

REPORT

Millport Coastal Flood Protection Scheme: European Protected Species (EPS) Risk Assessment

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1 Introduction

The town of Millport is located at the southern end of the island of Great Cumbrae, 2.5km offshore from mainland North Ayrshire in the Firth of Clyde. Millport is at risk from flooding and erosion due to overtopping and potential failure of the existing coast protection structures. The flood protection risks to Millport are also recognised in Scotland's national flood risk strategy, with the delivery of a flood protection scheme for Millport prioritised at 10 in a list of 42 proposed schemes for implementation between 2016 and 2021, considered in further detail in the Ayrshire Flood Risk Management Strategy (SEPA, 2015).

The flood protection scheme includes offshore rock armour structures which will be built in the vicinity of the rock islets within Millport Bay. Works on the foreshore include shore-connected rock armour breakwaters and rock armour revetments. Onshore works will include flood walls, improvement works to existing coast protection structures, and works to raise the level of existing amenity grass areas.

1.1 Determining the need for a marine EPS licence

Annex IV of the Habitats Directive lists all cetacean species (porpoise, whales and dolphins) as species of community interest in need of strict protection as European Protected Species (EPS)¹. Harbour porpoise (*Phocoena phocoena*) and bottlenose dolphin (*Tursiops truncatus*) are listed individually, while the remaining cetacean species are encapsulated in the Directive as "All other cetacea". These species are fully protected in Scottish territorial waters under the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended). It should be noted that seal species are not listed as EPS.

The purpose of the EPS Risk Assessment presented in this report is to determine whether, when considering appropriate mitigation as presented in **Section 3**, there is still potential for the construction activities to cause deliberate harm, or inadvertently cause disturbance to cetaceans. The need for a Marine EPS Licence will be determined by the Marine Scotland Licencing Operations Team (MS-LOT), with advice from NatureScot, based on findings from the EPS Risk Assessment. MS-LOT's consideration of whether an EPS Licence will be required will comprise three tests:

1. To ascertain whether the licence is to be granted for one of the purposes specified in the Regulation 44;
2. To ascertain whether there are no satisfactory alternatives to the activity proposed (that would avoid the risk of offence); and
3. That the licencing of the activity will not be detrimental to the maintenance of the population of the species concerned at a *Favourable Conservation Status* (FCS)².

1.2 Construction works

The worst case scenario for the construction of the foreshore breakwaters foundation could involve some excavation of rock to form a trench. This might be required in areas where the rock foreshore is found during construction to have a steeper slope. If required, rock would be excavated using hydro-demolition or the use of a rock wheel, with the works taking up to two weeks for each structure. During the offshore

¹ <https://www.nature.scot/professional-advice/protected-areas-and-species/protected-species/legal-framework/habitats-directive-and-habitats-regulations/european-protected>

² The Habitats Directive defined the conservation status of a species to be taken as 'favourable' when population dynamics data on the species indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, when the natural range of the species is not being reduced for the foreseeable future and there is, a sufficiently large habitat to maintain its populations on a long-term basis.

breakwater construction there is the potential for the use of a long-reach excavator to clear the material away from the offshore breakwater footprint.

For the purposes of this assessment, it is assumed that works will be within cetacean hearing range of less than 100 kHz (Joint Nature Conservation Committee (JNCC) 2017).

The construction works are anticipated to commence in September 2022 with some preparation works at the temporary slipway and compound area beginning mid-August 2022. Excavation works at the foreshore breakwater are anticipated to be undertaken over a two week period per structure and one week for the excavation work at the offshore breakwater.

2 Assessment of Potential for Impact

The desk-based impact assessment for the construction works has been undertaken to determine any significant level of effects on the local cetacean population under a precautionary principle. The activities for construction include rock excavation works, rock placement and vessel interaction and noise.

There are two types of excavation work during the proposed works, firstly during the shore-connected breakwater using hydro-demolition or the use of a rock wheel to create a trench; and secondly, there is the use of a long-reach excavator to clear the material away from the offshore breakwater footprint. The use of a rock wheel for excavation works has been assessed as the worst-case.

