Partners in UK offshore wind

MORGAN OFFSHORE WIND PROJECT: GENERATION ASSETS

Annex 4.10 to Response to Hearing Action Points: Response to Scottish Fishermen's Federation oral representation at ISH1

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Image of an offshore wind farm

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Contents

Glossary

Term	Meaning
Applicant	Morgan Offshore Wind Limited.
Development Consent Order (DCO)	An order made under the Planning Act 2008 granting development consent for a Nationally Significant Infrastructure Project (NSIP).
Morgan Array Area	The area within which the wind turbines, foundations, inter-array cables, interconnector cables, scour protection, cable protection and offshore substation platforms (OSPs) forming part of the Morgan Offshore Wind Project: Generation Assets will be located.
Morgan Offshore Wind Project: Generation Assets	This is the name given to the Morgan Generation Assets project as a whole (includes all infrastructure and activities associated with the project construction, operations and maintenance, and decommissioning).
The Planning Inspectorate	The agency responsible for operating the planning process for applications for development consent under the Planning Act 2008.

Acronyms

Acronym	Description
EMF	Electromagnetic Field
ExA	Examining Authority
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
RMS	Route Mean Square
SFF	Scottish Fishermen’s Federation
SSC	Suspended Sediment Concentration

Units

Unit	Description
cm	Centimetre
dB	Decibel
km^2	Square Kilometre
m	Metre
mm	Millimetre
mg/L	Milligrams per Litre
µPa	Micropascal

1 Annex to Response to Hearing Action Points: Response to Scottish Fishermen's Federation oral representation at ISH1

1.1 Introduction

1.1.1.1 This document has been prepared to address concerns raised by the Scottish Fishermen's Federation (SFF) during ISH1 which was held on the 10 September 2024 in respect of the Morgan Offshore Wind Project: Generation Assets (hereafter Morgan Generation Assets). The concerns raised by the SFF are:

- The Scottish Fishermen's Federation stated during ISH1 (Part 2) that assumptions made within the assessment are based upon expert judgement and limited evidence.

1.2 Response

1.2.1.1 The Environmental Impact Assessment undertaken for fish and shellfish ecology receptors (Volume 2, Chapter 3: Fish and shellfish ecology; APP-021), including for queen scallop, is informed by extensive evidence which has been used to undertake the assessments and inform the conclusions regarding significance of potential impacts (as set out in section 3.6 of Volume 2, Chapter 3: Fish and shellfish ecology; APP-021). This robust evidence base includes publicly available peer-reviewed literature and statistics, and site-specific sampling and modelling studies. Expert interpretation has been applied where appropriate to cross-reference between information sources in support of drawing conclusions.

1.2.1.2 The Applicant can confirm that all relevant data sources including fisheries statistics have been incorporated into the assessment presented in Volume 2, Chapter 3: Fish and shellfish ecology (APP-021) and Volume 2, Chapter 6: Commercial fisheries (APP-024), and the literature reviewed supports that there is nothing to indicate that the effects will be greater than those assessed.

1.2.1.3 The evidence base used to define predictions regarding impact significance for queen scallop within Volume 2, Chapter 3: Fish and shellfish ecology (APP-021) is outlined below in section 1.2.2 to 1.2.8.

1.2.1.4 In each section of this document, the Applicant draws upon evidence within numerous existing studies and papers. It is important to clarify that the information presented in the following sections is sourced directly from existing Morgan Generation Assets Environmental Statement chapters. The Applicant is not therefore seeking to introduce any new evidence or data into the Examination.

1.2.2 Temporary habitat loss/disturbance

1.2.2.1 The assessment undertaken for temporary habitat loss/disturbance to fish and shellfish ecology receptors is presented within section 3.9.2 of Volume 2, Chapter 3: Fish and shellfish ecology (APP-021).

