

# REPORT

## Boston Alternative Energy Facility

### Outline Marine Mammal Mitigation Protocol (Tracked)

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## Glossary of Acronyms

Acronym	Definition
<b>BDMLR</b>	British Divers Marine Life Rescue
<b>COLREGS</b>	Convention on the International Regulations for Preventing Collisions at Sea
<b>CSIP</b>	Cetacean Strandings Investigation Programme
<b>dB re 1 <math>\mu</math>Pa</b>	Decibel level in water (decibels per 1 micro pascal)
<b>DCO</b>	Development Consent Order
<b>DML</b>	Deemed Marine Licence
<b>IMO</b>	International Maritime Organisation
<b>IWC</b>	International Whaling Commission
<b>JNCC</b>	Joint Nature and Conservation Committee
<b>km</b>	Kilometre
<b>km<sup>2</sup></b>	Square Kilometres
<b>MMO</b>	Marine Management Organisation
<b>MMOb</b>	Marine Mammal Observer
<b>MMMP</b>	Marine Mammal Mitigation Protocol
<b>MU</b>	Management Unit
<b>NMP</b>	Navigation Management Plan
<b>PAM</b>	Passive Acoustic Monitoring
<b>PTS</b>	Permanent Threshold Shift
<b>SCOS</b>	Special Committee on Seals
<b>SE</b>	South East
<b>SEL</b>	Sound Exposure Level
<b>SEL<sub>cum</sub></b>	Sound Exposure Level (cumulative)
<b>SEL<sub>ss</sub></b>	Sound Exposure Level (single strike)
<b>SNH</b>	Scottish Natural Heritage (now NatureScot)
<b>SPL<sub>peak</sub></b>	Sound Pressure Level (peak)

## 1 Purpose of This Report

### 1.1 Introduction

1.1.1 This Outline Marine Mammal Mitigation Protocol (MMMP) is for the Boston Alternative Energy Facility ('the Facility'). This report is provided on behalf of Alternative Use Boston Projects Limited ('the Applicant'), to support the application for a Development Consent Order (DCO) ('the DCO application') for the Facility that has been made to the Planning Inspectorate under Section 37 of the Planning Act 2008 ('the Act').

1.1.2 The purpose of this Outline MMMP is to define the measures to be put in place to avoid (where possible) and mitigate the potential impacts of any physical injury or permanent auditory injury / change in hearing sensitivity (Permanent Threshold Shift (PTS)) to marine mammals associated with the construction and operation of the proposed Facility.

1.1.3 ~~This Outline MMMP is secured by~~ Condition 17 of the draft Deemed Marine Licence (DML) contained within Schedule 9 to the draft DCO (document reference 2.1(3)) ~~which~~ requires a final MMMP to be approved by the Marine Management Organisation (MMO) following consultation with the statutory nature conservation body and Lincolnshire Wildlife Trust. The final MMMP submitted for approval must be in accordance with this Outline MMMP. The piling method statement (secured and approved under Condition 13 of the DML) and the navigation management plan (secured and approved under Condition 14 of the DML) are both required to contain measures for managing potential risks to marine mammals in accordance with the approved MMMP.

1.1.4 This Outline MMMP sets out the protocol of how ~~the proposed Facility would mitigate~~ impacts assessed in Environmental Statement Chapter 17 Marine and Coastal Ecology (document reference 6.2.17(1), REP9-011APP-055) will be mitigated, to reduce the likelihood of any potential for physical or permanent auditory injury to marine mammals as a result of underwater noise during underwater piling operations and the presence of vessels during construction and operation. Mitigation protocols are covered in Sections 3 and 4.

### 1.2 **Error! Reference source not found.-Agreement on the Final MMMP**

1.2.1 The final MMMP will be submitted for approval in accordance with Schedule 9, Condition 17 of the DML, which states:

*17.—(1) The undertaker must submit a marine mammal mitigation protocol to the MMO for approval in accordance with the procedure in Part 4,*

*following consultation with the relevant statutory nature conservation body and Lincolnshire Wildlife Trust, at least 13 weeks prior to the commencement of any of licenced activity.*

*(2) The marine mammal mitigation protocol submitted for approval under sub-paragraph (1) must be in accordance with the outline marine mammal mitigation protocol.*

*(3) The undertaker must not commence the licenced activities until the MMO has approved in writing the submitted marine management mitigation protocol.*

*(4) Unless otherwise agreed by the MMO, the marine mammal mitigation protocol must be implemented as approved by the MMO.*

1.2.2 When finalising the MMMP, once the final piling design and methodologies are known, the Applicant will ensure the following information is provided on the pile design:

- Types of pile.;
- Number of each type of pile.;
- Pile diameters.;
- Piling methodologies.;
- Hammer energy required for installation for each pile type (for any impact piling).;
- Piling durations (for each pile, and in total for all piles and pile types).;
- ~~and~~ Piling programme.

1.2.3 The final MMMP will be based on the mitigation measures as set out within this Outline MMMP. As set out in the Updated Piling Noise Assessment (document reference 9.16, REP1-029) there is unlikely to be any simultaneous piling (unless non-impact piling methodologies are used) as each pile location would have its own specific requirements, that would require previous piles to be installed in order for the next to be installed. The wharf piling duration (4 months) is predicated on almost continuous piling during the allowable construction hours without any simultaneous piling occurring (unless non-impact piling methods are used).

1.2.4 If required, following final pile design, site-specific underwater noise modelling would be undertaken to determine the maximum impact range for PTS. The modelled impact range for PTS will be used to determine the range over which monitoring by the Marine Mammal Observers (MMOs) from suitable vantage points will need to be conducted, to reduce the risk of PTS in marine mammals that could be present in the area during piling operations. The underwater noise

modelling would be undertaken for conditions at both high and low tides to determine potential requirements for mitigation measures during both these periods.

- 1.2.5 The final MMMP will be approved by the MMO in consultation with Natural England and Lincolnshire Wildlife Trust.

## 2 Summary of Potential Impacts to Marine Mammals

- 2.1.1 High exposure levels from underwater noise sources (such as impact piling) can cause permanent auditory injury or hearing impairment, through permanent loss of hearing sensitivity (PTS).

2.1.2 Piling at for the Facility will be comprise for both sheet piles and tubular piles, and it is assumed that, as a worst case scenario, the piling method will be use impact piling. Based on the information provided in Table 2-1 and given the distance from any harbour seals (with no haul out sites within The Haven and only infrequent use of this waterbody by seal species), it is of note that the predicted impact ranges for impact piling are up to 90m for PTS due to cumulative piling operations. However, precautionary mitigation was put in place to reduce this further, as set out in Addendum to Environmental Statement Chapter 17 and Appendix 17.1 - Marine Mammals (doc ref 9.14(1), REP9-020).

