporated into an Environmental Management Plan as set out in Table 18.1.

18.23. Potentially significant impacts were identified for the originally consented Project during construction, from underwater noise on harbour seal, with respect to auditory injury and disturbance, should pin piled (jacket) foundations be selected. Potentially significant impacts were predicted for Project Alpha and Project Bravo in isolation, both projects combined and cumulatively with other plans and projects. Potentially significant cumulative impacts were also predicted for grey seal, and harbour porpoise, during construction, with respect to auditory injury and grey seal and bottlenose dolphin with respect to disturbance. Potentially significant cumulative impacts were also identified during operation, for harbour seal, grey seal and bottlenose dolphin, with respect to changes in prey resource and during decommissioning, for all species, with respect to underwater noise impacts (both auditory injury and disturbance) with respect to mechanical cutting of substructures prior to removal.

18.24. Through design optimisation, a number of changes were proposed for the optimised Seagreen Project of relevance to marine mammal receptors, including:

- Introduction of a monopile foundation option in a limited number of locations. This has the potential to change noise propagation extents and reduce durations; and
- Reduction in the number of WTGs from 150 in the 2012 Offshore ES (Project Alpha and Project Bravo combined) to 120 for the optimised Seagreen Project. The reduced turbine numbers will reduce the number of foundations required and therefore piling duration.

18.25. The impact assessment for potential noise impacts on marine mammal receptors has been repeated for the optimised Seagreen Project. The assessment utilises developments and improvements in approaches and methods for underwater noise modelling since the 2012 Offshore ES and updates to the existing baseline for identified receptors. The assessment concluded no significant impacts on marine mammals, including harbour seal and grey seal, as a result of the installation of either pin piled (jacket) or monopile foundations, either in isolation, or cumulatively with other plans and projects.

18.26. No significant impacts are predicted for the optimised Seagreen Project and therefore no additional mitigation measures are proposed.

Monitoring

18.27. No additional monitoring has been identified for the optimised Seagreen Project as a result of the assessment presented in this EIA Report.

COMMERCIAL FISHERIES

18.28. A number of embedded mitigation measures were identified for commercial fisheries receptors within the 2012 Offshore ES, these have been carried through and further developed and added to for the optimised Seagreen Project and are set out below:

- Development and implementation of a Fisheries Management and Mitigation Strategy;
- Development Specification and Layout Plan (DSLP) to be developed post consent;
- Appointment of a Fisheries Liaison Officer (FLO);
- Application for and use of safety zones during construction, major maintenance work during operation and during decommissioning;
- Implementation of temporary advisory safety zones over vulnerable sections of array cables (i.e., sections of cables awaiting burial or protection);
- Buoyed construction and decommissioning area;
- Use of guard vessels and Offshore Fisheries Officers (OFLOs) where appropriate;
- A dedicated Marine Coordination Centre will be established. This will coordinate project vessel operations and will monitor and record vessel Automatic Identification System (AIS) information indicating the movement of shipping traffic in an around the Project Alpha and Project Bravo sites;
- Where possible all array cables will be buried to sufficient depth to protect from fishing activity. The majority of array cables will be buried with approximately 10% being protected by other means (i.e., rock placement, concrete mattresses);
- Array cable post installation surveys will be undertaken to confirm the achievement of target burial depth and to inform any mitigation requirements if sufficient burial is not achieved. In addition to burial status, these will help to identify the condition of the seabed, following completion of installation works;
- In line with standard practice in the North Sea offshore oil and gas industry, measures will be undertaken to ensure that where cable protection is required, the protection methods used are as far as practically possible, compatible with fishing activities;
- Timely and efficient Notice to Mariners (NtMs), Kingfisher notifications and other navigational warnings (of the position and nature of works) will be issued to the fishing community;
- Appropriate liaison will be undertaken with all relevant fishing interests to ensure that they are fully informed of development planning, construction and maintenance activities and items which may accentuate risk;
- Adherence to the Fishing Liaison with Offshore Wind and Wet Renewables (FLOWW) Guidelines (2014; 2015);
- Implementation of a Vessel Management Plan (VMP). This will draw on lessons learned during construction at the Beatrice Offshore Wind Farm, to minimise potential for interference with fishing activities;
- All contractors undertaking site works will be obliged to ensure compliance with standard offshore policies, such as the Convention for the Prevention of Collisions at Sea (COLREGs) (International Maritime Organisation (IMO), 1972), and the Convention of the Prevention of Marine Pollution by Dumping of Wastes and other matter (IMO, 1996); and
- The UK Hydrographic Office (UKHO) will be informed of both the progress and the completion of Project Alpha and Project Bravo.

