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# **SECTION 1**

# **INTRODUCTION**

## **1. INTRODUCTION**

### **1.1 The Project**

1.1.1 The Project has been proposed to improve the supply reliability, transmission efficiency and system performance of the equipment and overhead transmission lines in Lantau. The Project includes the construction of three 132kV transmission lines from Pui O via Chi Ma Wan Peninsula via a sea crossing to Cheung Chau Island shown on Figure 1.1.

### **1.2 Background Information**

1.2.1 The following Environmental Monitoring and Audit (EM&A) Manual has been prepared by Atkins China Limited (ACL) on behalf of CLP Power Hong Kong Limited (CLP Power), the Project proponent. ACL have been appointed by CLP Power to undertake the duties of the Environmental Team (ET) for the Project.

1.2.2 The Project is considered to be a Designated Project under Schedule 2, Q.1 of the Environmental Impact Assessment Ordinance (EIAO) (Cap 499), due to the transmission lines traversing through Lantau South Country Park. As such, an Environmental Impact Assessment (EIA) was required to be undertaken for the Project to demonstrate that the Project would not result in significant impacts to the environment. Mott Connell Limited prepared the Project EIA on behalf of CLP Power. The EIA was accepted under the EIAO (EIA-065/2001) on 28 February 2002 and the Environmental Permit for the Project was granted under the EIAO (EP-126/2002) on 2 April 2002.

1.2.3 During the finalisation of the construction plans for the Project, minor changes to the construction works were identified and an Application for Variation to the Environmental Permit (VEP) (VEP-076/2002) was submitted to the Director of Environmental Protection (DEP) for approval of the following changes:

- A change in the horizontal alignment of the tunnel at the two portholes was proposed to improve ground stability;
- A change in the construction programme was identified; and
- A change in the tunneling works was proposed to commence tunneling at Tai Long Wan, rather than from Pui O, to minimise the amount of excavated rock that was required to be removed via the narrow roads in Pui O and enable sufficient area to assemble and operate the tunnel boring machine. As part of this change, the construction of a temporary platform and jetty at Tai Long Wan is now proposed (4,300 m<sup>2</sup>, approximate).

1.2.4 Further to the above, as part of the identified changes, the platform at Pui O was reduced in size from 550 m<sup>2</sup> to 500 m<sup>2</sup> and the length of the platform was increased to provide a safe berthing area.

1.2.5 The VEP application (VEP-076/2002) was made by CLP on 18 September 2002 and the amended EP (EP-126/2002/A) was granted by DEP on 17 October 2002 and is provided in Annex A.

### **1.3 Purpose of the Manual**

- 1.3.1 The purpose of this Environmental Monitoring and Audit (EM&A) Manual is to guide the EM&A programme to ensure compliance with the Environmental Impact Assessment (EIA) study recommendations, to assess the effectiveness of the recommended mitigation measures and to identify any further need for additional mitigation measures or remedial action.
- 1.3.2 As part of the conditions of the EP for this Project (EP-126/2002/A; Part C, Condition 2.20), the EM&A Manual is required to be updated and certified by the ET Leader and verified by the Independent Environmental Checker (IEC) as conforming to the information and recommendations contained in the EIA Report and the EP conditions.
- 1.3.3 The following EM&A Manual has been prepared to satisfy this EP condition and has been based on the following documents:
- Environmental Impact Assessment Report (EIA) for 132kV Supply Circuit from Pui O via Chi Ma Wan Peninsula via Sea Crossing towards Cheung Chau (EIA-065/2001), Mott Connell, January 2002.
  - Environmental Monitoring and Audit Manual (EM&A) for 132kV Supply Circuit from Pui O via Chi Ma Wan Peninsula via Sea Crossing towards Cheung Chau, Mott Connell, January 2002.
  - Variation to Environmental Permit (VEP) Application 132kV Supply Circuit from Pui O via Chi Ma Wan Peninsula via Sea Crossing towards Cheung Chau, (VEP-076/2002) Dragages (HK) Joint Venture (DJV), CLP Power, 18 September 2002.
  - Environmental Permit (EP) (EP-126/2002/A), 132kV Supply Circuit from Pui O via Chi Ma Wan Peninsula via Sea Crossing towards Cheung Chau, Environmental Protection Department, 17 October 2002.

### **1.4 EM&A Content**

- 1.4.1 This EM&A Manual has been prepared in accordance with the requirements of Annex 21 of the Technical Memorandum on Environmental Impact Assessment Process (EIAOTM) (EIAO, Cap. 499, S.16), and includes the following information:
- Project Background, Organisation and Programme;
  - Purpose of the Manual;
  - Implementation Schedule, summarising all recommended environmental mitigation measures with reference to the programme for their implementation (see Annex B);
  - Drawings showing the environmental sensitive receivers;
  - The EM&A Programme for the construction of the Project including:
    - responsibility for EM&A work;
    - EM&A organisation and management structure;
    - EM&A methodology;
    - equipment to be used and calibration required;
    - locations, parameters, frequency and duration for baseline, impact and post project monitoring;
    - environmental quality performance limits (Action and Limit levels);
    - Event-Action plans and decision audit flow charts;

## **2. DUST**

### **2.1 Introduction**

2.1.1 The EIA predicted that air quality sensitive receivers (ASRs) would not be impacted by the Project. As a result, dust measurements are not required for this Project. Rather, the Contractor's implementation of dust suppression measures shall be reviewed during field inspections to evaluate their effectiveness and to ensure compliance with the recommended measures provided in the EIA Report.

### **2.2 Dust Generating Activities**

2.2.1 The EIA identified the following dust generating activities associated with the Project:

- Construction of Underground Cable works in the vicinity of ASRs in Cheung Chau and Pui O due to excavation of the trench near sensitive receivers ; and
- Dust generated by the construction of the Cable Tunnel (Project Works Section 2) at the tunnel portals and platform area of Pui O.

### **2.3 Sensitive Receivers**

2.3.1 ASRs were identified in the EIA Report at Pui O and on Cheung Chau as follows:

- Pui O – Po Lo Wai Tsuen; Ham Tin Tsuen; Hostel (Lot No. 27); and
- Cheung Chau – Greenery Crest; Buddhist Wai Yan Memorial College; Village House along Pak She Praya Street; and Cheung Kwai Estate.

2.3.2 The above ASRs that were identified in the EIA are shown in Figure 2.1.

### **2.4 Dust Mitigation Measures**

2.4.1 The following dust mitigation measures provided in Table 2.1 were identified in the EIA and EP. The Contractor shall be responsible for the design and implementation of these measures and the ET shall be responsible for monitoring their implementation and effectiveness.



# **SECTION 2**

## **DUST**

- Procedures for reviewing the monitoring results; and
- compliance audit procedures and follow up
- Implementation Programme and Impact Prediction Review Procedures;
- Site Inspection, Deficiency and Action Reporting Procedures;
- Complaint/Consultation procedures; and
- Reporting Format and Procedures.

## 1.5 Project Works

1.5.1 The Project works can be divided into the following five sections:

- **Section 1** – Minor Underground Cable Installation Works from the Pui O Substation to Pui O Beach (approximately 2,350 m in length);
- **Section 2** – Tunneling Works from Pui O Beach to Tai Long Wan (tunnel approximately 3,200 m in length, approximately 3.5 m diameter), including a temporary working platform at Pui O Wan (approximately 500 m<sup>2</sup> in area) to be used for the excavation and construction of the tunnel portal and a temporary works platform at Tai Long Wan (approximately 4,300 m<sup>2</sup> in area) for the excavation and construction of the tunnel portal and launching of the tunnel boring machine;
- **Section 3** – Submarine Cable Installation from Tai Long Wan to Cheung Chau Sai Tai Road using cable burial techniques (approximate length 2,300 m);
- **Section 4** – Minor Underground Cable Installation Works from Cheung Chau Sai Tai Road to Cheung Chau South Station (approximate length 100 m); and
- **Section 5** – Minor Underground Cable Installation from Cheung Chau Sai Tai Road to Cheung Chau North Station (approximate length 1,250 m).

1.5.2 The construction works described in Section 1, 4 and 5 involve minor ground installation works. As such, the Project EIA and the following EM&A Manual have focused primarily on the Section 2, Tunnelling and Platform Works, and Section 3, Submarine Cable Installation and Marine Works.

## 1.6 Environmental Monitoring and Audit Requirements

1.6.1 The EIA study identified the likely environmental impacts during construction and operational phases and found that these impacts can be minimised to acceptable levels with the implementation of environmental mitigation measures. In order to ensure the acceptability of the Project, the monitoring and audit requirements have been identified and are described in the following sections.

## 1.7 Project Organisation

1.7.1 The Project organisation and responsibilities are shown in Figure 1.2.

## 1.8 Construction Programme

1.8.1 The tentative Project programme is provided in Annex C.

**Table 2.1 EIA and EP Dust Mitigation Measures**

Reference	Mitigation Measure
<b>Specific Measures During Construction</b>	
EIA S.3.3.6	Dust suppression efficiency of 50% can be achieved by applying watering twice a day
<b>General Measures During Construction</b>	
EIA S.3.3.6	The following control measures are stipulated in the Air Pollution Control (Construction Dust) Regulation and should be implemented to minimise the dust nuisance:
	<ul style="list-style-type: none"> <li>• the stockpile should be properly treated and sealed with latex, vinyl, bitumen or other suitable surface stabiliser if a stockpile of dusty materials is more than 1.2m but less than 2m high and lies within 50m from any site boundary that adjoins a road, street, or other area accessible to the public;</li> </ul>
	<ul style="list-style-type: none"> <li>• effective dust screens, sheeting or netting should be provided to enclose the scaffolding from the ground floor level of the building or if a canopy is provided at the first floor level, from the first floor level, up to the highest level of the scaffolding where a scaffolding is erected around the perimeter of a building under construction;</li> </ul>
	<ul style="list-style-type: none"> <li>• dump truck for material transport should be totally enclosed by impervious sheeting;</li> </ul>
	<ul style="list-style-type: none"> <li>• any excavated dusty materials or stockpile of dusty materials should be covered entirely by impervious sheeting or sprayed with water so as to maintain the entire surface wet, and recovered or backfilled or reinstated within 24 hours of the excavation or unloading;</li> </ul>
	<ul style="list-style-type: none"> <li>• stockpile of dusty materials should not extend beyond the pedestrian barriers, fencing or traffic cones;</li> </ul>
	<ul style="list-style-type: none"> <li>• dusty materials remaining after a stockpile is removed should be wetted with water and cleared from the surface of roads;</li> </ul>
	<ul style="list-style-type: none"> <li>• vehicle washing facilities should be provided at every vehicle exit point;</li> </ul>
	<ul style="list-style-type: none"> <li>• the area where vehicle washing takes place and the section of the road between the washing facilities and the exit point should be paved with concrete, bituminous materials or hardcores;</li> </ul>
	<ul style="list-style-type: none"> <li>• where a site boundary adjoins a road, streets or other area accessible to the public, hoarding of not less than 2.4m high from ground level should be provided along the entire length except for a site entrance or exit;</li> </ul>
	<ul style="list-style-type: none"> <li>• every main haul road should be scaled with concrete and kept clear of dusty materials or sprayed with water so as to maintain the entire road surface wet;</li> </ul>
	<ul style="list-style-type: none"> <li>• the portion of road leading only to a construction site that is within 30m of a designated vehicle entrance or exit should be kept clear of dusty materials;</li> </ul>
	<ul style="list-style-type: none"> <li>• every stock of more than 20 bags of cement should be covered entirely by impervious sheeting or placed in an area sheltered on the top and the 3 sides;</li> </ul>
	<ul style="list-style-type: none"> <li>• loading, unloading, transfer, handing or storage of bulk cement or any cement during or after the de-bagging process should be carried out in a totally enclosed system or facility, and any vent or exhaust should be fitted with an effective fabric or equivalent air pollution control system or equipment;</li> </ul>
	<ul style="list-style-type: none"> <li>• cement, or any other dusty materials collected by fabric filters or other air pollution control system or equipment should be disposed of in totally enclosed containers;</li> </ul>
	<ul style="list-style-type: none"> <li>• stockpile of dusty materials should be either covered entirely by impervious sheeting, placed in an area sheltered on the top and the 3 sides; or sprayed with water so as to maintain the entire surface wet;</li> </ul>