2.1.2.1.3 For impact piling, sheet piles would take up to five minutes each to install, while tubular piles would take up to 15 minutes. A number of piling rigs would be on site at any one time, allowing for the next piles to be placed in readiness for piling, and for while the previous are installed. It is possible that there would be continuous piling to be possible, as there would sufficient rigs on site to allow for changeover times to occur while other piles are installed. However, it is unlikely that there would be any simultaneous piling as each pile location would have its own specific requirements, that would require previous piles to be installed in order for the next to be installed. A maximum of 96 sheet piles and a maximum of 48 tubular piles could therefore be installed in any one day (over a maximum of 12 hours working time).

2.1.4 The Applicant has also been investigating alternative non-impact piling methods with potential contractors. However, the piling window is already restricted to avoid disturbance to overwintering birds, therefore should non-impact piling methods be used there is a risk that piling would be required to take place over more than one year which would extend the period of piling impact. Therefore, instead of increasing the piling programme, there would be a need to undertake simultaneous piling if non-impact piling methods are deemed suitable by the

contractors. As non-impact piling methods are unlikely to have the potential to cause PTS in marine mammals, it is expected that there would be no increased risk in the case of simultaneous piling (if non-impact methods were used).

2.1.32.1.5 PTS can occur instantaneously from acute exposure (Sound Exposure Level (SEL)) to high noise levels, such as single strike (SEL<sub>ss</sub>) of the maximum hammer energy during piling. PTS can also occur as a result of prolonged cumulative exposure to increased noise levels, such as during the duration of ongoing pile installation (SEL<sub>cum</sub>).

2.1.42.1.6 Due to the water levels at the Facility during low water (or W within three hours of low water<sub>;</sub>, noise levels are not expected to propagate a significant at distance from the sound source. There is not expected to be any significant levels of underwater noise at levels high enough to cause injury due to piling undertaken during low water<sub>;</sub> however, all piling is expected to be subject to the procedures as provided set out within this Outline MMMP (to be confirmed in the final MMMP) on a precautionary basis. This will be confirmed in the final MMMP following final pile design, and following site-specific underwater noise modelling (if required).

2.1.52.1.7 **Table 2-1** summarises the assessments relevant to the Outline MMMP for underwater noise impacts to harbour seal due to piling, dredging, and vessels, during construction and operation, and the potential for an increase in collision risk with vessels, during construction and operation. Further information on these assessments is provided within Chapter 17 Marine and Coastal Ecology (document reference 6.2.17(1), REP9-011), Appendix 17.1 Habitats Regulations Assessment (document reference 6.4.18(1), AS-006), and the Marine Mammal Addendum (document reference 9.14, REP1-027).



Table 2-12-4 Summary of underwater noise assessments using impact piling methodologies (PTS) and vessel collision risk for harbour seal

Potential impact	Criteria and threshold	Impact range (and area)	Maximum number of individuals (% of reference population)	Magnitude	Sensitivity	Impact significance	Mitigation
<b>Construction related impacts only</b>							
PTS from single strike piling	218 dB re 1 $\mu$ Pa SPL <sub>peak</sub> unweighted impulsive criteria (Southall <i>et al.</i> , 2019)	0m (0km <sup>2</sup> )	0 harbour seal	No potential for impact.	High	No impact.	Mitigation for piling at high water following Joint Nature Conservation Committee (JNCC)
PTS from cumulative piling	185 dB re 1 $\mu$ Pa <sup>2</sup> s SEL <sub>cum</sub> weighted impulsive criteria (Southall <i>et al.</i> , 2019)	90m (<0.01km <sup>2</sup> )	0.008 harbour seal (based on the harbour seal density of 0.80/km <sup>2</sup> at the Application Site) <sup>1,2</sup> .  0.0002% of the South East (SE) England Management Unit (MU) population <sup>3</sup> .  0.0003% of the most recent count of adult seals in The Wash <sup>3</sup> .	Permanent effect with negligible magnitude (less than 0.001% of the reference population anticipated to be exposed to effect).	High	Minor adverse	Protocol (JNCC, 2010), as outlined in <b>Section 3.1</b> and <b>Box 1</b>
PTS from dredging activities (cumulative)	201 dB re 1 $\mu$ Pa <sup>2</sup> s SEL <sub>cum</sub> weighted non-impulsive criteria	<10m (0.0003km <sup>2</sup> )*	0.0002 harbour seal (based on the harbour seal density of 0.80/km <sup>2</sup> at the Application Site).  0.000005% of the SE England MU population.	Permanent effect with negligible magnitude (less than 0.001% of the reference population)	High	Minor adverse	No mitigation required as highly unlikely that marine mammal would be in very close vicinity

<sup>1</sup> Russell *et al.*, 2017

<sup>2</sup> Application Site = the development area around the Facility

<sup>3</sup> Special Committee on Seals (SCOS), 2020

Potential impact	Criteria and threshold	Impact range (and area)	Maximum number of individuals (% of reference population)	Magnitude	Sensitivity	Impact significance	Mitigation
	(Southall <i>et al.</i> , 2019)		0.000008% of the most recent count of adult seals in The Wash.	anticipated to be exposed to effect).			(<10m) for 24 hours or more.
<b>Construction and operation related impacts</b>							
Increased risk of collision for marine mammals (impact zone includes the Wash as a transit area) during both construction and operation [5% at increased risk]	-	10.46km <sup>2</sup>	1.7 harbour seal (based on the harbour seal density of 3.189/km <sup>2</sup> over whole project area).  0.05% of the SE England MU population.  0.07% of the most recent count of adult seals in The Wash.	Permanent effect with medium magnitude (between 0.01% and 0.1% of the reference population anticipated to be exposed to effect).	Low	Minor adverse	Mitigation for vessels as outlined in <b>Section 3.3</b> and <b>Box 2</b>

### 3 Marine Mammal Mitigation Measures

#### 3.1 Piling

3.1.1 As a precautionary approach, mitigation will be undertaken for all piling works, to ensure that any potential impact to marine mammals (and fish species) are reduced as far as is possible. These measures are secured as part of the piling method statement required by condition 13 of the DML (Schedule 9 to the draft DCO (document reference 2.1(36), REP10-004), which requires the piling method statement to include measures for managing potential risks to marine mammals in accordance with the approved MMMP.

3.1.2 Piling would be undertaken between June and September only, to reduce the potential for impact to ~~ecological receptors such as~~ overwintering birds and minimise impacts on migratory fish.

3.1.3 This mitigation would ~~include~~ comprise:

- Pre-piling watch for marine mammals, following the standard JNCC 'Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise' (JNCC Protocol)<sup>4</sup> (JNCC, 2010) for minimising the risk of injury to marine mammals from piling noise; and
- Soft-start and ramp-up procedures, for piling activities, where ~~possible~~ necessary taking into account final pile design (and durations).

