



Contract No. EP/SP/66/12
Integrated Waste Management Facilities, Phase 1

Appendix A

Marine Mammal Exclusion Zone Plan

1 Introduction

1.1 Background

The Government of Hong Kong SAR will develop the Integrated Waste Management Facilities (IWMF) Phase 1 (hereafter referred to the Project) with incineration to achieve substantial bulk reduction for unavoidable Municipal Solid Waste (MSW) and to recover energy from incineration process. The IWMF will be on an artificial island to be formed by reclamation at the south-western coast of Shek Kwu Chau (SKC).

An Environmental Impact Assessment (EIA) for the Project was conducted according to the EIA Study Brief No. ESB-184/2008. The EIA report (Register No: AEIAR-163/2012) was approved on 17 January 2012 under the Environmental Impact Assessment Ordinance (EIAO). An Environmental Permit (EP) (EP No.: EP-429/2012) was granted on 19 January 2012 for the construction and operation of the Project. A variation of environmental permit (VEP) was subsequently applied and the latest VEP (EP No: EP-429/2012/A) was issued by the Environmental Protection Department (EPD) on 14 October 2016. Application for further environmental permit (FEP) was made on 28 November 2017 and the FEP was granted on 27 December 2017. Keppel Seghers – Zhen Hua Joint Venture (“the JV”) has been awarded the Project to carry out reclamation works (including associated dredging works) which is located near the south-western coast of Shek Kwu Chau, and the JV will construct an incinerator and its relevant facilities on the reclaimed land.

According to the Condition 2.9 of the FEP, a Detailed Monitoring Programme on Finless Porpoise monitoring plan shall be prepared at least one month before the commencement of construction of the Project to propose the monitoring frequency and mitigation measures to be taken to avoid disturbance to Finless Porpoise.

In order to protect Finless Porpoise from being affected by the acoustic disturbance generated by marine construction works, one Marine Mammal Exclusion Zone Plan is considered necessary to be set up and provide a 24-hours Marine Mammal Exclusion Zone with a 250m radius from the boundary of any marine work area such that any marine mammal are free from acoustic impacts arising from the marine work.

1.2 Project Description

The project is proposed to be located on a new land formation covering a permanent footprint of 15.9 hectares near the south-western coast of Shek Kwu Chau, an island between the southwest of Cheung Chau and the south of Chi Ma Wan Peninsula. As stated in the approved EIA report, the project is mainly to:

- reclaim 15.9 hectares of land;
- construct and operate an incinerator with design capacity of 3000 tonnes per day for treating municipal solid wastes;
- construct and operate a mechanical sorting and recycling plant with design capacity of 200 tonnes per day;
- construct and operate an on-site wastewater treatment plant for the reuse of treat sewage effluent;
- construct and operate an on-site desalination plant;
- construct and operate an electricity power plant for the heat recovered from the incineration process;
- construct submarine cables for exporting surplus electricity to be power grid;
- construct and operate a berthing area; and
- construct and operate an environmental education center, supporting and community facilities.

1.3 Purpose and Scope of the Marine Mammal Exclusion Zone (MMEZ) Plan

Marine construction activities might cause behavioural disturbance (e.g., disturbance to communication and

echolocation) or even physical harm to marine mammal. This MMEZ plan is prepared as a precautionary and mitigation measures for Finless Porpoise and Chinese White Dolphin to provide detailed implementation of the exclusion zone during marine construction. The MMEZ Plan is submitted as the Appendix of the Detailed Monitoring Programme on Finless Porpoise to the Environmental Protection Department (EPD) and the Agriculture, Fisheries and Conservation Department (AFCD) for approval at least 1 month prior to commencement of construction activities requiring MMEZ. This plan provides the general specifications and requirements for the implementation of the exclusion zone monitoring which shall be adopted by all relevant Contractors under the IWMF Project.

2 Marine Mammal Exclusion Zone (MMEZ) Monitoring

2.1 Construction Activities Requiring MMEZ

According to the Condition 2.25 of the FEP, MMEZ should be implemented before 30 minutes and during the installation/re-installation/relocation process of silt curtains in order to avoid the accidental entrance and entrapment of marine mammals within the silt curtains. Also, marine construction works expected to produce underwater acoustic disturbance as per Condition 2.27 of the FEP, especially within December and May, would require the implementation of MMEZ, which currently all those specific construction activities have been replaced by less acoustically disturbing construction methods such as Deep Cement Mixing (DCM) and Precast Concrete Blocks Installation as discussed in Section 5.3 of the Detailed Monitoring Programme on Finless Porpoise, however, MMEZ would also be implemented for precautionary purpose for DCM works.