The assessments are based on the Southall *et al.* (2019) impact criteria, which uses thresholds and weightings in relation to the different marine mammal species hearing sensitivity (weighted) as well as unweighted thresholds (**Table 2.1**). The thresholds indicate the risk of permanent auditory injury / change in hearing sensitivity (Permanent Threshold Shift (PTS)) and temporary auditory injury / change in hearing sensitivity (Temporary Threshold Shift (TTS)) in species of cetaceans that could be present in and around the construction areas. Note that the Southall *et al.* (2019) Marine Mammal Noise Exposure Criteria are the same as the National Marine and Fisheries Service (NMFS) (2018) criteria, although Southall *et al.* (2019) renames the species groupings: Medium-Frequency (MF) Cetaceans are now classed as High-Frequency (HF) Cetaceans, and previous HF Cetaceans as Very High Frequency (VHF) Cetaceans (**Table 2.1**).

The Sound Exposure Level (SEL) criteria are weighted, which corrects the sound level based on the sensitivity of the receiver, for example, harbour porpoise are less sensitive to low frequency sound than minke whales. The weighting takes that difference into account. Southall *et al.* (2019) also includes criteria based on peak Sound Pressure Level (SPL_{peak}), which are unweighted and do not take species sensitivity into account. However, it is important to note that they are different criteria and as such they should not be compared directly. All decibel SPL values are referenced to 1 μPa and all SEL values are referenced to 1 μPa^2s .

Table 2.1: Noise impact assessment criteria for the relevant receptors (Southall *et al.*, 2019).

Receptor	PTS Criteria			TTS Criteria		
	SPL_{peak} Unweighted Impulsive (re 1 μPa)	SEL Weighted Impulsive (re 1 μPa^2s)	SEL Weighted Non-impulsive criteria (re 1 μPa^2s)	SPL_{peak} Unweighted Impulsive (re 1 μPa)	SEL Weighted Impulsive (re 1 μPa^2s)	SEL Weighted Non-impulsive criteria (re 1 μPa^2s)
Very High Frequency (VHF)	202 dB	155 dB	173 dB	196 dB	140 dB	153 dB

High-Frequency (HF)	230 dB	185 dB	198 dB	224 dB	170 dB	178 dB
Low frequency (LF)	219 dB	183 dB	199 dB	213 dB	168 dB	179 dB

2.1 EPS presence in the area

The Clyde Marine Mammal Project reports public sightings data as well as recording marine mammal specific surveys within the Clyde. The most recent reports available are from January 2016 to July 2017 which recorded harbour porpoise as the most common species, bottlenose dolphin and common dolphin (*Delphinus delphis*) are also common in the area (Clyde Porpoise Community Interest Company (C.I.C), 2018). Other species that were recorded in lower numbers include minke whale (*Balaenoptera acutorostrata*), humpback whale (*Megaptera novaeangliae*), and killer whale (*Orcinus orca*) (Clyde Porpoise C.I.C, 2018).

The SCANS-III survey was undertaken in the summer of 2016 and covered all European Atlantic waters from the Strait of Gibraltar in the south to 62°N in the north and extending west to the 200nm limits of all EU Member States (Hammond *et al.*, 2021). The Proposed Scheme is located in SCANS-III survey block G, which only recorded harbour porpoise, bottlenose dolphin and minke whale within that block. The Phase III Joint Cetacean Protocol (JCP) report shows a similar presence of species within the area, with harbour porpoise, minke whale and bottlenose dolphin being shown to be the only species present in the Firth of Clyde (Paxton *et al.*, 2016).

The total number of each species that may be impacted by the construction works at the Proposed Scheme have been related to the overall population estimate for the relevant Management Unit (MU) (**Table 2.2**), as defined by Inter-Agency Marine Mammal Working Group (IAMWWG) (2021) (note that there is no population estimate for either humpback whale or killer whale).

Member states report back to the EU every six years on the Conservation Status of marine EPS. In the UK, all four cetacean species relevant to the area of the Proposed Scheme have been assessed as having an 'unknown' Conservation Status (**Table 2.2**) based on the 2013-2018 reporting (JNCC, 2019).

Table 2.2 summarises the conservation status, density estimates and reference population used for each cetacean species included within the following assessments. There is no density estimate available for humpback whale and killer whale and so a quantitative assessment has not been possible for these species.