Reference	Mitigation Measure
	<ul style="list-style-type: none"> <li>all dusty materials should be sprayed with water prior to any loading, unloading or transfer operation so as to maintain the dusty material wet;</li> </ul>
	<ul style="list-style-type: none"> <li>vehicle speed should be limited to 10 kph except on completed access roads;</li> </ul>
	<ul style="list-style-type: none"> <li>every vehicle should be washed to remove any dusty materials from its body and wheels before leaving the construction sites;</li> </ul>
	<ul style="list-style-type: none"> <li>the load of dusty materials carried by vehicle leaving a construction site should be covered entirely by clean impervious sheeting to ensure that the dusty materials do not leak from the vehicle;</li> </ul>
	<ul style="list-style-type: none"> <li>the working area of excavation should be sprayed with water immediately before, during and immediately after the operations so as to maintain the entire surface wet;</li> </ul>
<b>During Tunnel Blasting</b>	
EIA S3.3.6	The following mitigation measures shall be implemented during blasting works
	<ul style="list-style-type: none"> <li>the area within 30m from the blasting area should shall be wetted with water prior to blasting; and</li> </ul>
	<ul style="list-style-type: none"> <li>blasting should shall not be carried out when the strong wind signal or tropical cyclone warning signal No. 3 or higher is hoisted unless prior permission of the Commissioner of Mines is obtained.</li> </ul>
	<ul style="list-style-type: none"> <li>wire mesh, gunny sacks and sandbags should be used on top of the blast area at each shot to prevent flying rock and dust;</li> </ul>
	<ul style="list-style-type: none"> <li>water the surface of the blast area to increase its moisture content;</li> </ul>
	<ul style="list-style-type: none"> <li>dust filters should be fitted to the tunnel construction ventilation systems;</li> </ul>
	<ul style="list-style-type: none"> <li>vents of all silos and weighing scale shall be fitted with fabric filtering system; and</li> </ul>
	<ul style="list-style-type: none"> <li>seating of pressure relief valves of all silos shall be checked, and the valves resealed if necessary, before each delivery.</li> </ul>
EP S2.5	<ul style="list-style-type: none"> <li>The doors at Pui O tunnel portal shall be kept close during blasting works, within the tunnel section, in order to minimize noise impact</li> </ul>

Note: As the direction of tunnel drilling will commence from Tai Long Wan to Pui O, the extent and duration of construction activities undertaken at the Pui O tunnel portal will be significantly reduced. Further, visual screening of the Pui O platform will be included in the design to reduce the visual impacts to sensitive receivers. During the project construction works, the project proponent will ensure that potential nuisances to sensitive receivers in the area are minimised through appropriate programming and planning of construction works.

## 2.5 Environmental Monitoring & Audit

2.5.1 Full compliance with the AQOs during construction is expected to be achieved at all air sensitive receivers with the implementation of mitigation measures by the Contractor. Therefore, routine dust measurements are not required during construction but regular field inspection (a minimum of twice per month) and site audits shall be undertaken as follows:

- conducted during construction works undertaken within 500 m of ASRs;
- during blasting works; and
- during the tunneling works and at the platform site at Pui O.

# **SECTION 3**

## **NOISE**

### **3. NOISE**

#### **3.1 Introduction**

3.1.1 According to the findings of the EIA Report, noise exceedances during construction phase are not expected to occur at noise sensitive receivers with the implementation of noise mitigation measures. As a result, noise measurements are not required for this Project. Rather, the Contractor's implementation of noise suppression measures shall be reviewed during field inspections to evaluate their effectiveness and to ensure compliance with the recommended measures provided in the EIA Report.

3.1.2 The EIA identified the following noise generating activities associated with the Project:

- Installation of underground cable works in the vicinity of ASRs in Cheung Chau and Pui O (due to road breaking, trench excavation and road reinstatement along the route); and
- Construction of the Cable Tunnel (Site formation, TBM, drill and blast and tunnel lining) within the Pui O Section.

#### **3.2 Noise Sensitive Receivers**

3.2.1 NSRs were identified in the EIA Report at Pui O, Lantau and on Cheung Chau as follows:

- Pui O – Po Lo Wai Tsuen; Ham Tin Tsuen; Hostel (Lot No. 27); and
- Cheung Chau – Greenery Crest; Buddhist Wai Yan Memorial College; Village House along Pak She Praya Street; and Cheung Kwai Estate.

3.2.2 There are no NSRs located within 300 m of the work site at Tai Long Wan tunnel portal.

3.2.3 The above NSRs are the same as the ASRs and are shown on Figure 2.1.

#### **3.3 Noise Mitigation Measures**

3.3.1 The EIA Report has recommended construction noise control and mitigation measures as provided in Table 3.1. The Contractor shall be responsible for the design and implementation of these measures.

**Table 3.1 EIA and EP Noise Mitigation Measures**

Reference	Mitigation Measure
<b>Good Site Practices During Construction</b>	
EIA S3.4.6	<ul style="list-style-type: none"> <li>only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction works;</li> </ul>
	<ul style="list-style-type: none"> <li>machines and plant that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum;</li> </ul>
	<ul style="list-style-type: none"> <li>plant known to emit noise strongly in one direction, should, where possible, be orientated to direct noise away from the NSRs;</li> </ul>
	<ul style="list-style-type: none"> <li>mobile plant should be sited as far away from NSRs as possible; and</li> </ul>
	<ul style="list-style-type: none"> <li>material stockpiles and other structures should be effectively utilised, where practicable, to screen noise from on-site construction activities.</li> </ul>
<b>Selecting Quieter Plant and Working Methods during Construction</b>	
EIA S3.4.6	<ul style="list-style-type: none"> <li>Application of properly designed silencers, mufflers, acoustically dampened panels and acoustic sheds or shields, etc.;</li> </ul>
	<ul style="list-style-type: none"> <li>Use of electric-powered equipment where applicable instead of diesel-powered or pneumatic-powered equipment;</li> </ul>
	<ul style="list-style-type: none"> <li>Erecting noise enclosures around noisy plants;</li> </ul>
	<ul style="list-style-type: none"> <li>Location of noise emitting plants at maximum possible distances from sensitive receivers;</li> </ul>
	<ul style="list-style-type: none"> <li>Contractual clauses for construction works; and</li> </ul>
	<ul style="list-style-type: none"> <li>Schedule of noisy operations during non-restricted hours;</li> </ul>
	<ul style="list-style-type: none"> <li>Regular maintenance of site plant/ equipment.</li> </ul>
	<ul style="list-style-type: none"> <li>A temporary cantilevered barriers of 4m high is proposed to be erected at the tunnel portal area in order to alleviate the construction noise impact by blocking the line of view from the nearby receivers. The barrier material needs to have a surface density (<math>&gt; 7 \text{ kg/m}^2</math>) to provide sufficient screening effect (approx. 10 dB(A)).</li> </ul>
<b>Mitigation Measures during blasting of works (Specific)</b>	
EIA S3.4.6; EP-2.5	<ul style="list-style-type: none"> <li>Tunnel portal doors should be closed when the construction activities are carried within the tunnel.</li> </ul>

Note: As the direction of tunnel drilling will commence from Tai Long Wan to Pui O, the extent and duration of construction activities undertaken at the Pui O tunnel portal will be significantly reduced. Further, visual screening of the Pui O platform will be included in the design to reduce the visual impacts to sensitive receivers. During the project construction works, the project proponent will ensure that potential nuisances to sensitive receivers in the area are minimised through appropriate programming and planning of construction works.

### 3.4 Environmental Monitoring & Audit

3.4.1 With the implementation of noise mitigation measures and scheduling the construction activities, full compliance with the environmental criteria is expected to be achieved. Therefore, routine construction noise measurements are not required during the construction of the Project but regular monitoring of construction practices and site audits are required (a minimum of twice per month) as follows:

- when construction works are within 500 m of NSRs;
- during blasting works; and
- during the tunneling works at Pui O.

3.4.2 During the field inspections, the Contractor's implementation of the relevant measures and their effectiveness for suppressing noise shall be reviewed.

- 3.4.3 If a noise complaint is received during the construction works, noise measurements shall be taken by the ET to confirm noise levels generated (see Section 10.3). If noise levels are found to exceed the non-statutory daytime noise control limits (75 dB(A) for residences and 70 dB(A) for schools and 65 dB(A) during school examination periods), the Contractor shall take immediate action to reduce noise levels and noise measurements shall be taken to verify the acceptability of noise reduction measures.



# **SECTION 4**

# **WATER QUALITY**

## **4. WATER QUALITY**

### **4.1 Introduction**

4.1.1 For marine based works, sediment plume modelling was undertaken to determine the environmental acceptability of laying cables across the Adamasta Channel. The model results indicated full compliance with the WQO's at the defined sensitive receivers during cable installation. For marine works, baseline water quality monitoring and impact water quality monitoring and site inspection of works practices shall be undertaken to verify compliance with the Water Quality Objectives (WQOs).

4.1.2 For land based works, water quality measures have been recommended in the EIA Report to reduce potential impacts to surface waters runoff and receiving water bodies. Implementation of these measures shall be reviewed during field inspection to ensure compliance with the requirements of the EIA and the effectiveness of these measures.

### **4.2 Project Works Affecting Water Quality**

4.2.1 The various marine works activities identified in the EIA and Application for VEP that may result in adverse water quality impacts include:

- Cable laying (either by direct burial or dredging methods);
- Formation and decommissioning of the temporary working platform at the tunnel portal at Tai Long Wan; and
- The marine works associated with the cable installation within the typhoon shelter at Cheung Chau.

4.2.2 The marine works associated with the establishment of the Pui O works platform were identified in the EIA as being minor works that would not result in an impact to water quality and as such monitoring of these works is not proposed.

4.2.3 The various land based activities identified in the EIA that may result in adverse water quality impacts include potential discharge or runoff of materials from the tunnel boring machine and works area and during cable burial works near streams and drainage areas.

### **4.3 Water Quality Sensitive Receivers**

4.3.1 The sensitive receivers identified in the EIA include: marine life; mariculture; beaches and other recreational areas; fish spawning grounds; and areas for navigation/shipping including typhoon shelters, marinas and boat parks. The marine sensitive receivers within a 6 km radius include: the Cheung Sha Wan Fish Culture Zone and Tai Kwai Wan (non-gazetted) Beach on Cheung Chau; and Pui O (gazetted) Beach shown on Figure 4.1.