#### 3.2 Mitigation Protocol for Impact Piling

3.2.1 A flowchart of the mitigation to be applied during piling is included in **Box 1 within Section 4**. ~~See Section 1 for more information. These measures would only be required for impact piling. Alternative non-impact piling methods would not be expected to require mitigation due to significantly reduced underwater noise levels.~~

##### Pre-Piling Watch

3.2.2 For any impact piling activity, a pre-piling watch will be undertaken for a period of at least 30 minutes ~~prior to piling~~. This will be undertaken by fully qualified and experienced ~~Marine Mammal Observer (MMOb)~~ during hours of daylight and good visibility (as good visibility is defined within the JNCC MMOb recording forms<sup>5</sup> as

<sup>4</sup>Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise, 2010 <https://data.jncc.gov.uk/data/31662b6a-19ed-4918-9fab-8fbcff752046/JNCC-CNCB-Piling-protocol-August2010-Web.pdf>

<sup>5</sup> Marine Mammal Recording Form <https://data.jncc.gov.uk/data/e2a46de5-43d4-43f0-b296-c62134397ce4/Deckforms-rev04.doc>

more than 1km in all directions [noting the restrictions set out in **paragraph 3.2.4**]).

3.2.3 Due to the piling programme restrictions of being undertaken in daylight hours only<sup>6</sup>, the use of Passive Acoustic Monitoring (PAM) ~~is not currently considered in this Outline MMMP. PAM~~ is not an ~~optimum-optimal~~ method of detecting seal species (as they tend to vocalise less underwater than cetacean species) and is not considered in this Outline MMMP.

3.2.4 Wherever it is possible to do so, ~~T~~the pre-piling watch ~~should~~will monitor a 500m radius around the piling location (referred to as the monitoring zone). ~~Note that~~ Due to the location of the Facility, it may not be possible to see the entire monitoring zone from all piling locations (~~despite due to~~ the bend in the river to the north, ~~however,~~ the minimum viewable distance would be at least 150m at all times) ~~, and the full 500m monitoring zone would be used wherever possible to do so. Although it is important~~ Critically, to note that the maximum potential PTS range of 90m would be visible at all times and for all piling locations.

3.2.5 If marine mammals are detected within the monitoring zone, ~~the commencement of~~ piling would be delayed until the marine mammal is outside of the monitoring zone for 20 minutes, and the full 30 minute pre-piling watch has been completed.

#### Soft-Start and Ramp-Up Protocol

3.2.6 The soft-start and ramp-up procedure for piling, where is it technically possible taking into account final pile design (e.g. durations), will be conducted prior to any piling. Each piling event will commence with a hammer energy at as low as is reasonably practicable, followed by a gradual ramp-up to full hammer energy. ~~Note that, due~~ to the very short expected piling times of five minutes or 15 minutes per pile (dependent on pile type), the full soft-start procedure as stated within the JNCC Piling Protocol (JNCC, 2010) may not be possible. However, the piling, where possible, would commence with hammer energies as low as is reasonably practicable, with a ramp-up to full hammer energy for as long a period as is possible.

3.2.7 This procedure is only required where there has been no piling for the preceding 10 minutes (i.e. if piling continues at a new location within 10 minutes of a pile being installed, as is expected, then this soft-start and ramp-up protocol would not be required).

3.2.8 If a marine mammal enters the monitoring zone during the soft-start and ramp-up procedure, then, ~~if possible,~~ the piling energy will not increase until the marine

<sup>6</sup> Of between 7am and 7pm, or 8am and 8pm, during the summer months only (~~of~~ June to September)

mammal exits the monitoring zone.

### Full Piling Sequence

**3.2.83.2.9** Due to the specific piling requirements of this project, with a piling period of five minutes for each sheet pile, and 15 minutes for each tubular pile, 'full piling' refers to a sequence of piling, at different piling locations, with no break in overall piling (i.e. a piling sequence would include multiple sheet piles, and the next pile sequence would commence only when there is a break of more than 10 minutes in piling).

**3.2.93.2.10** When piling at full power, there is no requirement to cease piling or reduce the power if a marine mammal is detected in the monitoring zone.

### Breaks in Piling

**3.2.103.2.11** In the event that piling activity is stopped for less than 10 minutes, then a check of the surrounding area should be undertaken by the MMOB for any marine mammal presence within the monitoring zone before piling can recommence. If a marine mammal is present within the monitoring zone, the full mitigation procedure should be undertaken prior to piling recommencing.

**3.2.113.2.12** In the event that piling activity is stopped for more than 10 minutes, the piling coordinator would ensure that the pre-piling watch, soft-start and ramp-up procedure (if possible) is conducted prior to piling re-commencing.

**3.2.123.2.13** If a watch has been undertaken in the 30 minute period prior to the piling sequence re-commencing, ~~then~~ there would be no requirement for the full pre-piling monitoring to be undertaken, ~~as the 30 minute watch has already been completed.~~

### Reporting

**3.2.133.2.14** Reporting would be undertaken following the JNCC Statutory protocols<sup>5,7</sup> and in accordance with Condition 24 of the DML which requires reporting of impact sound to the Marine Noise Registry:

*(1) Only when impact driven or part-driven pile foundations or detonation of explosives are proposed to be used as part of the foundation installation the undertaker must provide the following information to the Marine Noise Registry:*

<sup>7</sup> Marine mammal deck forms - <https://data.jncc.gov.uk/data/e2a46de5-43d4-43f0-b296-c62134397ce4/Deckforms-rev04.doc>

*(a) prior to the commencement of the licenced activities, information on the expected location, start and end dates of impact pile driving/detonation of explosives to satisfy the Marine Noise Registry's Forward Look requirements; and*

*(b) within 12 weeks of completion of impact pile driving/detonation of explosives, information on the exact locations and specific dates of impact pile driving/detonation of explosives to satisfy the Marine Noise Registry's Close Out requirements.*

*(2) The undertaker must notify the MMO of the successful submission of Forward Look or Close Out data pursuant to paragraph (1) above within 7 days of the submission.*

### 3.3 Vessels

3.3.1 As stated in **Table 2-1**~~Table 1~~, mitigation and monitoring measures are proposed to reduce the potential for impact to harbour seals due to an increase in commercial vessel numbers associated with the construction and operation of the Facility.

3.3.2 Mitigation measures and monitoring will be applied to reduce the potential impacts due to the increased number of vessels in the area (i.e. the potential for an increase in collision risk and disturbance from vessels). These are detailed in the sections below and summarised below as follows:

- ~~• Subject to the pilotage requirements for navigational safety and efficiency (vessel management), and the application of the principle of 'safe speed' (application of Convention on the International Regulations for Preventing Collisions at Sea (COLREGS)), vessel speeds of 'as low a speed as reasonably practicable' are to be encouraged within The Haven and The Wash.~~
- ~~• Noting that since the potential for fatal collisions with marine mammals is significantly reduced at vessel speeds of less than 10 knots, BAEF vessels speeds should be aimed to be below that speed. Subject to the pilotage requirements for navigational safety and efficiency (vessel management) and the application of the principle of 'safe speed' (application of COLREGS), that when reasonably practicable to do so, the Port of Boston will require that all ships that are subject to compulsory pilotage when moving between the Port of Boston designated anchorage in the Wash and the Docks maintain a speed below 10 knots. This will apply to all vessels that are subject to compulsory pilotage (both existing shipping and the additional shipping resulting from the Facility) meaning that all commercial vessels over 30m in length will be subject to these new operating conditions.~~