18.29. Potentially significant impacts were identified for the originally consented Project, from temporary loss or restricted access to fishing grounds and displacement for scallop fisheries during construction and decommissioning for Project Alpha and Project Bravo combined. Potentially significant impacts were also identified with respect to the complete loss or restricted access to fishing grounds and displacement for scallop fisheries during operation. When considered cumulatively with other plans and project potentially significant impacts were identified with respect to temporary loss or restricted access to fishing grounds and displacement for scallop and squid fisheries during construction and decommissioning and complete loss or restricted access to fishing grounds and displacement during operation. With the application of embedded mitigation, no significant impacts were predicted for Project Alpha or Project Bravo in isolation.

18.30. There was no creeling activity within Project Alpha and Project Bravo at the time the 2012 Offshore ES was produced and activity by this fishery was only occurring in areas relevant to export cables. Potentially significant impacts with respect to temporary loss or restricted access to fishing grounds for lobster and crab fisheries were identified associated with the offshore Transmission Asset (export cables).

18.31. In addition, within the 2012 Offshore ES, cumulative impacts of safety issues were considered to be outside of acceptable limits for all fisheries until appropriate post installation surveys were completed and, in addition, significant impacts with respect to navigational conflict (interference with fishing activities) was identified for lobster and crab fisheries during construction and decommissioning until appropriate protocols to agree transit lanes could be established.

18.32. Through design optimisation, a number of changes were proposed for the optimised Seagreen Project of relevance to commercial fisheries receptors, including:

- Reduction in the number of WTGs from 150 (Project Alpha and Project Bravo) in the 2012 Offshore ES to 120 for the optimised Seagreen Project. The reduced turbine numbers would reduce potential displacement impacts. The reduced turbine numbers will also reduce the number of foundations required and therefore piling duration;
- Increase in minimum WTG separation from 610m in the 2012 Offshore ES to 1000m in the 2014 consents and the optimised Seagreen Project, to reduce potential navigation risk; and
- Introduction of a monopile foundation option in a limited number of locations. This has the potential to change noise propagation extents and durations for commercially exploited fish and shellfish receptors.

18.33. The impact assessment for commercial fisheries receptors has been repeated for the optimised Seagreen Project. The assessment includes further consultation and necessary updates to the existing baseline.

18.34. With the agreement and application of appropriate mitigation, as part of the Fisheries Management and Mitigation Strategy, including adherence to appropriate policy in line with FLOWW Guidelines (2015), no significant impacts are identified for the optimised Seagreen Project either in isolation, combined, or cumulatively with other plans and projects.

Monitoring

18.35. No additional monitoring has been identified for the optimised Seagreen Project as a result of the assessment presented in this EIA Report.

SHIPPING AND NAVIGATION

18.36. A number of embedded mitigation measures were identified for shipping and navigation receptors within the 2012 Offshore ES, these have been carried through and developed and added to for the optimised Seagreen Project and are set out below:

- Application for and use of safety zones during construction, major maintenance work during operations and decommissioning;
- Buoyed construction and decommissioning area – temporary (as per Northern Lighthouse Board [NLB] requirements);
- Blade clearance exceeding the minimum requirement of 22m above Mean High Water Springs (MHWS);
- Development Specification and Layout Plan (DSLP) to be developed post consent giving consideration to Marine Guidance Note (MGN) 543 (it is noted the current layout shown is indicative only);
- Promulgation of information through Notices to Mariners, Kingfisher bulletins, fisheries liaison and further appropriate media. As per the Royal Yachting Association (RYA) Scotland's request, information will be promulgated to allow insertion into Pilot Books as required;
- The use of guard vessels during construction and decommissioning when deemed appropriate by a risk assessment;
- Compliance from all vessels with international maritime regulations as adopted by the flag state, including the Convention for the Prevention of Collisions at Sea (COLREGs) (IMO, 1972) and the Safety of Life at Sea (SOLAS) (IMO, 1974);
- Where possible, all array cables will be buried to sufficient depth to protect from fishing activity. The majority of array cables will be buried with approximately 10% being protected by other means (i.e., rock placement, concrete mattresses);
- Development of an Emergency Response Cooperation Plan (ERCoP) post consent;
- Dedicated marine coordination to manage on site vessels;
- Consideration of MGN 543 – including Search and Rescue (SAR) annex;
- Permanent Aids to Navigation in line with International Association of Lighthouse Authorities (IALA), Northern Lighthouse Board (NLB), Civil Aviation Authority (CAA) and Maritime and Coastguard Agency (MCA) SAR requirements; and
- WTGs, cables and Offshore Substation Platforms (OSP) marked on Admiralty Navigational Charts and Admiralty Sailing Directions.

18.37. With the application of identified mitigation, no significant impacts were predicted for shipping and navigation receptors for the originally consented Project and no additional mitigation measures were identified.

18.38. Through design optimisation, a number of changes were proposed for the optimised Seagreen Project of relevance to shipping and navigation receptors, including:

- Reduction in the number of WTGs from 150 (Project Alpha and Project Bravo combined) in the 2012 Offshore ES to 120 for the optimised Seagreen Project. The reduced turbine numbers would reduce potential displacement impacts; and
- Increase in minimum WTG separation from 610m in the 2012 Offshore ES to 1000m in the 2014 consents and the optimised Seagreen Project, to reduce potential navigation risk.

18.39. The impact assessment for shipping and navigation has been repeated for the optimised Seagreen Project and an addendum to the original Navigational Risk Assessment has been completed. With the application of identified mitigation, no significant impacts are predicted for optimised Seagreen Project, either alone or cumulatively with other plans and projects and no additional mitigation measures are identified.

Monitoring

18.40. No additional monitoring has been identified for the optimised Seagreen Project as a result of the assessment presented in this EIA Report.

18.41. Monitoring proposals identified within the impact assessment of the 2012 Offshore ES remain valid for the optimised Seagreen Project impact assessment and are set out within this EIA Report (Chapter 12 [Shipping and Navigation]). These include:

- Safety Management System (SMS). The SMS will include an incident/accident reporting system which will ensure that incidents and near misses are recorded and reviewed to monitor the effectiveness of the risk control measures in place at the site;
- During planned and unplanned maintenance works, there will be vessels operating regularly in the OWF sites which can monitor any third party vessel activity both visually and on radar, although this will not be their primary function;
- The Marine Coordination Centre will coordinate project vessel operations and will monitor and record vessel AIS information to indicate the movement of project vessel traffic in and around Project Alpha and/or Bravo; and
- Routine operational inspections and maintenance will be carried out on WTGs, and foundations. Array and export cables are expected to be subject to periodic inspection to ensure they remain buried and/or protected.

SEASCAPE, LANDSCAPE AND VISUAL AMENITY

18.42. Embedded mitigation for seascape, landscape and visual amenity (SLVIA) for the originally consented Project and the optimised Seagreen Project principally relates to the 'pulling back' of the turbine development from the western boundary of the Crown Estate's Round 3 Zone boundary for Area 2 and minor adjustments to the boundary itself (refer to Chapter 3 [Site Selection and Alternatives] of this EIA Report).

18.43. No additional mitigation measures were identified for seascape, landscape and visual receptors within the 2012 Offshore ES, other than industry best practice.