## 4.4 Water Quality Mitigation Measures

4.4.1 The mitigation measures provided in the EIA and EP are provided in Table 4.1, as follows. The Contractor shall be responsible for the design and implementation of these measures and the ET shall be responsible for monitoring their effectiveness.

**Table 4.1 EIA and EP Water Quality Mitigation Measures**

Reference	Mitigation Measure
<b>General Mitigation Measures for Land Based During Tunneling, At the Tunnel Portholes and Within Sensitive Areas of Pui O Work</b>	
EIA S.4.6	<ul style="list-style-type: none"> <li>All waste water generated on the site shall be collected, removed from site via a suitable and properly designed temporary drainage system and disposed of at a location and in a manner that will cause neither pollution nor nuisance;</li> </ul>
	<ul style="list-style-type: none"> <li>The Contractor should construct, maintain, remove and reinstate, as necessary, temporary drainage works and take all other precautions necessary for the avoidance of damage by flooding and silt washed down from the works. The Contractor should also provide adequate precautions to ensure that no spoil or debris of any kind is allowed to be pushed, washed down, fall or be deposited on land or on the seabed adjacent to the site;</li> </ul>
	<ul style="list-style-type: none"> <li>The Contractor should not permit any sewage, waste water or other effluent containing sand, cement, silt or any other suspended or dissolved material to flow from the site onto any adjoining land or allow any solid waste to be deposited anywhere within the site or onto any adjoining land and shall have all such materials removed from the site;</li> </ul>
	<ul style="list-style-type: none"> <li>The Contractor should be responsible for temporary drainage, diverting or conducting of open streams or drains intercepted by any works and for reinstating these do their original courses on completion of the works;</li> </ul>
	<ul style="list-style-type: none"> <li>All waste water generated on the site shall be collected, removed from site via a suitable and properly designed temporary drainage system and disposed of at a location and in a manner that will cause neither pollution nor nuisance;</li> </ul>
	<ul style="list-style-type: none"> <li>The Contractor should construct, maintain, remove and reinstate, as necessary, temporary drainage works and take all other precautions necessary for the avoidance of damage by flooding and silt washed down from the works. The Contractor should also provide adequate precautions to ensure that no spoil or debris of any kind is allowed to be pushed, washed down, fall or be deposited on land or on the seabed adjacent to the site;</li> </ul>
	<ul style="list-style-type: none"> <li>The Contractor should not permit any sewage, waste water or other effluent containing sand, cement, silt or any other suspended or dissolved material to flow from the site onto any adjoining land or allow any solid waste to be deposited anywhere within the site or onto any adjoining land and shall have all such materials removed from the site;</li> </ul>
	<ul style="list-style-type: none"> <li>The Contractor should be responsible for temporary drainage, diverting or conducting of open streams or drains intercepted by any works and for reinstating these do their original courses on completion of the works;</li> </ul>
	<ul style="list-style-type: none"> <li>Any proposed temporary diversions to stream courses or nullahs shall be submitted to the Engineer for agreement one month prior to such diversion works being commenced. Diversions shall be constructed to allow the water flow to discharge without overflow, erosion or washout. The area through which the temporary diversion runs is to be reinstated to its original condition when the temporary diversions is no longer required;</li> </ul>

Reference	Mitigation Measure
	<ul style="list-style-type: none"> <li>The Contractor shall not discharge directly or indirectly (by runoff) or cause or permit to be discharged into any public sewer, storm-water drain, channel, stream-course or sea, any effluent or foul or contaminated water or cooling water without the prior consent of the relevant Authority who may require the Contractor to provide, operate and maintain at the Contractor's own expense, within the premises or otherwise, suitable works for the treatment and disposal of such effluent or foul or contaminated or cooling or hot water;</li> </ul>
	<ul style="list-style-type: none"> <li>The Contractor shall at all times ensure that all existing stream courses and drains within, and adjacent to the site are kept safe and free from any debris and any excavated materials arising from the works. The Contractor shall ensure that chemicals and concrete agitator washings are not deposited in watercourses; and</li> </ul>
	<ul style="list-style-type: none"> <li>All Contractor's equipment shall be designed and maintained to minimise the risk of silt and other contaminants being released into the water column or deposited in other than designated locations.</li> </ul>
4.13	<ul style="list-style-type: none"> <li>The Contractor shall not discharge directly or indirectly (by runoff) or cause or permit to be discharged into any public sewer, storm-water drain, channel, stream-course or sea, any effluent or foul or contaminated water or cooling water without the prior consent of the relevant Authority who may require the Contractor to provide, operate and maintain at the Contractor's own expense, within the premises or otherwise, suitable works for the treatment and disposal of such effluent or foul or contaminated or cooling or hot water;</li> </ul>
4.14	<ul style="list-style-type: none"> <li>The Contractor shall at all times ensure that all existing stream courses and drains within, and adjacent to the site are kept safe and free from any debris and any excavated materials arising from the works. The Contractor shall ensure that chemicals and concrete agitator washings are not deposited in watercourses; and</li> </ul>
4.15	<ul style="list-style-type: none"> <li>All Contractor's equipment shall be designed and maintained to minimise the risk of silt and other contaminants being released into the water column or deposited in other than designated locations.</li> </ul>
4.16 EP2.18	<ul style="list-style-type: none"> <li>The Permit Holder shall install silt curtain during construction and removal of the temporary working platform at Tai Long Wan to minimize the water quality impact as shown in Figure 7. The installation of silt curtain shall be certified by the ET Leader and verified by the IEC as conforming to the information and recommendations contained in the application documents for variation of an environmental permit (VP-76/2002)D</li> </ul>
<b>Site Drainage System for Temporary Works Platform:</b>	
4.17 EP2.19	<ul style="list-style-type: none"> <li>The Permit Holder shall implement construction site drainage system as shown in figure 8 for the temporary working platform at Tai Long Wan to bund and divert the polluted surface runoff away from the seaward side and prevent pollution to the sea. The Permit Holder shall deposit details of the drainage system with the Director at least two weeks before commencement of construction of the temporary working platform at Tai Long Wan. The details of the drainage system shall be certified by the ET Leader and verified by the IEC as conforming to the information and recommendations contained in the application documents for variation of an environmental permit (Application No. VEP-76/2002) in the Register.</li> </ul>
<b>General Pollution Prevention Measures During Dredging</b>	
EP 2.8(a)	<ul style="list-style-type: none"> <li>use of closed and sealed grabs to be used to reduce sediment release rate by at least 50%;</li> </ul>
EIA S.4.6	<ul style="list-style-type: none"> <li>mechanical grabs shall be designed and maintained to avoid spillage and shall seal tightly while being lifted; all vessels shall be sized such that adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash;</li> </ul>
EIA S.4.6; EP 2.9	<ul style="list-style-type: none"> <li>dredging rate must be lower than 547m<sup>3</sup>/day during dry season;</li> </ul>

Reference	Mitigation Measure
EIA S.4.6	<ul style="list-style-type: none"> <li>dredging rate must be lower than 328m<sup>3</sup>/day during wet season (if three trenches dredged simultaneously);</li> </ul>
EIA S.4.6; EP 2.8 (b)	<ul style="list-style-type: none"> <li>all barges shall be fitted with tight fitting seals to their bottom openings to prevent leakage of materials;</li> </ul>
EIA S.4.6; EP 2.8 (c)	<ul style="list-style-type: none"> <li>excess material shall be cleaned from the decks and exposed fittings of barges before the vessel is moved;</li> </ul>
EIA S.4.6	<ul style="list-style-type: none"> <li>mechanical grabs shall be designed and maintained to avoid spillage and shall seal tightly while being lifted; all vessels shall be sized such that adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash;</li> </ul>
EIA S.4.6	<ul style="list-style-type: none"> <li>all barges shall be fitted with tight fitting seals to their bottom openings to prevent leakage of material;</li> </ul>
EIA S.4.6	<ul style="list-style-type: none"> <li>loading of barges and hoppers shall be controlled to prevent splashing of dredged material to the surrounding water and barges or hoppers shall not be filled to a level which will cause overflowing of material or polluted water during loading or transportation;</li> </ul>
EIA S.4.6	<ul style="list-style-type: none"> <li>the Engineer may monitor any or all vessels transporting material to ensure that no dumping outside the approved location takes place. The Contractor shall provide all reasonable assistance to the Engineer for this purpose;</li> </ul>
EIA S.4.6	<ul style="list-style-type: none"> <li>all vessels used for marine works must be currently registered as such with the marine department; and</li> </ul>
EIA S.4.6	<ul style="list-style-type: none"> <li>water quality monitoring shall be carried out by the Contractor during the dredging. Requirements and extent of monitoring will be agreed with DEP and the Engineer.</li> </ul>
<b>General Pollution Prevention Measures During Direct Burying</b>	
EIA S.4.6	<ul style="list-style-type: none"> <li>other than exerting due care when carrying out the works, direct burying can be carried out without any special mitigation measures being required to protect sensitive receivers regardless of the tide or season. rates of burying can be carried out at up to 400m/day without any adverse impact being detected at water sensitive receivers.</li> </ul>
EIA S.4.6	<ul style="list-style-type: none"> <li>between completing one direct burying activity and commencing the next a rest period of 6 hours should be observed to allow the sediment levels to reduce to pre-works levels.</li> </ul>
<b>General Pollution Prevention Measures During Placing of Cables in Cheung Chau Typhoon Shelter</b>	
EIA S.4.6	<ul style="list-style-type: none"> <li>use of silt screens may be required, either side of the cable laying if the placing of cables causes elevation in suspended solids in excess of 30% above the ambient level as defined through the baseline water quality monitoring data. For the purposes of this assessment this is assumed to be 3.9 mg/L.</li> </ul>
<b>General Water Pollution Prevention Measures to be Applied if TBM's Used or Drill and Blast Method is Adopted</b>	
EIA S.4.6	<ul style="list-style-type: none"> <li>all wastewater generated must be treated to the appropriate standard given in the TM on "Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters".</li> </ul>
EIA S.4.6	<ul style="list-style-type: none"> <li>in the event that conventional sedimentation techniques are inadequate to treat wastewater generated, consideration should be given to use of alternative techniques such as mobile microfiltration plants.</li> </ul>

## 4.5 Environmental Monitoring & Audit

4.5.1 Routine field inspections and site audits (a minimum of twice per month) shall be conducted during the construction works with regard to the land based work. The routine inspections shall be carried out as follows:

- During tunnelling works;

- During works at the porthole platforms; and
  - During works undertaken within the non urban area of Pui O.
- 4.5.2 To confirm compliance with the WQO's during the platform construction and decommissioning at Tai Long Wan a water quality monitoring programme has been proposed. During operation of the platform, regular site audits will be undertaken to ensure that working practices are not resulting in excessive runoff discharging from the construction site.
- 4.5.3 At present, specific details of the submarine cable installation works are not available. As such, the specific monitoring locations and impact monitoring programme will need to be confirmed with DEP prior to undertaking these submarine cable installation works.