- The Applicant's vessels will also follow the same vessel collision speed restrictions while transiting through The Wash, to the anchorage area. All vessels travelling to the Facility will abide by a vessel speed limit of 10 knots, subject to the above same conditions regarding COLREGS and navigational safety, as far as is practicable. The Applicant will twice a year issue a tool box note (or similar) to request all shipping agents and vessel master's associated with the Applicant's vessels, to issue guidance on this matter.
  - Safety permitting, vessels will maintain the same course (if possible) and speed to give, if required, any seal(s) time to avoid the vessel.
  - Tool box talks to provide management measures relating to vessels, to include:
    - Pre-departure checks of the vessel, when depart from the anchorage area
    - Locations of known seal haul-out locations, and minimum distance to maintain between all vessels and haul-out locations
    - Vessel speed management measures (as set out above)
  - Propellor guards to be used on all vessels that utilise dynamic positioning. On the basis of currently available vessels in the charter market, vessels servicing the Facility will not include any using dynamic positioning. Even if the market evolves over time to include vessels that do have dynamic positioning, the Applicant undertakes to only charter vessels that have drives that are fitted with propellor guards.
  - Monitoring of Vessel Interactions (options to be refined within the final MMMP):
    - Monitoring Option 1: Observers on board each vessel, monitoring for marine mammals as the vessel makes its way through The Wash and up The Haven.
    - Monitoring Option 2: Adaptive monitoring programme to record marine mammal presence and behaviour in response to vessels within The Haven and The Wash.
- 3.3.3 The best practice measures for vessels travelling through and into The Wash and The Haven are shown in **Box 2**.
- 3.3.4 These measures will inform of the Navigation Management Plan (NMP) secured by Condition Requirement 14 of the draft DCO.

### Development of the Best Practice Measures for Vessels

- 3.3.5 Following consultation with the Port of Boston, additional information has been received on vessel speed limits within The Haven. While there is currently a general advisory speed limit of 6 knots along The Haven (to mitigate erosion from wash), it is not subject to enforcement by any party.
- 3.3.6 Currently, cargo vessels travel through The Haven at up to approximately 12 knots, ~~but~~ slowing as they move further up The Haven to between 4 and 6 knots near the Port itself. The current speed limit is 'safe speed at all times', in accordance with the ~~Convention on the International Regulations for Preventing Collisions at Sea, 1972 (COLREGS)~~.
- 3.3.7 An enforced speed limit is inconsistent with current safe practice and would restrict the number of vessels able to transit to the Port each tide (i.e. it would increase the transit time, reducing the number of vessels able to transit each tide, and significantly increase the number of vessels within the anchorage area). This may also restrict the existing activity at the Port which is not currently restricted by a speed limit.
- 3.3.8 In order to ensure that the presence of vessels within the anchorage area is as low as possible (the anchorage is within The Wash and North Norfolk Coast SAC, and increased vessel presence could pose a greater risk to harbour seals) ~~is as low as possible (which is within The Wash and North Norfolk Coast SAC), and poses a greater risk to harbour seals), the previously provided proposed speed limit has been removed~~ an enforced speed limit has not been included, however, vessel speed restrictions will be in place both within The Haven and The Wash, as provided in Paragraph 4.3.2. ~~from the mitigation previously set out in this document.~~
- 3.3.9 As explained above, vessel movements (and speeds) will be under the management of the Port at all times (on-board pilot), to ensure navigational safety at all times between the Port of Boston designated anchorage in The Wash and the Docks.

### Best Practice Measures for Vessels during Construction and Operation

- 3.3.10 The best practice measures follow the relevant principles as outlined in:
- The Sea Watch Foundation Pinniped Code of Conduct (Sea Watch Foundation, 2021);
  - Cornwall Marine and Coastal Code Guidelines (Cornwall Marine and Coastal Code Group, 2017);



- Scottish Marine Wildlife Watching Code Parts 1 and 2 (Scottish Natural Heritage (SNH) (now NatureScot), 2017a; SNH, 2017b);
- The Wash & North Norfolk Coast Wild Recreation Guide (The Norfolk Coast Partnership, 2021); and
- North Norfolk District Council Personal Watercraft Code of Conduct (North Norfolk District Council, 2017).

### Vessel Speed and Direction

- 3.3.11 A reduction in vessel speed is one of the key measures that can be put in place in order to reduce the risk of collision to marine mammal species.
- 3.3.12 There is a higher risk of collision to fatally injure marine mammals from vessels travelling at higher speeds, due to the increased level of impact (Wang *et al.*, 2007). This relationship between vessels speeds and lethality of collision is species dependant, as it is strongly related to body size.
- 3.3.13 The Port of Boston relies on the COLREGS (1972) safe speed; in the case of large shipping, safe speed is set by the onboard pilot and is based on the prevailing circumstances, conditions and proximity of other vessels. Subject to pilotage requirements for navigational safety and efficiency (vessel management), and the application of 'safe speed', vessel speeds of 'as low a speed as reasonably practicable' are to be encouraged within The Haven and The Wash, and taking into consideration that the potential for fatal collision with marine mammals is significantly reduced at vessel speeds of less than 10 knots.
- 3.3.14 As well as reducing the potential for lethal injury, a reduction in vessel speeds also reduces the number of collision events (Vanderlaan and Taggart, 2007; Conn and Silber, 2013), as individuals are more likely to have the ability and time to move out of the way with vessels travelling at lower speeds (Hazel *et al.*, 2007; Gende *et al.*, 2011). Seals are very agile, giving them a good opportunity to move out of the way, and therefore reducing the potential for collision with vessels.
- 3.3.15 Where there is a presence of vessels, the reduction in vessel speed is a preferred method for reducing collision risk, as stated by the International Whaling Commission (International Whaling Commission (IWC), 2014) and the International Maritime Organisation (IMO, 2016). It is also the only method that has been recommended for smaller marine mammal species.
- 3.3.16 Notwithstanding the need to ensure vessel safety, and the safety of other vessels, at all times the **B**est **P**ractice measures relating to **speed** are:

- Vessels will maintain a steady speed, and direction, at all times, to allow any marine mammal to predict where the vessel may be headed, and to move out of the way. Vessels should use the defined anchorage area and shipping channel at all times.
- Within 300m of a marine mammal at sea, vessels should maintain speed and direction to ensure the individual can predict the vessel movements, and move out of the area if needed (**Box 2**).
- Vessels should not approach within 600m of known seal haul-out sites<sup>8</sup>.
- Extra care should be taken during the harbour seal pupping season of June to July (inclusive), and moult period of August.
- If a marine mammal chooses to approach the vessel (for example, to bow-ride) maintain the vessel's speed and direction.