1.2.2.2 The sensitivity of queen scallop *Aequipecten opercularis* to the impact of temporary habitat loss is based upon information from the following species-specific information sources:

- Schmidt *et al.* (2008) indicated that with increased size and age, queen scallop individuals were able to travel increased distances in response to a disturbance

event. This study also suggested that queen scallop make physiological adjustment throughout their lifetime to avoid predation, but also to be able to move away from unfavourable abiotic living conditions.

- Laming *et al.* (2013) however noted that repeated disturbances of up to four events within 28 days were found to significantly decrease reaction times to disturbances in queen scallop.
- Brand (1991) referenced the swimming escape responses of numerous scallop species, including queen scallop, and also referenced the nature of all scallop species to occur in aggregations.
- Kaiser *et al.* (2018) studied the efficacy of marine reserves, investigating areas with and without historic dredge fisheries. Queen scallop were included as a key species of interest. No recovery times were calculated for queen scallop, as abundances were above the carrying capacity in all stations previously subject to dredge fishing at the study's commencement, and remained so throughout during post-disturbance sampling in years one, eight and 10. This study also found that the mean size of queen scallop recorded did not change during the study period of 2007 to 2016, regardless of the historic fishing activity (or absence of historic fishing). Queen scallop was therefore assumed to have fully recovered from historic impacts from dredge fisheries from sampling post-disturbance in year one.

1.2.2.3 Further additional supporting information based upon king scallop *Pecten maximus* was drawn upon when considering particular similarities between the two species:

- Marshall and Wilson (2008) concluded in the Marine Evidence-based Sensitivity Assessment (MarESA) that king scallop have high recoverability to substratum loss (i.e. recovery within months, and full recovery in a small number of years). The same authors highlighted the predominantly sessile nature of scallop species (i.e. they do not undertake continuous free-swimming), which is considered a similarity between king and queen scallop.
- Howell and Fraser (1984) documented king scallop moving up to 30 m from a release site during a tagging study in an enclosed loch environment.

1.2.2.4 Finally, information regarding habitat recovery potential was summarised from the following sources,

- RPS (2019) reviewed recovery trends of marine sediments following disturbance due to cable installation at over 20 UK offshore wind projects. Sandy sediments were found to recovery rapidly with little to no evidence of disturbance in the years following cable installation. Areas of coarse and mixed sediments were found to recover more slowly, with remnant cable trenches evident for several years post-installation, however representing only minor depressions of c. tens of centimetres. In muddy sand, remnant trenches and anchor drags were evident years post-installation, however, as with coarse/mixed sediments, the remnant features were found to be shallow (tens of centimetres).
- Hiddink (2017) reported that soft sediment epifauna (such as queen scallop) broadly exhibit relatively rapid recovery times following disturbance events resulting in temporary habitat loss such as trawling or dredging.

1.2.2.5 These literature sources indicate high recoverability of queen scallop to temporary habitat loss/disturbance, which is reflected in the low sensitivity defined for queen scallop within paragraph 3.9.2.35 of section 3.9.2 of Volume 2, Chapter 3: Fish and shellfish ecology (APP-021). This defined sensitivity also considers the medium

vulnerability of queen scallop, drawn from the above literature sources, and their regional importance to commercial fisheries, as outlined within Volume 4, Annex 6.1: Commercial fisheries technical report (APP-059).

1.2.2.6 The magnitude of the impact for the construction phase considers the extent of temporary habitat loss/disturbance to equate to a maximum of 6.4% of the Morgan Generation Assets, which is considered a relatively small area within the context of the project, with a small proportion of this area subject to disturbance at any one time.

1.2.2.7 The magnitude of disturbance events during the operation and maintenance phase is expected to be of a much lesser extent than during construction, and for decommissioning is expected to be of a similar or lower magnitude than during construction (due to the absence of the requirement for sandwave clearance).