#### **4.6 Water Quality Parameters**

- 4.6.1 Monitoring for Dissolved Oxygen (DO), temperature, turbidity, pH and suspended solids (SS) shall be undertaken at designated monitoring stations. The purpose of which is to ensure that any deterioration in water quality can be readily detected and timely action can be taken to resolve any problems. DO, temperature, turbidity and pH should be measured in-situ whereas SS shall be determined by laboratory analysis.
- 4.6.2 In association with the water quality parameters, other relevant data shall also be measured, such as monitoring location/position, time, weather conditions, and any special phenomena and description of work underway at the construction site etc.

#### **4.7 Monitoring Equipment**

- 4.7.1 The following equipment and facilities shall be provided by the ET and used for the monitoring of water quality impacts:

##### ***Dissolved Oxygen and Temperature Measuring Equipment***

- (a) The instrument shall be portable and weatherproof using a DC power source. The equipment shall be capable of measuring:
- a DO level in the range of 0-20 mg/l and 0-200% saturation; and
  - a temperature of between 0-45 degree Celsius.
- (b) It shall have a membrane electrode with automatic temperature compensation complete with a cable.

##### ***Turbidity Measurement Instrument***

- 4.7.2 The instrument shall be portable and weatherproof using a DC power source. It should have a photoelectric sensor capable of measuring turbidity between 0-1000 NTU, such as a Hach model 2100P or similar approved.

##### ***Sample Containers and Storage***

- (a) Water samples for SS analysis shall be stored in high density polythene bottles with no preservative added, packed in ice (cooled to 4°C without being frozen), delivered to the laboratory, and analysed as soon as

possible after collection.

### **Calibration of In-Situ Instruments**

- 4.7.3 All pH meters, DO meters and turbidimeters shall be checked and calibrated prior to use. DO meters and turbidimeters shall be calibrated by a laboratory accredited under HOKLAS or any other international accreditation scheme, and subsequently re-calibrated at 3 monthly intervals throughout all stages of the water quality monitoring. Responses of sensors and electrodes shall be checked with certified standard solutions before each use. Wet bulb calibrations for all DO meters shall be carried out before measurement at each monitoring location. For the on site calibration of field equipment, BS 127:1993, "Guide to field and on-site test methods for the analysis of waters" should be observed.

### **Laboratory Measurement/Analysis**

- 4.7.4 Analysis shall be carried out in a HOKLAS or other international accredited laboratory. If a site laboratory is set up or a non-HOKLAS or non-international accredited laboratory is hired for carrying out the laboratory analysis, the laboratory equipment, analytical procedures, and quality control shall be approved by the DEP.
- 4.7.5 Sample volume and maximum storage time for each analytical parameter carried out in the laboratory are shown below in Table 4.2

**Table 4.2 Water Sample Handling Requirements**

<b>Analytical Parameter</b>	<b>Sample Volume Taken (ml)</b>	<b>Storage Temperature</b>	<b>Maximum Storage Time After Sampling</b>
SS	500	4°C	24 hours

- 4.7.6 Each sample shall be analysed in accordance with the APHA Standard Methods for the Examination of Water and Wastewater, 18th edition, or an equivalent method approved by the DEP. If an in-house or non-standard method is proposed, details of the method verification may require to be submitted to the DEP. In any circumstance, the sample testing shall comply with a comprehensive quality assurance and quality control programme. The laboratory should be prepared to demonstrate the quality programmes to the DEP when requested.

## **4.8 Baseline Monitoring**

- 4.8.1 Baseline conditions for the water quality of Southern Waters shall be undertaken at the locations provided in Figure 4.1. The purpose of the baseline monitoring is to establish ambient conditions prior to the commencement of the marine works and to demonstrate the suitability of the proposed impact, control and reference monitoring points.

- 4.8.2 The baseline conditions will be established by measuring the water quality parameters specified in Section 4.6. The measurements shall be taken at all designated monitoring stations including control points, 3 days per week, at mid-flood and mid-ebb tides, for at least four weeks prior to the commencement of marine works.
- 4.8.3 Measurements shall be taken at 3 water depths, namely, 1 m below water surface, mid-depth and 1m above sea bed, except where the water depth less than 6 m, the mid-depth station may be omitted. Should the water depth be less than 3m, only the mid-depth station will be monitored.
- 4.8.4 Replicates *in-situ* measurements and samples collected from each independent sampling event are required for all parameters to ensure a robust statistically interpretable dataset.
- 4.8.5 There shall not be any construction activities over water in the vicinity of the points during the baseline monitoring.
- 4.8.6 In exceptional case when insufficient baseline monitoring data or questionable results are obtained, the ET Leader shall seek approval from the IC(E) and DEP on an appropriate set of data to be used as baseline reference.
- 4.8.7 The baseline monitoring schedule shall be faxed to DEP 1 week prior to the commencement of baseline monitoring. The interval between 2 sets of monitoring shall not be less than 36 hours.

#### **4.9 Impact Monitoring During Construction and Decommissioning**

- 4.9.1 The proposed water quality monitoring points during construction and decommissioning of the Tai Long Wan Platform are shown on Figure 4.2. a total of seven monitoring stations shall be sampled, including two nearfield stations, three midfield stations and two control station.
- 4.9.2 The proposed monitoring stations for the cable installation work and associated marine works shall be selected once the marine programme is established and will be agreed with DEP prior to commencement of works (seawall preparation or dredging activities).
- 4.9.3 Measurements shall be taken at 3 water depths, namely, 1 m below water surface, mid-depth and 1m above sea bed, except where the water depth less than 6 m, the mid-depth station may be omitted. Should the water depth be less than 3 m, only the mid-depth station will be monitored.
- 4.9.4 Replicates *in-situ* measurements and samples collected from each independent sampling event are required for all parameters to ensure a robust statistically interpretable dataset.
- 4.9.5 During the course of the marine works (construction and decommissioning), monitoring shall be undertaken three days per week, at mid-flood and mid-ebb tides, with sampling at the designated monitoring points. The interval between 2 sets of monitoring shall not be less than 36 hours except where there are exceedances of Action and/or Limit levels, in which case the monitoring frequency will be increased.



4.9.6 Proposed water quality monitoring schedule shall be faxed to EPD on or before the first day of the monitoring month, EPD shall be notified immediately of any change in schedule by fax.

#### 4.10 Monitoring During Tunnel Drilling Work

4.10.1 During tunnel drilling work at the Tai Long Wan Platform, regular inspections (on a twice a month basis) in the required areas of construction works and site practices will be undertaken by the Environmental Team to identify if construction works are affecting water quality from excessive runoff discharge.

#### 4.11 Event and Action Plan for Water Quality

4.11.1 The water quality assessment criteria, namely Action and Limit levels shall be based on the results of baseline monitoring and WQO of the Southern Waters water control zone.

4.11.2 The Action and Limit levels for the submarine cable installation and associated works will be specified once the sequence of these works has been established and will be agreed with DEP and the IEC.

4.11.3 The Action and Limit levels for water quality monitoring during construction of the Tai Long Wan platform are provided in Table 4.3 and shall be carried out if the water quality assessment criteria are exceeded at any one of the midfield monitoring points (M1, M2 and M3). The action and limit levels for the EM&A programme will be agreed with EPD prior to the commencement of construction works.

**Table 4.3 Action and Limit Levels for Water Quality at Midfield Stations**

Parameters	Action	Limit
DO in mg/L (Surface, Middle & Bottom)	<u>Surface &amp; Middle</u> 5%-ile of baseline data for surface and middle layer. <u>Bottom</u> 5%-ile of baseline data for bottom layer.	<u>Surface &amp; Middle</u> 4mg/L except 5mg/l for FCZ or 1%-ile of baseline data for surface and middle layer <u>Bottom</u> 2mg/l or 1%-ile of baseline data for bottom layer
SS in mg/l (depth-averaged)	95%-ile of baseline data or 120% of upstream control station's SS at the same tide of the same day	99%-ile of baseline or 130% of upstream control station's SS at the same tide of the same day and specific sensitive receiver water quality requirements

Notes:

- For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limits.
- For SS, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.
- Action and Limit levels have not been assigned for turbidity due to the high level of marine traffic in the area, which would significantly reduce the correlation efficiency between SS and turbidity in the area.

- 4.11.4 The near field monitoring stations will be reviewed with regard to the gradient effect of the marine works from near field to mid field water quality.

**Table 4.4 Event/Action Plan for Water Quality**

<b>Event</b>	<b>ET Leader</b>	<b>IC(E)</b>	<b>ER</b>	<b>Contractor</b>
Action Level being exceeded by one sampling day	<ol style="list-style-type: none"> <li>1. Repeat in-situ measurement to confirm finding;</li> <li>2. Identify source(s) of impact;</li> <li>3. Inform IC(E) and Contractor;</li> <li>4. Check monitoring data, all plant, equipment and Contractor's working methods;</li> <li>5. Discuss mitigation measures with IC(E) and Contractor; and</li> <li>6. Repeat measurement on next day of exceedance.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss with ET and Contractor on the mitigation measures;</li> <li>2. Review proposals on mitigation measures submitted by Contractor and advise the ER accordingly; and</li> <li>3. Assess the effectiveness of the implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss with IC(E) on the proposed mitigation measures; and</li> <li>2. Make agreement on the mitigation measures to be implemented.</li> </ol>	<ol style="list-style-type: none"> <li>1. Inform the ER and confirm notification of the non-compliance in writing;</li> <li>2. Rectify unacceptable practice;</li> <li>3. Check all plant and equipment;</li> <li>4. Consider changes of working methods;</li> <li>5. Discuss with ET and IC(E) and propose mitigation measures to IC(E) and ER; and</li> <li>6. Implement the agreed mitigation measures.</li> </ol>
Action Level being exceeded by more than one consecutive sampling day	<ol style="list-style-type: none"> <li>1. Repeat in-situ measurement to confirm finding;</li> <li>2. Identify source(s) of impact;</li> <li>3. Inform IC(E) and Contractor;</li> <li>4. Check monitoring data, all plant, equipment and Contractor's working methods;</li> <li>5. Discuss mitigation measures with IC(E) and Contractor;</li> <li>6. Ensure mitigation measures are implemented;</li> <li>7. Prepare to increase the monitoring frequency to daily; and</li> <li>8. Repeat measurement on next day of exceedance.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss with ET and Contractor on the mitigation measures;</li> <li>2. Review proposals on mitigation measures submitted by Contractor and advise the ER accordingly; and</li> <li>3. Assess the effectiveness of the implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss with IC(E) on the proposed mitigation measures;</li> <li>2. Make agreement on the mitigation measures to be implemented; and</li> <li>3. Assess the effectiveness of the implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Inform the Engineer and confirm notification of the non-compliance in writing;</li> <li>2. Rectify unacceptable practice;</li> <li>3. Check all plant and equipment;</li> <li>4. Consider changes of working methods;</li> <li>5. Discuss with ET and IC(E) and propose mitigation measures to IC(E) and ER within 3 working days; and</li> <li>6. Implement the agreed mitigation measures.</li> </ol>

