REPORT

# Port of Dundee Capital Dredge and Quay Improvement Works

## Construction European Protected Species Risk Assessment

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| Client: | Port of Dundee Limited |
| Reference: | PC6550-RHD-XX-XX-RP-EV-0078 |
| Status: | Final/01 |
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# 1 Introduction

One of the primary uses for the Port of Dundee is to service and support the offshore renewables industry. The port already provides facilities for the transhipment and storage of components, such as wind turbine generators (WTGs) and other component parts associated with wind farm projects. Due to the increasing size of the components and vessels used by the offshore renewables industry, the Port of Dundee Limited is proposing to undertake a suite of works at the Port of Dundee and Lady Shoal approach channel in order to accommodate the increasing needs of the offshore renewables industry.

The works would include improvement of the existing quay through the installation of new piles along its front. As underwater noise can cause disturbance to cetaceans, an application for a European Protected Species (EPS) licence is required. Where there is the possibility for disturbance to any individual EPS to occur, an EPS Risk Assessment (RA) must be carried out and the need for a Marine EPS Licence determined.

## 1.1 Determining the Need for a Marine EPS Licence

All species of cetacean in waters around the UK are considered EPS under Annex IV of the Habitats Directive (Council Directive 92/43/EEC), which covers animal and plant species of community interest in need of strict protection.

The need to consider EPS within 12 nautical miles of the Scottish coastline comes from the Conservation (Natural Habitats &c.) Regulations 1994, as amended (hereafter the Habitats Regulations), which transposes the Conservation of Natural Habitats and Wild Fauna and Flora Directive (Council Directive 92/43/EEC; referred to as the Habitats Directive) into Scottish law.

The Habitats Regulations state, under section 39, that it is an offence to:

- Deliberately or recklessly capture, kill or injure a wild animal of an EPS, as listed under Annex IV of the Habitats Directive;
- Damage or recklessly destroy, or cause deterioration of the breeding sites or resting places of an EPS;
- Deliberately or recklessly disturb EPS (in particular disturbance which is likely to impair their ability to survive, breed, reproduce, nurture their young, migrate or hibernate);
- Deliberately or recklessly disturb an animal in a manner that is, or in circumstances which are, likely to significantly affect the local distribution or abundance of the species to which it belongs; and
- Deliberately or recklessly disturb any dolphin, porpoise or whale (cetacean).

It is therefore an offence to deliberately or recklessly disturb a single cetacean in Scottish Territorial Waters. In addition, any means of capturing or killing which is indiscriminate and capable of causing the local disappearance of – or serious disturbance to – any population of EPS is an offence.

The purpose of the EPS RA is to determine whether, when considering appropriate mitigation as presented in **Section 4**, there is potential for activities to cause deliberate harm, or inadvertently cause disturbance to any EPS. The need for a Marine EPS Licence will be determined by the Marine Directorate Licencing Operations Team (MD-LOT), with advice from NatureScot, based on findings from the EPS RA.

MD-LOT's consideration of whether a Marine EPS Licence can be granted comprises three tests:

1. To ascertain whether the licence is to be granted for one of the purposes specified in Regulation 44(2) of the Habitats Regulations;
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).

These tests are considered in **Section 6**.

## 1.2 Construction Works

The suite of works that comprise the Proposed Scheme includes the following:

- Capital dredging works to:
  - Deepen the approaches to DunEco Quay and Prince Charles Wharf (PCW) to -6.0m Chart Datum (CD) and -6.5m CD, respectively;
  - Widen the PCW berth pocket to 70m and deepen to -9m CD, extend eastwards by approximately 200m to a depth of -10m CD (called the Prince Charles Wharf Extension (PCWE)); and
  - Deepen a section of the Lady Shoal Approach channel to -6.5m CD.
- Improvement works to the PCW.

The improvement works include the installation of new piles along the 106m front of the existing PCW to reinforce the quay structure, consisting of 48 main piles, infilled with sheet-piles. Piling would undertaken using a combination of vibro- and impact-piling. A new beam will be installed at the head of the piles to facilitate the pile being tied into the existing PCW deck. Existing fenders would be cut off at existing piles, retained and welded back on following installation of the wall. The proposed piling works are planned to commence on 4 January 2026 and last for approximately 35 days. The proposed dredging and disposal activities would take up to seven weeks to complete. The proposed works are planned to commence in January 2026. Piling parameters can be seen in **Table 1.1**.

*Table 1-1 Piling Parameters*

| Piling Parameter | Details |
|---|---|
| Pile diameter | 700 mm |
| Maximum hammer blow energy | 83 kNm |
| Piling duration | Two minutes of vibro-piling followed by approximately 40 minutes of impact piling. |
| Total amount of piles | 48 |

# 2 Protected Species

## 2.1 Cetacean Species

Annex IV of the Habitats Directive (the Directive) lists all cetacean species as species of community interest in need of strict protection as EPS. 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

Habitats Regulations. Bottlenose dolphin and harbour porpoise are also listed on Annex II of the Habitats Directive and thus require Special Area of Conservation (SAC) designation.

A number of marine mammal species are found off the east coast of Scotland, including harbour porpoise, bottlenose dolphin, white-beaked dolphin (*Lagenorhynchus albirostris*) and minke whale (*Balaenoptera acutorostrata*) (Gilles *et al*., 2023; Waggitt *et al*., 2019; Paxton *et al*., 2016; Evans and Waggitt, 2020). Less common marine mammal species in this area include common dolphin (*Delphinus delphis*); humpback whale (*Megaptera novaeangliae*), killer whale (*Orcinus orca*), Atlantic white-sided dolphin (*Lagenorhynchus acutus*), Risso's dolphin (*Grampus griseus*) and long-finned pilot whales (*Globicephala melas*) (Waggitt *et al*., 2019).

Reported sightings of marine mammal species to the Seawatch Foundation in 2024 and 2025 near to the Port of Dundee, include mainly bottlenose dolphin, with lower numbers of sightings of minke whale, common dolphin, white-beaked dolphin, and harbour porpoise.