1.2.2.8 The Applicant is confident that the evidence based used to inform the assessment of the impacts of temporary habitat loss/disturbance is robust, with evidence suggesting relatively rapid recovery of queen scallop and their habitat following disturbance, and ability to elicit escape responses (i.e. swimming short distances, or jumping movements) to avoid significant disturbance events. Therefore, the Applicant can conclude with confidence no significant effects to queen scallop as a result of temporary habitat loss/disturbance.

1.2.3 Underwater sound impacting fish and shellfish receptors

1.2.3.1 The assessment undertaken for underwater sound impacting fish and shellfish ecology receptors is presented within section 3.9.3 of Volume 2, Chapter 3: Fish and shellfish ecology (APP-021).

1.2.3.2 As outlined within Volume 2, Chapter 3: Fish and shellfish ecology (APP-021), no standardised exposure criteria are available for shellfish species in relation to the impacts of underwater sound, and seabed-dwelling shellfish are typically considered of higher sensitivity to the particle motion/vibration component of underwater sound, through ground transmission (Popper *et al.,* 2001; Roberts *et al.,* 2016). There is limited evidence available to support assessment of the impacts of underwater sound on queen scallop, therefore evidence regarding the giant scallop *Placopecten magellanicus* and New Zealand scallop *Pecten novaezelandiae* has been applied as a proxy within Volume 2, Chapter 3: Fish and shellfish ecology (APP-021). This evidence is summarised below in paragraphs 1.2.3.3 and 1.2.3.4.

1.2.3.3 Jezequel *et al*. (2022) studied the impacts of piling sound on the giant scallop and found that in close proximity to piling (up to 50 m from the source) giant scallop showed increase valve closures, and no acclimation to multiple piling exposures. This behavioural response has potential to affect feeding success within close proximity to piling, however natural behaviours were found to return almost immediately upon cessation of piling, indicated that significant behavioural effects in scallop are unlikely.

1.2.3.4 De Soto *et al.* (2013) studied the effects of seismic survey pulse playback on New Zealand scallop larvae and found evidence of developmental delays and abnormal growth within soft tissues. This laboratory-based experiment was based upon a playback transducer suspended approximately 9 cm from the larval specimens contained within flasks, with a received sound pressure level of 160 to 164 dB RMS re. 1 µPa with 90 hours of continuous exposure. Developmental delays were observed from the first measurement at 24 hours post-fertilisation, and abnormal growth was reported from 66 hours post-fertilisation. This study indicated that the developmental abnormalities observed were likely through the particle motion element of sound, as opposed to sound pressure, and in this tank-based experiment, larvae were located

within the near-field of the acoustic transducer and therefore considered to be subject to higher levels of particle motion than would be the case in the far-field. It should be noted that the continuous exposure durations necessary for larval abnormalities and delayed development to take place will not occur during piling for the Morgan Generation Assets, with up to 4.5 hours of piling per pile before a break in operations for repositioning (see Table 3.18 of Volume 2, Chapter 3: Fish and shellfish ecology; APP-021). In addition, larvae will be continuously moving within the water column, transported by currents, and will therefore not remain stationary within the vicinity of piling for a series of hours or days. As such, the Morgan Generation Assets are not expected to lead to the occurrence of significant larval abnormalities, nor a resultant impact on stock recruitment.

1.2.3.5 The Applicant therefore considers that piling is unlikely to cause short term or long-term effects on queen scallop, given the small footprint of impact within close range (c. 50 m) to piling activity in the context of the wider habitat available for this species, and the extended periods of exposure required to cause larval development abnormalities. This is also considered alongside the ability of queen scallop to exhibit escape responses through swimming of short distances away from disturbance events, as outlined within section 1.2.2 above. As outlined within Volume 2, Chapter 3: Fish and shellfish ecology (APP-021) no significant effects to queen scallop are predicted as a result of underwater sound impacts.

1.2.4 Increased suspended sediment concentrations (SSCs) and associated sediment deposition

1.2.4.1 The assessment undertaken for the impact of increases in SSCs and associated deposition on fish and shellfish ecology receptors is presented within section 3.9.4 of Volume 2, Chapter 3: Fish and shellfish ecology (APP-021).