Event	ET Leader	IC(E)	ER	Contractor
Limit Level being exceeded by one sampling day	<ol style="list-style-type: none"> <li>1. Repeat in-situ measurement to confirm finding;</li> <li>2. Identify source(s) of impact;</li> <li>3. Inform IC(E), Contractor and EPD;</li> <li>4. Check monitoring data, all plant, equipment and Contractor's working methods;</li> <li>5. Discuss mitigation measures with IC(E), ER and Contractor;</li> <li>6. Ensure mitigation measures are implemented; and</li> <li>7. Increase the monitoring frequency to daily until no exceedance of Limit level.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss with ET and Contractor on the mitigation measures;</li> <li>2. Review proposals on mitigation measures submitted by Contractor and advise the ER accordingly; and</li> <li>3. Assess the effectiveness of the implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss with IC(E), ET and Contractor on the proposed mitigation measures; and</li> <li>2. Request Contractor to critically review the working methods;</li> <li>3. Make agreement on the mitigation measures to be implemented; and</li> <li>4. Assess the effectiveness of the implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Inform the Engineer and confirm notification of the non-compliance in writing;</li> <li>2. Rectify unacceptable practice;</li> <li>3. Check all plant and equipment;</li> <li>4. Consider changes of working methods;</li> <li>5. Discuss with ET and IC(E) and ER and propose mitigation measures to IC(E) and ER within 3 working days; and</li> <li>6. Implement the agreed mitigation measures.</li> </ol>
Limit Level being exceeded by more than one consecutive sampling day	<ol style="list-style-type: none"> <li>1. Repeat in-situ measurement to confirm finding;</li> <li>2. Identify source(s) of impact;</li> <li>3. Inform IC(E), Contractor and EPD;</li> <li>4. Check monitoring data, all plant, equipment and Contractor's working methods;</li> <li>5. Discuss mitigation measures with IC(E), ER and Contractor;</li> <li>6. Ensure mitigation measures are implemented; and</li> <li>7. Increase the monitoring frequency to daily until no exceedance of Limit level for two consecutive days.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss with ET and Contractor on the mitigation measures;</li> <li>2. Review proposals on mitigation measures submitted by Contractor and advise the ER accordingly; and</li> <li>3. Assess the effectiveness of the implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss with IC(E), ET and Contractor on the proposed mitigation measures; and</li> <li>2. Request Contractor to critically review the working methods;</li> <li>3. Make agreement on the mitigation measures to be implemented;</li> <li>4. Assess the effectiveness of the implemented mitigation measures; and</li> <li>5. Consider and instruct, if necessary, the Contractor to slow down or to stop all or part of the marine work until no exceedance of Limit Level.</li> </ol>	<ol style="list-style-type: none"> <li>1. Inform the ER and confirm notification of the non-compliance in writing;</li> <li>2. Rectify unacceptable practice;</li> <li>3. Check all plant and equipment;</li> <li>4. Consider changes of working methods;</li> <li>5. Discuss with ET and IC(E) and ER and propose mitigation measures to IC(E) and ER within 3 working days;</li> <li>6. Implement the agreed mitigation measures; and</li> <li>7. As directed by the Engineer, to slow down or to stop all or part of the marine work or construction activities.</li> </ol>

# **SECTION 5**

# **GROUNDWATER MONITORING**

## 5. GROUNDWATER MONITORING

### 5.1 Introduction

5.1.1 Site investigations have been conducted to identify the ground condition in Chi Ma Wan Peninsula along the proposed cable alignment. The investigation revealed that the proposed tunnelling will have negligible effect on the water catchment and is unlikely to cause any significant drawn down of the groundwater profile. However, as a preventative measure, mitigation requirements have been specified in the EIA and EP.

### 5.2 Mitigation Measures

5.2.1 The groundwater mitigation measures are provided in Table 5.1.

**Table 5.1 Groundwater Mitigation Measures During Tunnelling**

Item No.	Mitigation Measure
EIA EP2.6 S3.5.1	In case any substantial and abnormal changes in the ground water table are observed from the monitoring point as a result of groundwater inflow into the proposed cable tunnel, mitigation measures as outlined below are recommended to prevent further groundwater loss.
EP2.6	<ul style="list-style-type: none"><li>• Three sets of groundwater monitoring plan including monitoring points, action levels for implementing mitigation measures shall be submitted to the Director before the commencement of construction of the Project. The mitigation measures shall be implemented if the ground level dropped to the action levels defined. The mitigation measures shall include:<ul style="list-style-type: none"><li>- Traditional pre-injection systems using cement grout will be applied in the identified fault intersection zone to reduce the water inflow, if necessary; and</li><li>- Apply 2mm thick typical high performance PVC waterproof membrane and geotextile fleece mats as suggested in the tunnel preliminary design report to ensure watertightness of the tunnel.</li></ul></li></ul>
EP2.7	<ul style="list-style-type: none"><li>• The Permit Holder shall submit to Director at least one month before the commencement of the works for approval the method statements for the mitigation measures as described in Conditions 2.6 a) and b) for prevention of groundwater loss.</li></ul>

5.2.2 Contractor is required to submit a layout plan showing the proposed locations groundwater monitoring points to the satisfaction of DEP; and is also required to submit method statements for the proposed mitigation measures to prevent further ground water inflow into the proposed cable tunnel. Once these measures have been agreed, they will be incorporated into this EM&A Manual.

# **SECTION 6**

# **ECOLOGY**

## 6. ECOLOGY

### 6.1 Introduction

6.1.1 The proposed 132 kV circuits will mainly be located on existing road/footpaths. The impacts due to the construction of the underground cable were predicted to be minor in the EIA, and no adverse residual impact is expected. The largest loss of direct habitat (0.12 ha of tall shrubland) would occur within the South Lantau Country Park. The EIA found that no unacceptable residual impact would result from this loss with the implementation of mitigation measures. Field verification of the Contractor's implementation of mitigation measures is required.

6.1.2 Constraints on controlling impacts to water quality to within acceptable levels during construction are expected to also control impacts on marine ecology. No unacceptable impacts are expected to occur during the operation phase of the Project. Hence, monitoring and auditing of marine ecological resources during the construction and operation of the Project is deemed not necessary.

### 6.2 Mitigation Measures

6.2.1 The mitigation measures provided in the EIA and EP are provided in Table 6.1. The Contractor shall be responsible for the design and implementation of these measures.

**Table 6.1 Terrestrial Ecology Mitigation Measures (During Land Based Construction)**

Reference	Mitigation Measure
EIA-S.6.3.5	The following mitigation measures to minimise disturbance due to the project are recommended below.
	<ul style="list-style-type: none"> <li>Prevent stream sedimentation during construction, particularly tunnel construction, by erection of sediment barriers and operation of stilling ponds in streams which could be potentially affected.</li> </ul>
	<ul style="list-style-type: none"> <li>Erect fences along the boundary of construction sites before the commencement of works to prevent tipping, vehicle movements, and encroachment of personnel into adjacent areas, particularly streams S1 to S4 (see EIA), forest beside the Pui O portal, Pui O Marsh and Pui O Taro Bed.</li> </ul>
	<ul style="list-style-type: none"> <li>Regularly check the work site boundaries to ensure that they are not exceeded and that no damage occurs to surrounding areas.</li> </ul>
	<ul style="list-style-type: none"> <li>Treat any damage that may occur to individual major trees in the adjacent area with surgery.</li> </ul>
	<ul style="list-style-type: none"> <li>Reinstate temporary work sites/disturbed areas immediately after completion of the construction by on-site tree/shrub planting. Tree/shrub species used should take reference from those in the surrounding area.</li> </ul>
	<ul style="list-style-type: none"> <li>Prohibit and prevent open fires within the site boundary during construction and provide temporary fire fighting equipment in the work areas, particularly close to forest areas.</li> </ul>



### **6.3 Environmental Monitoring & Audit**

- 6.3.1 The implementation of the terrestrial ecological mitigation shall be checked regularly (a minimum of twice per month) at ecologically sensitive locations as part of the environmental monitoring and audit field investigation procedures during the construction period and the implementation of compensatory planting and reinstatement of the site after construction works. The field investigations should be undertaken during tunnelling works; and during works undertaken in the non urban areas of Pui O.

# **SECTION 7**

# **CULTURAL HERITAGE**

## 7. CULTURAL HERITAGE

### 7.1 Introduction

7.1.1 Cultural heritage resources in the Project area include the Pui O Tin Hau Temple, potential archaeological deposits at Bui O Public School (Site A) and inner raised each at Pui O (Site B).

### 7.2 Recommended Mitigation Measures

7.2.1 The proposed development has tried to avoid potential impacts to cultural heritage in the Project area and mitigation measures have been recommended in the EIA and EP to avoid impacts to cultural heritage resources and to control of the construction work schedule during peak visiting hour at Pui O Tin Hau Temple as provided in Table 7.1. The Contractor shall be responsible for the design and implementation of these measures.

**Table 7.1 Cultural Heritage Mitigation Measures**

Reference	Mitigation Measure
EIA-S.7.6	<ul style="list-style-type: none"> <li>The indirect air and noise impact on Pui O Tin Hau Temple will require consultation with villagers to identify peak visiting periods to the temple, such as festival days, to avoid construction works to be undertaken at those times.</li> </ul>
EIA-S.7.6	<ul style="list-style-type: none"> <li>In order to avoid reaching the core area of the sandbar at Pui O Public School area (Site A), it is recommended to keep the circuit alignment as east as possible at the margin of the sandbar near the junction between South Lantau Road and Chi Ma Wan Road to minimise the direct impact. It is also recommended that the trench to be dug out to lay the cable should follow the existing road and does not penetrate into the 'no-dig' zone as defined by AMO to avoid reaching the original ground surface which may contain the cultural remains from the lime kilns.</li> </ul>
EIA-S.7.6	<ul style="list-style-type: none"> <li>With regard to the direct impact on the inner raised beach at Pui O (Site B), it is recommended that the detail design of the underground cable construction should not allow any disturbance of the Tang dynasty layer (4.38 - 4.9 mPD), which is 1.5 m from existing ground level (6.2 - 6.9 mPD) within this section.</li> </ul>
EIA-S.7.6	<ul style="list-style-type: none"> <li>The future levels of the proposed Chi Ma Wan Road widening implemented by Highways department need to be carefully designed to allow for the minimum 1000 mm cover for the cables, which shall be laid above the Tang dynasty layer or the 'no dig' zone as defined by AMO. If the cover requirement cannot be achieved, approval from Highway Department should be sought in advance for allowing the cables to be laid in a shallow depth with additional protection such as concrete surround to protect the cables.</li> </ul>
EP-2.17	<ul style="list-style-type: none"> <li>The Permit Holder shall not disturb the layer below 1 m from existing ground level at the shaded area in Figure 6 of the EP unless otherwise approved by the Director.</li> </ul>

### 7.3 Environmental Monitoring & Audit

7.3.1 The recommended mitigation measure of avoiding the cultural layer in sites A and B is expected to prevent damage to the existing archaeological deposits.

# **SECTION 8**

# **LANDSCAPE AND VISUAL IMPACTS**

## **8. LANDSCAPE AND VISUAL IMPACTS**

### **8.1 Introduction**

8.1.1 The level of significance of the landscape and visual impacts of the project has been classified in accordance with *Annex 10* of the EIA-TM. Based on the criteria in *Annex 10*, the landscape and visual impacts are considered acceptable for the following reasons:

- The change to the baseline condition will be negligible except Section 2, 4 & 5 of the EIA report;
- In some locations, Cheung Chau Sai Tai Road (Section 5 of the EIA report), the proposed alignment can be sited so as to avoid disturbances to the existing tree along the promenade.
- Landscape and visual impacts are considered to be significance during construction only in Section 1 and 6, significant impacts persist in Section 2, 4 & 5 of the EIA report where permanent structures will be built. However all potentially high landscape impacts can be reduced or offset to a large extent by landscape mitigation measures as indicated in Tables 8-5 and 8-6 of the EIA report.
- As the direction of tunnel drilling will commence from Tai Long Wan to Pui O, the extent and duration of construction activities undertaken at the Pui O tunnel portal will be significantly reduced. Further, visual screening of the Pui O platform will be included in the design to reduce the visual impacts to sensitive receivers

8.1.2 The alignment of the circuit is significantly constrained by the technical engineering requirements. However, the nature of the proposed works means that most of alignment can be constructed with minimal disturbance to the existing landscape owing the limited working boundary along existing roads, footpaths. The EIA found that the proposed works would have only limited adverse impacts or negligible impacts on baseline condition, which could be mitigated.