3.3.17 **General measures** that would be taken in order to reduce the risk of disturbance and collision risk to marine mammals include:

- Use of propellor guards for all vessels associated with the Facility using dynamic positioning. On the basis of currently available vessels in the charter market, vessels servicing the Facility will not include any using dynamic positioning. Even if the market evolves over time to include vessels that do have dynamic positioning, the Applicant undertakes to only charter vessels that have drives that are fitted with propellor guards.
- A 360-degree visual check of the vessel will be undertaken (including vertically) prior to any vessel within the anchorage area transiting off.
- Keeping a well-maintained engine and propellor to minimise underwater noise.
- Turning off 'noisy' equipment when close to marine mammals (e.g. engines, propellers (within the anchorage area), and echo sounders) if possible.

3.3.18 All vessels into and out of The Haven and The Wash will follow existing shipping routes, where practicable. Within the jurisdiction of the Port of Boston, the vessels will be transiting from the Boston Anchorage Area up and down The Haven using well established transit routes but at this point vessel movements are at the discretion of the pilots. The shipping channel is 840m away from the nearest haul-out site, which is greater than the distance that research has shown can cause any discernible effect from vessel disturbance, which is 600m. Vessels should not approach within 600m of known seal haul-out sites.

<sup>8</sup> As most recently reported in the 2018 harbour seal haul-out site report: <https://wnnmp.co.uk/wp-content/uploads/sites/29/reports/2019/05/SMRU-The-Wash-Breeding-Season-Seal-Survey-Report-2018.pdf>

### Tool box talks

3.3.19 As noted in the above sections, a number of management measures will be in place through the lifetime of the Facility, and therefore to ensure all shipping agents associated with the construction and operation of the Facility are aware of the management measures to be implemented, a series of tool box talks will be developed (and kept up to date as required). These would be provided and discussed with all shipping agents at regular intervals, to ensure all parties are aware of the management measures required.

3.3.20 Three tool box talks will be required throughout the construction and operation of the Facility, and include:

- Vessel speed management measures and best practice guidance
- Pre-departure anchorage checks to ensure no seal presence prior to engines powering on
- Seal haul-out locations in relation to shipping routes and the Facility anchorage area

### **Monitoring of Vessel Interactions**

~~3.3.19~~3.3.21 There are two options for monitoring the interactions between harbour seals and vessel transits;

1. Observers on-board all Facility vessels for a specified period, or
2. Observers at set land-based locations for defined monitoring periods. The ~~below~~ following sections provide more detail on the potential options for monitoring, and outline the methodologies that may be used under each of the options.

~~3.3.20~~3.3.22 In the post-consent phase of the Project, the preferred monitoring option would be defined and a full monitoring programme provided within the final MMMP. This will be designed in consultation with the MMO, Natural England and ~~The~~ Lincolnshire Wildlife Trust.

### Monitoring Option 1: Marine Mammal Observers

~~3.3.21~~3.3.23 This potential monitoring option uses non-dedicated MMObs on-board all Facility vessels transiting through The Wash and The Haven over a set period.

~~3.3.22~~3.3.24 This monitoring option would be adaptive, to allow for the programme to change with results of initial observations.

~~3.3.23~~3.3.25 This monitoring ~~plan~~ option would be fully developed post-consent, with both

the MMO and Natural England, in order to define objectives, monitoring methods and spatial areas included, and programme. However, an example of what this monitoring option may include is provided below.

~~3.3.24~~3.26 As outlined above, for all vessels used by the Facility, during both the construction and operational phases, best practice is to have a non-dedicated MMOB on board; to keep watch for any harbour seal (or other marine mammal presence); within both The Haven and The Wash. A non-dedicated MMOB relates to a fully trained MMOB<sup>9</sup> ~~(by an JNCC accredited course)~~, who may undertake other vessel duties while not required on watch (i.e. this can be a member of the vessel's crew). The MMOB duties would be the priority whenever it was required.

~~3.3.25~~3.27 The MMOB would be positioned to ensure the best and uninterrupted view; if required for some vessels, the option ~~for~~ of more than one MMOB will be considered. The MMOB should be equipped with binoculars, and in the case of any sighting, evaluate its location and heading against the location and heading of the vessel. Measures should be taken, if required, to avoid a collision with the individual, noting that ideally the protocol is to maintain vessel speed and course (if possible) to allow the seal to move out of the way.

~~3.3.26~~3.28 The purpose of having a MMOB on board each vessel will be to watch ahead of the vessel, to minimise the risk of collision ~~ensure that no~~ between harbour seal (or other marine mammal) ~~is at risk of collision with~~ and the vessel. If a harbour seal (or any other marine mammal) is sighted and considered to be at risk, the protocol is to maintain vessel speed and course (if possible) to allow the seal to move out of the way.

~~3.3.27~~3.29 In addition, for vessels preparing to leave the anchorage area, the MMOB would be required to undertake a check of the area surrounding the vessel; to ensure there are no seals ~~within close proximity~~ to the vessel, particularly the propellers, prior to the vessel starting the engine ~~for transit through The Haven.~~

~~3.3.28~~3.30 Additional measures that could be taken, ~~only in the case in the event~~ that it is observed that the individual is not vacating the area and is at risk of collision, include slowing down of the vessel. However, this should only be undertaken where the harbour seal (marine mammal) is at risk and not moving, and it is possible and safe to undertake these additional measures.

~~3.3.29~~3.31 This monitoring option would be in place for all Facility vessels within a defined period (e.g. the first year of construction and operation), to monitor the potential for collision events to occur with marine mammals. The monitoring would

<sup>9</sup>An observer trained by an JNCC accredited course.

only be undertaken when the vessel is within ~~the Project defined~~ areas (i.e. the anchorage area, vessel transit corridor through The Haven, and around the Facility itself).

~~3.3.30~~3.3.32 If a significant level of collision events<sup>10</sup> are detected during these periods, then the monitoring programme may be extended. If there are no collisions detected within the first year, or the harbour seal population stabilises following the current decline, then the monitoring programme may be ~~completed~~terminated. This would be decided in consultation with both the MMO and Natural England, and be based on the data recorded to date, and through a process to be agreed in the Final MMMP.

### Monitoring Option 2: Adaptive Monitoring Programme

~~3.3.31~~3.3.33 This monitoring option utilises land-based (and potential vessel-based) observers, at a set location, to monitor all vessel and seal interactions in a set period, pre-operation and through operation of the Facility (as described below).

~~3.3.32~~3.3.34 An adaptive monitoring programme may be developed to monitor and record harbour seal and cargo vessel interactions within The Haven and The Wash. This would be developed in order to validate assessments presented in the application documents and through the DCO examination of the impact of increased vessel usage on the harbour seal population. In order to understand any impacts the increased vessel presence has on the population, it would be necessary to undertake monitoring for a period prior to the Facility becoming operational.

~~3.3.33~~3.3.35 The monitoring programme would be adaptive, to allow for the programme to change with results of initial observations.

~~3.3.34~~3.3.36 Monitoring would take place ~~in~~ both prior to operation (for example, for a year prior to operation), and during the first period of operation (for example, for the first year of operation). The monitoring would take place over set timeframes (e.g. for one or two days a month, throughout the monitoring programme).