The Proposed Scheme is located block NS-D of the SCANS-IV survey (Gilles *et al*., 2023), which provide cetacean species density estimates. Each of the density estimates for block NS-D of the SCANS-IV survey and the reference population for the relevant Management Unit (MU) using the most recent estimate reported in the Inter-Agency Marine Mammal Working Group (IAMMWG) report (IAMMWG, 2023), for the species included within this application, are listed in **Table 2-1**.

*Table 2-1 Marine mammal densities and reference populations*

| Marine mammal species | Density (/km$^2$) | Source of density estimate | Reference population | Source of reference population |
|---|---|---|---|---|
| Harbour porpoise (Very high-frequency (VHF)) | 0.5985 | SCANS-IV Survey Block NS-D (Gilles *et al*., 2023) | 346,601<br>159,632 (UK portion) | North Sea (NS) MU (IAMMWG, 2023) |
| Bottlenose dolphin (High frequency (HF)) | 0.0298 | SCANS-III block R (Hammond *et al*., 2021) | 226 | Coastal East Scotland (CES) MU Cheney *et al*., (2024) |
| White-beaked dolphin (HF) | 0.0799 | SCANS-IV Survey Block NS-D (Gilles *et al*., 2023) | 43,951<br>34,025 (UK portion) | Celtic and Greater North Seas (CGNS) MU (IAMMWG, 2023) |
| Minke whale (Low Frequency (LF)) | 0.0419 | SCANS-IV Survey Block NS-D (Gilles *et al*., 2023) | 20,118<br>10,288 (UK portion) | CGNS MU (IAMMWG, 2023) |

There is currently no estimate of either humpback whale or sei whale density within the area as, although individuals have recently been increasingly sighted in the area, they have previously not been identified in high enough numbers to provide a density estimate. However, the key impact of underwater noise considers the potential for impact to whale species through the assessment on minke whale. The resultant impact ranges and areas would be the same for the rarer whale species as they are for minke whale, and any mitigations would protect both humpback whale and sei whale, as they will be designed to protect minke whale. Therefore, while not considered in detail, these two rarer whale species will be fully mitigated for due to the potential for underwater noise impacts, and there would therefore be no significant impact to either of these species, if they were to increase in presence in the area.

## 2.2 Pinnipeds

Harbour seal (*Phoca vitulina*) and grey seals (*Halichoerus grypus*) are common throughout UK waters. Although both species are Annex II species, they are not listed on Annex IV of the Habitats Directive, and

as such are not classified as EPS. Seals are protected in the UK under the Conservation of Seals Act 1970. Both species are listed under Annex II of the EU Habitats Directive and are considered Scottish Priority Marine Features (PMFs). The Protection of Seals (Designated of Haul-Out Sites) (Scotland) Order 2014 introduces additional protection for seals at 194 designated haul-out sites, where harbour seal and grey seal come ashore to rest, moult or breed.

## 2.3 Designated Sites

### 2.3.1 Special Areas of Conservation

SACs are designated under Regulation 33(2) of the Habitats Regulations. Part II of the Habitats Regulations sets out the provisions for the selection of SACs for Annex I habitats and Annex II species. Key to the designation of SACs is Paragraph 7 (2), the relevant part of which states: *"...For aquatic species which range over wide areas, such sites will be proposed only where there is a clearly identifiable area representing the physical and biological factors essential to their life and reproduction*".

Due to the close proximity to the Firth of Forth, the Scottish Natural Heritage (SNH, now referred to as NatureScot) guidance document (HRA on the Firth of Forth – A Guide for Developers and Regulators; SNH, 2016) has been considered. This states that the following designated sites for marine mammal species be considered:

- Isle of May SAC;
- Berwickshire and North Northumberland Coast SAC:
- Firth of Tay and Eden Estuary SAC; and
- Moray Firth SAC.

Of these sites only the Moray Firth SAC is designated for bottlenose dolphin, an Annex IV species. The other designated sites are listed are listed for grey seal (Isle of May SAC (>30km from the Proposed Scheme), and Berwickshire and North Northumberland Coast SAC (>70km from the Proposed Scheme)) and harbour seal (Firth of Tay and Eden Estuary SAC); due to the limited impact ranges no further assessment has been conducted for the grey seal sites; however, the Firth of Tay and Eden Estuary SAC, designated for harbour seal, has been assessed further as the Proposed Scheme is situated within this SAC.

### 2.3.2 Designated Seal Haul-Out Sites

Seal haul-out sites are coastal locations that seals use to breed, moult and rest. 194 seal haul-out sites have been designated through the Protection of Seals (Designation of Haul-Out Sites) (Scotland) Order 2014 which was amended with additional sites in 2017. These haul-out sites are protected under Section 117 of the Marine (Scotland) Act 2010. The Act is designed to assist in protecting the seals when they are at their most vulnerable, and as such provide additional protection from intentional or reckless harassment.

There is the potential for seals from haul-out sites to move along the coast and offshore to forage in and around the Proposed Scheme. The closest designated haul-out site for seal species to the Proposed Scheme is Craiglieth, for grey seal, approximately 57km from the Proposed Scheme, further information is provided in **Section 5.3**

# 3 European Protected Species Stage 1 Risk Assessment

The assessment for potential impacts as a result of underwater noise impacts is based on the modelling impact ranges (and areas), which are used to calculate the number of marine mammals potentially at risk (based on the known densities of each relevant marine mammal species in the vicinity of the Proposed Scheme).

The number of animals that can be 'removed' from a population through injury or disturbance varies between species but is largely dependent on the growth rate of the population; populations with low growth rates can sustain the removal of a smaller proportion of the population than one with a larger growth rate. The JNCC *et al*. (2010) draft guidance provides some indication on how many animals may be removed from a population without causing detrimental effects to the population at FCS. The JNCC *et al*. (2010) draft guidance also provides consideration of permanent displacement and limited consideration of temporary effects. As such, this guidance has been considered in defining the thresholds for effects.

Temporary effects are considered to be of medium significance at greater than 5% of the reference population being affected within one year. JNCC *et al*. (2010) draft guidance considered 4% as the maximum potential growth rate in harbour porpoise, and the 'default' rate for cetaceans. Therefore, beyond natural mortality, up to 4% of the population could theoretically be permanently removed before population growth would be halted. In assigning 5% to a temporary impact in this assessment, consideration is given to uncertainty of the individual consequences of temporary disturbance.

