

# Upgrading of Tai Po Sewage Treatment Works

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## **ENVIRONMENTAL MONITORING AND AUDIT MANUAL**

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**PREPARED FOR**

**Drainage Services Department**

SEPTEMBER 2022



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# 1 Introduction

## 1.1 Background

- 1.1.1 Drainage Services Department (DSD) appointed Binnies Hong Kong Limited (the consultants) to undertake the consultancy “Agreement No. CE 50/2019 (DS) Upgrading of Tai Po Sewage Treatment Works - Investigation” on 31 March 2020. The scope of the consultancy includes the carrying out an Environmental Impact Assessment (EIA) study for the Project.
- 1.1.2 The existing Tai Po Sewage Treatment Works (TPSTW) is located within Tai Po Industrial Estate (TPIE) and has undergone various stages of extension since it was first commissioned in 1979. Currently, the existing TPSTW is a secondary treatment works with a design capacity of 120,000 m<sup>3</sup> per day, in Average Dry Weather Flow (ADWF), serving TPIE, Tai Po, Lam Tsuen and Ting Kok areas. Based on the latest flow records, the existing TPSTW is already operating close to its design capacity.
- 1.1.3 This EM&A Manual is a working document which will be reviewed periodically and updated if necessary during the implementation of the Project.

## 1.2 Project Scope and Location

- 1.2.1 The scope of the Project is to upgrade the existing TPSTW from 120,000 m<sup>3</sup> per day to 160,000 m<sup>3</sup> per day in ADWF, with a view to meeting the future needs of Tai Po District, and allowing provision to utilize and co-digest sludge from TPSTW, other existing and proposed sewage treatment works (STW) in New Territories and pre-treated food waste from the adjoining Organic Waste Pre-treatment Centre (OWPC) (New Territories East).
- 1.2.2 The Project mainly comprises the following works:
- (a) Construction and operation of new treatment facilities, modification / demolition of existing treatment facilities of TPSTW;
  - (b) Providing effluent reuse facilities to provide reclaimed water for non-portable use within the Project site; and
  - (c) Providing co-digestion facilities for imported sewage sludge and pre-treated food waste.
- 1.2.3 Owing to the space limitation within the existing TPSTW and in order to maintain the sewage treatment services of the existing TPSTW, which is almost fully utilized, a piece of government land to the south of the existing TPSTW (1.6 hectares) is identified as the proposed expansion site for the Project. The location plan of the Project is shown in **Figure 1.1**.

## 1.3 Designated Project

- 1.3.1 The Project consists of the following Designated Projects (DPs) under Part I, Schedule 2 of the Environmental Impact Assessment Ordinance (EIAO):
- Item F.1 - Sewage treatment works with an installed capacity of more than 15,000 m<sup>3</sup> per day;
  - Item F.4 - An activity for the reuse of treated sewage effluent from a treatment plant;
  - Item D.1 – A public utility electricity power plant; and
  - Item D.2 – A public utility gas generation plant.

## 1.4 Construction Programme

- 1.4.1 In order to maintain normal sewage treatment services of the existing TPSTW during the construction phase, a New West Plant will be built in the proposed expansion site outside the existing TPSTW boundary. The New West Plant will be a relatively compact STW and able to provide adequate sewage treatment capacity to meet the projected sewage flow buildup before the normal treatment services of the existing West Plant of TPSTW is decommissioned for re-development.
- 1.4.2 The construction works of this Project are tentatively scheduled to commence in 2025 for completion in 2036. Majority of the demolition works in the existing West Plant of TPSTW will be carried out from 2029 to 2033 after the New West Plant in the proposed expansion site is in operation.

## 1.5 Purpose of the Manual

- 1.5.1 The purposes of this Environmental Monitoring and Audit (EM&A) Manual are to:
- Guide the set-up of an EM&A programme to ensure compliance with the EIA recommendations;
  - Specify the requirements for monitoring equipment;
  - Propose environmental monitoring points, monitoring frequency, etc.;
  - Propose Action and Limit Levels; and
  - Propose Event and Action Plans.
- 1.5.2 This Manual outlines the monitoring and audit programme for the construction and operation of the proposed Project and provides systematic procedures for monitoring, auditing and minimizing environmental impacts.
- 1.5.3 Hong Kong environmental regulations and the Hong Kong Planning Standards and Guidelines (HKPSG) have served as environmental standards and guidelines in the preparation of this Manual. In addition, this EM&A Manual has been prepared in accordance with the requirements stipulated in Annex 21 of the Technical Memorandum on the EIA Process (EIAO-TM).
- 1.5.4 This Manual contains the following information:
- Responsibilities of the Contractor, the Engineer or Engineer's Representative (ER), Environmental Team (ET), and the Independent Environmental Checker (IEC) under the context of EM&A;
  - Project organization for the EM&A works;
  - The basis for, and description of the broad approach underlying the EM&A programme;
  - Details of the methodologies to be adopted, including all laboratories and analytical procedures, and details on quality assurance and quality control programme;
  - The rationale on which the environmental monitoring data will be evaluated and interpreted;
  - Definition of Action and Limit Levels;
  - Establishment of Event and Action Plans;
  - Requirements for reviewing pollution sources and working procedures required in the event of non-compliance with the environmental criteria and complaints; and

- Requirements for presentation of environmental monitoring and audit data and appropriate reporting procedures.

1.5.5 For the purpose of this manual, the ER shall refer to the Engineer as defined in the Construction Contract, in cases where the Engineer's powers have been delegated to the ER, in accordance with the Construction Contract. The ET leader, who shall be responsible for and in charge of the ET, shall refer to the person delegated the role of executing the EM&A requirements.

## 1.6 Project Organization

1.6.1 The proposed project organization and lines of communication with respect to environmental protection works are shown in **Appendix A**.

1.6.2 Only one ET with an ET Leader shall be engaged for the entire Project at any time. The ET shall conduct the EM&A programme and ensure the Contractor's compliance with the Project's environmental performance requirements. The ET shall be established by the Project Proponent, or shall be part of the Resident Site Staff of the Engineer and directly supervised by the Engineer or ER, and shall be an independent party from the Contractor or the IEC for the Project. The ET shall be led and managed by an ET leader. The ET leader shall possess at least 7 years of experience in EM&A and/or environmental management.

1.6.3 Only one IEC with a supporting team shall be directly employed by the Project Proponent for the entire Project at any time. The IEC shall audit the overall EM&A programme, including the implementation of all environmental mitigation measures, submissions required in this Manual, as well as any other relevant submissions required under the Environmental Permit. The IEC shall be an independent party from the Engineer or ER, Contractor and the ET for the Project. The IEC shall possess at least 7 years of experience in EM&A and/or environmental management. The IEC shall report directly to the EPD on matters relating to the EM&A programme and environmental impacts from the Project.

1.6.4 The responsibilities of respective parties are:

### The Contractor

- Implement the EIA recommendations and requirements;
- Provide assistance to ET in carrying out monitoring and auditing;
- Submit proposals on mitigation measures in case of exceedances of Action and Limit Levels in accordance with the Event and Action Plans;
- Implement measures to reduce impact where Action and Limit Levels are exceeded; and
- Adhere to the agreed procedures for carrying out compliant investigation.

### Environmental Team (ET)

- Set up all the required environmental monitoring stations;
- Monitor various environmental parameters as required in the EM&A Manual;
- Analyse the EM&A data, review the success of EM&A programme, confirm the adequacy of mitigation measures implemented and the validity of the EIA predictions, and to identify any adverse environmental impacts arising;
- Carry out site inspection to investigate and audit the Contractors' site practice, equipment and work methodologies with respect to pollution control and environmental mitigation measures, take proactive actions to pre-empt problems, and carry out ad-hoc site inspections if significant environmental problems are identified;

- Audit and prepare audit reports on the environmental monitoring data and site environmental conditions;
- Report on the EM&A results to the IEC, Contractor, the ER and EPD or its delegated representative;
- Recommend suitable mitigation measures to the Contractor in the case of exceedance of Action and Limit Levels in accordance with the Event and Action Plans;
- Undertake regular on-site audits / inspections and report to the Contractor and the ER of any potential non-compliance;
- Follow up and close out non-compliance actions; and
- Adhere to the procedures for carrying out environmental complaint investigation.

#### Engineer or Engineer's Representative (ER)

- Supervise the Contractor's activities and ensure that the requirements in the EM&A Manual are fully complied with;
- Inform the Contractor when action is required to reduce impacts in accordance with the Event and Action Plans;
- Assist the Project Proponent in employing an IEC to audit the results of the EM&A works carried out by the ET;
- Comply with the agreed Event and Action Plans in the event of any exceedance;
- Adhere to the procedures for carrying out complaint investigations.

#### Independent Environmental Checker (IEC)

- Review the EM&A works performed by the ET (at not less than monthly intervals);
- Audit the monitoring activities and results (at not less than monthly intervals);
- Validate and confirm the accuracy of monitoring results, monitoring equipment, monitoring locations, monitoring procedures and location of sensitive receivers;
- Report the audit results to the ER and EPD in parallel;
- Review the EM&A reports (monthly and quarterly summary reports) submitted by the ET;
- Review the proposal on mitigation measures submitted by the Contractor in accordance with the Event and Action Plans;
- Check the mitigation measures submitted by the Contractor in accordance with the Event and Action Plans;
- Check the mitigation measures that have been recommended in the EIA Report and this Manual, and ensure they are properly implemented in a timely manner, when necessary; and
- Report the findings of site inspections and other environmental performance reviews to ER and EPD.

1.6.5 Sufficient and suitably qualified professional and technical staff shall be employed by the respective parties to ensure full compliance with their duties and responsibilities, as required under the EM&A programme for the duration of the Project.

## 2 Air Quality

### 2.1 Introduction

- 2.1.1 Potential air quality impacts arising from the construction of the Project have been addressed in the EIA Report. No unacceptable air quality impact during the construction phase is anticipated with implementation of proposed mitigation measures. Odour monitoring is considered not necessary during the construction phase. However, regular dust monitoring and environmental site audits are recommended to verify the EIA predictions and ensure the proper implementation of proposed mitigation measures during the construction period.
- 2.1.2 Potential air quality impacts arising from the operation of the Project have been addressed in the EIA Report. No unacceptable air quality impact during the operational phase is anticipated with implementation of proposed plant design, provision of adequate ventilation and appropriate deodorization systems. Nevertheless, a commissioning test at the exhaust of the Combined Heat and Power (CHP) as well as Hydrogen Sulphide (H<sub>2</sub>S) monitoring at the deodorizers upon commissioning to ascertain the odour removal performance are recommended. In addition, odour patrol is proposed during the period of maintenance or cleaning of the deodorization system for the Project.
- 2.1.3 In this section, the requirements for the monitoring and audit of air quality impacts arising from the Project are presented.