18.44. Potentially significant impacts were identified for the originally consented Project. For Project Alpha two significant impacts on seascape character and two significant impacts on visual amenity were identified. No significant impacts were identified for Project Bravo. A number of significant visual impacts were also identified for the projects combined, including those described for Project Alpha, and also on recreational pursuits, vantage points and tourist attractions. Significant impacts on four seascape character units and two viewpoints were also identified when assessed cumulatively with neighbouring offshore wind farm sites.

18.45. Through design optimisation, a key change was proposed for the optimised Seagreen Project of relevance to SLVIA receptors:

- Reduction in the number of WTGs from 150 (Project Alpha and Project Bravo combined) in the 2012 Offshore ES to 120 for the optimised Seagreen Project, through the use of fewer, larger, higher capacity turbines.

18.46. The impact assessment for SLVIA has been repeated for the optimised Seagreen Project and includes updates in guidance, methodologies and approaches, as well as updates to the baseline. The SLVIA for the optimised Seagreen Project predicts significant visual effects upon the seascape neighbouring the Angus coastline. These include two significant effects upon visual amenity at viewpoint 2 (VP2 – Beach Road, Kirkton, St Cyrus) and viewpoint 5 (VP5 – Braehead of Lunan) for Project Alpha throughout construction, operation and decommissioning. No significant effects are predicted for Project Bravo. The optimised Seagreen Project is not predicted to contribute to potential cumulative effects at viewpoints VP2 and VP5 (Given the presence of Inch Cape OWF and Neart na Gaoithe OWF), and this is not considered to be Significant under the EIA Regulations for this SLVIA. It is also noted that this is comparable to the originally consented Project.

18.47. The optimised Seagreen Project is located a considerable distance from the coast and within the same application boundaries as the originally consented Project. The potential for significant effects on Seascape, Landscape and visual receptors is judged to be comparable to those originally identified within the originally consented Project, with no further significant effects predicted. Therefore, no additional mitigation measures are identified.

Monitoring

18.48. No monitoring has been identified for the optimised Seagreen Project as a result of the assessment presented in this EIA Report.

MILITARY AND CIVIL AVIATION

18.49. A number of embedded mitigation measures were identified for Military and Aviation receptors within the 2012 Offshore ES, these have been carried through for the optimised Seagreen Project and are set out below:

- Publication of the construction and site details through the mandated and accepted National Air Traffic Services (NATS) AIS procedures to ensure dissemination of all necessary information to all air users;
- The Project will be clearly defined on all aviation charts in accordance with Ministry of Defence (MOD) and CAA requirements;
- The project will be clearly identified on UKHO charts for nautical charting purposes; and
- The Project will be marked and lit in accordance with the requirements of the NLB, the CAA and MOD at all times.

18.50. Potentially significant impacts were identified for the originally consented Project for both civil and military radar for Project Alpha and Project Bravo in isolation, the projects combined and cumulatively with an associated safety risk. Therefore, additional mitigation was required to remove such impacts and a commitment was made in the 2012 Offshore ES to ensure ongoing negotiation and communication with NATS and the MOD to establish an appropriate mitigation solution.

18.51. Through design optimisation, changes were proposed for the optimised Seagreen Project of relevance to military and aviation receptors, which includes:

- Reduction in the number of WTGs from 150 (Project Alpha and Project Bravo combined) in the 2012 Offshore ES to 120 for the optimised Seagreen Project, through the use of fewer, larger, higher capacity turbines.

18.52. The impact assessment for military and aviation receptors has been repeated for the optimised Seagreen Project, this takes into account any updates in guidance, methods and the baseline environment. The assessment concludes potentially unacceptable impacts on military radar, en-route radar and air defence radar for Project Alpha and Project Bravo in isolation, the projects combined and cumulatively with other projects and plans. This is in line with the 2012 Offshore ES and therefore additional mitigation will be required to remove such impacts.

18.53. A commitment is made to ensure technical mitigation solutions are developed with both NATS and the MOD to address each of these potential impacts, to ensure impacts are removed and consultation is ongoing, to ensure appropriate solutions are implemented prior to the construction or operation of the optimised Seagreen Project.