Permanent effects to greater than 1% of the reference population being affected within a single year are considered to be high significance in this assessment. This is based on Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS) and The Department for Environment, Food and Rural Affairs (Defra) advice (Defra, 2003; ASCOBANS, 2015) relating to impacts from fisheries by-catch (i.e. a permanent effect) on harbour porpoise. A threshold of 1.7% of the relevant harbour porpoise population above which a population decline is inevitable has been agreed with Parties to ASCOBANS, with an intermediate precautionary objective of reducing the impact to less than 1% of the population (Defra, 2003; ASCOBANS, 2015).

## 3.1 Potential Impacts

The potential impacts on cetaceans during the construction phase are:

- Potential for auditory injury and / or behavioural impacts from underwater noise during impact piling; and
- Auditory injury and disturbance from underwater noise from dredging and the presence of vessels.

These construction works may be undertaken in conjunction with capital dredge operations in the area; however, any increase in vessels through the construction phase would be minimal, and in line with current use of the port and surrounding area.

### 3.1.1 Underwater Noise Modelling

To inform the impact assessment of piling, underwater noise modelling was carried out by Subacoustech Environmental Ltd. to estimate the noise levels likely to arise during the works.

Impact piling has long been established as a source of high-level underwater noise (Würsig *et al.*, 2000; Caltrans, 2001; Nedwell *et al*., 2003; 2007; Parvin *et al.*, 2006; Thomsen *et al*., 2006). If a marine mammal is in very close proximity to the piling sound source, the high peak pressure sound levels have the potential

to cause physical injury, with a severe injury having the potential to lead to death, without mitigation. High exposure levels from underwater noise sources (such as impact piling) can cause auditory injury or hearing impairment, through permanent loss of hearing sensitivity, or Permanent Threshold Shift (PTS) or from a temporary loss in hearing sensitivity, or Temporary Threshold Shift (TTS). The potential for auditory injury is not just related to the level of the underwater sound and its frequency relative to the hearing bandwidth of the animal but is also influenced by the duration of exposure. The level of impact on an individual is related to the Sound Exposure Level (SEL) that an individual receives.

PTS can occur instantaneously from acute exposure to high noise levels, such as single strike ($SEL_{ss}$) of the maximum hammer energy during piling. PTS can also occur as a result of prolonged exposure to increased noise levels, such as during the duration of pile installation ($SEL_{cum}$).

All species of cetaceans rely on sonar for navigation, finding prey and communication; they are therefore highly sensitive to permanent hearing damage (Southall *et al*., 2007). The effect would be permanent and marine mammals within the potential impact area are considered to have very limited capacity to avoid such effects, and unable to recover from the effects.

### 3.1.2 Potential For Impacts from Underwater Noise During Piling

#### 3.1.2.1 Potential for PTS Onset

Southall *et al*. (2019) guidelines and weightings were used to predict the likely range at which the thresholds for impulsive and non-impulsive sounds would be exceeded by marine mammals. The predicted impact range for PTS in all marine mammals except for harbour porpoise is predicted to not be exceeded the given criteria based on the results of the modelling, which means that noise levels from impact piling have minimal risk of auditory injury (PTS/TTS) to marine mammals. These details, along with TTS impact ranges predicted across all groups, are presented in **Table 3-1**.

*Table 3-1 Estimated impact ranges for impact piling activities using the Southall et al. (2019) $SPL_{peak}$) marine mammal criteria for impulsive noise sources and SEL marine mammal criteria assuming a fleeing animal for impulsive noise sources*

| Southall *et al*. (2019) criteria (Impulsive) | | Estimated impact range (m) using $SPL_{peak}$ | Estimated impact range (m) using SEL, for fleeing animal |
|---|---|---|---|
| Low Frequency (LF) cetaceans (minke whale) | PTS | No Exceedance | No Exceedance |
| | TTS | 10 | 10 |
| High Frequency (HF) cetaceans (dolphin species) | PTS | No Exceedance | No Exceedance |
| | TTS | No Exceedance | No Exceedance |
| Very High Frequency (VHF) cetaceans (harbour porpoise) | PTS | No Exceedance | <10 |
| | TTS | 10 | 80 |

For harbour porpoise using SEL, with a fleeing response, the predicted impact range for PTS is 10m, which equates to an impact area of 0.00031km$^2$. Although it is very unlikely for any marine mammal to remain within close proximity to a noisy activity, if that was the case, less than one individual (0.0002) would potentially be at risk of PTS, 0.0000001% of the NS MU (UK portion) could be affected. The predicted impact range for TTS is up to 80m (0.02km$^2$), resulting in less than two individuals (1.2) that could be impacted and 0.000008% of the NS MU (UK portion) population could be affected.

The predicted impact range for TTS for minke whale is 10m (0.00031km$^2$), less than one individual (0.001) could be impacted; 0.0000001% of the CGNS MU UK reference population could be impacted.

The impact piling mitigation measures, outlined in **Section 4**, are designed to protect marine mammals from PTS onset, and they would also reduce the potential for TTS onset, as they are designed to ensure (as far as is possible) that there are no marine mammal species within close proximity to the piling location prior to piling commencing. The implementation of the mitigation measures would therefore further reduce the risk of injury to animals from PTS and TTS as a result of piling which will preclude the potential to commit an offence with regards to injury or to affect the FCS of any cetacean species and, therefore, there is no requirement for a Marine EPS Licence.

#### 3.1.2.2 Potential for Disturbance

For marine mammal species, there is currently no agreed threshold for disturbance from underwater noise. The US National Marine Fisheries Service guidance (NMFS, 2018) sets the Level B harassment threshold for marine mammals at 160 dB re 1 µPa (root mean square (rms)) for impulsive noise and 120 dB re 1 µPa (rms) for continuous noise. However, Southall *et al.* (2021) found that simple all-or-nothing thresholds such as these, 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.