~~3.3.35~~3.3.37 If there are changes detected in the presence and behaviour of harbour seal, then the monitoring programme may be extended. If there are no changes detected in the presence and behaviour of harbour seal within the first year, in comparison to the pre-operation phase, or the harbour seal population stabilises following the current decline within The Wash, then the monitoring programme may be ~~completed~~terminated. This would be decided in consultation with both the

<sup>10</sup> A 'significant level of collision' would be defined and agreed with the MMO and Natural England, during the post-consent phase of the Project, as the MMMP is finalised

MMO and Natural England, and be based on the data recorded to date.

~~3.3.363~~3.38 Monitoring could be undertaken by trained observers, or with the use of camera and auto-detection systems, or by another method not yet available.

~~3.3.373~~3.39 Monitoring could take the form of a number of trained marine mammal observers along the banks of The Haven, and using a vessel within the anchorage area within The Wash, to monitor all presence of marine mammals (principally harbour seal) in the vicinity of the vessel, and any movements and behaviours observed in response to any cargo (or other large) vessel presence or transit. There could be three observer stations along The Haven; one near the Port of Boston, one between the Facility and the mouth of The Haven, and one at the outer part of The Haven, where it meets The Wash. In addition, there could be one on a vessel within the anchorage area.

~~3.3.383~~3.40 Monitoring could also be undertaken with the use of high-definition, underwater, and infrared cameras being set-up at each of the above mentioned stations. This would greatly reduce the personnel requirements of the monitoring programme. Cameras with auto-detection of marine mammals could be used to reduce the amount of data to be recorded and transmitted. Observers would then be able to review any footage with marine mammals, greatly reducing time requirements to gather the data.

~~3.3.393~~3.41 Potential methods ~~proposed for~~ this adaptive monitoring, ~~if required,~~ would, if required, be reviewed when the programme is finalised, and in consultation with both the MMO and Natural England.

~~3.3.403~~3.42 A monitoring programme such as this has the benefit, (when compared to having observers on-board each vessel, as described for Monitoring Option 1), of providing data and information on harbour seal behaviour around large vessels to both the MMO and Natural England as part of the MMMP reporting requirements. There remains fairly limited information on these potential responses, and this monitoring programme would validate the assessments of potential impacts made in the application documents and through the DCO examination.

## 3.4 Reporting of Stranding's and Collisions

3.4.1 Any stranding and / or collision event through the chosen monitoring programme should be reported as follows:

- Any live strandings and / or non-fatal collisions (where the location of the individual is known) should be reported to British Divers Marine Life Rescue (BDMLR) (contact details are in **Box 3**)

- Any deceased strandings and / or fatal collisions should be reported to the Cetacean Strandings Investigation Programme (CSIP) (contact details are in **Box 3**).

3.4.2 For any stranded or injured seal, the MMOB should determine whether the individual is exhibiting normal behaviour, or whether it requires assistance. A seal may require assistance for one of the following reasons:

- Abandonment of juvenile seals:
  - Juvenile grey seals have a white coat, and are born in November and December.
  - Harbour seals are born in June and July.
  - Monitor the seal periodically for as long as possible (for a period of at least 30 minutes, but preferably up to two hours) to determine whether there is a parent seal nearby. Monitoring can be done from either a moving or stationary vessel.
- Malnutrition:
  - Signs of malnutrition include visible ribs, hips and neck. Sometimes the skin can be baggy and wrinkled in places.
- Unwell – signs of ill health include:
  - Coughing, sneezing or noisy, rapid breathing.
  - Thick mucus coming from the nose, wounds or swellings.
  - Favouring one flipper when moving.
  - Cloudy eyes, or mucus around the eyes, or one eye kept closed.
  - Seal showing little response to any disturbance (unless asleep).
- Entanglement in rope or gear.

3.4.3 Any other marine mammal (dolphin, porpoise, or whale) that has stranded will require immediate assistance – ~~do not attempt to help~~ the MMOB should not attempt to help but, should call BDMLR for specialist assistance, following the instructions in **Box 3**.

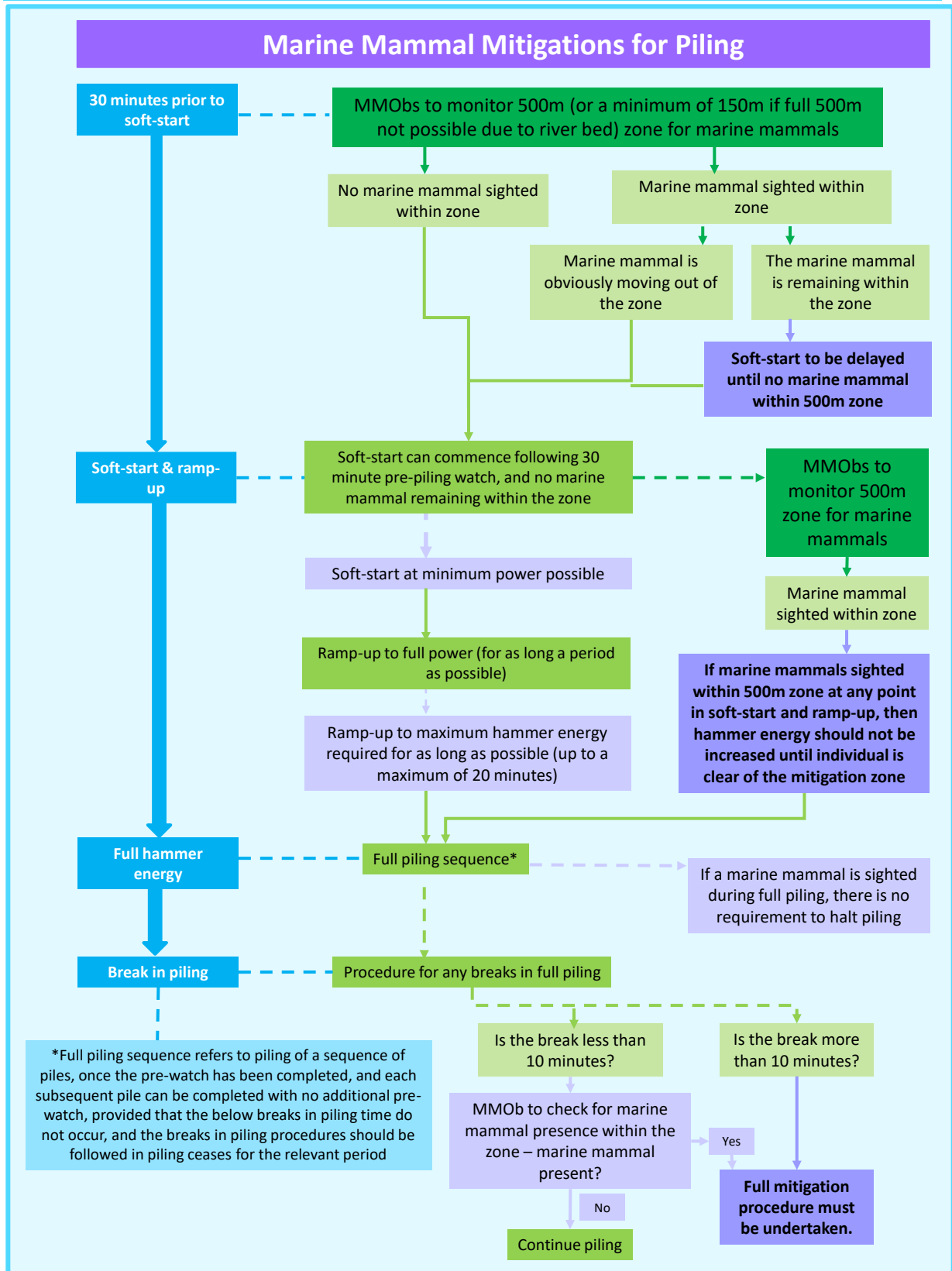
3.4.4 Photographs, and a record of any collision incidents, should be kept by the vessel crew for reporting to the relevant bodies. **Box 4** provides a collision event form that should be used in the case that any collision occurs, and **Box 5** provides a stranding form.