2.1.1 MMEZ for continuous MMO monitoring

A MMEZ with 250 m distance from silt curtain shall be established during the above situation. If 3 or more construction vessels are required with MMO's duty and operating in close proximity, for the purpose of avoiding accidental entrance to the works area by Marine Mammal, a cluster MMEZ plan will be implemented to form a MMEZ with 250 m distance from the boundary of a work area as indicated in **Figure 1** for reference. A team of MMO (i.e. at least two MMOs per day/night shift teams) for 24-hour MMEZ monitoring would be arranged at the out-lying construction vessels to form the cluster MMEZ. Maximum of 12 hours of monitoring work per MMO per day; and at least two MMOs on duty to carry out the monitoring work in rotation (e.g. rotate observer every 30 minutes) in order to minimize fatigue. The MMEZ serves as a monitoring approach to provide appropriate and immediate actions once finless porpoise or Chinese White Dolphin is sighted within the MMEZ. All MMEZ will be monitored by competent Marine Mammal Observers (MMOs) to be provided by the Environmental Team (ET) for the IWMF and trained by the Marine Mammal Monitoring Specialist of the ET who is independent from JV. The situation requiring implementation of MMEZ is summarized as below:

1. 30 minutes before commencement of and during silt curtain installation/re-installation/relocation, deep cement mixing injection works or noisy construction works (as stipulated in FEP Clause 2.25 and 2.27); or
2. During implementation of MMEZ cluster plan with 3 or more construction vessels requiring MMO's duty operating simultaneously in close proximity.

2.1.2 MMEZ for marine access opening

For the construction activities requiring non-continuous MMO monitoring (i.e. opening of floating type silt curtain at marine access for reclamation works), MMO(s) will be arranged for:

1. 30 minutes before the commencement of installation / re-installation / relocation works of floating type silt curtain at marine access; and
2. MMEZ monitoring during installation / re-installation / relocation of floating types silt curtain when opening and closing at marine access area; and
3. After the enclosure of floating type silt curtain at marine access area for reclamation works to implement visual inspection as detailed in Marine Mammal Watching Plan.

One trained MMO shall be on site to perform non-continuous MMO monitoring. Each shift of MMO will be responsible for maximum 12 hours of monitoring work per day and two shifts of MMO shall be arranged at the duty vessel to perform non-continuous MMO monitoring per day.

2.2 Methodology of MMEZ

For each of the construction vessel for construction activities required to implement the MMEZ plan, the Contractor shall prepare a Method Statement for the MMEZ Monitoring that follows the specifications and requirements as stated in the MMEZ plan. The Contractor's Method Statement for MMEZ Monitoring shall include the following information:

- Actual locations;
- Distribution of construction barges;
- Working vessels along with construction programme; and
- Provision and Setup of MMEZ monitoring stations on barges for ET's MMOs with unobstructed view of the MMEZ.

Should Contractor(s) propose alternative approach or plan achieving similar objectives of MMEZ monitoring, the proposed approach/plan shall be reviewed and approved by SOR, ET and IEC. The Contractor's Method Statement for MMEZ Monitoring shall be submitted to the ET Leader of the IWMP Project at least three weeks prior to commencement of the construction activities requiring implementation of MMEZ as summarized above.

As stated in Section 5.4.2 of the Detailed Monitoring Programme on Finless Porpoise, as marine mammals cannot be effectively monitored within the proposed monitored exclusion zone at night, or during adverse weather conditions (i.e. Beaufort 5 or above, visibility of 300 meters or below), marine works should be avoided under weather conditions with low visibility as much as possible. For the night-time marine mammal monitoring, spotlight will be used to provide sufficient brightness to assist the inspection in dark condition. In case of inadequate of brightness, night vision device will be used. For the marine mammal monitoring during adverse weather, the MMO shall confirm the visibility of lookout point for effective implementation of the exclusion zone monitoring, whilst contractor shall confirm safety of MMO and practicability of deployment of silt curtain, otherwise marine works requiring the exclusion zone monitoring shall be ceased.