During a harbour development project in Scotland, the behavioural response of harbour porpoise and bottlenose dolphin was recorded, both for impact piling and vibro-piling, using an array of acoustic recording devices (Graham *et al*., 2017). Monitoring was undertaken for a year prior to construction, and during construction. The impact piling sound level was recorded as being 240 dB re 1 µPa. Neither harbour porpoise or bottlenose dolphins were excluded from the area as a result of the piling, but fine-scale changes in the local abundance were detected, and bottlenose dolphins were present in the area less often when impact piling was occurring, compared to where no activity was occurring (Graham *et al.,* 2017). This indicates that harbour porpoise and bottlenose dolphin can be disturbed from a very localised area, and for a short-period of time.

Due to no currently agreed thresholds for assessing disturbance, the updated JNCC guidance for Effective Deterrent Ranges (EDRs) have been considered, for sheet and conductor piling the JNCC guidance recommends applying a 5km EDR for assessing disturbance (JNCC, 2025). **Table 3-2** below indicates the results of assessing disturbance to piling on each of the species using a 5km EDR (78.54km$^2$ impact area).

*Table 3-2 Disturbance from piling assessment*

| Species | Number of animals disturbed | % of reference population |
|---|---|---|
| Harbour porpoise | 47 | 0.01% NS MU<br>0.03% (UK portion) |
| Bottlenose dolphin | 3 | 1.3% CES MU |
| White-beaked dolphin | 7 | 0.02% (CGNS MU and UK portion) |
| Minke whale | 4 | 0.02% CGNS MU<br>0.04% (UK portion) |

While there is the potential for a displacement response from the area for any marine mammal species, it is predicted that they would return once the activity has been completed, and therefore any impacts from underwater noise as a result of piling will be both localised and temporary. The assessment in **Table 3-2** indicates the potential for disturbance due to piling is not significant due to less than 5% of the reference population of all species being disturbed. Therefore, there is unlikely to be the potential for any significant impact on marine mammals. 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.

### 3.1.3 Potential Impacts from Underwater Noise During Dredging

#### 3.1.3.1 Assessment of auditory Injury

The Southall *et al.* (2019) guidelines and weightings were used to predict the likely range at which the thresholds for impulsive and non-impulsive sounds would be exceeded by marine mammals (**Table 3-3**). When the $SEL_{cum}$ criteria for non-impulsive noise is applied to the predicted noise contours, it is unlikely that animals will exceed the PTS threshold for all marine mammal species at any range from the dredging activities. This assumes that the dredging is taking place continuously for eight hours, and that the animals flee away from the noise source at a constant speed.

The predicted impact range for PTS in all marine mammals due to dregdging is predicted to be No Exceedance, indicating that no exceedance is expected for the given criteria based on the results of the modelling which means that noise levels from drtedging have minimal risk of permeant auditory injury to marine mammals. For TTS, the estimated impact ranges is <10m for minke whale and up to 30m for harbour porpoise (**Table 3-3**). Any risk of auditory injury to harbour porpoise or minke whale would be less that what was assessed for piling and therefore it is concluded that there would be no significance effect to any marine mammal.

*Table 3-3 Estimated impact ranges for non-impulsive sounds using the Southall et al. (2019) $SEL_{cum}$ marine mammal criteria for non-impulsive noise sources assuming a fleeing animal.*

| Southall *et al.* (2019) criteria (Impulsive) | | Estimated impact range (m) using $SPL_{peak}$ | Estimated impact range (m) using SEL, for fleeing animal |
|---|---|---|---|
| LF cetaceans (minke whale) | PTS | No Exceedance | No Exceedance |
| | TTS | <10 | <10 |
| HF cetaceans (dolphin species) | PTS | No Exceedance | No Exceedance |
| | TTS | No Exceedance | No Exceedance |
| VHF cetaceans (harbour porpoise) | PTS | No Exceedance | No Exceedance |
| | TTS | 20 | 30 |
| Phocids in Water (PCW) (seals) | PTS | No Exceedance | No Exceedance |
| | TTS | No Exceedance | No Exceedance |

#### 3.1.3.2 Assessment of disturbance due to dredging activities

As noted for piling, the area surrounding the Port of Dundee is a busy marine area, and any marine mammals present in the area would be used to increased levels of underwater noise. Given the busy nature of the area, that the dredging works will be small in scale and temporary, any potential for disturbance would be localised, and that it is unlikely to cause any significant disturbance to marine mammals in the area, it is unlikely that there would be any potential for any significant effect on marine mammals, as a result of dredging activity.

Sound sources include for dredging include the dragging of equipment on the seabed as well as sound sources from the vessel such as inboard pump, thrusters, propeller and engine noise (Central Dredging Association (CEDA), 2011; World Organization of Dredging Associations (WODA), 2013). Noise measurements indicate that the most intense sound emissions from dredgers are typically low frequencies, up to and including 1kHz (Robinson *et al*., 2011). Underwater noise from dredging is comparable to those for a cargo ship travelling at modest speed (between 8 and 16 knots) (Theobald *et al.,* 2011).

McQueen *et al.* (2020) found that habitat avoidance was not at a sufficient spatial scale to pose a risk to seals, in the context of activity in dredging areas (adjacent to navigation channels and port infrastructure areas). The major sources of uncertainty are clear exposure–response relationships among observed

marine mammal behavioural studies (McQueen *et al.*, 2020). In some cases, there are orders of magnitude differences in reported sound thresholds for similar behavioural reactions, likely influenced by the difficulties with behavioural response scoring (Gomez *et al.*, 2016) and study-specific context (e.g., multivariate exposure conditions; Ellison *et al.*, 2012).

Without any know disturbance ranges of dredging to marine mammals, a 2km disturbance range and area of 12.57km$^2$ has been applied as previous studies by Brandt *et al.* (2018) and Benhemma-Le Gall *et al.* (2021) show that harbour porpoise could be disturbed up to 2km from construction vessels in renewables, therefore this disturbance range has been applied to all marine mammals. A 2km disturbance range is considered precautionary in this assessment as dredging is anticipated to be a low level noise, 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. **Table 3-4** presents the assessment for any potential disturbance from dredging activities using a 2km disturbance range. 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. Therefore, there is unlikely to be the potential for any significant effect on marine mammals, and the impact for all marine mammal species is considered negligible, due to the predicted short-term nature and localised potential for disturbance.