### 2.2 Mitigation Measures

- 2.2.1 Mitigation measures for air quality impacts during construction and operational phases have been recommended in the EIA Report. All the recommended mitigation measures and designs are provided in the implementation schedule in **Appendix B**.

### 2.3 Monitoring Requirements

#### Construction Dust Monitoring

- 2.3.1 Fugitive dust would be generated from construction activities including site clearance and site formation, demolition works, excavation works, and wind erosion. Therefore, 1-hour Total Suspended Particulates (TSP) is recommended to be monitored and audited at the proposed monitoring locations during construction phase.
- 2.3.2 One-hour TSP shall be measured to indicate the impacts of construction dust on air quality. The TSP levels shall be measured by following the standard high volume sampling method as set out in the Title 40 of the Code of Federal Regulations, Chapter 1 (Part 50), Appendix B. Upon approval of the IEC and the Environmental Protection Department (EPD), 1-hour TSP levels can be measured by direct reading method which are capable of producing comparable results as that by the high volume sampling method, to indicate short event impacts.
- 2.3.3 All relevant data including temperature, pressure, weather conditions, elapsed-time meter reading for the start and stop of the sampler, identification and weight of the filter paper, and any other local atmospheric factors affecting or affected by site conditions, special phenomena and work progress of the site etc., shall be recorded down in detail by the ET. A sample data sheet is shown in **Appendix C**.

#### Monitoring Equipment

- 2.3.4 A high volume sampler (HVS) in compliance with the following specifications should be used for

carrying out the 1-hour TSP monitoring:

- 0.6 - 1.7 m<sup>3</sup> per minute (20 - 60 standard cubic feet per minute) adjustable flow range;
- equipped with a timing / control device with  $\pm 5$  minutes accuracy for 24 hours operation;
- installed with elapsed-time meter with  $\pm 2$  minutes accuracy for 24 hours operation;
- capable of providing a minimum exposed area of 406 cm<sup>2</sup>;
- flow control accuracy:  $\pm 2.5\%$  deviation over 24-hour sampling period;
- equipped with a shelter to protect the filter and sampler;
- incorporated with an electronic mass flow rate controller or other equivalent devices;
- equipped with a flow recorder for continuous monitoring;
- provided with a peaked roof inlet;
- incorporated with a manometer;
- able to hold and seal the filter paper to the sampler housing at horizontal position;
- easy to change the filter; and
- capable of operating continuously for 24-hour period.

2.3.5 The ET is responsible for the provision, installation, operation, maintenance, and dismantling of the monitoring equipment. They shall ensure that sufficient number of HVSs with an appropriate calibration kit are available for carrying out the baseline monitoring, regular impact monitoring and ad hoc monitoring. The HVSs shall be equipped with an electronic mass flow controller and be calibrated against a traceable standard at regular intervals. All the equipment, calibration kit, filter papers, etc., shall be clearly labelled by the ET.

2.3.6 The flow-rate of the sampler before and after the sampling exercise with the filter in position shall be verified to be constant and be recorded in the data sheet as mentioned in **Appendix C**.

2.3.7 Wind data monitoring equipment shall also be provided and set up at suitable locations for logging wind speed and wind direction near the dust monitoring locations. The equipment installation location shall be proposed by the ET and agreed with the Engineer and the IEC. For installation and operation of wind data monitoring equipment, the following points shall be observed.

- The wind sensors should be installed at 10m above ground so that they are clear of obstructions or turbulence caused by buildings;
- The wind data should be captured by a data logger, the data shall be downloaded for analysis at least once a month;
- The wind data monitoring equipment should be re-calibrated at least once every six months; and
- Wind direction should be divided into 16 sectors of 22.5 degrees each.

2.3.8 In exceptional situations, the ET may propose alternative methods to obtain representative wind data upon approval from the Engineer and agreement from the IEC.

#### Proposal of Use of Portable Direct Reading Dust Meter

2.3.9 If the ET proposes to use a direct reading dust meter to measure 1-hour TSP levels, they shall submit sufficient information to the IEC to prove that the instrument is capable of achieving a comparable result to the HVS. The instrument should also be calibrated every year against HVS to check the validity and accuracy of the results measured by direct reading method.

Laboratory Measurement/Analysis

- 2.3.10 A clean laboratory with constant temperature and humidity control, and equipped with necessary measuring and conditioning instruments to handle the dust samples collected shall be available for sample analysis, equipment calibration and maintenance. The laboratory should be Hong Kong laboratory accreditation scheme (HOKLAS) accredited.
- 2.3.11 If a site laboratory is set up or a non-HOKLAS accredited laboratory is hired for carrying out the laboratory analysis, the laboratory equipment shall be approved by the Engineer, in consultation with the IEC. Measurement performed by the laboratory shall be demonstrated to the satisfaction of the ER and IEC. The IEC shall regularly audit the measurement performed by the laboratory to ensure the accuracy of measurement results. The ET shall provide the Engineer and the IEC with one copy of the Title 40 of Code of Federal Regulations, Chapter 1 (Part 50), Appendix B for reference.
- 2.3.12 Filter paper of size 8" × 10" shall be labelled before sampling. It shall be a clean filter paper with no pin holes and shall be conditioned in a humidity-controlled chamber for over 24-hours and be pre-weighed before use for the sampling.
- 2.3.13 After sampling, the filter paper loaded with dust shall be kept in a clean and tightly sealed plastic bag. The filter paper shall then be returned to the laboratory for reconditioning in the humidity-controlled chamber followed by accurate weighing by an electronic balance with readout down to 0.1 mg. The balance shall be regularly calibrated against a traceable standard.
- 2.3.14 All the collected samples shall be kept in a good condition for 6 months before disposal.

Monitoring Location

- 2.3.15 The selected air quality monitoring locations are the worst potentially affected air sensitive receivers located in the vicinity of construction sites. The proposed air quality monitoring locations during construction phase are listed in **Table 2.1** below and shown in **Figure 2.1**.

**Table 2.1 Construction Dust Monitoring Locations**

ID	Air Sensitive Receiver (ASR) ID	Description
DM-1	ASR 3	Maxim's Food Factory 2
DM-2	ASR 9	Tung Fong Hung
DM-3	ASR 13	Taclon Industrial Ltd.

*Note:*

*The monitoring period is determined based on the tentative construction period of the nearest worksites within the Project site and will subject to adjustment based on the actual construction programme of the relevant contracts in the Construction Stage.*

- 2.3.16 The status and locations of the air sensitive receivers may change after issuing this manual. In such case, the ET shall propose updated monitoring locations and seek approval from ER and the IEC, and agreement from the EPD on the proposal.
- 2.3.17 When alternative monitoring locations are proposed, the following criteria, as far as practicable, shall be followed:
- i. At the site boundary or such locations close to the major dust emission source;
  - ii. Close to the air sensitive receivers as defined in the EIAO-TM;
  - iii. Proper position/ sitting and orientation of the monitoring equipment; and
  - iv. Take into account the prevailing meteorological conditions.
- 2.3.18 The ET shall agree with the ER in consultation with the IEC on the position of the HVS for the installation of the monitoring equipment. When positioning the samplers, the following points shall be noted:

- i. a horizontal platform with appropriate support to secure the samplers against gusty wind shall be provided;
- ii. the distance between the sampler and an obstacle, such as buildings, shall be at least twice the height that the obstacle protrudes above the sampler;
- iii. a minimum of 2 metres of separation from walls, parapets and penthouses is required for rooftop samplers;
- iv. a minimum of 2 metres of separation from any supporting structure, measured horizontally is required;
- v. no furnace or incinerator flue is nearby;
- vi. airflow around the sampler is unrestricted;
- vii. the sampler is more than 20 metres from the dripline;
- viii. any wire fence and gate, to protect the sampler, shall not cause any obstruction during monitoring;
- ix. permission must be obtained to set up the samplers and to obtain access to the monitoring stations;
- x. a secured supply of electricity is needed to operate the samplers; and
- xi. no two samplers should be placed less than 2 meters apart.

2.3.19 Before construction in each month, the corresponding dust monitoring schedule shall be prepared by the ET based upon the construction schedule provided by the Contractor. The ET shall forward the IEC the impact monitoring programme such that he/she can conduct on-site audits to ensure accuracy of the impact monitoring results.

#### Baseline Monitoring

2.3.20 The ET shall carry out the baseline monitoring at all of the designated monitoring locations for at least 14 consecutive days prior to the commissioning of major construction works to obtain 1-hour TSP samples. The selected baseline monitoring stations should reflect baseline conditions at the impact stations. One-hour sampling should also be done at least 3 times per day while the highest dust impact is expected.

2.3.21 During the baseline monitoring, there should not be any major construction or dust generation activities in the vicinity of the monitoring stations. Before commencing baseline monitoring, the ET shall inform the IEC of the baseline monitoring programme such that, if required, the IEC can conduct on-site audit to ensure accuracy of the baseline monitoring results.

2.3.22 In case the baseline monitoring cannot be carried out at the designated monitoring locations during the baseline monitoring period, the ET shall carry out the monitoring at alternative locations which can effectively represent the baseline conditions at the impact monitoring locations. The alternative baseline monitoring location shall be agreed with the Engineer and the IEC, and approved by the EPD.

2.3.23 In exceptional cases, when insufficient baseline monitoring data or questionable results are obtained, the ET shall liaise with the IEC and EPD to agree on an appropriate set of data to be used as a baseline reference and submit to Engineer and IEC for approval.

2.3.24 Ambient conditions may vary seasonally and shall be reviewed once every three months. If the ET considered that the ambient conditions have changed and a repeat of the baseline monitoring is required to be carried out for obtaining the updated baseline levels, the monitoring should be at times when the Contractor's activities are not generating dust, at least in the proximity of the monitoring stations. Should change in ambient conditions be determined, the baseline levels and, in turn, the air quality criteria, should be revised. The revised baseline levels and air quality criteria should be agreed with the IEC and the EPD.