Table 2.2: Summary of cetacean density estimates and reference populations to be used within the assessment

Species	Favourable conservation status	Density estimate	Reference population
Harbour porpoise	Unknown	0.336/km ² (Hammond <i>et al.</i> , 2021)	28,936 West Scotland MU (IAMWWG, 2021)
Bottlenose dolphin	Unknown	0.121/km ² (Hammond <i>et al.</i> , 2021)	45 Coastal West Scotland and the Hebrides MU (IAMWWG, 2021)

Common dolphin ³	Unknown	0.133/km ² (Hammond <i>et al.</i> , 2021)	102,656 Celtic and Greater North Seas MU (IAMMWG, 2021)
Minke whale	Unknown	0.027/km ² (Hammond <i>et al.</i> , 2021)	20,118 Celtic and Greater North Seas MU (IAMMWG, 2021)

2.2 Assessment of potential impacts of construction on cetaceans

The construction activities have been used as the worst-case to inform the EPS assessments.

2.2.1 Construction activities

Excavation works for the creation of a trench by using either hydro-demolition or a rock wheel will produce a continuous, non-impulsive noise source. Hydro-demolition is proposed to create a trench using ultra high-pressure water jets, the pressure of the water is sufficient to break up the bedrock (Whitby Piers Refurbishment, 2017). Very limited noise data is publicly available for subsea, high pressure water jetting. A source noise level of 170 dB re 1 μ Pa SPL_{RMS}, i.e. the noise level at 1 m from the equipment, was recorded for the jetting, using a Woma high pressure system. Measured values were at range, and so the source level was back-calculated to 1m. For continuous noise, a 1-second SPL_{RMS} is equivalent to a 1-second SEL (Whitby Piers Refurbishment, 2017).

A Cutter Suction Dredger (CSD) operates with a similar mechanism to a rock wheel and is proposed as a suitable proxy (Whitby Piers Refurbishment, 2018) as no publicly available data for underwater noise from a rock wheel is currently available. In order to establish an approximate source level for a rock wheel, the source level from a CSD was scaled based on the power of the device (Whitby Piers Refurbishment, 2018). Measurements of the Phoenix CSD was suggested that it had a source level of 176.1 dB SPL_{RMS} re 1 μ Pa when operating at 678 kW. For the Whitby Piers refurbishment an Erkat ER 650 has been suggested as an appropriate rock wheel. The Erkat ER 650 has an operating power of 80 kW. The source level for an Erkat ER 650 rock wheel is therefore estimated to be an SPL_{RMS} of 166.8 dB re 1 μ Pa. The assumption that has been made for this scaling is that the acoustical energy radiated is proportional to the power of the plant (Whitby Piers Refurbishment, 2018).

In relation to cetaceans, based on criteria defined in Southall *et al.* (2019) threshold criteria (**Table 2.1**) neither source for both hydro-demolition and the rock wheel are not loud enough to trigger an injury-level exposure to noise at any distance. As the source level is lower, the impact due to noise from a rock wheel is expected to be less than that of hydro-demolition.

The activities that were assessed include:

- CSD with an estimated sound source of 178.7 dB re 1 μ Pa SPL_{RMS}

The results of the underwater noise modelling undertaken for similar activities were used in the following assessments, show that at the source levels predicted for the excavation works (with CSD used as a proxy), that any marine mammal would have to remain in close proximity (less than 10m; area of less than 0.0003km^{2.4}) of an active CSD for 24 hours to be exposed to levels of sound that could induce permanent shift in hearing sensitivity (PTS) or temporary shift in hearing sensitivity (TTS) as per the Southall *et al.* (2019) threshold criteria (**Table 2-3**). As the source levels for the CSD used in the modelling differs from the

³ No estimate made for common dolphin within SCANS-III Block G, the common dolphin density estimate is survey Block J

⁴ based on the area of a circle.

values assessed in the Whitby Piers Refurbishment (2017, 2018), a precautionary assessment for PTS has been undertaken for completeness even though the value is considered conservative.

Studies into the noise levels associated with rock placement have shown that they are not often discernible over and above the noise of the associated vessel. Measurements of rock laying vessels near the Shetland Isles in relatively deep water (60-70m in depth), reported that there was no evidence of rock laying sound over and above background levels (SubAcoustech, 2004). Other studies that have reported on the noise levels expected from rock placement activities have estimated the source level to be 172 dB re 1 μ Pa @ 1m (RMS), less than the noise levels associated with the excavation works (ScottishPower Renewables (SPR), 2019). As noise levels for rock placement are considered to be no louder than the vessel noise associated with that activity or than the noise associated with excavation works, the assessment of excavation works can therefore be used as a conservative proxy to determine the risk of impact to cetaceans.