### **8.2 Mitigation Measures**

8.2.1 Landscape mitigations proposed in the EIA and EP are as shown in Table 8.1.

**Table 8.1 Landscape Mitigation Measures**

Reference	Mitigation Measure
<b>Baseline Condition / Records:</b>	
EP2.16	<ul style="list-style-type: none"> <li>The Permit Holder shall deposit with the Director 3 sets of records by photographs and video of existing conditions of the affected area at Pui O and Tai Long Wan Tunnel Portals at least 4 weeks before the commencement of the construction works on site. The records shall include the existing conditions of the re-creation of natural and rocky shoreline, footpath and vegetation. The works areas at Pui O and Tai Long Wan Tunnel Portal should be reinstated to their existing condition before completion of the construction works.</li> </ul>
<b>Landscape Proposal:</b>	
EP2.4	<ul style="list-style-type: none"> <li>The Permit Holder shall deposit with the Director 3 sets of landscape proposal, including a tree, orchids preservation plan indicating the location of trees and orchids to be preserved and transplanted, for the Project during construction and operation stages with explanatory statement, design drawings and layout plans of the scale 1 to 1000 or other scale as agreed by the Director. The submission shall include an implementation programme for the landscaped areas, with clear identification of the responsibility for funding, implementation, management and maintenance of the landscaped areas. The submission shall be verified by the IEC as conforming to the information and recommendations contained in the EIA report (No. AEIAR-051/2001), the Application (No. AEP-126/2002) and the EM&amp;A Manual. The Permit Holder shall make available additional copies to the Director upon his request.</li> </ul>
<b>Landscape Mitigation Measure (During Construction )</b>	
EIA S.8.8.1	<ul style="list-style-type: none"> <li>The construction programme for the Project should be reduced to the shortest possible period and should be executed in phases, particularly in those locations where severe or high landscape and visual impacts are expected such as Pui O tunnel portal. Additionally, the extent and periphery of the works areas should be managed so that they are as small as possible and do not appear cluttered, untidy and unattractive, particularly to pedestrians and people undertaking recreation activities in the Country Parks, beach and Cheung Chau Promenade. Temporary hoarding barriers should be of a recessive visual appearance in both colour and form. Measures should be implemented during construction to store materials in areas with the least obstruction to residents, pedestrians and traffic and cover all material stockpiles with impermeable material and sandbagging diversions around exposed soil. The temporary working platform area at the Pui O portal is required for stockpiles from construction of the tunnel portal.</li> </ul>
EP-2.15	<ul style="list-style-type: none"> <li>The Permit Holder shall use visually non-obstructive security fencing for the Pui O, Tai Long Wan Tunnel Portal and landfall area during the operation phase to minimize the visual impact of the portal building.</li> </ul>
EP- 2.13	<ul style="list-style-type: none"> <li>The Permit Holder shall, unless otherwise approved by the Director, provide the temporary hoarding barriers not less than 2 m high and in subdued colour at the Pui O Tunnel Portal as shown in figure 4 of the EP during the entire construction period.</li> </ul>
<b>Landscape Mitigation Measure 2 - Advanced Transplantation and Planting Works (During and After Construction)</b>	
EIA-S8.8.2	<ul style="list-style-type: none"> <li>Where possible, the transplantation of existing valuable trees affected by the proposed works and new compensatory planting works; should be carried out as early as possible in the construction period instead of at the end. This will allow the maximum time for maintenance, resulting in a higher success rate for the survival of transplanted trees and the early establishment of new screen trees and compensatory planting.</li> </ul>

Reference	Mitigation Measure
EP2.14	<p><b>Orchid Transplantation:</b></p> <ul style="list-style-type: none"> <li>Three sets of detailed transplantation proposal for the protected orchids <i>Aphyllorchis montana</i> and <i>Cleisostoma simondii</i> found at Pui O Tunnel Portal as shown in figure 5 (attached to the EP) shall be submitted to the Director before the commencement of construction for approval. The proposal shall contain details on the locations of the orchids, transplantation schedule and method, locations of the suitable receptor sites, and arrangement for post-transplantation monitoring. The transplantation shall be conducted by a qualified plant biologist with at least 3 years of relevant experience. A 1-year post-transplantation monitoring shall also be conducted. No works in the area concerned should commence before the orchids are transplanted. The Permit Holder shall fully and properly implement the approved transplantation proposal.</li> </ul>
EIA-S8.8.2	<ul style="list-style-type: none"> <li>The protected orchid species, <i>Aphyllorchis montana</i> which was found in the area of the Pui O Tunnel Portal (Section2a) should be temporarily moved to a new location on site and carefully monitored and maintained. Following completion of the construction works they should be reinstated in a condition and suitable location as near as possible to the original habitat.</li> </ul>
EIA-S8.8.2; EP 2.11	<ul style="list-style-type: none"> <li>In compensation for the disturbance, a planting reinstatement scheme will be implemented. It will comprise replanting 750m<sup>2</sup> of the Pui O tunnel portal area and 700 m<sup>2</sup> of the Tai Long Wan landfall area with similar tree species to those found in the existing environs, on a minimum 1 to 1 basis, a matrix of nursery stock seedlings and transplants are proposed at a rate of 1/m<sup>2</sup>. A 24-month maintenance (i.e. defects liability) period will also be needed to ensure transplantation in successful.</li> </ul>
<b>Landscape Mitigation Measure 3 - Colour Finishes of Ancillary Elements (During Design)</b>	
EIA-S8.8.3	<ul style="list-style-type: none"> <li>The design of the tunnel portal, and landfall areas should incorporate materials, details and textures so as to be as visually recessive as possible and in a style that fits with the surrounding rural setting. Colour should be of low chromatic intensity to reduce the potential contrast between the structures and their background. External finishing of the tunnel portal and landfall area will be designed in conjunction with the landscape scheme. Considering these two elements in tandem will integrate and improve the visual mitigation of the overall proposed works. Where possible the use of visually permeable security fencing is recommended. This type of fencing will help to reduce the level of visual impact of the portal building by maximising the ground width available for planting. Grass-Crete planter incorporated onto the roof of the portal.</li> </ul>
<b>Landscape Mitigation Measure 4 (LMM4) Reinstatement of Planting and Shoreline (After Construction)</b>	
EIA-S8.8.4	<ul style="list-style-type: none"> <li>The works areas at both Pui O and Tai Long Wan Tunnel portals should be restored to their previous condition, including the re-creation of natural and rocky shoreline, footpath and re-establishment of disturbed vegetation. Topsoil dredged out during construction of the tunnel will be used in restatement of the disturbed coastline. Where mature trees are felled that are considered high in environmental amenity, a replacement semi-mature tree should be planted. Existing trees cleared by construction activity should be replaced so that there is a net gain in tree numbers after the project is completed.</li> </ul>

### 8.3 Environmental Monitoring & Audit

8.3.1 With the implementation of landscape mitigation measures full compliance with the environmental criteria is expected to be achieved. Regular field inspection of the implementation of landscape measures shall be undertaken by the ET on a twice a month basis in the required areas.

# **SECTION 9**

# **WASTE MANAGEMENT**



## 9. WASTE MANAGEMENT

### 9.1 Introduction

- 9.1.1 The Contractor is responsible for waste control within the construction site, removal of waste material produced by the site and the implementation of any mitigation measures to minimise waste or redress problems arising from site waste. The waste material may include site clearance waste, excavated materials, construction and demolition (C&D) waste, chemical waste and general refuse.
- 9.1.2 The proposed re-use, recycling, storage, collection, transport and disposal methods for various wastes which are recommended to avoid or minimise potential adverse impacts are detailed below. Specifically, it is recommended that during the construction phase, the Contractor incorporate the recommendations into an on-site waste management plan.
- 9.1.3 The Contractor shall also pay attention to the Waste Disposal Ordinance and its subsidiary regulations, the Public Health and Municipal Services Ordinance and the Water Pollution Control Ordinance, and carry out the appropriate waste management work. The relevant license/permit, such as the effluent discharge license, the chemical waste producer registration, etc. shall be obtained. The Contractor shall refer to the relevant booklets issued by EPD when applying for the license/permit.
- 9.1.4 During the site inspections and the document review procedures, the ET Leader shall pay special attention to the issues relating to waste management, and check whether the Contractor has followed the relevant contract specifications and the procedures specified under the laws of Hong Kong.

### 9.2 Waste Mitigation Measures

- 9.2.1 A summary of the proposed mitigation measures and proposed disposal options are presented in Table 9.1.

**Table 9.1 Waste Management Mitigation Measures**

Reference	Mitigation Measure
EIA S9.5	<b>General Requirements</b>
	The following general requirements shall be implemented:
	<ul style="list-style-type: none"> <li>maximising the opportunity for re-use of excavated materials for example, forming the temporary working platform;</li> </ul>
	<ul style="list-style-type: none"> <li>Provide treatments for converting unsuitable excavated materials for use in other purpose e.g. upgrading of subsoil to topsoil by mixing with compost;</li> </ul>
	<ul style="list-style-type: none"> <li>providing an area within the construction site to allow for sorting and segregation of materials.</li> </ul>
	<ul style="list-style-type: none"> <li>minimisation of waste generation for disposal (via reduction/recycling/re-use);</li> </ul>
	<ul style="list-style-type: none"> <li>segregating waste materials according to type to facilitate re-use and recycling;</li> </ul>
	<ul style="list-style-type: none"> <li>separation of inert construction and demolition materials for either re-use on-site or use as public fill;</li> </ul>
	<ul style="list-style-type: none"> <li>during demolition works, segregating materials at source as far as practical;</li> </ul>
	<ul style="list-style-type: none"> <li>co-ordinate material deliveries to site in order to minimise storage times on site and the likelihood of causing damage;</li> </ul>
	<ul style="list-style-type: none"> <li>training site staff in waste minimisation practices;</li> </ul>