2.3 MMEZ Monitoring Stations

MMEZ monitoring stations shall be setup to cover the 250 m distance from the boundary of all construction activities that require the implementation of MMEZ. Each monitoring station shall be located on a stationary barge or vessel, depending on the type of construction activity or at a safe platform with an unobstructed and elevated view of the MMEZ. The barges/vessels selected for MMEZ monitoring stations shall be reviewed and updated based on actual locations of the barges/vessels relative to the distribution of works that require implementation of MMEZ at the site.

2.4 General Requirement of MMEZ Monitoring Team

A MMEZ team for the implementation of MMEZ monitoring requiring continuous MMO monitoring shall be formed by at least two trained MMOs to the following requirements:

1. 100% monitoring coverage during all periods of the construction activities aforementioned in Section 2.1.1 of this Plan;
2. At least two shifts of the MMEZ monitoring team (e.g. at least two MMOs per day / night shift teams) for 24 hour MMEZ monitoring;
3. Maximum of 12 hours of monitoring work per MMO per day; and
4. At least two MMOs on duty to carry out the monitoring work in rotation (e.g. rotate observer every 30 minutes) in order to minimize fatigue.

The implementation of MMEZ monitoring requiring non-continuous MMO monitoring shall be carried by a trained MMO to the following requirements:

1. 100% monitoring coverage during the construction activities requiring non-continuous MMO monitoring aforementioned in Section 2.1.2 of this Plan;
2. Two shifts of one trained MMO shall be on-site per day to perform non-continuous MMO monitoring;
3. Maximum of 12 hours of monitoring work per MMO per day.

The MMOs shall be trained by qualified specialist of ET or with certification by suitably qualified marine mammal specialist to demonstrate with relevant experience. Preferably with a degree in environmental or biological sciences or equivalent, experience in observing marine mammals, and basic knowledge of marine mammals in Hong Kong. The observers shall be appointed by ET and are independent of JV. The ET shall submit the information of every MMO candidates to IEC for review of the appointment if deemed necessary. Competence checking by ET shall be provided at least once every 6 months to the trained MMO involved in implementation of this plan. It is of crucial importance that MMOs shall have the power to call-off construction activities when any marine mammal is identified within the MMEZ.

2.5 Monitoring Equipment

The MMEZ shall be scanned by the marine mammal observer with naked eyes and occasionally with the aid of binoculars for confirmation. During night-time monitoring, night vision devices (NVDs) shall be used when little or no lighting on sea surface is available. Marine binoculars with built-in compass (e.g. Steiner Navigator 7X50 HD-stabilized Compass, Bushnell Marine Binoculars 7X50 with Compass, or model with similar or more advanced specification) shall be used during day-time monitoring. Night vision device (NVD) shall be used during night-time monitoring.

The NVD is suggested to be in the form of hand-held, head-mounted or tripod-mounted units depending on the location of the MMEZ monitoring station. NVDs from ATN, model PS15-CGTI Night Vision Goggle with 3X lens and Daking, model D-B1105 Night Vision Binocular with 5X lens, have proved practicable for night-time MMEZ monitoring. Therefore, the same model or NVDs with similar or more advanced specification and performance shall be selected for night-time MMEZ monitoring based on availability in the market. The feasibility of using Passive Acoustic Monitoring (PAM) involving the use of hydrophones or automated cetacean detectors with real-time data capability will be explored for the Marine Mammal Exclusion Zone monitoring in case the NVD is found to be ineffective for night-time Marine Mammal detection.

2.6 General MMEZ Monitoring Response to Marine Mammal Discovery

Prior to the commencement of construction activity, our MMOs shall ensure the boundary of a marine work area and setting up of the MMEZ for the work area and get access to the monitoring location on a barge or a lookout point where there is no obstructed views for monitoring the MMEZ during the construction activity.

The MMEZ shall be scanned thoroughly by a MMO for any presence of marine mammal e.g. finless porpoise for an initial period of 30 minutes. Construction activity shall only be commenced after the MMO has confirmed that the MMEZ is clear of the marine mammal for the initial period of 30 minutes. The MMO shall then inform the construction superintendent through mobile phone or handheld transceivers to certify the commencement of construction activity. The MMEZ monitoring shall be carried on throughout the period for all active construction activities requiring implementation of MMEZ.

When any mammal marine, e.g. Finless Porpoise, is detected by the MMO within the MMEZ during construction, the MMO shall inform the construction superintendent immediately through mobile phone or handheld transceivers to cease construction activity within the MMEZ. Construction activity shall not be re-commenced until the MMO confirms that the MMEZ is continuously clear of marine mammal for a period of 30 minutes. The MMO shall then inform the construction superintendent through mobile phone or handheld transceivers to certify the re-commencement of construction activity.