Table 2-3 Maximum number of individuals (and % of reference population) that could be impacted as a result of underwater noise (PTS or TTS) associated with excavation works

Potential Impact	Receptor	Modelled Impact Range (m) and area* (km ²) for CSD works	Estimated number of individuals in impact area (% of the reference population)	Magnitude
PTS or TTS from cumulative SEL during excavation works (CSD)	Harbour porpoise	<10m 0.0003km ²	0.0001 harbour porpoise (0.0000003% WS MU) based density of 0.336/km ²	Permanent effect with negligible / no impact magnitude (less than 0.001% of the reference population anticipated to be exposed to effect).
	Bottlenose dolphin	<10m 0.0003km ²	0.00004 dolphins (0.00009% CWSH MU) based on a density of 0.121/km ²	Permanent effect with negligible / no impact magnitude (less than 0.001% of the reference population anticipated to be exposed to effect).
	Common dolphin	<10m 0.0003km ²	0.00004 common dolphin (0.00000004% CGNS MU) based on density of 0.133/km ²	Permanent effect with negligible / no impact magnitude (less than 0.001% of the reference population anticipated to be exposed to effect).
	Minke whale	<10m 0.0003km ²	0.00008 minke whale (0.0000004% CGNS MU) based on density of 0.027/km ²	Permanent effect with negligible / no impact magnitude (less than 0.001% of the reference population anticipated to be exposed to effect).

Harbour porpoise

The number of harbour porpoise that could potentially be at risk of the onset of PTS or TTS from the excavation works is approximately 0.0001 individuals (0.0000003% of the West Scotland MU reference population) based on potential impact range of less than 10m (an area of less than 0.0003km²). There is therefore a negligible risk of injury to the harbour porpoise population (**Table 2-3**).

Bottlenose dolphin

The number of bottlenose dolphin that could potentially be at risk of the onset of PTS or TTS from the excavation works is approximately 0.00004 individuals (0.00009% of the Coastal West Scotland and the Hebrides MU reference population) based on potential impact range of less than 10m (an area of less than 0.0003km²). There is therefore a negligible risk of injury to the bottlenose dolphin population (**Table 2-3**).

Common dolphin

The number of common dolphin that could potentially be at risk of the onset of PTS and TTS the excavation works is approximately 0.00004 individuals (0.00000004% of the Celtic and Greater North Seas MU) based on potential impact range of less than 10m (an area of less than 0.0003km²). Therefore, there is a negligible risk of injury to the common dolphin population (**Table 2-3**).

Minke Whale

The number of minke whale that could potentially be at risk of the onset of PTS or TTS from the from the excavation works is approximately 0.00008 individuals (0.00000004% of the Celtic and Greater North Seas MU) based on potential impact range of less than 10m (an area of less than 0.0003km²). Therefore, there is a negligible risk of injury to the minke whale population (**Table 2-3**).

Other species

As there are no density or population estimates for humpback or killer whale within the Firth of Clyde region, or UK waters, but their presence has been recorded within the Firth of Clyde. The representative hearing groups have been assessed and any mitigation measures implemented would be appropriate for any species not assessed; therefore, there is a negligible risk of disturbance to either the humpback whale or killer whale populations.

2.2.1.1 Disturbance

McQueen *et al.* (2020) found the spatial scale and context of the dredging areas (adjacent to navigation channels and port infrastructure areas), determined that habitat avoidance was not at a sufficient spatial scale to pose risks to harbour porpoises⁵. The unweighted 140 dB re 1 µPa SPL generic threshold level for behavioural avoidance of high-frequency cetaceans and pinnipeds in water is exceeded at distances up to approximately 400m from the dredge (McQueen *et al.*, 2020). For behavioural assessments, there are a myriad of significant data gaps that contribute to the uncertainty of the assessment. The major sources of uncertainty are clear exposure–response relationships among observed marine mammal behavioural studies. In some cases, there are orders of magnitude differences in reported sound thresholds for similar behavioural reactions (McQueen *et al.*, 2020)..

Although there is the potential for behavioural response to the construction activities and excavation works it is anticipated to be localised in effect and short in duration with animals returning to the area shortly after the sound source is stopped or completion of the works.

2.2.1.2 Residual impact

Taking into account the receptor sensitivity (of high for PTS, and medium for TTS for cetaceans), and the potential magnitude of the effect, along with the temporary nature of the disturbance, the impact significance for any PTS, TTS or behavioural impact as a result of underwater noise from the construction works on cetaceans (EPS) has been assessed as **minor** (not significant). As such, no mitigation is required but best practice measures will be used throughout the construction works (**Section 3**).