### Impact Monitoring

2.3.25 The ET shall carry out impact monitoring during construction phase of the Project. For 1-hour TSP monitoring, the sampling frequency of at least three times in every six-days should be undertaken when the highest dust impact occurs. In case of non-compliance with the air quality criteria, more frequent monitoring, as specified in the action plan in the following section, should be conducted within the specified timeframe after the result is obtained. This additional monitoring should be continued until the excessive dust emission or the deterioration in the air quality is rectified. The impact monitoring programme is summarised in **Table 2.2**.

**Table 2.2 Summary of Construction Dust Monitoring Programme**

Monitoring Period	Duration	Sampling Parameter	Frequency
Baseline Monitoring	Consecutive days of at least 2 weeks before commencement of major construction works	1-hour TSP	3 times per day
Impact Monitoring	Throughout the construction phase	1-hour TSP	3 times every 6 days

### Event and Action Plan – Dust

2.3.26 The baseline monitoring results form the basis for determining the air quality criteria for the impact monitoring. The ET shall compare the impact monitoring results with air quality criteria set up for 1-hour TSP. **Table 2.3** shows the air quality criteria, namely action and limit levels to be used.

**Table 2.3 Action and Limit Levels for Air Quality (Dust)**

Parameter	Action Level	Limit Level
1-hour TSP level in $\mu\text{g}/\text{m}^3$	For baseline level $\leq 384 \mu\text{g}/\text{m}^3$ , action level = (baseline level $\times$ 1.3 + limit level)/2 For baseline level $> 384 \mu\text{g}/\text{m}^3$ , action level = limit level.	500 $\mu\text{g}/\text{m}^3$

2.3.27 Should non-compliance of the air quality criteria occur, action in accordance with the action plan in **Table 2.4** shall be carried out.

**Table 2.4 Event and Action Plan for Air Quality (Dust)**

Event	Action			
	ET	IEC	ER	Contractor
Action level exceedance for one sample	1. Identify source, investigate the causes of exceedance and propose remedial measures; 2. Inform IEC and ER; 3. Repeat measurement to confirm finding; 4. Increase monitoring frequency to daily.	1. Check monitoring data submitted by ET; 2. Check contractor's working method.	1. Notify Contractor.	1. Rectify any unacceptable practice; 2. Amend working methods if appropriate.
Action level exceedance for two or more consecutive samples	1. Identify source; 2. Inform IEC and ER; 3. Advise the ER on the effectiveness of the proposed remedial measures; 4. Repeat measurements	1. Check monitoring data submitted by ET; 2. Check Contractor's working method; 3. Discuss with ET and Contractor on possible remedial	1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. Ensure remedial measures properly	1. Submit proposals for remedial actions to ER within 3 working days of notification; 2. Implement the

Event	Action			
	ET	IEC	ER	Contractor
	to confirm findings; 5. Increase monitoring frequency to daily; 6. Discuss with IEC and Contractor on remedial actions required; 7. If exceedance continues, arrange meeting with IEC and ER; 8. If exceedance stops, cease additional monitoring.	measures; 4. Advise the ET on the effectiveness of the proposed remedial measures; 5. Supervise Implementation of remedial measures.	implemented.	agreed proposals; 3. Amend proposal if appropriate.
Limit level exceedance for one sample	1. Identify source, investigate the causes of exceedance and propose remedial measures; 2. Inform ER, Contractor and EPD; 3. Repeat measurement to confirm finding; 4. Increase monitoring frequency to daily; 5. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results.	1. Check monitoring data submitted by ET; 2. Check Contractor's working method; 3. Discuss with ET and Contractor on possible remedial measures; 4. Advise the ER on the effectiveness of the proposed remedial measures; 5. Supervise implementation of remedial measures.	1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. Ensure remedial measures properly implemented.	1. Take immediate action to avoid further exceedance 2. Submit proposals for remedial actions to IEC within 3 working days of notification; 3. Implement the agreed proposals; 4. Amend proposal if appropriate.
Limit level exceedance for two or more consecutive samples	1. Notify IEC, ER, Contractor and EPD; 2. Identify source; 3. Repeat measurement to confirm findings; 4. Increase monitoring frequency to daily; 5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented; 6. Arrange meeting with IEC and ER to discuss the remedial actions to be taken; 7. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results;	1. Discuss amongst ER, ET, and Contractor on the potential remedial actions; 2. Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly; 3. Supervise the implementation of remedial measures.	1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. In consultation with the IEC, agree with the Contractor on the remedial measures to be implemented; 4. Ensure remedial measures properly implemented; 5. If exceedance continues, consider what portion of the work is responsible and instruct the	1. Take immediate action to avoid further exceedance; 2. Submit proposals for remedial actions to IEC within 3 working days of notification; 3. Implement the agreed proposals; 4. Resubmit proposals if problem still not under control; 5. Stop the relevant portion of works as determined by the ER until the exceedance is abated.

Event	Action			
	ET	IEC	ER	Contractor
	8. If exceedance stops, cease additional monitoring.		Contractor to stop that portion of work until the exceedance is abated.	

Notes:

ET – Environmental Team; IEC – Independent Environmental Checker; ER – Engineer’s Representative

### Commissioning Test at the Exhausts of CHP unit

2.3.28 Measurement of air quality parameters of concern due to stack emission from the CHP unit should be conducted at each stack during commission stage to demonstrate the process/facility is operated properly and the design emission limits presented in **Table 2.5** can be achieved. The proposed sampling and analytical methods for the measured parameters are listed in **Table 2.6**. The proposed methods are for reference only. The monitoring scopes and analytical methods to be adopted for the commissioning tests shall be agreed with EPD before measurement.

**Table 2.5 Emission Limit for CHP Unit**

Parameter	Maximum Emission Level (mg/m <sup>3</sup> )
Respirable Suspended Particulates (RSP)	10
Nitrogen Oxides (NO <sub>x</sub> ) (as Nitrogen Dioxides, NO <sub>2</sub> )	250
Sulphur Dioxide (SO <sub>2</sub> )	12

**Table 2.6 Analytical Parameters and Methods**

Parameter	Method
Particulates (as RSP)	ISO 9096, ASTM D3685-98, USEPA Method 17
NO <sub>x</sub> (as NO <sub>2</sub> )	USEPA Method 7 and associated methods
SO <sub>2</sub>	USEPA Method 8

### Hydrogen Sulphide Monitoring

2.3.29 The odour monitoring in term of Hydrogen Sulphide (H<sub>2</sub>S) concentration at the inlets and outlets of each deodorizing unit shall be conducted quarterly using H<sub>2</sub>S sensor in the first three years upon commissioning to determine whether the odour removal efficiency of the proposed deodorization systems meet the requirements specified in the EIA Report (i.e. 99%). The first H<sub>2</sub>S monitoring shall be conducted within one month after the commissioning of the deodorizing unit. Subsequent H<sub>2</sub>S monitoring shall be conducted quarterly for the first year. For the second and third years, subject to EPD’s approval, the frequency of the impact H<sub>2</sub>S monitoring could be reduced to once every 6 months provided that no non-compliance is found. If there is any non-compliance, the deodorization unit should be inspected by the operator and the frequency of H<sub>2</sub>S monitoring shall be resumed to quarterly. Upon the third year of monitoring, the H<sub>2</sub>S monitoring should be reviewed and agreed with EPD to determine the need and plan of further monitoring.

### Odour Complaint Registration

2.3.30 An Odour Complaint Registration System is recommended to be included in the EM&A Programme to assess whether the ASRs experience odour nuisance as a result of emissions from the upgraded TPSTW. For all odour complaints, the procedures for handling complaints from the public given in DSD Administration Circular No. 4/2009 shall be followed.

- 2.3.31 In the event of receipt of odour complaint, the operator shall liaise with the complainant and a Complaint Registration Form shall be completed. The Complaint Registration Form is to record detailed information regarding the odour complaint and hence, facilitates efficient investigation work. The registration form shall contain, but not be limited to the following information:
- Location of where the odour nuisance occurred, including whether the odour was experienced indoors or outdoors;
  - Date and time of the complaint and the nuisance event;
  - Description of the complaint, i.e. the type and characteristics of the odour; and an indication of the odour strength (highly offensive / offensive / slightly offensive / just continuously detectable /intermittently detectable); and
  - Name and contact information of the complainant.
- 2.3.32 This information shall be obtained by the plant engineer or his representative(s) of the TPSTW when the complaint is received. A sample of Odour Compliant Registration Form is shown in **Appendix D**.
- 2.3.33 In addition, the following information shall be obtained:
- Meteorological conditions from the Hong Kong Observatory's Tai Po (Yuen Chau Tsai Park) / Tai Po Kau Weather Stations (including temperature, wind speed, relative humidity) at the time of the complaint; and
  - Whether any abnormal operations were being carried out at the upgraded TPSTW at the time the nuisance occurred.
- 2.3.34 The Odour Complaint Register shall be kept at the upgraded TPSTW.

### **Odour Patrol**

- 2.3.35 Odour patrol is proposed to monitor the potential odour impact from the upgraded TPSTW during the period of maintenance or cleaning of the deodorization system. During the maintenance or cleaning period, the standby odour removal system will be used. The odour patrols shall be conducted by an odour patrol team. The odour patrol team shall patrol and sniff along the upgraded TPSTW site boundary. The implementation of the odour patrols shall be subject to the prevailing weather forecast condition and should not be carried out during rainy days.
- 2.3.36 The odour patrol team shall be comprised of at least two independent trained personnel / competent persons, who should pass a set of screening tests and fulfil the following requirements.
- Have their individual odour threshold of n-butanol in nitrogen gas in the range of 20 to 80 ppb/v required by the European Standard Method (EN 13725);
  - Be at least 16 years of age and willing and able to follow instructions;
  - Be free from any respiratory illnesses;
  - Be engaged for a sufficient period to build up and monitor/detect at the monitoring location;
  - Not be allowed to smoke, eat, drink (except water) or use chewing gum or sweets 30 minutes before and during odour patrol;
  - Take great care not to cause any interference with their own perception or that of others by lack of personal hygiene or the use of perfumes, deodorants, body lotions or cosmetics; and

- Not communicate with each other about the results of their choices.

2.3.37 The independent trained personnel / competent persons should use their noses (olfactory sensors) to sniff odour along the odour patrol route. The main odour emission sources and the areas to be affected by the odour nuisance shall be identified.