As there could be a number of Contractors working at the same time within a work area for the IWMF project, a full

contact list of MMEZ monitoring team members of the ET and the relevant responsible construction superintendents of the Contractor at the site shall be prepared, updated regularly and circulated to all parties involved in the MMEZ monitoring. With a full contact list, our MMOs shall be able to find out the contacts of corresponding persons in case of marine mammal sighting within and near the MMEZ or emergent occurrence of any unpredictable impact on marine mammal.

If a marine mammal is still observed in close vicinity but outside the MMEZ, the MMO shall inform the construction superintendent about the presence of marine mammal. The MMO shall remain in position and closely observe the movement of the marine mammal as well as searching for the appearance of any other marine mammal within the MMEZ. No matter the marine mammal is observed within or in close vicinity but outside the MMEZ, the construction superintendent or relevant persons shall inform all vessel captains involved in construction activities around the MMEZ to pay special attention of the presence of the marine mammal in order to reduce chance of collision with them. In case of injury or live-stranded marine mammal being found within the MMEZ, the marine mammal observer shall immediately inform the construction superintendent to suspend construction activities within the works area and contact AFCD through “1823” marine mammal stranding hotline.

Specific Response Plan for Deep Cement Mixing (DCM) Works

According to the results of the site trials for the Expansion of Hong Kong International Airport into a Three-Runway System, the DCM works is relatively quiet, and it is anticipated that ground treatment of DCM would not induce any underwater acoustic disturbance to Finless Porpoise. Nonetheless, MMEZ would also be implemented for precautionary purpose. For DCM works, as it is understood that DCM activities would take time to proceed suspending the works and not be able to cease the works immediately, **a specific response plan is outlined as an example shown in Appendix III** in the Method Statement for MMEZ Monitoring during DCM works. The response plan shall be site specific and developed based on the actual equipment for DCM and their impact. The Contractor can revise or propose the specific response plan, subject to SOR, ET and IEC’s review and approval. The specific response plan shall include the following information:

- Alert Level for MMEZ monitoring:
 - When marine mammal is spotted by the MMO near the fringe of the MMEZ around the work area for DCM works, the MMO shall inform the DCM construction superintendent on the appearance of marine mammal. The DCM construction superintendent shall check the DCM operating level and progress.
 - In the case of DCM withdrawal, i.e. cement injection and mixing underway, the DCM construction superintendent shall instruct the control operator to stop rotation of the DCM rig(s) and to prepare lifting up the DCM rig(s) above the cement layer but below the seabed within the DCM column(s) to avoid bringing out the contaminants from the contaminated mud pit.
 - In the case of DCM penetration underway, the DCM construction superintendent shall instruct the control operator to stay alert and suspend the subsequent DCM procedures after the bottom level is reached.
- Action Level for MMEZ monitoring:
 - When the MMO found that marine mammal has entered the MMEZ for DCM works, in the case of DCM withdrawal, the action of lifting up the DCM rig(s) above the cement layer (but below the seabed) shall be completed within 1 minute and all DCM activities shall be ceased.
 - In the case of DCM penetration, the rotation of DCM rig(s) shall be ceased immediately.

2.7 Data Recording

Our MMO shall fill in **a Monitoring Log Record Sheet (shown in Appendix I)** for data keeping purpose when they are on duty. General information listed below shall be recorded at the beginning of effort and every 30 minutes of the monitoring:

- Date;
- Monitoring Station;
- Names of marine mammal observers;

- Time;
- Status of monitoring;
- Marine mammal observer on effort;
- Weather;
- Beaufort Sea State;
- Visibility;
- Sun glare;
- Observation difficulty; and
- Construction activity