1.2.4.2 The sensitivity of queen scallop *Aequipecten opercularis* to the impact of increases in SSCs and associated deposition is derived from information from the following species-specific information sources:

- Hendrick *et al.* (2016) undertook a laboratory study into emergency and mortality potential of queen scallop subject to burial. This study indicated high intolerance to burial over a period of two to four days under 5 cm to 7 cm of sediment, and highlighted that survival is strongly linked to the ability of queen scallop to emerge from the sediment. The limitations of this laboratory-based study area acknowledged in paragraph 3.9.4.17 of Volume 2, Chapter 3: Fish and shellfish ecology (APP-021).

1.2.4.3 Further additional supporting information based upon bay scallop *Agropecten irradians* was drawn upon when considering impacts to scallop as a group:

- Wilber and Clarke (2001) reviewed available information regarding responses of various species to suspended sediments, including the bay scallop. No effects were reported for exposure of bay scallop to SSCs of 250 mg/L for a period of up to 14 days. Higher respiration rates were reported for bay scallop at exposure to SSCs of 500 mg/L to 1,000 mg/L for the same duration.
- Speiser and Johnsen (2008) studied visual detection by bay scallop and surmised that scallop may visually detect the size and speed of moving particles to support identification of favourable feeding conditions, which has implications for their behavioural responses to increases in SSCs.

1.2.4.4 Further, site-specific modelling for the Morgan Generation Assets, presented in full in Volume 4, Annex 1.1 Physical processes technical report (APP-033) determined that

during construction high levels of sedimentation (>50 mm thickness) are unlikely to occur outside of the immediate construction footprint or discharge point (the source). Beyond the immediate vicinity of the source, sediment deposition thickness is modelled to be just 0.3 to 0.5 mm, with deposited sediments expected to be redistributed within a couple of tidal cycles into the existing sediment transport regime. Sediment deposition associated with the operation and maintenance and decommissioning phases are expected to be of a lesser extent than during construction.

1.2.4.5 Considering the site-specific modelling undertaken alongside the evidence base consulted to determine the sensitivity of queen scallop to this impact, the Applicant is confident that the assessment presented is robust, drawing upon the best available information sources. No significant effects to queen scallop are predicted as a result of increases in SSCs and associated deposition.

1.2.5 Long term habitat loss

1.2.5.1 The assessment undertaken for the impact of long term habitat loss on fish and shellfish ecology receptors is presented within section 3.9.5 of Volume 2, Chapter 3: Fish and shellfish ecology (APP-021).

1.2.5.2 The extent of long term habitat loss represents up to 0.14% of the Morgan Generation Assets (equivalent to 1.31 km^2); this is considered a small area when considered in the context of available habitat for queen scallop within the region.

1.2.5.3 The Morgan Generation Assets will include a defined Scallop Mitigation Zone in the western part of the Array Area, where no surface infrastructure will be installed, to allow continued scallop fishing activities.

1.2.5.4 Considering the small footprint of long term habitat loss, and the commitment to the Scallop Mitigation Zone, the Applicant is confident in the assessment prediction of no significant effects to queen scallop due to long term habitat loss.

1.2.6 Electromagnetic Fields from subsea electrical cabling

1.2.6.1 The assessment undertaken for electromagnetic fields (EMFs) from subsea electrical cabling impacting fish and shellfish ecology receptors is presented within section 3.9.6 of Volume 2, Chapter 3: Fish and shellfish ecology (APP-021).

1.2.6.2 There is limited evidence available to support assessment of the impacts of EMFs on queen scallop, however current research suggests that EMFs generated by subsea cables attenuate to background levels within a series of metres, thereby limiting the effects to the immediate vicinity of the EMF source (CSA, 2019). As such, the footprint of effects is considered minimal in the context of available habitat for queen scallop. This, coupled with the ability of queen scallop to move away from disturbances supports the prediction that EMFs will not result in significant effects to queen scallop.