	<ul style="list-style-type: none"> <li>• transport of wastes off site as soon as possible;</li> </ul>
	<ul style="list-style-type: none"> <li>• maintenance of comprehensive accurate waste records;</li> </ul>
	<ul style="list-style-type: none"> <li>• use of re-useable metal hoardings / signboards;</li> </ul>
	<ul style="list-style-type: none"> <li>• no on-site burning will be permitted;</li> </ul>
	<ul style="list-style-type: none"> <li>• follow the practice set out in WBTC No.5/99 "Trip-ticket System for Disposal of construction and Demolition Material".</li> </ul>
<b>Cleared vegetation from site clearance</b>	
EIA-S9.5	The following measures shall be implemented:
	<ul style="list-style-type: none"> <li>• segregation of materials to facilitate disposal;</li> </ul>
	<ul style="list-style-type: none"> <li>• segregation of excavated topsoil from roots and re-use for the landscaping works to minimise the volume of waste requiring off-site disposal.</li> </ul>
<b>Demolition Waste</b>	
EIA-S9.5	The following measures shall be implemented:
	<ul style="list-style-type: none"> <li>• segregation of materials to facilitate disposal;</li> </ul>
	<ul style="list-style-type: none"> <li>• appropriate stockpile management;</li> </ul>
	<ul style="list-style-type: none"> <li>• follow the practice set out in WBTC No.5/98 "On site Sorting of Construction Waste on Demolition Sites".</li> </ul>
<b>Excavated Materials</b>	
EIA-S9.5	The following measures shall be implemented:
	<ul style="list-style-type: none"> <li>• segregation of materials to facilitate disposal / reuse;</li> </ul>
	<ul style="list-style-type: none"> <li>• appropriate stockpile management;</li> </ul>
	<ul style="list-style-type: none"> <li>• re-use of excavated material on or off site (where possible);</li> </ul>
	<ul style="list-style-type: none"> <li>• special handling and disposal procedures in the event that contaminated materials are excavated;</li> </ul>
	<ul style="list-style-type: none"> <li>• follow the practice set out in WBTC No.5/99 "Trip-ticket System for Disposal of construction and Demolition Material".</li> </ul>
<b>Construction waste</b>	
EIA-S9.5	The following mitigation measures shall be implemented:
	<ul style="list-style-type: none"> <li>• segregation of materials to facilitate recycling/reuse (within designated area and in appropriate containers/stockpiles);</li> </ul>
	<ul style="list-style-type: none"> <li>• appropriate stockpile management;</li> </ul>
	<ul style="list-style-type: none"> <li>• planning and design considerations to reduce over ordering and waste generation;</li> </ul>
	<ul style="list-style-type: none"> <li>• recycling and re-use of materials where possible (e.g. metal, wood from hoardings, formwork);</li> </ul>
	<ul style="list-style-type: none"> <li>• for material which cannot be re-used/recycled, collection should be carried out by an approved waste contractor for landfill disposal;</li> </ul>
	<ul style="list-style-type: none"> <li>• follow the practice set out in WBTC No.5/98 "On site Sorting of Construction Waste on Demolition Sites".</li> </ul>
<b>Chemical Waste</b>	
EIA-S9.5	The following mitigation measures shall be implemented:
	<ul style="list-style-type: none"> <li>• storage within locked, covered and bunded area;</li> </ul>
	<ul style="list-style-type: none"> <li>• the storage area should <i>not</i> be located adjacent to sensitive receivers e.g. drains;</li> </ul>
	<ul style="list-style-type: none"> <li>• minimise waste production and recycle oils/solvents where possible;</li> </ul>
	<ul style="list-style-type: none"> <li>• a spill response procedure should be in place and absorption material available for minor spillages;</li> </ul>
	<ul style="list-style-type: none"> <li>• use appropriate and labelled containers;</li> </ul>
	<ul style="list-style-type: none"> <li>• educate site workers on site cleanliness/waste management procedures;</li> </ul>
	<ul style="list-style-type: none"> <li>• if chemical wastes are to be generated, the contractor must register with EPD as a chemical waste producer;</li> </ul>
	<ul style="list-style-type: none"> <li>• collection by a licensed chemical waste collector.</li> </ul>
<b>Municipal Waste</b>	
EIA-S9.5	The following mitigation measures shall be implemented:
	<ul style="list-style-type: none"> <li>• waste should be stored within a temporary refuse collection facility, in appropriate containers prior to collection and disposal;</li> </ul>
	<ul style="list-style-type: none"> <li>• regular, daily collections are required by an approved waste collector;</li> </ul>
	<ul style="list-style-type: none"> <li>• provide sanitary facilities.</li> </ul>

	<ul style="list-style-type: none"><li>• waste should be stored within a temporary refuse collection facility, in appropriate containers prior to collection and disposal</li></ul>
	<ul style="list-style-type: none"><li>• regular, daily collections are required by an approved waste collector</li></ul>
<b>Operational Waste</b>	
EIA-S9.5	The following measures shall be implemented:
	<ul style="list-style-type: none"><li>• wastes should be stored within a designated storage area;</li></ul>
	<ul style="list-style-type: none"><li>• waste such as material wrapping should be segregated into recyclable, non recyclable and putrescible wastes, where possible to facilitate disposal.</li></ul>

### 9.3 Environmental Monitoring & Audit

- 9.3.1 It has been recommended that auditing of each waste stream should be carried out periodically by the Contractor to determine if wastes are being managed in accordance with approved procedures and the site waste management plan (a minimum of twice per month). The audits should look at all aspects of waste management including waste generation, storage, recycling, treatment, transport, and disposal. The first audit shall be undertaken at the commencement of the construction works, and quarterly audits should be undertaken thereafter.

# **SECTION 10**

## **SITE ENVIRONMENTAL AUDIT**

## **10. SITE ENVIRONMENTAL AUDIT**

### **10.1 Site Inspections**

- 10.1.1 Site Inspections provide a direct means to trigger and enforce the specified environmental protection and pollution control measures. They shall be undertaken routinely by the ET Leader to inspect the construction activities in order to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented.
- 10.1.2 The ET Leader is responsible for formulation of the environmental site inspection, deficiency and action reporting system, and for carrying out the site inspection works. The ET Leader shall submit a proposal on the site inspection, deficiency and action reporting procedures within 21 days of the construction contract commencement to the Contractor for agreement and to the ER for approval.
- 10.1.3 Regular site inspections shall be carried out a minimum of twice per month. The areas of inspection shall be focused on those that have been identified in each section of this report and may also include the environment outside the site area that could be affected, directly or indirectly, by the site activities. The ET Leader shall make reference to the following information in conducting the inspection:
- a) the EIA recommendations on environmental protection and pollution control mitigation measures;
  - b) works progress and programme;
  - c) individual works methodology proposals (which shall include proposal on associated pollution control measures);
  - d) the contract specifications on environmental protection;
  - e) the relevant environmental protection and pollution control laws; and
  - f) previous site inspection results.
- 10.1.4 The Contractor shall update the ET Leader with all relevant information of the construction contract for the ET Leader to carry out the site inspections. The inspection results and its associated recommendations on improvements to the environmental protection and pollution control works shall be submitted to the IC(E) and the Contractor within 24 hours, for reference and for taking immediate action. The Contractor shall follow the procedures and time-frame as stipulated in the environmental site inspection, deficiency and action reporting system formulated by the ET Leader to report on any remedial measures subsequent to the site inspections.
- 10.1.5 Ad hoc site inspections shall also be carried out if significant environmental problems are identified. Inspections may also be required subsequent to receipt of an environmental complaint, or as part of the investigation work, as specified in the Action Plan for environmental monitoring and audit.

## **10.2 Site Log Book**

- 10.2.1 The ET Leader shall keep a contemporaneous log-book of each and every circumstance or change of circumstances which may affect the environmental impact assessment and each and every non-compliance with the recommendations of the EIA Report or this Permit. The log-book shall be kept readily available for inspection by all persons assisting in supervision of the implementation of the recommendations of the EIA Report and the EP. The IEC shall verify the log-book and the EIA Report or the EP.

## **10.3 Compliance with Legal and Contractual Requirements**

- 10.3.1 There are contractual environmental protection and pollution control requirements as well as environmental protection and pollution control laws in Hong Kong which the construction activities shall comply with.
- 10.3.2 All the works method statements submitted by the Contractor to the ER for approval shall also be sent to the ET Leader for vetting to see whether sufficient environmental protection and pollution control measures have been included.
- 10.3.3 The ET Leader shall also review the progress and programme of the works to check that relevant environmental laws have not been violated, and that any foreseeable potential for violating the laws can be prevented.
- 10.3.4 The Contractor shall regularly copy relevant documents to the ET Leader so that the checking work can be carried out. The document shall at least include the updated Work Progress Reports, the updated Works Programme, the application letters for different license/permits under the environmental protection laws, and all the valid license/permit. The site diary shall also be available for the ET Leader's inspection upon his/her request.
- 10.3.5 After reviewing the document, the ET Leader shall advise the ER and the Contractor of any non-compliance with the contractual and legislative requirements on environmental protection and pollution control for them to take follow-up actions. If the ET Leader's review concludes that the current status on license/permit application and any environmental protection and pollution control preparation works may not cope with the works programme or may result in potential violation of environmental protection and pollution control requirements by the works in due course, he/she shall advise the Contractor and the ER accordingly.
- 10.3.6 Upon receipt of the advice, the Contractor shall undertake immediate action to remedy the situation. The ER shall follow up to ensure that appropriate action has been taken by the Contractor in order that the environmental protection and pollution control requirements are fulfilled.

## **10.4 Environmental Complaints**

- 10.4.1 Complaints shall be referred to the ET Leader for carrying out complaint investigation procedures. The ET Leader shall undertake the following procedures upon receipt of complaint:

- a) log complaint and date of receipt onto the complaint database and inform the IC(E) immediately;
- b) investigate the complaint to determine its validity, and to assess whether the source of the problem is due to works activities;
- c) if a complaint is valid and due to works, identify mitigation measures;
- d) if mitigation measures are required, advise the Contractor accordingly;
- e) review the Contractor's response on the identified mitigation measures, and the updated situation;
- f) if the complaint is transferred from EPD, submit interim report to EPD on status of the complaint investigation and follow-up action within the time frame assigned by EPD;
- g) undertake additional monitoring and audit to verify the situation if necessary, and review that any valid reason for complaint does not recur;
- h) report the investigation results and the subsequent actions to the source of complaint for responding to complainant (If the source of complaint is EPD, the results shall be reported within the time frame assigned by EPD); and
- i) record the complaint, investigation, the subsequent actions and the results in the monthly EM&A reports.

10.4.2 During the complaint investigation work, the Contractor and ER shall cooperate with the ET Leader in providing all the necessary information and assistance for completion of the investigation. If mitigation measures are identified in the investigation, the Contractor shall promptly carry out the mitigation. The ER shall ensure that the measures have been carried out by the Contractor. A copy of compliant log is shown in Annex D.

10.4.3 A flow chart of the complaint response procedures is shown in Figure 10.1.

# **SECTION 11**

# **REPORTING**



## **11. REPORTING**

### **11.1 Baseline Monitoring Report**

11.1.1 The ET Leader shall prepare and submit a Baseline Environmental Monitoring Report within 10 working days of completion of the baseline monitoring. Copies of the Baseline Environmental Monitoring Report shall be submitted to all parties; the Contractor, the IC(E), the ER and the EPD. The format and content of the report, and the representation of the baseline monitoring data shall be in a format to the satisfaction of EPD and include, but not be limited to the following:

- a) up to half a page executive summary;
- b) brief project background information;
- c) drawings showing locations of the baseline monitoring stations;
- d) monitoring results (in both hard and diskette copies) together with the following information:
  - monitoring methodology;
  - name of laboratory and types of equipment used and calibration details;
  - parameters monitored;
  - monitoring locations (and depth);
  - monitoring date, time, frequency and duration;
  - QA/QC results and detection limits;
- e) details on influencing factors, including
  - major activities, if any, being carried out on the site during the period;
  - weather conditions during the period;
  - other factors which might affect the results.
- f) determination of the AL Levels for each monitoring parameter and statistical analysis of the baseline data; the analysis shall conclude if there is any significant difference between control and impact stations for the parameters monitored, and the following information shall be recorded:
  - graphical plots of monitored parameters in the month annotated against;
  - the major activities being carried out on site during the period;
- g) revisions for inclusion in the EM&A Manual; and
- h) comments and conclusions.