*Table 3-4 Impact ranges and areas, and maximum number of individuals (and % of reference population) that could be at risk of disturbance from dredging activities using a 2km disturbance range*

| Marine mammal species | Number of animals disturbed | % of reference population |
|---|---|---|
| Harbour porpoise | 8 | 0.002% NS MU<br>0.005 % UK portion |
| Bottlenose dolphin | <1 | 0.2% CES MU |
| White-beaked dolphin | 1 | 0.002% CGNS MU<br>0.003% UK portion |
| Minke whale | <1 | 0.003% CGNS MU<br>0.005% UK portion |

## 3.2 Consideration of Cumulative Effects

Projects that have been identified for potential cumulative effects with the Proposed Scheme are presented in **Table 3-5**. For wide ranging species (such as cetaceans), it is important to consider projects over a wider area. With the exception of the 'Port of Dundee proposed extension to laydown area and landside improvements to PCW' project, all other projects are further than 5km from the Proposed Scheme. As each project is required to provide mitigation for any potential for PTS onset, there is no potential for PTS onset at the Proposed Scheme cumulative with other projects; therefore, the following assessment considers the potential for disturbance only.

*Table 3-5 Project with the potential for cumulative effects with the proposed works*

| Project | Distance from the proposed works (approximate) | Date of Activity | Potential for cumulative effects |
|---|---|---|---|
| Port of Dundee proposed extension to laydown area and landside improvements to PCW | 0km | August 2025 - June 2026 | No – The proposed extension to laydown area and landside improvements would have no effect on the marine environment. |
| Seagreen OWF operation and maintenance (O&M) | 6km | 01/01/2024 - 31/12/2026 | Yes – potential overlap in timeframes. |
| Neart na Goeithe OWF | 28km | 2024-2030 | No – no known activities. |
| Inch Cape OWF - Landfall | 57km | 23/05/2024 - 31/12/2028 | No - No EIA required, no effect on marine mammals. |
| Berwick Bank OWF geophysical survey | 62km | 01/01/2024 - 31/12/2027 | Yes – potential overlap in construction timeframes. |
| Eastern Green Link Subsea cable construction | 67km | 20/05/2025 - 31/12/2031 | Yes – potential overlap in construction timeframes. |
| North Sea Renewables Grid OWF geophysical surveys | 112km | 01/10/2024 – 01/10/2025 | Yes – potential overlap in construction timeframes. |
| Moray West OWF O&M | 248km | 01/01/2023 – 31/12/2025 | Yes – potential overlap in timeframes. |
| Beatrice O&G Decommissioning topside, jacket and subsea removals | 269km | 2025-2029 | No – While this is within the study area for the dolphin population, the noise and disturbance levels were not considered to have a cumulative effect and were therefore screened out. |

For cetaceans the density has been selected from the SCANS survey block of where the project is located and using the IAMMWG abundance for their full MU rather than the UK portion (**Table 2-1**).

For harbour porpoise, less than 1% of the NS MU population is estimated to be potentially affected; therefore there is no significant cumulative effect as a result of disturbance from piling (**Table 3-6**Table 3-6).

*Table 3-6 Cumulative effects for harbour porpoise*

| Project | Density (/km$^2$) | Effect area | Maximum number of individuals potentially disturbed |
|---|---|---|---|
| Proposed works | 0.5985 | 78.54 | 47.0 |
| Seagreen O&M | 0.5985 | 50.27 | 30.1 |
| Eastern Green Link | 0.2813 | 50.27 | 14.1 |
| North Sea Renewables Grid geophysical surveys | 0.5985 | 78.54 | 47.0 |
| Berwick bank geophysical surveys | 0.5985 | 78.54 | 47.0 |
| Moray west O&M | 0.2813 | 50.27 | 14.1 |

| Project | Density (/km²) | Effect area | Maximum number of individuals potentially disturbed |
|---|---|---|---|
| **Total number** | | | **199.4** |
| **Percentage of NS MU** | | | **0.06%** |
| **Cumulative impact** | | | **Negligible** |

For bottlenose dolphin up to 3.9% of the CES population is estimated to be potentially affected, giving a low cumulative effect. This is less than the 5% temporary impact, therefore there is no significant cumulative effect as a result of disturbance (**Table 3-7**Table 3-7).

*Table 3-7 Cumulative effects for bottlenose dolphin*

| Project | Density (/km²) | Effect area | Maximum number of individuals potentially disturbed |
|---|---|---|---|
| Proposed Scheme | 0.0298 | 78.54 | 2.3 |
| Seagreen O&M | 0.0298 | 50.27 | 1.5 |
| Eastern Green Link | 0.0037 | 50.27 | 0.2 |
| North Sea Renewables Grid geophysical surveys | 0.0298 | 78.54 | 2.3 |
| Berwick bank geophysical surveys | 0.0298 | 78.54 | 2.3 |
| Moray west O&M | 0.0037 | 50.27 | 0.2 |
| **Total number of bottlenose dolphin** | | | **9** |
| **Percentage of CES MU** | | | **3.9%** |
| **Cumulative impact** | | | **Low** |

For white-beaked dolphin less than 1% of the CGNS population is estimated to be potentially affected, therefore there is no significant cumulative effect as a result of disturbance (**Table 3-8**Table 3-8).

*Table 3-8 Cumulative effects for white-beaked dolphin*

| Project | Density (/km²) | Effect area | Maximum number of individuals potentially disturbed |
|---|---|---|---|
| Proposed Scheme | 0.0799 | 78.54 | 6.3 |
| Seagreen O&M | 0.0799 | 50.27 | 4.0 |
| Eastern Green Link | 0.1352 | 50.27 | 6.8 |
| North Sea Renewables Grid geophysical surveys | 0.0799 | 78.54 | 6.3 |
| Berwick bank geophysical surveys | 0.0799 | 78.54 | 6.3 |
| Moray west O&M | 0.1352 | 50.27 | 6.8 |
| **Total number** | | | **36.5** |
| **Percentage of CGNS MU** | | | **0.08%** |
| **Cumulative impact** | | | **Negligible** |

For minke whale less than 1% of the CGNS population is estimated to be potentially affected, therefore there is no significant cumulative effect as a result of disturbance (**Table 3-9**Table 3-9).