Monitoring

18.54. No monitoring has been identified for the optimised Seagreen Project as a result of the assessment presented in this EIA Report.

SOCIO-ECONOMICS

18.55. No specific embedded mitigation measures, or additional mitigation measures were identified for socio-economic receptors within the 2012 Offshore ES.

18.56. No significant adverse impacts were identified for the originally consented project, either in isolation or cumulatively with other plans and projects. However, a number of significant beneficial impacts were predicted through employment opportunities and investment. Significant beneficial, impacts were predicted on capital expenditures (CAPEX) in Scotland during construction and during operation for both Project Alpha and Project Bravo in isolation and for Project Alpha and Project Bravo combined. Significant beneficial impacts were also identified through employment in Scotland, during construction and operation of Project Alpha and Project Bravo in isolation and for Project Alpha and Project Bravo combined.

18.57. Through design optimisation, changes were proposed for the optimised Seagreen Project which may have relevance to socio-economic receptors through changes to the supply chain, or landscape and visual effects, these include:

- Reduction in the number of WTGs from 150 (Project Alpha and Project Bravo combined) in the 2012 Offshore ES to 120 for the optimised Seagreen Project, through the use of fewer, larger, higher capacity turbines; and
- Introduction of a monopile foundation option in a limited number of locations.

18.58. The impact assessment for socio-economic receptors has been repeated for the optimised Seagreen Project, this incorporates any updates to assessment methodologies and socio-economic baseline information as appropriate. This concludes no significant adverse impacts for socio-economic receptors either in isolation or cumulatively with other plans or projects. However, a number of significant beneficial impacts were predicted, in line with the 2012 Offshore ES. These include, significant beneficial impacts on the Scottish economy, through analysis of Gross Value Added (GVA) and job years of employment, during construction for both Project Alpha and Project Bravo in isolation and for Project Alpha and Project Bravo combined.

Monitoring

18.59. No monitoring has been identified for the optimised Seagreen Project as a result of the assessment presented in this EIA Report.

PHYSICAL ENVIRONMENT (SCOPED OUT OF THE 2018 EIA)

18.60. A number of mitigation measures were identified for potential impacts on the physical environment within the 2012 Offshore ES and these are set out below. With the application of identified mitigation measures, no significant impacts were identified for the originally consented project, either in isolation or cumulatively and therefore no additional mitigation was identified.

18.61. The potential impacts on the physical environment from the optimised Seagreen Project were scoped out of the 2018 EIA Report and therefore no further mitigation was identified.

18.62. Embedded mitigation measures described in the 2012 Offshore ES and relevant to the optimised Seagreen Project included:

- Design optimisation to minimise the quantity of worst case gravity base substructures (GBS) required, through the use of smaller GBS and the use of jacket foundations where possible to reduce scour protection needed and depths of seabed preparation required, to minimise effects on hydrodynamic conditions, sediments and reduce suspended sediment concentrations;
- Design optimisation to minimise the use of jetting techniques and reduce potential effects on sediments and suspended sediment concentrations; and
- Design optimisation to minimise the length of cable where cable protection would be required to reduce potential effects on sediments and suspended sediment concentrations.

WATER AND SEDIMENT QUALITY (SCOPED OUT OF THE 2018 EIA)

18.63. A number of embedded mitigation measures were identified for potential impacts on water and sediment quality within the 2012 Offshore ES and these are set out below. No significant impacts were identified for the originally consented project, either in isolation or cumulatively and therefore no additional mitigation was identified.

18.64. The potential impacts on water and sediment quality from the optimised Seagreen Project were scoped out of the 2018 EIA Report and therefore no further mitigation was identified.