2.3.38 The perceived odour intensity is divided into 5 levels. The odour intensity for different levels is presented in **Table 2.7**.

**Table 2.7 Odour Intensity Levels**

Level	Odour Intensity
0	Not detected. No odour perceived or an odour so weak that it cannot be easily characterised or described
1	Slight identifiable odour, and slight chance to have odour nuisance
2	Moderate identifiable odour, and moderate chance to have odour nuisance
3	Strong identifiable, likely to have odour nuisance
4	Extreme severe odour, and unacceptable odour level

2.3.39 During each odour patrol event, the independent trained personnel / competent persons shall record the findings including date, start and end times, weather condition (e.g. sunny, fine, cloudy, and rainy), odour intensity along the patrol route, local wind speed and wind direction. The odour nature, possible odour sources, date and time shall be recorded at each section along the upgraded TPSTW site boundary where odour is detected.

#### Event and Action Plan – Odour

2.3.40 Action and Limit levels for odour are shown in **Table 2.8**. Should the action or limit level be reached, action shall be carried out in accordance with the Action Plan described in **Table 2.9**.

**Table 2.8 Action and Limit Levels for Air Quality (Odour)**

Parameter	Action Level	Limit Level
Odour Nuisance (from odour patrol)	Odour intensity of 2 is measured from odour patrol	Odour intensity of 3 or above is measured from odour patrol
Odour Complaints	Any incidence of odour complaint received through the Odour Complaint Register	Two or more complaints through the Odour Complaint Register within three months

Table 2.9 Event and Action Plan for Air Quality (Odour)

Event	Action		
	TPSTW Engineer-in-charge of Odour Patrol	DSD Sewage Treatment Division 1 (ST1)	DSD Sewerage Projects Division (SP) / Electrical and Mechanical Projects Division (E&MP)
<b>Action Level</b>			
Action level for Odour Patrol is reached	<ol style="list-style-type: none"> <li>1. Identify source / reason of exceedance;</li> <li>2. Repeat odour patrol to confirm finding</li> </ol>	<ol style="list-style-type: none"> <li>1. Carry out investigation to identify the source/reason of exceedance;</li> <li>2. Rectify any unacceptable practice;</li> <li>3. Implement more mitigation measures if necessary.</li> </ol>	<ol style="list-style-type: none"> <li>1. Assist ST1 to find the root cause of non-compliance; and</li> <li>2. Modify or improve design as appropriate.</li> </ol>
Receipt of any odour complaint	<ol style="list-style-type: none"> <li>1. Identify source / reason of odour complaints</li> </ol>	<ol style="list-style-type: none"> <li>1. Carry out investigation to identify the source/reason of complaints. Investigation shall be completed within 1 week;</li> <li>2. Rectify any unacceptable practice;</li> <li>3. Amend working methods if required;</li> <li>4. Inform DSD SP/E&amp;MP if cause of complaint is considered to be caused by civil or E&amp;M design problems;</li> <li>5. Correspond to the complainant within 10 days to inform the cause of the nuisance and action taken; and</li> <li>6. Implement amended working methods.</li> </ol>	<ol style="list-style-type: none"> <li>1. Assist ST1 to find the root cause of the complaint; and</li> <li>2. Modify or improve design as appropriate.</li> </ol>
<b>Limit Level</b>			
Limit level for Odour Patrol is reached	<ol style="list-style-type: none"> <li>1. Identify source / reason of non-compliance;</li> <li>2. Repeat odour patrol to confirm findings;</li> <li>3. Assess effectiveness of remedial action and keep EPD informed of the results</li> </ol>	<ol style="list-style-type: none"> <li>1. Carry out investigation to identify the source/reason of non-compliance;</li> <li>2. Rectify any unacceptable practice;</li> <li>3. Amended working methods if required;</li> <li>4. Notify DSD SP / E&amp;MP;</li> <li>5. Formulate remedial actions;</li> <li>6. Ensure amended working methods and remedial actions properly implemented;</li> <li>7. If non-compliance continues, consider what portion of the work is responsible and stop that portion of the work until the non-compliance is abated.</li> </ol>	<ol style="list-style-type: none"> <li>1. Assist ST1 to find the root cause of non-compliance;</li> <li>2. Modify or improve design as appropriate; and</li> <li>3. Formulate remedial actions in association with ST.</li> </ol>
Receipt of two or more odour complaints in 3 months	<ol style="list-style-type: none"> <li>1. Identify source / reason of odour complaints;</li> <li>2. Repeat measurements to confirm findings;</li> <li>3. Increase monitoring frequency to monthly;</li> <li>4. If non-compliance stops, cease additional monitoring.</li> </ol>	<ol style="list-style-type: none"> <li>1. Carry out investigation to identify the source/reason of non-compliance or complaints. Investigation shall be completed within 1 week;</li> <li>2. Rectify any unacceptable practice;</li> <li>3. Amended working methods if required;</li> <li>4. Notify DSD SP / E&amp;MP;</li> <li>5. Formulate remedial actions;</li> <li>6. Ensure amended working methods and remedial actions properly implemented;</li> <li>7. If non-compliance continues, consider what portion of the work is responsible and stop that portion of the work until the non-compliance is abated; and</li> <li>8. Correspond to the complainant within 10 days to inform the cause of the nuisance and action taken.</li> </ol>	<ol style="list-style-type: none"> <li>1. Assist ST1 to find the root cause of the complaint or non-compliance;</li> <li>2. Modify or improve design as appropriate; and</li> <li>3. Formulate remedial actions in association with ST1.</li> </ol>

## **2.4 Audit Requirements**

- 2.4.1 Regular site inspections and audits (at least once per week) should be conducted by the ET, ER and the Contractor during the entire construction phase of the Project to ensure the recommended mitigation measures are properly implemented as detailed in Section 12.

## 3 Water Quality

### 3.1 Introduction

- 3.1.1 Under the normal operation of the Project and the Tolo Harbour Effluent Export Scheme (THEES), the treated effluent from the Project together with the treated effluent from the Sha Tin Cavern Sewage Treatment Works (CSTW) will be conveyed to Kai Tai River (KTR) for discharge into the Kai Tak Approach Channel (KTAC) in Victoria Harbour. In addition, effluent from the Project may be discharged into Tolo Harbour under emergency condition or during the THEES maintenance period.
- 3.1.2 According to the EIA Report, no adverse water quality impact is anticipated with implementation of proposed mitigation measures during both construction and operational phases. No water quality monitoring is recommended for the land-based construction works of the Project. Nevertheless, river water quality monitoring at KTR and marine water quality monitoring in Victoria Harbour are recommended after the commissioning of the New West Plant under normal operation of the THEES. Marine water quality monitoring in Tolo Harbour is also recommended for THEES maintenance and emergency discharge under both construction and operational phases of the Project.
- 3.1.3 Regular environmental site audits are also recommended to ensure the proper implementation of proposed mitigation measures during the construction period.
- 3.1.4 In this section, the requirements for the monitoring and audit of water quality impacts arising from the Project are presented.

### 3.2 Mitigation Measures

- 3.2.1 Mitigation measures for water quality impacts during construction and operational phases have been recommended in the EIA Report. All the recommended mitigation measures and designs are provided in the implementation schedule in **Appendix B**.

### 3.3 Monitoring Requirements

#### **Effluent Monitoring for Normal Operation**

- 3.3.1 Effluent quality and effluent flow of the existing TPSTW and Sha Tin STW (STSTW) are being routinely monitored by the DSD<sup>1</sup>. It is recommended that DSD should carry out the same effluent monitoring for the future upgraded TPSTW and the proposed CSTW. The effluent quality monitoring data shall be used as necessary for analysis of the river and marine water quality monitoring data of this Project.
- 3.3.2 Monitoring of the treated effluent quality from the Project will also be governed by the Water Pollution Control Ordinance (WPCO) license to ensure that the effluent quality would comply with the design standards, which is under the ambit of regional office (RO) of EPD.

#### **River Water Quality Monitoring for Normal Operation**

- 3.3.3 River water quality monitoring in KTR is recommended for normal operation of THEES after commissioning of the New West Plant (see Section 1.4.1). The river water quality data collected

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<sup>1</sup> [https://www.dsd.gov.hk/EN/Sewerage/Sewage Treatment Facilities/Effluent Quality of Major Sewage Treatment Works/index.html](https://www.dsd.gov.hk/EN/Sewerage/Sewage_Treatment_Facilities/Effluent_Quality_of_Major_Sewage_Treatment_Works/index.html)

from the monitoring programme should be compared with the routine river water quality monitoring data collected by EPD to verify whether there is any adverse water quality impact at KTR as compared to that before the implementation of this Project.

#### River Water Quality Monitoring Stations

- 3.3.4 River water quality monitoring shall be carried out at six (6) EPD's routine river water monitoring stations along KTR as listed in **Table 3.1**.

**Table 3.1 Proposed River Water Quality Monitoring Stations**

Station	Easting	Northing
KN1	838745	820375
KN2	838771	820824
KN3	838525	821092
KN4	838296	821319
KN5	838072	821593
KN7	838396	822258

- 3.3.5 Any change to the monitoring stations shall be justified by the ET Leader, agreed by the ER, verified by the IEC before seeking approval from EPD prior to the commencement of the monitoring.

#### River Water Quality Monitoring Parameters and Schedule

##### *Depths of Measurements*

- 3.3.6 Measurements shall be taken at three water depths, namely, 1 m below water surface, mid-depth and 1 m above riverbed, except where the water depth is less than 6 m, in which case the mid-depth station may be omitted. Shall the water depth be less than 3 m, only the mid-depth station will be monitored.

##### *Monitoring Programme*

- 3.3.7 River water quality parameters including pH, salinity, dissolved oxygen (DO), turbidity, suspended solids (SS), 5-day biochemical oxygen demand (BOD<sub>5</sub>), chemical oxygen demand (COD), ammonia nitrogen (NH<sub>3</sub>-N), nitrate-nitrogen (NO<sub>3</sub>-N), unionized ammonia (UIA), total inorganic nitrogen (TIN) and *E. coli* levels shall be monitored. The proposed river water quality monitoring schedule shall be submitted to the ER, IEC and EPD at least four weeks before the first day of the monitoring month. The ER, IEC and EPD should be notified immediately of any changes in schedule. Salinity, pH, DO and turbidity shall be measured *in-situ* whereas SS, BOD<sub>5</sub>, COD, NH<sub>3</sub>-N, NO<sub>3</sub>-N, UIA, TIN and *E. coli* shall be determined by laboratory. Duplicate *in-situ* measurements and collection of duplicate water samples for laboratory analysis should be carried out in each independent sampling event.
- 3.3.8 A one-year impact water quality monitoring programme is proposed for KTR at a frequency of once per month after commissioning of the New West Plant. Where necessary, available effluent monitoring data of the existing / upgraded TPSTW and the existing STSTW / future CSTW routinely collected by DSD before and after commissioning of the New West Plant and during the river monitoring period should be reviewed to assist in identification of the potential impact.