### **11.2 EM&A Reports**

11.2.1 The results and findings of all EM&A work required in the Manual shall be recorded in the monthly EM&A reports prepared by the ET Leader. The EM&A report shall be prepared, endorsed by IC(E) and submitted within 10 working days of the end of each reporting month, with the first report due in the month after construction commences.

11.2.2 Before submission of the first EM&A report, the ET Leader shall liaise with the parties on the exact number of copies and format of the monthly reports in both hard copy and electronic medium requirement.

11.2.3 The ET Leader shall review the number and location of monitoring stations and parameters to monitor every 6 months or on as needed basis in order to cater for the changes in surrounding environment and nature of works in progress.

***First Monthly EM&A Report***

11.2.4 The First Monthly EM&A Report shall include at least the following :

(a) 1-2 pages executive summary;

- Breaches of AL levels;
- Complaints Log;
- Notifications of any summons and successful prosecutions;
- Reporting Changes;
- Future key issues.

(b) Basic Project Information

- Project organisations including key personnel contact names and telephone numbers;
- Programme
- Management structure; and
- Works undertaken during the month;

(c) Environmental Status

- Work undertaken during the month with illustrations (such as location of works daily dredging/filling rates percentage fines in the fill material used);and
- Drawing showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations.

(d) Summary of EM&A requirements

- All monitoring parameters;
- AL Levels;
- Event-Action Plans;
- Environmental mitigation measures, as recommended in the project EIA Report;
- Environmental requirements in contract documents;

(e) Implementation Status

Advice on the implementation status of environmental protection and pollution control/mitigation measures, as recommended in the project EIA Report, summarised in the implementation schedule;

(f) Monitoring Results

To provide monitoring results (in both hard and diskette copies) together with the following information:

- Monitoring methodology
- Name of laboratory and types of equipment used and calibration details
- Parameters monitored

- Monitoring locations (and depth)
  - Monitoring date, time, frequency, and duration;
  - Weather conditions during the period; and
  - Any other factors which might affect the monitoring results;
  - QA/QC results and detection limits
- (g) Report on Non-compliance, Complaints, Notifications of Summons and Successful Prosecutions
- Record of all noncompliance (exceedances) of the environmental quality performance limits (AL Levels);
  - Record of all complaints received (written or verbal) for each media, including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
  - Record of all notifications of summons and successful prosecutions for breaches of the current environmental protection/pollution control legislations, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;
  - Review of the reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures; and
  - Description of the actions taken in the event of noncompliance and deficiency reporting and any follow-up procedures related to earlier noncompliance;
- (h) Others
- An account of the future key issues as reviewed from the works programme and work method statements; and
  - Advice on the solid and liquid waste management status.

### ***Subsequent Monthly EM&A Reports***

11.2.5 The subsequent Monthly EM&A Reports shall include the following :

- (a) Executive Summary (1-2 pages)
- Breaches of AL levels
  - Complaint Log
  - Notifications of any summons and successful prosecutions;
  - Future key issues
- (b) Environmental Status
- Works undertaken during the month with illustrations including key personnel contact names and telephone number; and
  - Drawing showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations
- (c) Implementation Status
- Advice on the implementation status of environmental protection and pollution control/mitigation measures including measures for ecological, landscape and visual impacts, as recommended in the EIA Report, summarised in the updated implementation schedule (see *Annex A*).
- (d) Monitoring Results

To provide monitoring results (in both hard and diskette copies) together with the following information:

- Monitoring methodology
- Name of laboratory and types of equipment used and calibration details
- Parameters monitored
- Monitoring locations (and depth);
- Monitoring date, time, frequency, and duration;
- Weather conditions during the period; and
- Any other factors which might affect the monitoring results;
- QA/QC results and detection limits

(e) Report on Non-compliance, Complaints, Notifications of Summons and Successful Prosecutions

- Record of all noncompliance (exceedances) of the environmental quality performance limits (AL Levels);
- Record of all complaints received (written or verbal) for each media, including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
- Record of all notifications of summons and successful prosecutions for breaches of the current environmental protection/pollution control legislations, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;
- Review of the reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures; and
- a description of the actions taken in the event of noncompliance and deficiency reporting and any follow-up procedures related to earlier noncompliance;

(f) Others

- An account of the future key issues as reviewed from the works programme and work method statements; and
- Advice on the solid and liquid waste management status.

(g) Appendix

- AL levels
- Graphical plots of trends of monitored parameters at key stations over the past four reporting periods for representative monitoring stations annotated against the following:
  - i) major activities being carried out on site during the period;
  - ii) weather conditions during the period; and
  - iii) any other factors which might affect the monitoring results
- Monitoring schedule for the present and next reporting period
- Cumulative statistics on complaints, notifications of summons and successful prosecutions
- Outstanding issues and deficiencies

### **Quarterly EM&A Summary Reports**

- 11.2.6 The Quarterly EM&A Summary Report which shall generally be around 5 pages (including about 3 of text and tables and 2 of figures) shall contain at least the following information.
- a) up to half a page executive summary;
  - b) basic project information including a synopsis of the project organisation, programme, contacts of key management, and a synopsis of work undertaken during the quarter;
  - c) a brief summary of EM&A requirements including:
    - monitoring parameters;
    - environmental quality performance limits (AL Levels); and
    - environmental mitigation measures, as recommended in the EIA Report;
  - d) advice on the implementation status of environmental protection and pollution control/mitigation measures, as recommended in the project EIA study report, summarised in the updated implementation schedule;
  - e) drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;
  - f) graphical plots of the trends of monitored parameters over the past 4 months (the last month of the previous quarter and the present quarter) for representative monitoring stations annotated against:
    - the major activities being carried out on site during the period;
    - weather conditions during the period; and
    - any other factors which might affect the monitoring results;
  - g) a quarterly assessment of construction impacts on suspended solids at the project site as appropriate during the Tai Long Wan Platform construction and decommissioning, including, but not limited to, a comparison of the difference between the quarterly mean and 1.3 times of the ambient mean, which is defined as 30% increase of the baseline data or EPD data, of the related parameters by using appropriate statistical procedures along with recommended mitigation measures, as appropriate;
  - h) advice on the solid and liquid waste management status;
  - i) a summary of noncompliance (exceedances) of the environmental quality performance limits (AL Levels);
  - j) a brief review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures;
  - k) a summary description of the actions taken in the event of non-compliance and any follow-up procedures related to earlier non-compliance;
  - l) a summary record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up

procedures taken;

- m) comments (e.g. effectiveness and efficiency of the mitigation measures), recommendations (e.g. any improvement in the EM&A programme) and conclusions for the quarter; and
- n) proponents' contacts and any hotline telephone number for the public to make enquiries.

### ***Annual/Final EM&A Review Reports***

11.2.7 The Annual/Final EM&A Report shall contain at least the following information:

- a) Executive Summary (1-2 pages);
- b) drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;
- c) basic project information including a synopsis of the project organization contacts of key management, and a synopsis of work undertaken during the course of the project or past twelve months;
- d) a brief summary of EM&A requirements including:
  - (i) environmental mitigation measures, as recommended in the project EIA Report;
  - (ii) environmental impact hypotheses tested;
  - (iii) AL Levels;
  - (iv) all monitoring parameters
  - (v) Event-Action Plans;
- e) a summary of the implementation status of environmental protection and pollution control/mitigation measures as recommended in the project EIA study report summarized in the updated implementation schedule;
- f) graphical plots and the statistical analysis of the trends of monitored parameters over the course of the project, including the post project monitoring (for the past twelve months for annual report) for all monitoring stations against:
  - the major activities being carried out on site during the period;
  - weather conditions during the period; and
  - any other factors which might affect the monitoring results
- g) a summary of noncompliance (exceedances) of the environmental quality performance limits (AL Levels);
- h) a review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures as appropriate;
- i) a description of the actions taken in the event of non-compliance;
- j) a summary record of all complaints received (written or verbal) for each media liaison and consultation undertaken, action and follow-up

procedures taken;

- k) a summary record of notifications of summons and successful prosecutions for breaches of the current environmental protection pollution control legislations locations and nature of the breaches, investigation, follow-up actions taken and results;
- l) a review of the validity of EIA Report predictions and identification of shortcomings in EIA Report recommendations;
- m) a review of the effectiveness and efficiency of the mitigation measures;
- n) a review of success of the EM&A programme to cost effectively identify deterioration and to initiate prompt effective mitigatory action when necessary.

### **11.3 Data Keeping**

11.3.1 The site document such as the monitoring field records, laboratory analysis records, site inspection forms, etc. are not required to be included in the monthly EM&A reports for submission. However, the document shall be well kept by the ET Leader and be ready for inspection upon request. All relevant information shall be clearly and systematically recorded in the document.

11.3.2 The monitoring data shall also be recorded in magnetic media form, and the software copy can be available upon request. The water quality data software format shall be agreed with EPD. All the documents and data shall be kept for at least one year after completion of the construction contract.

### **11.4 EIAO Internet Website**

11.4.1 To facilitate public inspection of the Baseline Monitoring Report and Monthly EM&A Reports via the EIAO Internet Website and at the EIAO Register Office, electronic copies of these Reports shall be prepared in Hyper Text Markup Language (HTML)(version 4.0 or later) and in Portable Document Format (PDF version 4.0 or later), unless otherwise agreed by the Director and shall be submitted at the same time as the hard copies. For the HTML version, a content page capable of providing hyperlink to each section and sub-section of these Reports shall be included in the beginning of the document. Hyperlinks to all figures, drawings and tables in these Reports shall be provided in the main text from where the respective references are made. All graphics in these Reports shall be in interlaced GIF format unless otherwise agreed by the Director. The content of the electronic copies of these Reports must be the same as the hard copies.

11.4.2 All environmental monitoring data shall be made available to the public via internet access in the shortest possible time and in no event later than 2 weeks after the relevant environmental monitoring data are collected or become available, unless otherwise agreed with the Director. The Permit Holder shall notify the Director in writing, within 6 weeks after the commencement of works, the internet address where the environmental monitoring data are to be placed. The internet address and the relevant environmental monitoring data shall be made available to the public via the EIAO Internet Website and the EIAO Register Office.

11.4.3 The internet website shall enable user-friendly public access to the monitoring data with features capable of:

- providing access to all environmental monitoring data collected since the commencement of works;
- searching by date;
- searching by types of monitoring data (water quality, noise and air quality); and
- hyperlinks to relevant monitoring data after searching.

or otherwise as agreed by the Director.

## **11.5 Interim Notifications of Environmental Quality Limit Exceedances**

11.5.1 With reference to Event/Action Plans in *Table 3.2*, when the environmental quality limits are exceeded, the ET Leader shall immediately notify the ER and EPD, as appropriate. The notification shall be followed up with advice to EPD on the results of the investigation, proposed action and success of the action taken, with any necessary follow-up proposals. A sample template for the interim notifications is shown in Annex E.