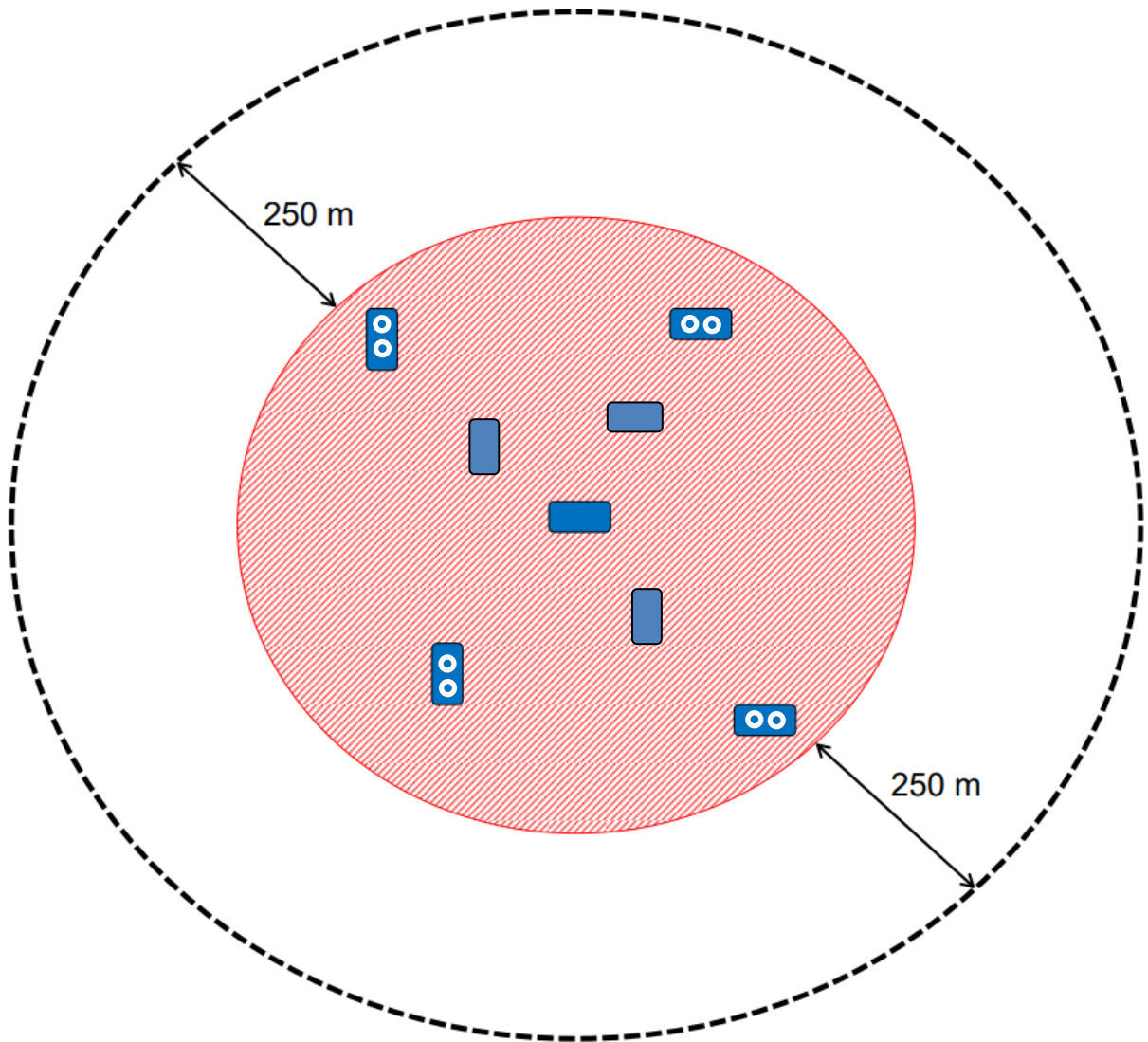
In case marine mammal e.g. Finless Porpoise or Chinese White Dolphin is detected within the MMEZ, our MMO shall fill in **the Marine Mammal Sighting Record Sheet (shown in Appendix II)** and record the following information:

- Sighting No.;
- Group Size;
- First Sighting Time within MMEZ;
- Last Sighting Time within MMEZ;
- Cessation Time of Construction Work;
- Re-start Time of Construction Work;
- Location of Marine Mammals; and
- Behavior of Marine Mammals

2.8 Regular Site Inspection / Audit of MMEZ Monitoring

Half-yearly site inspection / audit during both daytime and night-time MMEZ monitoring will be carried by the IEC jointed with the ET and other relevant parties, to monitor the effectiveness of the MMEZ implementation.