2.2.2 Increased collision risk and disturbance from vessels

2.2.2.1 Collision risk

There will be a small number of vessels required for the construction works (estimated that two vessels will be on site at any given time), ranging from large vessels to small craft. Cetaceans are able to detect and avoid vessels, although vessel strikes are known to occur. However, it is unlikely that cetaceans present in

⁵ using the maximum source level of 192 dB re 1 µPa-m, SELs for the marine mammals were calculated using the sheet for “non-impulsive, continuous, mobile sources” from the publicly available NMFS spreadsheet tool

the construction works area would be at increased collision risk with vessels, as the vessels would be stationary or slow moving. In addition, the number of vessels moving to and from the sites would be very small compared to the existing vessel movements in and around the area. All vessel operators will use good practice to reduce any risk of collisions with cetaceans. Therefore, the potential magnitude for any increased collision risk during the construction works at the Proposed Scheme has been assessed as negligible.

Cetaceans present within or around the Proposed Scheme are likely to be habituated to the presence of vessels given the existing levels of marine traffic and would therefore be expected to detect and avoid vessels. For this reason, harbour porpoise, bottlenose dolphin, common dolphin and minke whale, that could be present in the area are considered to have a low sensitivity to the risk of a vessel strike.

All cetaceans are considered to have a high value. However, taking into account the receptor sensitivity of low for all species and the potential magnitude of the impact of negligible, the impact significance for any potential increase in collision risk with vessels has been assessed as negligible (not significant) for cetaceans.

2.2.2.2 PTS and TTS from vessels noise

The maximum predicted impact ranges for the risk of PTS and TTS to cetacean species using the non-impulsive NMFS (2018) criteria for large and medium vessels at Wylfa Newydd (HNP, 2018), assuming a stationary animal remaining in the vicinity over a 24-hour period, have been used for the assessments (Table 2-4).

The underwater noise propagation modelling was undertaken using a simple modelling approach for underwater noise associated with both medium and large sized vessels, using measured sound source data. The source levels used in the underwater noise modelling of large and medium vessels for Wylfa Newydd are (HNP, 2018):

- Large vessels - 168dB re 1 μ Pa (RMS) @ 1m
- Medium vessels - 161dB re 1 μ Pa (RMS) @ 1m

Table 2-4 Summary of the maximum predicted PTS and TTS impact ranges (and areas*) for cetacean species for large and medium vessels

Potential Impact	Receptor	Criteria and threshold (NMFS, 2018)	Large vessels	Medium vessels
PTS from cumulative SEL from vessel noise over 24 hours	Harbour porpoise	173 dB re 1 μ Pa ² s Weighted SEL _{cum}	4m (0.00005 km ²)	<1m (0.000003 km ²)
	Dolphin sp.	198 dB re 1 μ Pa ² s Weighted SEL _{cum}	<1m (0.000003 km ²)	<1m (0.000003 km ²)
	Whale sp.	199 dB re 1 μ Pa ² s Weighted SEL _{cum}	10m (0.0003 km ²)	3m (0.00003 km ²)
TTS from cumulative SEL from vessel noise over 24 hours	Harbour porpoise	153 dB re 1 μ Pa ² s Weighted SEL _{cum}	140m (0.062 km ²)	30m (0.003 km ²)
	Dolphin sp.	178 dB re 1 μ Pa ² s Weighted SEL _{cum}	3m (0.00003 km ²)	<1m (0.000003 km ²)
	Whale sp.	179 dB re 1 μ Pa ² s Weighted SEL _{cum}	480m (0.72 km ²)	130m (0.053 km ²)

*Area based on area of a circle

The modelled impact ranges, indicate that any cetacean would have to be 10m from the continuous noise source for a 24 hour period, to acquire the necessary exposure to induce PTS. Therefore, the risk of PTS from underwater noise from vessels is negligible / no impact. This is consistent with noise levels reported by Malme *et al.* (1989) and Richardson *et al.* (1995) for large surface vessels which indicates that physiological damage to auditory sensitive marine mammals is unlikely.

The maximum number of harbour porpoise, bottlenose dolphin, common dolphin and minke whale that could be at risk of PTS and TTS from cumulative exposure over a 24 hour period, are presented in **Table 2-5**. There is the potential that there could be up to two vessels on site at any one time (likely to be a floating platform plus a barge delivering rock or working directly from two smaller barges which also collect the rock), and therefore an assessment for two vessels has also been presented.