#### **Marine Water Quality Monitoring for Normal Operation**

- 3.3.9 Marine water quality monitoring in Victoria Harbour is recommended for normal operation of the THEES after commissioning of the New West Plant. The water quality data collected from the monitoring programme should be compared with the baseline water quality condition to verify whether there is any adverse water quality impact to water sensitive receivers in Victoria

Harbour.

### Marine Water Quality Monitoring Stations

- 3.3.10 Nine (9) monitoring stations are proposed for the marine water quality monitoring for normal operation as listed in **Table 3.2**. Seven (7) impacts stations (including four WSD flushing water intakes, two typhoon shelters and one gradient station) and two (2) control stations (including two EPD monitoring stations) are proposed. Cooling water intakes are not sensitive to the changes of water quality and are therefore not covered. The two control stations are selected in the open water of the main Victoria Harbour channel, which would not be affected by the disinfected secondary effluent of the Project as predicted under the Water Quality Impact Assessment for the Project. The monitoring data collected at the control stations should be used to indicate any changes of the background water quality in Victoria Harbour. The locations of the proposed marine water quality monitoring stations in Victoria Harbour are indicated in **Figure 3.2**.

**Table 3.2 Proposed Marine Water Quality Monitoring Stations in Victoria Harbour**

Station	Description	Easting	Northing
<b>Impact Station</b>			
F1	WSD Flushing Water Intake at Cha Kwo Ling	841913	817691
F3	WSD Flushing Water Intake at Sai Wan Ho	841068	816501
F4	WSD Flushing Water Intake at Quarry Bay	839808	817025
F6	WSD Flushing Water Intake at Tai Wai	837952	818293
T1	To Kwa Wan Typhoon Shelter	838475	819373
T2	Kwun Tong Typhoon Shelter	840410	818888
G1	Kai Tak Approach Channel (KTAC) (Gradient Station)	839201	819767
<b>Control Station</b>			
VM1	EPD Monitoring Station VM1	841810	816568
VM5	EPD Monitoring Station VM5	836092	816541

- 3.3.11 The status and locations of water sensitive receivers may change after issuing this Manual. Any change to the monitoring stations shall be justified by the ET Leader, agreed by the ER, verified by the IEC before seeking approval from EPD prior to the commencement of the monitoring.

### Marine Water Quality Monitoring Parameters and Schedule

#### *Depths of Measurements*

- 3.3.12 Measurements shall be taken at three water depths (i.e. 1 m below water surface, mid-depth and 1 m above seabed), except where the water depth is less than 6 m, for which the mid-depth station may be omitted. Should the water depth be less than 3 m, only the mid-depth station will be monitored.

#### *Baseline Monitoring*

- 3.3.13 A one-year baseline monitoring programme is proposed at a frequency of twice per month covering different tidal states including both wet and dry seasons to establish the baseline marine water quality conditions under normal operation of THEES. The baseline monitoring programme should be carried out prior to the commissioning of the New West Plant.
- 3.3.14 During each monitoring event, water samples shall be collected at both mid-flood and mid-ebb tides. The proposed baseline water quality monitoring schedule should be submitted to ER, IEC and EPD at least 4 weeks before the first day of the monitoring month. The ER, IEC and EPD should also be notified immediately for any changes in schedule. Marine water quality parameters including pH, salinity, DO, turbidity, SS, BOD<sub>5</sub>, TIN, NH<sub>3</sub>-N, UIA and *E. coli* levels shall be monitored. Salinity, pH, DO and turbidity shall be measured *in-situ* whereas SS, BOD<sub>5</sub>, TIN,

NH<sub>3</sub>-N, UIA and *E. coli* shall be determined by laboratory. Duplicate *in-situ* measurements and collection of duplicate water samples for laboratory analysis should be carried out in each independent sampling event.

- 3.3.15 The purpose of the baseline monitoring is to establish ambient conditions without this Project. The baseline monitoring programme shall be suspended in the events of any THEES maintenance or emergency discharge during the monitoring period or if there are other marine construction activities in Victoria Harbour. The baseline water quality shall be established and agreed with EPD prior to commissioning of the New West Plant. In exceptional cases when insufficient baseline monitoring data or questionable results are obtained, the ET Leader shall seek approval from the IEC and EPD on an appropriate set of data to be used as baseline reference.

#### *Impact Monitoring*

- 3.3.16 A one-year water quality monitoring programme is proposed in Victoria Harbour at a frequency of twice per month over the first year of the New West Plant operation. Where necessary, available effluent data of the existing / upgraded TPSTW and the STSTW / CSTW routinely collected by the DSD during the baseline and impact monitoring periods should be reviewed to assist in identification of the potential impact.
- 3.3.17 During each monitoring event, water samples shall be collected at both mid-flood and mid-ebb tides. Water quality parameters including pH, salinity, DO, turbidity, SS, BOD<sub>5</sub>, TIN, NH<sub>3</sub>-N, UIA, and *E.coli* shall be measured under the impact monitoring programme. Salinity, pH, DO and turbidity shall be measured *in-situ* whereas SS, BOD<sub>5</sub>, TIN, NH<sub>3</sub>-N, UIA and *E. coli* shall be determined by laboratory. Duplicate *in-situ* measurements and collection of duplicate water samples for laboratory analysis should be carried out in each independent sampling event.
- 3.3.18 The proposed water quality monitoring schedule for impact monitoring should be submitted to the ER, IEC and EPD at least 4 weeks before the first day of the monitoring month. The ER, IEC and EPD should be notified immediately of any changes in schedule.

#### **Review of Water Quality Monitoring for Normal Operation**

- 3.3.19 After completion of the one-year impact monitoring programme, the Project Proponent shall review the impact monitoring results against the baseline conditions to identify if there is any change to the overall water quality in KTR and Victoria Harbour and propose remedial action if there is any deterioration in water quality due to the Project. The review should also determine the need and requirement of further monitoring in KTR and Victoria Harbour. The review findings shall be submitted to EPD. Any amendment to the river and marine water quality monitoring for normal operation shall be agreed with EPD.

#### **Marine Water Quality Monitoring for THEES maintenance and Emergency Discharge**

- 3.3.20 Marine water quality monitoring in Tolo Harbour is recommended for THEES maintenance and emergency discharge events during the construction phase of the Project and after commissioning of the New West Plant. The water quality data collected from the monitoring programme should be compared with the baseline water quality condition to evaluate the degree of water quality impact resulted from the THEES maintenance or emergency discharge.

#### Marine Water Quality Monitoring Stations

- 3.3.21 Under THEES maintenance or emergency discharge events, effluent would be discharged into the Tolo Harbour from the existing emergency outfalls of STSTW and TPSTW. Twelve (12) monitoring stations are proposed for the marine water quality monitoring for THEES maintenance and emergency discharge events as listed in **Table 3.3**. Eleven (11) are impact

stations and one (1) is control station. The coral site located far away from the emergency outfalls at the mouth of Tolo Channel is selected as control station. The locations of the proposed marine water quality monitoring stations in Tolo Harbour and Tolo Channel are indicated in **Figure 3.3**.

**Table 3.3 Proposed Marine Water Quality Monitoring Stations in Tolo Harbour and Tolo Channel**

Station	Description	Easting *	Northing *
<b>Impact Station</b>			
F7 / CR1	WSD Flushing Water Intake at Tai Po / Corals at Tai Po Industrial Estate	837786	834619
F8	WSD Flushing Water Intake at Sha Tin	840249	830072
E1	Seawater Intake for Experimental Mariculture at Marine Science Laboratory of CUHK	840160	831888
FC1	Yim Tin Tsai Fish Culture Zone	839228	834940
FC2	Yim Tin Tsai (East) Fish Culture Zone	840830	834904
FC3	Lo Fu Wat Fish Culture Zone	846391	836694
FC4	Yung Shue Au Fish Culture Zone	846537	831845
CR2	Corals at Shuen Wan Golf Course	838276	834652
CR3	Corals at Providence Bay	839193	832655
CR4	Corals at Ma Liu Shui	840308	831611
CR5	Corals at Sha Tin Hoi	840247	830596
<b>Control Station</b>			
CR12	Corals at Gruff Head	851041	837859

Note: \* The proposed marine water quality monitoring stations are tentative only and subject to review by ET and IEC based on actual site condition.

- 3.3.22 The status and locations of water sensitive receivers may change after issuing this Manual. Any change to the monitoring stations shall be justified by the ET Leader, agreed by the ER, verified by the IEC before seeking approval from EPD, AFCD and WSD prior to the commencement of the monitoring.

#### Marine Water Quality Monitoring Parameters and Schedule

##### *Depths of Measurements*

- 3.3.23 Measurements shall be taken at three water depths (i.e. 1 m below water surface, mid-depth and 1 m above seabed), except where the water depth is less than 6 m, for which the mid-depth station may be omitted. Should the water depth be less than 3 m, only the mid-depth station will be monitored.

##### *Baseline Monitoring*

- 3.3.24 A one-year baseline monitoring programme, covering both dry and wet seasons, is proposed at a frequency of twice per month to establish the baseline water quality conditions at all designated monitoring stations. The baseline monitoring programme should be carried out prior to the Project construction.
- 3.3.25 During each monitoring event, water samples shall be collected at both mid-flood and mid-ebb tides. The proposed baseline water quality monitoring schedule should be submitted to the ER, IEC and EPD at least 4 weeks before the first day of the monitoring month. The ER, IEC and EPD should also be notified immediately for any changes in schedule. Marine water quality parameters including pH, salinity, DO, turbidity, SS, BOD<sub>5</sub>, TIN, NH<sub>3</sub>-N, UIA, chlorophyll-*a* and *E. coli* levels shall be monitored. Salinity, pH, DO and turbidity shall be measured *in-situ* whereas SS, BOD<sub>5</sub>, TIN, NH<sub>3</sub>-N, UIA, chlorophyll-*a* and *E. coli* shall be determined by laboratory. Duplicate

*in-situ* measurements and collection of duplicate water samples for laboratory analysis should be carried out in each independent sampling event.