18.65. Embedded mitigation measures described in the 2012 Offshore ES and relevant to the optimised Seagreen Project included:

- Appropriate Construction Environmental Management Plans and Pollution Control and Spillage Response Plans will be put in place and agreed with the regulatory authorities prior to construction (refer to Table 18.1);
- Potential for the spread of invasive or non-native species will be managed through appropriate measures as part of the EMP (refer to Table 18.1); and
- As for the physical environment, design optimisation will be undertaken to reduce the area and depths of seabed preparation for GBS foundations, to reduce the use of jetting techniques for cable laying and to minimise the length of cable where cable protection would be required. These measures will reduce potential effects on sediment disturbance, suspended sediment concentrations and potential mobilisation of contaminants.

BENTHIC ECOLOGY AND INTERTIDAL ECOLOGY (SCOPED OUT OF THE 2018 EIA)

18.66. A number of embedded mitigation measures were identified for potential impacts on benthic and intertidal ecology within the 2012 Offshore ES and these are set out below (as far as they relate to the OWF areas). No significant impacts were identified for the originally consented Project, either in isolation or cumulatively and therefore no additional mitigation was identified.

18.67. The potential impacts on benthic and intertidal ecology of the optimised Seagreen Project were scoped out of the 2018 EIA Report and therefore no further mitigation was identified.

18.68. Embedded mitigation measures described in the 2012 Offshore ES and relevant to the optimised Seagreen Project included:

- Preconstruction surveys (the scope and extent of which will be agreed with Marine Scotland) will be undertaken to identify presence of rare or important habitats and micro-siting of WTGs, array cables and ancillary structures, would be undertaken, to avoid the areas of the more sensitive habitats wherever practicable;
- Where GBS foundations are identified, the use of smaller foundations where possible, will reduce impact on the seabed, and consideration will be given to use of jacket substructures associated foundations to limit need for seabed preparation and minimise potential for sediment release and reduce consequent risk of benthic smothering;
- Good practice guidance will be followed to ensure that potential habitat loss is minimised throughout the proposed construction works;
- Design optimisation will be undertaken to ensure the amount of rock, grout bags or mattresses used to protect the cable will be kept to the minimum amount (which may be less than the worst case estimate of 10%) necessary to ensure protection; and
- Annex I habitat surveys will be undertaken prior to decommissioning. Should these surveys indicate the presence of any sensitive habitats Seagreen will discuss how to decommission the OWFs with the relevant regulatory authorities and stakeholders to avoid, where possible, impacts upon such habitats.

ARCHAEOLOGY AND CULTURAL HERITAGE (SCOPED OUT OF THE 2018 EIA)

18.69. A number of embedded mitigation measures were identified for potential impacts on archaeology and cultural heritage within the 2012 Offshore ES and these are set out below. No significant impacts were identified for the originally consented Project, either in isolation or cumulatively and therefore no additional mitigation was identified.

18.70. The potential impacts on archaeology and cultural heritage from the optimised Seagreen Project were scoped out of the 2018 EIA Report and therefore no further mitigation was identified.

18.71. Embedded mitigation measures described in the 2012 Offshore ES and relevant to the optimised Seagreen Project included:

- Mitigation leading to preservation in situ would be advocated and exclusion zones of at least 100m will be implemented around cultural heritage assets defined as of high sensitivity and 50m around assets defined as of medium sensitivity;
- Micro-siting of WTGs, array cables and ancillary structures, would be undertaken, where possible and exclusion zones applied, to avoid direct impacts on cultural heritage assets and archaeological features; and
- In order to mitigate the risk of damage to any unrecorded archaeological remains, a Written Scheme of Investigation (WSI) and Protocol for Archaeological Discoveries (PAD) will be prepared for the approval by the appropriate regulatory authorities. This will allow investigation and recording of any such unexpected remains, leading to preservation by record.

OTHER MARINE USERS AND ACTIVITIES (SCOPED OUT OF THE 2018 EIA)

18.72. A number of embedded mitigation measures were identified for other marine users within the 2012 Offshore ES. These were primarily for commercial and recreational marine transport users in relation to maritime hazards. Therefore the mitigation measures summarised for shipping and navigation and commercial fisheries receptors were considered to apply and no further mitigation was identified.

18.73. The potential impacts other marine users from the optimised Seagreen Project were scoped out of the 2018 EIA Report and therefore no further mitigation was identified.