*Table 3-9 Cumulative effects for minke whale*

| Project | Density (/km$^2$) | Effect area | Maximum number of individuals potentially disturbed |
|---|---|---|---|
| Proposed Scheme | 0.0419 | 78.54 | 3.3 |
| Seagreen O&M | 0.0419 | 50.27 | 2.1 |
| Eastern Green Link | 0.0116 | 50.27 | 0.6 |
| North Sea Renewables Grid geophysical surveys | 0.0419 | 78.54 | 3.3 |
| Berwick bank geophysical surveys | 0.0419 | 78.54 | 3.3 |
| Moray west O&M | 0.0116 | 50.27 | 0.6 |
| **Total number** | | | **13.2** |
| **Percentage of CGNS MU** | | | **0.07%** |
| **Cumulative impact** | | | **Negligible** |

Based on the limited number of individuals predicted to be disturbed for each species assessed, it is concluded that there would be no significant cumulative effect as a result of disturbance.

# 4 Mitigation Strategy

As a precautionary procedure, mitigations will be in place for impact piling to ensure that no marine mammals are exposed to the potential for PTS onset from the piling works. This will be based on the best available information, methodologies, and industry best practice.

The proposed mitigation would therefore be designed to ensure no presence of marine mammal species within 200m (as a precautionary distance) of the impact piling location. The mitigation measures follow best practice guidance for minimising the risk of injury to marine mammals from impact piling noise detailed by the JNCC (JNCC, 2010). This includes:

- The establishment of a mitigation zone of 200m from the impact piling location
    - The JNCC guidance recommends a mitigation zone of 500m; however, due to the small impact ranges predicted for the Proposed Scheme (of less than 100m for PTS), a reduced mitigation zone of 200m would be used.
- Impact piling operations during the hours of daylight and good visibility only.
- Pre–piling search for marine mammals of mitigation zone by Marine Mammal Observer(s) (MMOs).
    - Delay if marine mammals detected within the mitigation zone.
- Soft-start and ramp-up of impact piling for a period of not less than 20 minutes.
- Pre–construction activity search and soft-start procedure should be repeated before impact piling recommences, if piling operations pause for a period of greater than 10 minutes.

All mitigation procedures, soft-start and ramp-up, and reporting requirements, are as per the JNCC guidelines, with the exception of the reduced mitigation zone.

# 5 Potential Effects on Designated Sites

The following assessment has been undertaken in support of the application for a Marine EPS Licence for construction works.

## 5.1 Firth of Tay and Eden Estuary SAC

The Proposed Scheme is within the Firth of Tay and Eden Estuary SAC, which is approximately 15,442 hectares, covering the full extent of the Tay and Eden estuaries, and includes a variety of habitats such as marine areas, sea inlets, tidal rivers, estuaries, mudflats, sandflats, salt marshes, coastal sand dunes, and inland water bodies. The Firth of Tay and Eden Estuary SAC supports a nationally important breeding colony of harbour seal, which form part of the east coast population of seals that typically utilise sandbanks. Harbour seal haul-out on land to rest, breed, and moult, with the core pupping period being between June and July. Harbour seal generally take foraging trips of between 30km and 50km; however, movements vary among individuals and foraging trips of up to 273km have been reported (Carter *et al*., 2022). The nearest seal haul-out site is located in the Tayport - Tentsmuir Coast Site of Special Scientific Interest (SSSI), approximately 4km from the Port of Dundee and approximately 340m from the Lady Shoal approach channel.

### 5.1.1 Conservation Objectives

The Firth of Tay and Eden Estuary SAC Conservation Objectives for harbour seal are:

- To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained, and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and
- To ensure for the qualifying species that the following are maintained in the long term:
    - Population of the species as a viable component of the site;
    - Distribution of the species within site;
    - Distribution and extent of habitats supporting the species;
    - Structure, function and supporting processes of habitats supporting the species; and
    - No significant disturbance of the species.

Harbour seal within the Firth of Tay and Eden Estuary SAC are in unfavourable condition.

### 5.1.2 Distribution and Abundance

The latest harbour seal count (from 2023) in the Firth of Tay and Eden Estuary SAC was 55 (Special Committee on Seals, SCOS, 2024), and the population in this site has been in decline since the 2000s; the 1990 to 2002 count within the SAC was 641 (Hague *et al*., 2020). To generate a SAC population estimate of this SAC, the count has been corrected to take account of those not available to count during the surveys (a correction of 0.72; Lonergan *et al*., 2013). This results in a total SAC population estimate (on land and at sea) of 76 for which the potential for effect has been assessed (SCOS, 2024).

While there is some connectivity of individuals from the Firth of Tay and Eden Estuary SAC within the wider area, this SAC population is the most isolated harbour seal SAC population in Scotland, with the majority of individuals staying within close proximity of the SAC. Only a small proportion of the wider East Scotland population are associated with haul-out sites within the Firth of Tay and Eden Estuary SAC (SCOS, 2020).

### 5.1.3 Potential Impacts

#### 5.1.3.1 Potential for disturbance from construction activities affecting harbour seal

Whilst there is the potential for a displacement response by harbour seal as a result of underwear noise generated by the proposed piling and dredging activities, it is expected that they would quickly return once the activity has been completed, and therefore any effects would be both localised and temporary. The area surrounding the Port of Dundee and Lady Shoal approach channel is already a busy marine area, and any seals in the vicinity of the Proposed Scheme would be used to a noisy environment.

Taking the above into account, there will be no adverse effect on the integrity of harbour seal, as a feature of the Firth of Tay and Eden Estuary SAC, due to underwater noise effects from construction works.

#### 5.1.3.2 Disturbance of seals at haul-out sites

Seals at haul-outs vary in their reaction to construction disturbance depending on disturbance type (vessel noise/presence, piling etc.) and proximity to the sites. The deepening of a section of the Lady Shoal approach channel is approximately 340m from the nearest seal haul-out located in the Tayport – Tentsmuir Coast SSSI.