- 3.3.26 The purpose of the baseline monitoring is to establish ambient conditions under normal operation of TPSTW and the THEES. The baseline monitoring programme shall be suspended in the events of any THEES maintenance or emergency discharge or if there are other marine construction activities in Tolo Harbour and Tolo Channel. The baseline water quality shall be established and agreed with EPD prior to the commencement of the Project construction. In exceptional cases when insufficient baseline monitoring data or questionable results are obtained, the ET Leader shall seek approval from the IEC and EPD on an appropriate set of data to be used as baseline reference.

#### *Impact Monitoring*

- 3.3.27 In case of THEES maintenance during the construction phase and after commissioning of the New West Plant, marine water quality at all designated monitoring stations should be monitored daily during and after the maintenance period. The monitoring should be carried out until the baseline water quality is restored for at least 2 consecutive days or at least 4 weeks after termination of the effluent bypass (whichever is longer). The effluent flow and quality of the THEES maintenance discharge (from the existing / upgraded TPSTW and STSTW / CSTW) should also be monitored daily during the THEES maintenance period.
- 3.3.28 In case of emergency discharge during the construction phase or during operation of the New West Plant, marine water quality at all designated monitoring stations should be monitored daily throughout the emergency discharge period until the baseline water quality is restored for at least 2 consecutive days or at least 1 week after termination of the discharge (whichever is longer). The marine water quality monitoring shall be commenced within 24 hours after the start of the emergency discharge. The effluent flow and quality of the emergency discharge should also be monitored daily during the emergency discharge period.
- 3.3.29 During each monitoring event, marine water samples shall be collected at both mid-flood and mid-ebb tides. Marine water quality parameters including pH, salinity, DO, turbidity, SS, BOD<sub>5</sub>, TIN, NH<sub>3</sub>-N, UIA, chlorophyll-*a* and *E.coli* shall be measured under the impact monitoring programme. The effluent monitoring parameters shall include flow, pH, salinity, turbidity, SS, BOD<sub>5</sub>, TIN, NH<sub>3</sub>-N, NO<sub>3</sub>-N and *E.coli*. Salinity, pH, DO and turbidity shall be measured *in-situ* whereas SS, BOD<sub>5</sub>, TIN, NH<sub>3</sub>-N, NO<sub>3</sub>-N, UIA, chlorophyll-*a* and *E. coli* shall be determined by laboratory. Duplicate *in-situ* measurements and collection of duplicate water samples for laboratory analysis should be carried out in each independent sampling event.
- 3.3.30 The monitoring programme for THEES maintenance and emergency discharge should continue during the construction phase of the Project as well as in the first 3 years after commissioning of the New West Plant. After the first 3 years of the New West Plant operation, a review shall be conducted by the Project Proponent to determine whether such monitoring shall be continued. The review results shall be submitted to EPD, AFCD, WSD and other relevant parties. Any amendment on the monitoring programme shall be agreed by EPD, AFCD and WSD.

#### Event and Action Plan

- 3.3.31 The Project Proponent / plant operators shall inform EPD, AFCD, WSD and, if necessary, other relevant stakeholders (such as the mariculturists) every day on the latest results of the water quality monitoring exercise to allow these parties to make informed decisions. By the end of the water quality monitoring exercise, the Project Proponent / plant operators shall also inform these parties that the ambient water quality is restored and thus the water quality is recovered. It is recommended that the Project Proponent / plant operators shall maintain good communications with various concerned parties. A list of address, email address, phone and fax

number of key persons of all relevant parties shall be made available to the Project Proponent / plant operators. The procedures to be followed in the event of THEES maintenance and emergency discharge are provided in **Table 3.4**.

**Table 3.4 Event and Action Plan for THEES Maintenance and Emergency Discharge**

Event	Actions by Project Proponent / Plant Operators
THEES Maintenance Discharge	<ol style="list-style-type: none"> <li>1. The regular THEES maintenance event should be carefully planned and scheduled outside the peak algae blooming season (i.e. December to April/May) to minimize the risk of red tides.</li> <li>2. The scheduling of the THEES maintenance discharge should take into account any ongoing blooming event in the area, which may occur outside the blooming season, in liaison with AFCD</li> <li>3. Notify EPD, AFCD and WSD and other relevant stakeholders on the maintenance event and submit the maintenance schedule to all relevant parties at least four weeks before any discharge.</li> <li>4. If required by WSD, install silt curtains at Tai Po and Shatin flushing water intakes during the whole water quality monitoring exercise.</li> <li>5. Conduct daily marine water monitoring (as discussed in Sections 3.3.20 to 3.3.30) until the baseline water quality levels are restored for at least 2 consecutive days or at least 4 weeks after termination of the maintenance period (whichever is longer).</li> <li>6. Conduct daily effluent monitoring (as discussed in Sections 3.3.20 to 3.3.30) throughout the THEES maintenance period.</li> <li>7. The monitoring data collected in Item 5 above shall be compared with the baseline data collected under normal operation of the THEES to identify the degree of impact caused by the THEES maintenance discharge.</li> </ol>
Emergency Discharge	<ol style="list-style-type: none"> <li>1. Investigate the reason of failure and adhere to the procedures in the latest emergency contingency plan prepared by DSD where appropriate.</li> <li>2. Determine possible remedial measures and identify the need of emergency discharge.</li> <li>3. If emergency discharge is required, EPD, AFCD, WSD and other relevant parties should be informed immediately.</li> <li>4. Ensure remedial measures are implemented.</li> <li>5. Assess the effectiveness of the implemented remedial measures and identify alternative measures if necessary.</li> <li>6. Discuss with EPD, AFCD and WSD for the required remedial actions if necessary and ensure all necessary remedial actions are properly implemented.</li> <li>7. Conduct daily marine water monitoring (as discussed in Sections 3.3.20 to 3.3.30) until the baseline water quality levels are restored for at least 2 consecutive days or at least 1 week after normal plant operation is resumed (whichever is longer).</li> <li>8. Conduct daily effluent monitoring (as discussed in Sections 3.3.20 to 3.3.30) during the emergency discharge period.</li> <li>9. The monitoring data collected in Item 7 above shall be compared with the baseline data collected under normal operation of the Project to identify the degree of impact caused by the emergency discharge (if any).</li> </ol>

#### Documentation of Water Quality Monitoring for THEES Maintenance and Emergency Discharge

3.3.32 Details of each THEES maintenance event occurring during the water quality monitoring programme, including the results and findings of the water quality monitoring exercise as well as the need and requirements of any additional water quality mitigation measures/plans for future THEES maintenance events shall be documented and submitted to EPD, AFCD and WSD within 4 weeks after completion of the water quality monitoring exercise for agreement.

- 3.3.33 Details of any emergency discharge event occurring during the water quality monitoring programme including the cause of plant failure, the remedial measures undertaken, the water quality impact monitoring results and findings, the recommendation of any follow-up actions to avoid future occurrence of the same incident as well as the need and requirements of any additional water quality mitigation measures for future emergency discharge shall be documented and submitted to EPD, AFCD and WSD within 4 weeks after completion of the water quality monitoring exercise for agreement.

#### **Site Record**

- 3.3.34 All relevant data shall be recorded, including monitoring location / position, time, water depth, pH value, salinity, turbidity, temperature, tidal stages, weather conditions and any special phenomena (provide photographs if appropriate) or work activities undertaken around the monitoring and works area that may influence the monitoring results. A sample data record sheet is shown in **Appendix E** for reference.

#### **Monitoring Equipment**

##### Dissolved Oxygen and Temperature Measuring Equipment

- 3.3.35 The instrument shall be a portable and weatherproof DO measuring instrument complete with cable and sensor, and use a direct current (DC) power source. The equipment shall be capable of measuring:
- DO level in the range of 0 - 20 mg L<sup>-1</sup> and 0 - 200% saturation; and
  - Temperature of 0 - 45 degree Celsius.
- 3.3.36 It shall have a membrane electrode with automatic temperature compensation complete with a cable. Sufficient stocks of spare electrodes and cables shall be available for replacement where necessary. For example, YSI model 59 meter, YSI 5739 probe, YSI 5795A submersible stirrer with reel and cable or an approved similar instrument.
- 3.3.37 Shall salinity compensation not be built-in to the DO equipment, *in-situ* salinity shall be measured to calibrate the DO equipment prior to each DO measurement.

##### Turbidity Measurement Instrument

- 3.3.38 Turbidity shall be measured *in-situ* by the nephelometric method. The instrument shall be portable and weatherproof turbidity measuring instrument using a DC power source complete with cable, sensor and comprehensive operation manuals. It shall have a photoelectric sensor capable of measuring turbidity between 0 - 1000 NTU (for example, Hach model 2100P or an approved similar instrument). The cable shall not be less than 25m in length. The meter shall be calibrated in order to establish the relationship between NTU units and the levels of suspended solids. The turbidity measurement should be carried out on a split water sample from the same water sample collected for suspended solids analysis.

##### Water Sampling Equipment

- 3.3.39 A water sampler is required. It shall comprise a transparent Polyvinyl Chloride (PVC) cylinder, with a capacity of not less than 2 litres, which can be effectively sealed with latex cups at both ends. The sampler shall have a positive latching system to keep it open and prevent premature closure until released by a messenger when the sampler is at the selected water depth (for example, Kahlsico Water Sampler or an approved similar instrument).

##### Water Depth Detector

- 3.3.40 A portable, battery-operated echo sounder shall be used for the determination of water depth

at each designated monitoring station. This unit can either be handheld or affixed to the bottom of the work boat, if the same vessel is to be used throughout the monitoring programme.

#### Salinity

- 3.3.41 A portable salinometer capable of measuring salinity in the range of 0 - 40 parts per thousand (ppt) shall be provided for measuring salinity of the water at each monitoring location.

