Bennun, L., van Bochove, J., Ng, C., Fletcher, C., Wilson, D., Phair, N., Carbone, G. (2021). *Mitigating biodiversity impacts associated with solar and wind energy development. Guidelines for project developers.* Gland, Switzerland: IUCN and Cambridge, UK: The Biodiversity Consultancy.

Mitigation measures to reduce impact of offshore wind power projects

The mitigation hierarchy provides developers with a logical framework to address the negative impacts of development on biodiversity and ecosystem services. It is applicable to projects in any sector, including renewable energy, and is based on the sequential and iterative application of four actions: avoid, minimise, restore and offset. There are several existing mitigation measures that can be applied across all the phases of an offshore wind power project. The IUCN ***Mitigating biodiversity impacts associated with solar and wind energy development Guidelines for project developers*** details recommendations for addressing the impacts of offshore wind power projects on nature across four phases: project design, constructions, operational, and end-of-life.

Table 6-5 Summary of mitigation approaches for offshore wind farm development

Project phase	Mitigation Hierarchy	Mitigation approaches
Site characterisation	Avoidance and minimisation	Scheduling: changing the timing of survey activities to avoid disturbing biodiversity during sensitive periods Operational controls to manage and regulate contractor activity (e.g. controlling vessel movements)
Project design phase	Avoidance and minimisation	Micro-siting: changing the layout of project infrastructure to avoid sensitive areas Selecting or designing project components to avoid or reduce impacts such as quiet foundations Re-routing, marking or burying onshore powerlines to avoid collision risk
Construction phase	Avoidance	Scheduling: changing the timing of construction activities to avoid disturbing biodiversity during sensitive periods
	Minimisation	Abatement controls to reduce emissions and pollutants (e.g. selecting construction methods to minimise underwater noise impacts) Operational controls to manage and regulate contractor activity (e.g. controlling construction/installation vessel movements and managing lighting)
	Restoration and rehabilitation	Repair of degradation or damage to biodiversity features and ecosystem services from project-related impacts that cannot be completely avoided and/or minimised (e.g. revegetating onshore laydown areas or restoring coastal intertidal habitats disturbed during export cable installation).
Operational phase	Minimisation	Physical controls involving modification to standard infrastructure, or the standard operation of infrastructure, to reduce impacts (e.g. through shutdown on demand to minimise collision risk) Abatement controls to reduce emissions and pollutants (e.g. by managing maintenance lighting) Operational controls to manage and regulate contractor activity (e.g. through controlling maintenance vessel movements)
End-of-life	Avoidance	Scheduling: changing the timing of decommissioning activities to avoid disturbing biodiversity during sensitive periods such as breeding seasons
	Minimisation	Abatement controls to reduce emissions and pollutants created during decommissioning, such as cutting of sub-sea infrastructure Operational controls to manage and regulate contractor activity (e.g. vessel speed regulation) and minimize risk to biodiversity such as marine mammal strike
	Restoration and rehabilitation	Consider (if legislation allows) leaving infrastructure in place if there is a biodiversity/ecosystem services benefit such as the reef effect associated with foundation/scour protection Revegetation of disturbed areas onshore as they become available, using top soil and indigenous plants from the site where possible.