## 4 Mitigation Protocols

- 4.1.1 The mitigation protocol for impact piling is shown in **Box 1**.
- 4.1.2 The best practice measures for vessels travelling through and into The Wash and The Haven are shown in **Box 2**.
- 4.1.3 Details for the reporting of stranded or deceased marine mammals are in **Box 3**.
- 4.1.4 Reporting forms for any collision and / or stranding are in **Box 4** and **Box 5**.



## Box 1 Mitigation Protocol for Piling



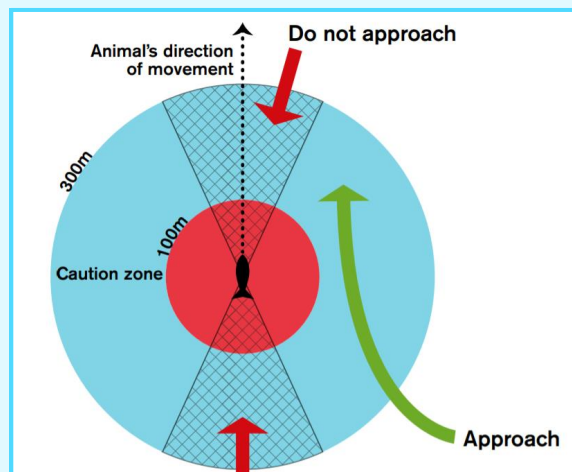
## Box 2 Best Practice Measures for Vessels

### Mitigation Measures for Vessels during Construction and Operation

#### Vessels in Transit through The Wash and The Haven

Subject to the pilotage requirements for navigational safety and efficiency, when reasonably practicable to do so, all ships that are subject to compulsory pilotage when moving between the Port of Boston designated anchorage in the Wash and the Docks maintain a speed below 10 knots. Vessels to transit at as low a speed as possible at all times within The Haven and The Wash.

- Vessels to use defined anchorage area and shipping channel at all times
- Mitigation measures to be followed are below (wherever possible considering vessel manoeuvrability and any health and safety concerns)
  - Avoid being within 600m of a haul-out site
  - Vessels to maintain steady speed and direction
  - Extra care to be taken during harbour seal pupping season of June to August (inclusive)
  - -If individual/s approach the vessel, maintain speed and direction
  - Avoid heading directly towards any marine mammal/s – follow guidelines in figure below

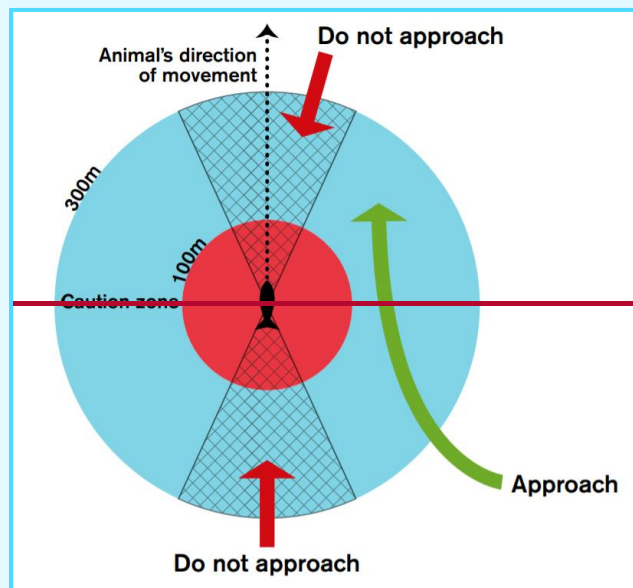


## Box 2 Continued

### Mitigation Measures for Vessels during Construction and Operation

#### Vessels in Transit through The Wash and The Haven

- ~~Vessels to use defined anchorage area and shipping channel at all times~~
- ~~Mitigation measures to be followed are below (wherever possible considering vessel manoeuvrability and any health and safety concerns)~~
  - ~~Avoid being within 600m of a haul-out site~~
  - ~~Vessels to maintain steady speed and direction~~
  - ~~Extra care to be taken during harbour seal pupping season of June to August (inclusive)~~
  - ~~If individual/s approach the vessel, maintain speed and direction~~
  - ~~Avoid heading directly towards any marine mammal/s – follow guidelines in figure below~~



#### Additional general vessels measures

- Keep engines and propellers well-maintained
- Turn off 'noisy' equipment when close to marine mammal(s) (if possible)
- Use of propeller guards for all vessels using dynamic positioning
- A 360-degree visual check of the vessel prior to any vessel within the anchorage area transiting off

## Box 3 Reporting of Marine Mammal Strandings


### Reporting of Marine Mammal Strandings

**Any live strandings and / or non-fatal collisions** (where the location of the individual is known) should be reported to BDMLR

<b>BDMLR Rescue Hotline</b>	<b>01825 765546 Monday-Friday (9am-5pm)</b> <b>07787 433412 Out of office hours and Bank Holidays</b>
<b>RSPCA Hotline</b>	<b>0300 1234 999 24 hours</b>

- **For seals**, follow this advice:
  1. Collect an accurate description of the seal
  2. Estimate the length of the animal and look for any distinguishing features
  3. Look for any signs of injury
  4. Provide information regarding location
  5. Avoid disturbance of the seal, do not scare it into the sea
  6. Do not touch the seal
  
- **For cetaceans** (dolphins, porpoises, whales), follow this advice:
  1. Avoid disturbance, excessive noise and too many observers
  2. Do not touch the cetacean and remain at a safe distance
  3. Estimate the length of the animal and look for any distinguishing features
  4. Look for any signs of injury
  5. If visible from a distance or via visual aids, count the number of breaths (opening of the blowhole) that occur over a minute
  6. Provide information regarding location
  7. Provide an accurate description of the animal, including its breathing rate, and whether it is in the surf, on rocks or sand, in the shade or in the full glare of the sun
  8. Provide information on weather conditions and sea state

**Any deceased strandings and / or fatal collisions** should be reported to the CSIP

<b>CSIP Hotline</b>	<b>0800 652 0333</b>
<b>Further information</b>	

## Box 4 Marine Mammal Collision Reporting Form

### Marine Mammal Collision Reporting Form

If a vessel is involved in a collision with a marine mammal, details of the incident should be captured using the following form.