#### pH Measuring Instrument

- 3.3.42 The instrument shall consist of a potentiometer, a glass electrode, a reference electrode and a temperature-compensating device. It shall be readable to 0.1 pH in a range of 0 to 14. Standard buffer solutions of at least pH 7 and pH 10 shall be used for calibration of the instrument before and after use. Details of the method shall comply with American Public Health Association (APHA), 19th ed. 4500-HTB or equivalent methods subject to approval of the EPD.

#### Sample Containers and Storage

- 3.3.43 Water samples shall be stored in high density polythene bottles with no preservative added, packed in ice (cooled to 4°C without being frozen) and delivered to the laboratory and analyzed as soon as possible after collection. Sufficient volume of samples shall be collected to achieve the required detection limit.

#### Monitoring Position Equipment

- 3.3.44 A hand-held or boat-fixed type digital Differential Global Positioning System (DGPS) with way point bearing indication or other equipment instrument of similar accuracy, shall be provided and used during marine water monitoring to ensure the monitoring vessel is at the correct location before taking measurements.

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

- 3.3.45 All *in-situ* monitoring instruments shall be checked, calibrated and certified by a laboratory accredited under HOKLAS or any other international accreditation scheme before use and subsequently re-calibrated at three monthly intervals throughout all stages of the water quality monitoring programme. Responses of sensors and electrodes shall be checked with certified standard solutions before each use. Wet bulb calibration for a DO meter shall be carried out before measurement at each monitoring location.
- 3.3.46 Sufficient stocks of spare parts shall be maintained for replacements when necessary. Backup monitoring equipment shall also be made available so that monitoring can proceed uninterrupted even when some equipment is under maintenance, calibration, etc.

#### **Laboratory Measurement / Analysis**

- 3.3.47 Analysis of SS, BOD<sub>5</sub>, COD, TIN, NH<sub>3</sub>-N, NO<sub>3</sub>-N, UIA, chlorophyll-*a* and *E. coli* levels shall be carried out in a HOKLAS or other international accredited laboratory. Sufficient water samples shall be collected at the monitoring stations for carrying out the necessary laboratory analysis. The analysis shall commence within 24 hours after collection of the water samples. The analyses shall follow the standard methods described in APHA Standard Methods for the Examination of Water and Wastewater, 21st edition or equivalent methods subject to approval of the EPD.
- 3.3.48 Detailed testing methods, pre-treatment procedures, instrument use, Quality Assurance (QA) /Quality Control (QC) details (such as blank, spike recovery, number of duplicate samples per batch, etc.), detection limits and accuracy shall be submitted to EPD for approval prior to the commencement of monitoring programme. The QA/QC shall be in accordance with the requirement of HOKLAS or international accredited scheme. EPD may also request the

laboratory to carry out analysis of known standards provided by EPD for quality assurance. Additional duplicate samples may be required by EPD for inter laboratory calibration. Remaining samples after analysis shall be kept by the laboratory for 3 months in case repeat analysis is required. If in-house or non-standard methods are proposed, details of the method verification may be required to be submitted to EPD. In any circumstance, the sample testing shall have comprehensive QA and QC programmes. The laboratory shall prepare to demonstrate the programmes to EPD or his representatives when requested.

### **3.4 Audit Requirements**

- 3.4.1 Regular environmental site audits are recommended to ensure the proper implementation of proposed mitigation measures during the construction phase as detailed in Section 12. .

## 4 Ecology

### 4.1 Introduction

- 4.1.1 The EIA has evaluated the ecological consequences of the Project and recommended ecological mitigation measures to avoid, minimize and compensate for the impact arising from the Project.
- 4.1.2 In this section, the requirements for the monitoring and audit of ecological impacts arising from the Project are presented.

### 4.2 Mitigation Measures

- 4.2.1 Mitigation measures for ecological impacts have been recommended in the EIA Report. All the recommended mitigation measures and designs are provided in the implementation schedule in **Appendix B**.

### 4.3 Monitoring and Audit Requirements for Terrestrial Ecology

#### Monitoring of Compensation for Occasional Ardeid Night Roost

- 4.3.1 Prior to the site clearance works at the tree group (i.e. the identified occasional night roost for ardeids) within the TPSTW, tree assessment shall be conducted by the qualified botanist/plant ecologist(s) of the ET. Transplantation Proposal shall be prepared to confirm the location, quantity and condition of the trees within the tree group, and propose methodology and receptor site (s) to transplant any of these trees that are to be affected by the construction works. After completion of the tree transplantation works, the conditions of the transplanted trees shall be closely monitored at monthly basis throughout the construction period of the Project.
- 4.3.2 Compensatory planting of suitable trees within TPSTW shall be implemented if transplanting the identified tree group is impracticable based on the tree assessment. A detailed Compensation Plan shall be prepared by the qualified botanist/plant ecologist(s) of the ET. The Plan shall include proposals on site preparation works, planting design and layout, planting period, planting methodology, site supervision of planting, post-planting monitoring and maintenance programme.
- 4.3.3 The Transplantation Proposal and Compensation Plan shall be submitted to AFCD for agreement prior to removal of the concerned tree group. The post-transplanting or post-planting monitoring shall be carried out by the qualified botanist/plant ecologist(s) of the ET and the results shall be submitted to AFCD on a monthly basis throughout the monitoring programme.
- 4.3.4 Given the sporadic use of the site by night roosting ardeids, no night roosting bird monitoring is proposed.

#### Monitoring of Disturbance Impacts during Construction Phase

- 4.3.5 Monthly ecological monitoring, focusing on avifauna species of conservation importance (e.g. Collared Crows and ardeids) utilizing habitats within the 500m assessment area, should be conducted during construction phase to monitor the effectiveness of proposed mitigation measures and detect any unpredicted indirect ecological impacts arising from the proposed Project. The ecological monitoring should be undertaken by experienced ecologist(s) with relevant working experience. Remedial actions can then be recommended, where appropriate, based on the impact monitoring results.
- 4.3.6 Whilst the roosting sites of Collared Crow and roosting sites of Black Kites were identified within

Shuen Wan Restored Landfill, which are separated from the Project works by the existing topography, monitoring of the pre-roost and night roost of Collared Crows is recommended given its importance.

- 4.3.7 Site audits should be undertaken by the ET, ER and the Contractor on weekly basis to check the proper implementation and maintenance of recommended mitigation measures during construction phase of the Project.
- 4.3.8 The ecological monitoring and site audit results and findings shall be documented in the Monthly / Quarterly / Final EM&A Reports for construction phase.

#### Monitoring of Disturbance Impacts during Operational Phase

- 4.3.9 Monthly ecological monitoring, focusing on avifauna species of conservation importance (e.g. Collared Crows and ardeids) utilizing habitats within the Project site, should be conducted in the first 3 years of the Project operation to monitor any changes in foraging habitats by the Project. The ecological monitoring should be undertaken by experienced ecologist(s) with relevant working experience. Remedial actions can then be recommended, where appropriate, based on the impact monitoring results. The monitoring results and recommendation of the ecologist(s) shall be submitted to AFCDC for agreement.

### **4.4 Monitoring and Audit Requirements for Marine Ecology**

- 4.4.1 Potential marine ecological impacts arising from the Project have been addressed in the EIA Report. No unacceptable marine ecological impact is anticipated with implementation of proposed mitigation measures. The water quality monitoring and audit programme presented in Section 3 would serve to protect the marine ecological resources. No monitoring and audit program specific to marine ecology is required.

## 5 Fisheries

### 5.1 Introduction

- 5.1.1 Potential fisheries impacts arising from the Project have been addressed in the EIA Report. No unacceptable fisheries impact is anticipated with implementation of proposed mitigation measures. The water quality monitoring and audit programme presented in Section 3 would serve to protect the fisheries resources. No monitoring program specific for fisheries is required.

### 5.2 Mitigation Measures

- 5.2.1 Mitigation measures recommended for controlling water quality impact would also serve to protect fisheries resources and activities from indirect impacts. The THEES maintenance discharge would be avoided in the algae blooming season (December to April/May). The scheduling of the THEES maintenance discharge would take into account any ongoing blooming event in the area, which may occur outside the blooming season. All the recommended mitigation measures and designs are provided in the implementation schedule in **Appendix B**.

## 6 Landscape and Visual Impacts

### 6.1 Introduction

6.1.1 The EIA Report has recommended landscape and visual mitigation measures for the construction and operational phases of the Project. This section defines the audit requirements to confirm the recommended landscape and visual impact mitigation measures are effectively implemented.

### 6.2 Mitigation Measures

6.2.1 The proposed mitigation measures of landscape and visual impacts are presented in **Appendix B**. The landscape and visual mitigation measures proposed should be incorporated in the detailed landscape and engineering design. The construction phase mitigation measures should be adopted from the commencement of construction and should be in place throughout the entire construction period. Mitigation measures for the operational phase should be adopted during the detailed design and be built as part of the construction works so that they are in place on commissioning of the Project.

6.2.2 Any potential conflict among the proposed mitigation measures, the Project works, and operational requirements should also be identified and resolved at early stage. Any change to the mitigation measure should be incorporated in the detailed design.

### 6.3 Baseline Review for Landscape Impact

6.3.1 Baseline review to check, record and report the status of the Landscape Resources (LR) and Landscape Character Areas (LCA) within the construction works sites and works areas shall be conducted prior to commencement of any construction works making reference to the LR and LCA maps included in the EIA Report.

6.3.2 Any significant change to the status of LR and LCA since the EIA shall be identified. The recommended mitigation measures shall be reviewed if such change warrants a change in the design of the mitigation measures.

6.3.3 A baseline monitoring report including photographic record of the site at the time of the Contractor's possession of the site shall be prepared by the Contractor and approved by the ER. The approved baseline monitoring report including photographic record shall be submitted to the Project Proponent, ET, IEC and EPD for record.

### 6.4 Audit Requirements

6.4.1 Site audits should be undertaken during the construction phase and the 12-month establishment period (operational phase) to check that the proposed landscape and visual mitigation measures are properly implemented and maintained as per their intended objectives. The extent of works areas should be regularly checked by the ET, ER and the Contractor to ensure no damage to existing vegetation or trees outside the works limits.

6.4.2 The conditions and growth performance of the implemented compensatory planting should be regularly checked and monitored by a qualified plant specialist of the ET to ensure the effectiveness of the mitigation measures.

6.4.3 Site inspections should be undertaken at weekly basis during the construction period and once every two months for the 12-month establishment period during operational phase.

6.4.4 In the event of non-compliance, the responsibilities of the relevant parties are detailed in the Event/Action plan provided in **Table 12.1** in Section 12.