Table 2-5 Maximum number of individuals (and % of reference population) that could be impacted as a result of underwater noise associated with vessel noise

Potential Impact	Receptor	Estimated number of individuals in impact area (% of the reference population) for 1 large vessel	Estimated number of individuals in impact area (% of the reference population) for 2 large vessels	Magnitude
PTS from cumulative SEL from vessels	Harbour porpoise	0.00002 harbour porpoise (0.00000007% WS MU) based density of 0.336/km ²	0.00004 harbour porpoise (0.0000001% WS MU) based density of 0.336/km ²	Permanent effect with negligible / no impact magnitude (less than 0.001% of the reference population anticipated to be exposed to effect).
	Bottlenose dolphin	0.0000004 dolphins (0.0000009% CWSH MU) based on a density of 0.121/km ²	0.000001 dolphins (0.000002% CWSH MU) based on a density of 0.121/km ²	Permanent effect with negligible / no impact magnitude (less than 0.001% of the reference population anticipated to be exposed to effect).
	Common dolphin	0.0000004 common dolphin (0.000000004% CGNS MU) based on density of 0.133/km ²	0.000001 common dolphin (0.00000001% CGNS MU) based on density of 0.133/km ²	Permanent effect with negligible / no impact magnitude (less than 0.001% of the reference population anticipated to be exposed to effect).
	Minke whale	0.00008 minke whale (0.0000004% CGNS MU) based on density of 0.027/km ²	0.0002 minke whale (0.000001% CGNS MU) based on density of 0.027/km ²	Permanent effect with negligible / no impact magnitude (less than 0.001% of the reference population anticipated to be exposed to effect).
TTS from cumulative SEL from vessels	Harbour porpoise	0.02 harbour porpoise (0.00007% WS MU) based density of 0.336/km ²	0.04 harbour porpoise (0.0001% WS MU) based density of 0.336/km ²	Temporary effect with negligible / no impact magnitude (less than 1% of the reference population anticipated to be exposed to effect).
	Bottlenose dolphin	0.0000008 dolphins (0.000002% CWSH MU) based on a density of 0.121/km ²	0.000002 dolphins (0.000004% CWSH MU) based on a density of 0.121/km ²	Temporary effect with negligible / no impact magnitude (less than 1% of the reference population anticipated to be exposed to effect).

Potential Impact	Receptor	Estimated number of individuals in impact area (% of the reference population) for 1 large vessel	Estimated number of individuals in impact area (% of the reference population) for 2 large vessels	Magnitude
				anticipated to be exposed to effect).
	Common dolphin	0.000004 common dolphin (0.000000004% CGNS MU) based on density of 0.133/km ²)	0.00001 common dolphin (0.00000001% CGNS MU) based on density of 0.133/km ²)	Temporary effect with negligible / no impact magnitude (less than 1% of the reference population anticipated to be exposed to effect).
	Minke whale	0.02 minke whale (0.0001% CGNS MU) based on density of 0.027/km ²	0.04 minke whale (0.0002% CGNS MU) based on density of 0.027/km ²	Temporary effect with negligible / no impact magnitude (less than 1% of the reference population anticipated to be exposed to effect).

The potential risk of PTS is assessed as **negligible** / no impact for all species, with less than 0.001% of all relevant reference populations anticipated to be exposed to any permanent effect and the potential of TTS is assessed as **negligible** / no impact for all species, with less than 1% of all relevant reference populations anticipated to be exposed to the temporary effect (**Table 2-5**).

The assessments (**Table 2-5**) indicate that there is negligible risk of PTS or TTS to cetacean species from vessel noise.

2.2.2.3 Disturbance

The presence and underwater noise from vessels has the potential to cause local disturbance to sensitive marine mammals in the immediate vicinity of the vessel, depending on ambient noise levels.

For the marine mammal species there is currently no agreed threshold for disturbance from underwater noise. As outlined in Southall *et al.* (2021), thresholds that attempt to relate single noise exposure parameters (e.g. received noise level) and behavioural response across broad taxonomic grouping and sound types can lead to severe errors in predicting effects. Differences between species, individuals, exposure situational context, the temporal and spatial scales over which they occur, and the potential interacting effects of multiple stressors can lead to inherent variability in the probability and severity of behavioural responses.

Modelling by Heinänen and Skov (2015) indicates that the number of ships can determine the density of harbour porpoise in the North Sea MU, with a threshold level of approximately 20,000 ships per year (approximately 80 vessels per day within a 5km² area).