Figure 1



LEGEND:



CONSTRUCTION WORKS AREA (INDICATIVE ONLY)



CONSTRUCTION VESSEL requiring MMO (INDICATIVE ONLY)



CONSTRUCTION VESSEL with a team of 2MMOs on duty (INDICATIVE ONLY)



MARINE MAMMAL EXCLUSION ZONE (AT LEAST 250m FROM THE CONSTRUCTION WORKS AREA OF IW MF)

Notes on Monitoring Log Record Sheet

- *Action: SVI – Start of Visual Inspection of the Waters Surrounded by Silt Curtains
- EVI – End of Visual Inspection of the Waters Surrounded by Silt Curtains
- SRI – Start of Regular Inspection of Deployed Silt Curtain
- ERI – End of Regular Inspection of Deployed Silt Curtain
- SO – Start of Observer Effort on MMEZ Monitoring
- CO – Change in Observer on MMEZ Monitoring
- EO – End of Observer Effort on MMEZ Monitoring
- SC – Start of Construction Activity
- EC – End of Construction Activity

**Beaufort Sea State descriptions:

Beaufort	Sea conditions
0	Flat Calm; Glass
1	Ripples without crests
2	Small wavelets; crests do not break
3	Large wavelets; crests begin to break; scattered whitecaps
4	Small waves with breaking crests; fairly frequent whitecaps
5	Moderate waves; many whitecaps, small spray

***Visibility descriptions:

Visibility	Condition
Excellent	Clear, no obstruction to horizon
Good	Little to no haze and/or rain; Relatively clear horizon line
Fair	Some haze and/or rain; Horizon still visible
Poor	No visible horizon due to fog and/or rain

****In the event of marine mammal observed, mark down the Sighting Group No. in this box and fill the separate Marine Mammal Sighting Record Sheet

Examples for notes on construction activity:

DCM Injection / Silt Curtain Deployment / Sand Laying / Reclamation / Material Transfer / Dredging / Gravel Refill / Diver Checking / Maintenance / Suspending

Response for Marine mammal Notification during MMEZ monitoring

Prior to the commencement of DCM works, if a marine mammal is found within the MMEZ during the initial 30 minutes of scanning, the marine mammal observer(s) shall immediately inform construction superintendents and site agent and other marine mammal observers of each barge within the MMEZ cluster by mobile phone. The construction superintendents and site agent shall then inform the frontline staffs. The commencement of the DCM works are to be delayed on all barges until the marine mammal is not visible on the sea surface and the MMEZ is continuously clear of marine mammal for a period of 30 minutes. Also, all the on-effort marine mammal observers within the MMEZ cluster should monitor the marine mammal's appearance and activity until the marine mammal is not visible on the sea surface.

If a marine mammal is found within the MMEZ during the DCM works, the marine mammal observer(s) shall immediately inform construction superintendents and site agent and other marine mammal observers of each barge within the MMEZ cluster by mobile phone. The construction superintendents and site agent shall then inform all frontline staffs to cease all the construction activities within the MMEZ. All the on-effort marine mammal observers will continue to monitor the marine mammal's activity until it has left the MMEZ and that the MMEZ is continuously clear of marine mammal for a period of 30 minutes. The marine mammal observer(s) will contact other marine mammal observers of each barge within the MMEZ cluster to confirm the MMEZ is clear of marine mammal for a period of 30 minutes. Once cleared, the marine mammal observer(s) shall inform monitoring team coordinator. The construction superintendents and site agent shall then inform all frontline staffs to resume the DCM works.

If a marine mammal is found in close proximity to the MMEZ, the marine mammal observer(s) shall also inform construction superintendents and site agent and other marine mammal observers of each barge within the MMEZ cluster by mobile phone. The construction superintendents and site agent shall then inform all frontline staffs regarding the marine mammal's presence. All the on-effort marine mammal observers within the MMEZ cluster will continue to monitor the marine mammal's activity and the waters surrounding and within the MMEZ.

When the marine mammal is observed within or in close proximity to the MMEZ, the construction superintendents and site agent within the MMEZ cluster shall inform the vessel captains involved in the construction activities around the MMEZ to pay special attention to the marine mammal's presence in order to avoid the chance of collision with the marine mammal.

In case of any injured or live-stranded marine mammal(s) are found within the MMEZ, the marine mammal observer(s) shall immediately inform construction superintendents and site agent and other marine mammal observers of each barge within the MMEZ cluster by mobile phone. The construction superintendents and site agent shall then inform all frontline staffs to cease all the construction activities within the MMEZ and contact Agriculture, Fisheries and Conservation Department (AFCD) through "1823" marine mammal stranding hotline and marine mammal specialist of the ET.

Response Plan for Marine Mammal Notification