1.2.7 Introduction and colonisation of hard structures

1.2.7.1 The assessment undertaken for the introduction and colonisation of hard structures for fish and shellfish ecology receptors is presented within section 3.9.7 of Volume 2, Chapter 3: Fish and shellfish ecology (APP-021).

1.2.7.2 Creation of hard substrate habitats equated to up to 0.19% of the Morgen Generation Assets (1.79 km^2) and includes vertical surfaces along with the direct footprint on the seabed.

1.2.7.3 In the context of queen scallop, the impact of long-term habitat loss is considered more applicable due to the direct loss of seabed footprint associated with the introduction of infrastructure. However, the introduction and colonisation of hard structures may lead to increased potential for Invasive and Non-native Species, which is considered within paragraph 3.9.7.18 of Volume 2, Chapter 3: Fish and shellfish ecology (APP-021) relating to all marine fish and shellfish species.

1.2.7.4 The Applicant predicts no significant effects to queen scallop as a result of the introduction and colonisation of hard structures.

1.2.8 Disturbance/remobilisation of sediment-bound contaminants

1.2.8.1 The assessment undertaken for the disturbance/remobilisation of sediment-bound contaminants for fish and shellfish ecology receptors is presented within section 3.9.8 of Volume 2, Chapter 3: Fish and shellfish ecology (APP-021).

1.2.8.2 Site-specific sediment contaminants data revealed a number of stations with slight elevations of the heavy metal arsenic present (above Cefas Action Level 1, but below Cefas Action Level 2; full results are provided in Volume 4, Annex 2.1 Benthic subtidal ecology technical report; APP-050). No other contaminants were found to be above toxicity thresholds within the sediment samples obtained.

1.2.8.3 Information sources used to inform the assessment of queen scallop in relation to impacts from the disturbance/release of sediment bound contaminants include:

- Aberkali and Trueman (1985) which referenced the risks to relatively immobile bivalve molluscs of heavy metals which may accumulate in their tissues leading to sublethal effects.
- Neff (1997) which stated that the most commonly bioavailable organoarsenic compound, arsenobetaine, is not reported to have significant toxic impacts to fish and shellfish species when ingested.
- Marsden and Cranford (2016) outlined that trace metal and organic bioaccumulation can occur in scallop species (Pectinidae spp.), with bioaccumulation of metals found to be metal specific (higher rates of lead accumulation). Bioaccumulation of organic contaminants, such as polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs) and organotins can occur through direct adsorption from water and can cause sub-lethal effects to scallops. Concentrations of organic contaminants were generally low throughout the Morgan Generation Assets, and in all cases were below toxicity thresholds.
- Site-specific modelling of SSCs and sediment transport (provided in full in Volume 4, Annex 1.1 Physical processes technical report; APP-033) which predicted areas of highest disturbance in the immediate vicinity of construction activities, with low levels of sediment mobilised and deposited beyond this area.

1.2.8.4 Based upon the results of the site-specific surveys at the Morgan Generation Assets and the site-specific modelling of sediment transport undertaken, the Applicant is confident in the prediction of no significant effects to queen scallop resulting from the disturbance/remobilisation of sediment bound contaminants.

1.2.9 Conclusion

1.2.9.1 The evidence base presented in section 1.2.2 to 1.2.8 used to inform the assessment of impacts to queen scallop within Volume 2, Chapter 3: Fish and shellfish ecology

(APP-021) is robust and precautionary, relying on peer-reviewed literature and site-specific sampling and modelling. As a result of the evidence-based assessment presented within Volume 2, Chapter 3: Fish and shellfish ecology (APP-021), the Applicant is confident in predicting no significant impacts to queen scallop, due to the Morgan Generation Assets alone, or cumulatively with other projects and plans.