The vessels on site would be slow moving (or stationary) and most noise emitted is likely to be of a lower frequency. The noise levels from could be sufficient to cause local disturbance to cetaceans in the immediate vicinity of the vessel, depending on ambient noise levels. Although the number of vessels on site, up to two, would be well below the Heinänen and Skov (2015) threshold.

If the behavioural response is displacement from the area, it is predicted that cetaceans will return once the activity has been completed and therefore any impacts from underwater noise as a result of vessels will be

both localised and temporary. Therefore, there is unlikely to be the potential for any significant impact on cetaceans (EPS). Any disturbance would be temporary and they would be expected to return to the area once the noise had ceased or they had become habituated to the sound.

2.2.2.4 Residual impact

Taking into account the receptor sensitivity of low to medium for cetaceans and the potential magnitude of the effect. The impact significance for increased collision risk, PTS or TTS or disturbance as a result of vessels on cetaceans (EPS) has been assessed as **negligible** (not significant). Best practice measures will be used throughout the works (**Section 3**). As such, no further mitigation measures are proposed for vessels during the construction works.

2.3 Consideration of designated sites

A number of important areas of ecological interest are located around the island, however, there are no designated sites for cetaceans (EPS) or designated seal haul-outs within the vicinity of the Proposed Scheme. The local sites include designated Sites of Special Scientific Interest (SSSI) for ecological interest:

- Kames Bay SSSI (0km)
- Southannan Sands SSSI (2.8km)
- Ballochmartin Bay SSSI (2.6km)
- Largs Coast Section SSSI (7.7km)
- Portencross Woods SSSI (4.3km)

Of these only Kames Bay has been screened into the Environmental Assessment (Royal HaskoningDHV, 2021) Kames Bay SSSI is located within the footprint of the Proposed Scheme and is designated for its biological (marine) coastline habitat, namely its sandflats. The SSSI has a high faunal population including the lugworm *Arenicola marina* and the bivalve *Tellina tenuis*. There are also wader species such as redshank and oyster catcher. Freshwater seepage allows the presence of estuarine species such as the ragworm *Nereis diversicolor* and the algae *Ulva intestinalis*.

Given the nature of the works, the impact assessments for coastal processes and benthic ecology on Kames Bay SSSI found that construction works at the Proposed Scheme would have a minor adverse or negligible (not significant) impact (Royal HaskoningDHV, 2021).

3 Mitigation Strategy / Best Practice Measures

The EPS assessments (**Section 2**), based on construction activities as the worst-case, indicate there is no risk of injury or auditory injury, or significant disturbance to cetacean species. Therefore, no mitigation measures are required. However, best practice measures will be undertaken, such as adherence to the Scottish Marine Wildlife Watching Code (www.nature.scot/marinecode) to minimise disturbance.

The best practice measure include:

- A nominated competent observer on the bridge of all vessels, including barges, and will keep watch for marine mammals (and basking sharks) during transit to and from the work site.
- Any sightings will be communicated to the Master of the vessel as soon as is practicable and the following actions, as per the Scottish Marine Wildlife Watching Code, implemented:
 - The Master of the vessel will ensure that marine mammals (and basking sharks) are avoided to a safe distance (100 m or more) in all possible circumstances; and
 - The Master of the vessel will minimise high powered manoeuvres where this does not impair safety.

4 Consideration of Cumulative Impacts

The following activities and projects have been identified and considered for potential cumulative impacts with the Proposed Scheme construction works. For wide ranging species (such as cetaceans), it is important to consider projects over a wider area. For cetaceans, due to the extent of the MU are associated with, projects are considered if they are located within the Firth of Clyde due to the limited zone of influence of the works.

The current status of the projects within the vicinity of the Proposed Scheme that could have cumulative impacts are:

- Hunterston PARC Marine construction Yard Proposals:
 - Have not applied for planning permission and date of proposed construction not confirmed – assumed no overlap in construction time frame
- Dawn Fresh Fish farms:
 - Have not applied for planning permission and date of proposed construction not confirmed – assumed no overlap in construction time frame

Therefore, there are currently there are no other marine projects which could result in cumulative impacts.

The assessment of impacts for the Proposed Scheme, as presented in this report, has identified that any potential impacts will be highly localised and short term in nature, and will therefore be negligible (not significant). As such, the potential for the Proposed Scheme contributing to cumulative impacts is highly unlikely. Therefore, no cumulative impacts that could increase the risk of injury or significant disturbance are considered likely for cetaceans (EPS) as a result of the Proposed Scheme.