The most common disturbance effects at haul out sites include increased vigilance and 'flushing' behaviour, which can be energetically taxing especially if pups are present or during moulting season when seals tend to spend more time on land (Machernis *et al*., 2018). A study was carried out by Sea Mammal Research Unit (SMRU) (Paterson *et al.,* 2015) using a series of controlled disturbance tests at harbour seal haul-out sites, consisting of regular (every three days) disturbance through direct approaches by vessel and effectively 'chasing' the seals into the water. The seal behaviour was recorded via GPS tags and found that even intense levels of disturbance did not cause seals to abandon their haul-out sites more than would be considered normal (for example seals travelling between sites) and the seals were found to haul-out at nearby sites or to undertake a foraging trip in response to the disturbance (but would later return).

Further studies on the effects of vessel disturbance on harbour seals when they are hauled out, suggest that even with repeated disturbance events that are severe enough to cause individuals to flee into the water, the likelihood of harbour seals moving to a different haul-out site would not increase. Furthermore, this appeared to have little effect on their movements and foraging behaviour (Paterson *et al*. 2019). In areas of high vessel traffic, there can be habituation effects and disturbance behaviours are generally reduced over time (Strong *et al.,* 2010).

It is expected that if there is any disturbance to seals at haul-out sites from construction activities it is a short-term effect. For example, a 2019 study on harbour seals in Scotland found that 30 minutes after a disturbance event, seals return to 52% pre-disturbance levels at haul-out sites and 94% pre-disturbance levels four hours after a disturbance event (Paterson *et al*., 2019).

Due to the distance from the haul-outs in the SAC, the short duration of the effects and recoverability or habituation due to high levels of vessel traffic in the area there will be no adverse effect on the integrity of harbour seal, as a feature of the Firth of Tay and Eden Estuary SAC, due to disturbance of seals at haul-out sites from dredging activities and vessels.

## 5.2 Moray Firth SAC

The Moray Firth SAC in north-east Scotland supports the only known resident population of bottlenose dolphin in the North Sea. The Moray Firth is approximately 138km from the Proposed Scheme. Individuals are present all year round, and, while they range widely in the Moray Firth, they appear to favour particular areas. The bottlenose dolphin is a wide-ranging species and occurs across the continental shelf. Historically,

very few sightings of bottlenose dolphin were recorded further south on the east coast of the UK, however, in recent years an increase in bottlenose dolphins in the north-east of England have been reported (Aynsley, 2017), with one individual from the Moray Firth population being recorded as far south as The Netherlands (Cheney *et al*., 2024).

### 5.2.1 Conservation Objectives

The Moray Firth SAC Conservation Objectives for bottlenose dolphin are:

- To ensure that the qualifying features of Moray Firth SAC are in favourable condition and make an appropriate contribution to achieving Favourable Conservation Status.
- To ensure that the integrity of Moray Firth SAC is maintained or restored in the context of environmental changes by meeting the following objectives for each qualifying feature:
    - The population of bottlenose dolphin is a viable component of the site.
    - The distribution of bottlenose dolphin throughout the site is maintained by avoiding significant disturbance.
    - The supporting habitats and processes relevant to bottlenose dolphin and the availability of prey for bottlenose dolphin are maintained.

Bottlenose dolphin within the Moray Firth SAC are in favourable condition.

### 5.2.2 Distribution and Abundance

The Moray Firth SAC is in the SCANS block CS-K. The SCANS-IV survey did not identify any bottlenose dolphins within survey block NS-D, where the Proposed Scheme is located; however, the SCANS-III survey did identified bottlenose dolphin in survey block R (renamed block NS-D for the SCANS-IV survey). Abundance estimates for bottlenose dolphin were 1,924 bottlenose dolphin (95% CI = 0 - 5,048) and a density estimate of 0.0298 bottlenose dolphin/km$^2$ (CV = 0.861) (Hammond *et al*., 2021).

The Moray Firth SAC consists of a resident population of bottlenose dolphin, with an estimated 226 individuals (95% CI: 214 – 239; Cheney *et al*. 2024). The most recent study from Cheney *et al*. (2024) on the Moray Firth SAC bottlenose dolphin population noted a decline in dolphins using the SAC from the previous six years. Although the population has been using the Moray Firth SAC less, as noted above, the population within the east coast of Scotland appears to be steady and slightly increasing.

A recent study published in 2024 by Cheney *et al*., (2024) provided results from a mark-recapture study of the Moray Firth SAC bottlenose dolphin population between 2017 and 2022. The results highlighted that the total abundance of bottlenose dolphin in 2022 was 94 within the SAC and 245 on the east coast of Scotland. The weighted mean estimate of the number of bottlenose dolphin in the east coast from 2020 to 2022 was 226 (95% CI: 214-239).

### 5.2.3 Potential Impacts

There will be no direct impacts on the Moray Firth SAC from the construction activities due to the distance from the Proposed Scheme; however, individuals connected to the site have the potential to be present in the local area during the construction activities. Potential disturbance from underwater noise from impact piling, as the worst case, has therefore been assessed for the Moray Firth SAC bottlenose dolphin population.

There is the potential for a displacement response from the area for as a result of the proposed impact piling; however, there is little information on behavioural response of bottlenose dolphin. During the installation of Moray East offshore wind farm, it was found that piling had no impact on the presence of

dolphins (Fernandez-Betelu *et al*., 2021). Although Graham *et al*. (2017) found dolphins to move away from impulsive noise sources such as piling during offshore wind construction.

The area surrounding the Port of Dundee is already a busy marine area, and any bottlenose dolphins in the vicinity of the Proposed Scheme would be used to increased levels of marine traffic and a noisy environment. Whilst there is the potential for a displacement response by bottlenose dolphin as a result of underwater noise generated by the proposed impact piling, it is expected that they would quickly return once the activity has been completed, and therefore any effects would be both localised and temporary.

The assessment of potential disturbance to bottlenose dolphin from impact piling is presented in **Section 3.1.2.2**. **Table 3-2** shows that there would be no significant effect to bottlenose dolphin as less than 5% of the reference population would be disturbed; therefore, there would be no adverse effect on the integrity of the bottlenose dolphin, as a feature of the Moray Firth SAC, due to disturbance from impact piling.