#### Contact Details for reporting - to be reported within 24 hours of incident

This form shall also be sent to the person in charge of the works, or the environmental liaison officer, as well as the regulator;

- Marine Management Organisation (MMO) – England
  - [REDACTED]

### Form to be completed

Details of the incident (to be filled in by Vessel Master)

Vessel		Date & Time	
Approx. Location			
Vessel Activity			
Species Involved (if known) e.g. harbour porpoise; seal			
No. animals e.g. 1; small group; large group			
Outcome of the collision	<input type="checkbox"/> Near miss	<input type="checkbox"/> Minor injury	<input type="checkbox"/> Major injury
	<input type="checkbox"/> Presumed dead	<input type="checkbox"/> Known dead	<input type="checkbox"/> Other
Photographic Evidence (if applicable)	<input type="checkbox"/> Yes (provided with form)		<input type="checkbox"/> Unable to capture following the incident
Description of incident, and any further information:			
Mitigating actions taken:			

## Box 5 Stranded or Deceased Marine Mammal Reporting Form

### Stranded or Deceased Animal Reporting Form – Page 1

If a stranded or deceased marine mammal is found, details of the individual should be captured using the following form.

#### **Contact details for reporting - to be reported within 24 hours of incident**

This form shall also be sent to the person in charge of the works, or the environmental liaison officer, and kept on file for any later information requested from a regulator

**Any live strandings** should be reported to BDMLR to get help for the individual

<b>BDMLR Rescue Hotline</b>	<b>01825 765546 Monday-Friday (9am-5pm) 07787 433412 Out of office hours and Bank Holidays</b>
<b>RSPCA Hotline</b>	<b>0300 1234 999 24 hours</b>

Note that any deceased strandings and / or fatal collisions should be reported to CSIP

<b>CSIP Hotline</b>	<b>0800 652 0333</b>
<b>Further information</b>	<input type="text"/>

Marine mammal stranding form can be found on next page.

## Stranded or Deceased Animal Reporting Form – Page 2

### Form to be completed

Details of the incident (to be filled in by Vessel Master)

<b>Date</b>		<b>Time</b>	
<b>Reported by</b>		<b>Employer</b>	
<b>Location of deceased or stranded animal</b>			
<b>Weather conditions</b>			
<b>Animal</b>	<input type="checkbox"/> Seal	<input type="checkbox"/> Cetacean	<b>No animals:</b>
<b>Status</b>	<input type="checkbox"/> Alive	<input type="checkbox"/> Dead (look for evidence of breathing, response to noise etc.)	
<b>If alive, please give details of behaviour, body condition &amp; trauma.</b>			
<input type="checkbox"/> Active	<input type="checkbox"/> Still / quiet	<input type="checkbox"/> Coughing	<input type="checkbox"/> Sneezing
<input type="checkbox"/> Thin	<input type="checkbox"/> Plump	<input type="checkbox"/> Cloudy eyes	<input type="checkbox"/> Squinting
<input type="checkbox"/> Clear eyes	<input type="checkbox"/> Trauma	<input type="checkbox"/> Blood	<input type="checkbox"/> Entangled
<input type="checkbox"/> Other			
<b>Further information:</b>			
<b>If dead, status of carcass</b>	<input type="checkbox"/> Fresh	<input type="checkbox"/> Decomposing	
<b>Photographic information provided</b>	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
<b>Parties contacted (e.g. CSIP)</b>			

## 5 References

Conn, P. B., and Silber, G. K. (2013). Vessel speed restrictions reduce risk of collision-related mortality for North Atlantic right whales. *Ecosphere* 4:43. doi: 10.1890/ES13-00004.1

Cornwall Marine and Coastal Code Group (2017) Learn. See. Respect. Report. Making your marine and coastal encounter great for wildlife – putting wildlife first! Available from:

[REDACTED]

[REDACTED]

Gende, S. M., Hendrix, A. N., Harris, K. R., Eichenlaub, B., Nielsen, J., and Pyare, S. (2011). A Bayesian approach for understanding the role of ship speed in whale-ship encounters. *Ecol. Applic.* 21, 2232–2240. doi: 10.1890/10-1965.1

Hazel, J., Lawler, I. R., Marsh, H., and Robson, S. (2007). Vessel speed increases collision risk for the green turtle *Chelonia mydas*. *Endanger. Species Res.* 3, 105–113. doi: 10.3354/esr003105

International Whaling Commission (2014). Report of the Joint IWC-SPAW Workshop to Address Collisions Between Marine Mammals and Ships With a Focus on the Wider Caribbean. Report IWC/65/CCrep01 discussed at the 14th Meeting of the Western Gray Whale Advisory Panel. Cambridge, UK: International Whaling Commission.

JNCC (2010) Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise. Available from:

<https://data.jncc.gov.uk/data/31662b6a-19ed-4918-9fab-8fbcff752046/JNCC-CNCB-Piling-protocol-August2010-Web.pdf>

North Norfolk District Council (2017) Personal Watercraft Code of Conduct. Available from: [https://www.north-norfolk.gov.uk/media/2101/code\\_of\\_conduct\\_for\\_personal\\_water\\_craft\\_users.pdf](https://www.north-norfolk.gov.uk/media/2101/code_of_conduct_for_personal_water_craft_users.pdf)

Sea Watch Foundation (2021) Marine Code of Conduct: Pinnipeds (seals). Available from:

[REDACTED]

SNH (now NatureScot) (2017a) The Scottish Marine Wildlife Watching Code. Available from: [h \[REDACTED\]](#)

[REDACTED]

[REDACTED]



SNH (now NatureScot) (2017b) A Guide to Best Practice for Watching Marine Wildlife.  
Available from: [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Southall, B.L., Finneran, J.J., Reichmuth, C., Nachtigall, P.E., Ketten, D.R., Bowles, A.E., Ellison, W.T., Nowacek, D.P. and Tyack, P.L. (2019). Marine mammal noise exposure criteria: updated scientific recommendations for residual hearing effects. *Aquatic Mammals*, 45(2), pp.125-232.

The Norfolk Coast Partnership (2021) The Wash & North Norfolk Coast Wild Recreation Guide. Available from: [REDACTED]

[REDACTED]

Vanderlaan, A. S. M., and Taggart, C. T. (2007). Vessel collisions with whales: the probability of lethal injury based on vessel speed. *Mar. Mamm. Sci.* 23, 144–156. doi: 10.1111/j.1748-7692.2006.00098.x

Wang, C., Lyons, S. B., Corbett, J. J., and Firestone, J. (2007). Using ship Speed and Mass do Describe Potential Collision Severity with Whales: an Application of the Ship Traffic, Energy and Environment Model (STEEM) [Report by the University of Delaware].