5 Assessment of Potential Offence

Following the Marine Scotland (2020) guidance, relevant to the construction works at the Proposed Scheme which occur in waters within the 12 nautical mile limit, it can be concluded that, potential impacts from the construction works and vessels are unlikely to result in the harassment, disturbance, injury or killing of an EPS as defined under regulation 39(1) of the Conservation (Natural Habitats &c.) Regulations 1994 (as amended in Scotland) (referred to as the Habitats Regulations).

In relation to regulation 39(2) of the Habitats Regulations, the percentage of the reference population of each species, which has the potential to be disturbed by the construction works and vessels, is considered to be negligible (less than 1% for all cetacean species which occur in the area) and therefore not detrimental to the maintenance of the population of the species concerned at a FCS. Any disturbance is likely to be localised and short-term, and with best practice measure is considered to be negligible. Disturbance will not be sufficient to cause any population level effects, and thus it is considered that an EPS licence (to disturb) can be issued under Section 39 of The Conservation (Natural Habitats, &c) Regulations 1994 (as amended in Scotland).

5.1 EPS tests

As outlined in **Section 1.1**, three tests must be passed before an EPS licence can be granted.

Test 1: The licence must relate to one of the purposes referred to in Regulation 44.

The Scottish Government can only issue licenses under Regulation 44(2) of the Regulations (as amended) for specific purposes. These purposes include:

- 44(2)(e) preserving public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment.

Millport is a small town which is built within a narrow low-lying coastal strip. Most of the residential and commercial properties in the town are built on this coastal strip immediately inshore of the coastal protection structures, promenade and coastal road. Millport is at risk from flooding and erosion due to overtopping and potential failure of the existing coast protection structures. There is a history of flooding due to overtopping of the sea wall adjacent to the harbour, with minor to moderate flooding occurring most years. If nothing is done to provide improved protection to Millport's residential and commercial properties and infrastructure located within the flood risk zone, flooding and erosion would cause economic losses in excess of £68 million over the next 100 years.

The Proposed Scheme as a whole aims to minimise the wave energy that can reach the sea walls around the shores of Millport Bay, to reduce wave overtopping volumes and wave loading during storms, and the associated flood risk and chance of failure of the coast protection structures. The town is designated as a Conservation Area for its historic townscape, and tourism is a strong component of the local economy of Millport. Without the Proposed Scheme there could be detrimental effects to the town's infrastructure and economy.

Test 2: There must be no satisfactory alternative (Regulation 44, 3a).

Alternative options were considered in the Scheme Recommendation Report (SRR) (Royal HaskoningDHV, 2018) which presented the findings of the work completed to date, including consultation with the community of Millport and relevant organisations, to develop an appraisal of the potential scheme options.

However, to provide protection to Millport there are no satisfactory alternatives which do not involve construction and reinforcement of the existing flood defences if they are to continue to be effective and are to remain operational. Thus, it is considered that the 'no satisfactory alternative test' has been met.

Test 3: The action authorised must not be detrimental to the maintenance of the population of the species concerned at a FCS in their natural range (Regulation 44, 3b).

The percentage of the reference population of each species, which has the potential to be temporarily disturbed, over a relatively small area for a short period of time, by the construction works and vessels, is considered to be negligible (less than 1% for all the cetacean species which occur in the Firth of Clyde area), and therefore not detrimental to the maintenance of the population of the species concerned at a FCS level.

6 Conclusions

While the construction works and vessels within the Proposed Scheme present a temporary disturbance to a localised marine environment, this work is important to the integrity of Millport's defences for flooding and erosion.

It is possible that a small number of animals may experience some level of disturbance for the short period they may encounter underwater noise from the construction works and vessels. Given the short term and

temporary impacts of the disturbance to cetaceans, it is considered that there is no potential for a significant impact on the wider populations of harbour porpoise, bottlenose dolphin, common dolphin and minke whale, with a negligible risk of injury or disturbance to any species of cetacean.

Based on current and likely future activities and the predicted level of impact, the level of cumulative disturbance is predicted to be negligible. However, any impacts arising from disturbance from each activity will be temporary and there will be no impact on the favourable conservation status of any EPS.

Therefore, a Marine EPS Licence is thus required for activities where there is potential for disturbance to cetaceans as per Regulation 39(2); this disturbance will not be sufficient to cause any population level effects, and thus it is considered that an EPS licence to disturb can be issued.

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