## 5.3 Designated Seal Haul-Out Sites

Craigleith haul-out designated for grey seal is approximately 57km from the Proposed Scheme. Modelling of impacts for cumulative exposure from PTS and TTS are less than 100m for seal species. The response of seals to disturbance at haul-out sites can range from increased alertness to moving into the water (Wilson, 2014). Grey and harbour seals have been reported to move into the water when vessels are at a distance of approximately 200m to 300m (Wilson, 2014); therefore, it is considered that, for grey seal, vessels travelling within 300m of a haul-out site, a grey seal may flee into water, but significant disturbance would be expected at a distance of less than 150m.

Given the distance of the Proposed Scheme from the Craigleith haul-out site, there would be no significant disturbance from the proposed construction activities.

# 6 Assessment of Potential Offence

Following the Marine Scotland (2020) guidance, relevant to injury and disturbance, which would occur in waters within the 12 nautical mile limit, it can be concluded that, with mitigation for the piling works, potential impacts are unlikely to result in the harassment, disturbance, injury or killing of an EPS as defined under Regulation 39(1) of the Habitats Regulations.

In relation to Regulation 39(2) of the Habitats Regulations, the potential for any species to be disturbed during piling at the Proposed Scheme, is considered to be negligible and therefore not detrimental to the maintenance of the population of the species concerned at a FCS. Any disturbance would be localised and short-term, and with mitigation is considered to be negligible. Disturbance will not be sufficient to cause any population level effects, and thus it is considered that a Marine EPS Licence (to disturb) can be issued under Regulation 39 of the Habitats Regulations.

## 6.1 EPS Tests

As stated in **Section 1.1**, three tests must be passed before a Marine EPS Licence can be granted. These are considered below.

### 6.1.1 Test 1: The licence must relate to one of the purposes referred to in Regulation 44(2).

The Scottish Government can only issue licenses under Regulation 44(2) of the Habitats Regulations for specific purposes. For the purposes of the proposed piling, this purpose is:

- 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.

Offshore wind is a key growth sector in Scotland, and the generation and development of offshore wind infrastructure is a key component for reaching Scotland's target to reduce greenhouse gas emissions (by 75% by 2030), and for being net-zero by 2045. Part of the next round of offshore wind development in Scotland (currently being bid for through the ScotWind process) is to ensure that 25% of the offshore wind industry is provided by local business.

One of the primary uses for the Port of Dundee is to service and support the offshore renewables industry. The port already provides facilities for the transhipment and storage of components, such as wind turbine generators (WTGs) and other component parts associated with wind farm projects. Due to the increasing size of the components and vessels used by the offshore renewables industry, the Port of Dundee Limited is proposing to undertake a suite of works at the Port of Dundee and Lady Shoal approach channel in order to accommodate the increasing needs of the offshore renewables industry.

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

By not doing these works (i.e. the do nothing scenario), the Port of Dundee would be unable to receive larger drafted vessels or the changing components on which the offshore energy sector is becoming increasingly reliant. This would likely make the Port less viable to support the offshore renewables industry in the future, thereby hindering Scotland achieving its net zero carbon emissions targets, and the objectives of the project could not be achieved. Though the do-nothing scenario is the least impactful option, this has been discounted.

The operational requirements of the Proposed Scheme are dictated by the requirements of the vessels and components of the renewables industry that the Port of Dundee already supports therefore, improvement of the existing infrastructure was considered as the first option. There was no consideration of alternative location as alternatives would likely require the development of new port infrastructure, which was considered to be less economically or technically feasible. As improvement of the existing infrastructure was considered to be less impactful than an alternative location, therefore, no alternatives were proposed on environmental grounds.

For construction, from experience on previous projects and understanding of the ground conditions, the installation of new piles was identified as required for the improvement of the quay. Impact piling of piles coupled with vibro piling was proposed as the first option, specifically, vibro-piling until refusal integrated into the methodology in order to reduce the time for impact piling required. As this approach also reduces the level of disturbance from piling works to surrounding species, no other alternatives were proposed.

For the dredging, the target depths proposed are the operational minimum depths required to achieve the project objectives therefore, no alternative depths were considered. The installation of a rock mattress was considered at an early stage of the project, however this was considered more than was required to meet the project objectives and was dropped from the project to reduce costs and works required. In terms of the dredging methodology, due to the shallow dredge depths across the majority of the dredge areas, back-hoe

dredging was proposed as the first and most efficient option. As this is a lower impact approach than other dredge methods such as trailer suction hopper dredge, no other dredge methods were considered.

### 6.1.3 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 have the potential to be impacted by the construction activity at the Proposed Scheme, has been shown to be negligible, and therefore not detrimental to the maintenance of the population of the species concerned at a FCS level.

## 7 Conclusions

The improvement works at the Port of Dundee are an important part of Scotland's growing contributions to the UK's renewable energy sector. It will provide additional support to the UK government's national and international commitments to reduce greenhouse gases.

It is possible that a very small number of cetaceans may experience some level of disturbance for the short period they may encounter underwater noise emissions from the proposed impact piling works. Given the short term, intermittent and temporary impacts to cetaceans, it is considered that there is no potential for a significant effect on the wider populations of harbour porpoise, bottlenose dolphin, white-beaked dolphin or minke whale. With a negligible risk of injury or disturbance to any species of cetacean.

Regarding cumulative effects, all species were assessed as having a non-significant population level effect. Based on current and likely future activities and the predicted level of impact, along with the potential mitigation that will be in place, the level of cumulative disturbance is predicted to be negligible. As the potential impacts arising from disturbance from each activity will be temporary, there will be no impact on the FCS of any cetacean.

The assessment is **Section 5** demonstrates there will be no potential for adverse effects on site integrity for the Moray Firth SAC and Firth of Tay and Eden Estuary SAC. With the implementation of the mitigation measures detailed in **Section 4**, there will be no injury resulting from the impact piling activities due to underwater noise and any disturbance would be intermittent and short lived.

Therefore, a Marine EPS Licence is required as there is the 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 a Marine EPS Licence to disturb can be issued.

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