## **7 Hazard to Life**

### **7.1 Introduction**

7.1.1 Potential hazard to life risk arising from the Project have been addressed in the EIA Report. No unacceptable risk is predicted.

### **7.2 Mitigation Measures**

7.2.1 Mitigation measures recommended to further manage and minimize the potential risk during construction and operational phases of the Project are provided in the implementation schedule in **Appendix B**.

### **7.3 Audit Requirements**

7.3.1 Implementation of the recommended mitigation measures should be regularly audited during the construction phase as detailed in Section 12..

## 8 Landfill Gas Hazard

### 8.1 Introduction

8.1.1 Potential landfill gas hazard arising from the Project have been addressed in the EIA Report. No adverse impact is anticipated with implementation of proposed mitigation measures.

### 8.2 Mitigation Measures

8.2.1 Precautionary and protection measures for landfill gas hazard have been recommended in the EIA Report. All the recommended mitigation measures and designs are provided in the implementation schedule in **Appendix B**.

### 8.3 Monitoring and Audit Requirements

#### Construction Phase

8.3.1 Landfill gas (LFG) Monitoring shall be undertaken during construction phase. The monitoring requirement of excavations stated in the Landfill Gas Hazard Assessment Guidance Note (EPD/TR8/ 97) sections 8.25 to 8.27 shall be followed. All measurements of LFG should be recorded and documented by a standard record form to be approved by EPD. The form will detail the location, time of monitoring and equipment used, together with the gas concentrations measured to ensure all relevant data are recorded. LFG monitoring during construction phase will be reported in the monthly EM&A Reports.

8.3.2 Periodically during ground-works construction, the works area should be monitored for methane, carbon dioxide and oxygen using appropriately calibrated portable gas detection equipment.

8.3.3 The monitoring frequency and areas to be monitored should be set down prior to commencement of ground-works either by the Safety Officer or by an appropriately qualified person.

8.3.4 Routine monitoring should be carried out in all excavations, manholes and chambers and any other confined spaces that may have been created by, for example, the temporary storage of building materials on the site surface.

8.3.5 The gas detection equipment should be appropriately calibrated and able to measure the following gases in the ranges indicated below:

- Methane 0-100% LEL and 0-100% v/v
- Carbon dioxide 0-100%
- Oxygen 0-21%

8.3.6 Monitoring should be performed properly to make sure that the area is free of LFG before any man enters into the area.

8.3.7 All measurements in excavations should be made with the extended monitoring tube located not more than 10mm from the exposed ground surface. The monitoring should be undertaken by the Safety Officer.

8.3.8 For excavations deeper than 1m, measurements should be carried out:

- at the ground surface before excavation commences;
- immediately before any worker enters the excavation;

- at the beginning of each working day for the entire period the excavation remains open; and
  - periodically through the working day whilst workers are in the excavation.
- 8.3.9 For excavations between 300mm and 1m deep, measurements should be carried out:
- directly after the excavation has been completed; and
  - periodically whilst the excavation remains open.
- 8.3.10 For excavations less than 0.3m deep, monitoring may be omitted, at the discretion of the Safety Officer or other appropriately qualified person.
- 8.3.11 Depending on the results of the measurements, actions required will vary and should be set down by the Safety Officer or other appropriately qualified person. As a minimum these shall encompass those actions specified in **Table 8.1**.

**Table 8.1 Actions in the event of LFG being detected in excavations**

Parameter	Monitoring Results	Action by the Contractor
Oxygen	<19%	<ul style="list-style-type: none"> <li>• Ventilate trench/void to restore O<sub>2</sub> to &gt;19%</li> </ul>
	<18%	<ul style="list-style-type: none"> <li>• Stop works;</li> <li>• Evacuate personnel/prohibit entry;</li> <li>• Increase ventilation to restore O<sub>2</sub> to &gt;19%</li> </ul>
Methane	>10% LEL (i.e. >0.5% v/v)	<ul style="list-style-type: none"> <li>• Prohibit hot works;</li> <li>• Ventilate to restore CH<sub>4</sub> to &lt;10% LEL</li> </ul>
	>20% LEL (i.e. >1% v/v)	<ul style="list-style-type: none"> <li>• Stop works;</li> <li>• Evacuate personnel/prohibit entry;</li> <li>• Increase ventilation to restore CH<sub>4</sub> to &lt;10% LEL</li> </ul>
Carbon Dioxide	>0.5% v/v	<ul style="list-style-type: none"> <li>• Ventilate to restore CO<sub>2</sub> to &lt;0.5%</li> </ul>
	>1.5% v/v	<ul style="list-style-type: none"> <li>• Stop works;</li> <li>• Evacuate personnel/prohibit entry;</li> <li>• Increase ventilation to restore CO<sub>2</sub> to &lt;0.5%</li> </ul>

- 8.3.12 Upon completion of the works, a competent professional person representing the Project Proponent shall confirm in writing to EPD that all the recommended LFG protection measures for the Project have been properly incorporated, installed and implemented. This could be in form of a report with photos showing the installation of membrane, installation of gas detection system, etc. as well as the relevant as-built drawings related to LFG protection measures.

### Operational Phase

- 8.3.13 Gas detection systems with audio alarm and forced ventilation should also be provided in the areas at or below the ground floor of new permanent building structures of the Project if provision of natural ventilation is not feasible in such areas. The gas detection systems should be calibrated and maintained at regular basis in according to the recommendation of manufacturer's instruction. The operators of the Project should also make sure that the gas detection systems are in functions during the operational phase of the Project.
- 8.3.14 Forced ventilation should be used if methane of more than 0.5 % (by volume) in the internal atmosphere (e.g. in voids or rooms as mentioned above) is detected in the aforementioned areas.
- 8.3.15 Carbon dioxide and oxygen concentration should be monitored and no person shall enter or remain in any confined spaces (e.g. in voids or rooms as mentioned above) where carbon dioxide concentration exceeds 1.5 % (by volume) or the oxygen content of air has fallen below 18 % (by volume).

- 8.3.16 Landfill gas concentration should be measured and monitored prior to any person entering the confined spaces.
- 8.3.17 When service voids, manholes or inspection chambers within the proposed site are entered for maintenance, monitoring and a checklist system of safety requirements should be performed before entry in accordance with Code of Practice on Safety and Health at Work in Confined Spaces published by Labour Department.

## 9 Waste Management Implications

### 9.1 Introduction

- 9.1.1 During the construction phase, the Contractor shall be responsible for the implementation of mitigation measures to minimize waste or redress problems arising from the waste materials including construction and demolition (C&D) materials, excavated sediments, chemical waste and general refuse. A Waste Management Plan (WMP), as a part of the Environmental Management Plan (EMP), should be prepared in accordance with ETWB TC (W) No.19/2005 and submitted to the Engineer for approval. The recommended mitigation measures should form the basis of the WMP. Regular audit of the construction waste materials and waste management practice is recommended during the construction phase.
- 9.1.2 Large quantities of wastes are not expected from the operation of the Project and no adverse environmental impact would arise with the implementation of good waste management practices. Hence, audit programme would not be required during the operational phase.

### 9.2 Mitigation Measures

- 9.2.1 The mitigation measures recommended in the EIA Report should form the basis of the site WMP to be developed by the Contractor during the construction stage.
- 9.2.2 With the appropriate handling, storage and disposal of waste arising from the construction and operation of the Project as recommended in **Appendix B**, the potential adverse environmental impacts would be avoided or minimized.

### 9.3 Audit Requirements

Regular audits and site inspections shall be carried out at regular interval (at least quarterly) during construction phase by the ER, ET and Contractor to ensure that the good waste management practices and mitigation measures listed in **Appendix B** and specified in the WMP and the relevant EPD's regulations and legislations are properly implemented by the Contractor. The audits should concern all aspects of on-site waste management practices including waste generation, storage, recycling, transport and disposal. The regular audit programme would ensure that the solid wastes generated during construction are not disposed into the nearby coastal waters. The auditing requirement stated in ETWB TC (W) No.19/2005 should be followed with regard to the management of &D materials. Apart from site inspection, documents including licenses, permits, disposal and recycling records should be reviewed and audited for compliance with the legislation and contract requirements.

## 10 Land Contamination

### 10.1 Introduction

10.1.1 As the existing facilities in the existing Project site is still in operation and will continue to operate during the EIA stage, further assessment and, if required, remediation works are recommended to be carried out after decommissioning of the concerned facilities / areas but prior to the construction works at the concerned facilities / areas. The recommended further assessment and remediation works, including the submission of supplementary Contamination Assessment Plan(s) (CAP(s)), Contamination Assessment Report(s) (CAR(s)), Remediation Action Plan(s) (RAP(s)) and Remediation Report(s) (RR(s)) would need to follow EPD's Guidance Manual, Guidance Note and Practice Guide and according to the EIA Report.

### 10.2 Mitigation Measures

10.2.1 Mitigation measures for potential land contamination have been recommended in the EIA Report. All the recommended mitigation measures and designs are provided in the implementation schedule in **Appendix B**.

### 10.3 Audit Requirements

10.3.1 Remediation works, if necessary, would be carried out based on the recommended further works outlined in Section 10.1. Mitigation measures as recommended in the future EPD endorsed RAP(s) should be implemented during the remediation works. The Environmental Monitoring and Audit (EM&A) requirements should be carried out in the form of regular site inspections to ensure the recommended mitigation measures are properly implemented.

## 11 Noise

### 11.1 Introduction

11.1.1 The EIA Report concluded that no existing, committed or planned noise sensitive receiver (NSR) has been identified within the assessment area. Based upon this, no noise monitoring is considered necessary for either the construction or operational phases.

### 11.2 Mitigation Measures

11.2.1 Mitigation measures for noise impacts have been recommended in the EIA Report. All the recommended mitigation measures and designs are provided in the implementation schedule in **Appendix B**.

### 11.3 Audit Requirements

11.3.1 Regular environmental site audits are recommended to ensure the proper implementation of proposed mitigation measures during the construction phase.

## 12 Site Environmental Audit

### 12.1 Site Inspection

- 12.1.1 Site inspection provides a direct means to initiate and enforce specified environmental protection and pollution control measures. These shall be undertaken routinely to inspect construction activities in order to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented. Site inspection is one of the most effective tools to enforce the environmental protection requirements at the works area.
- 12.1.2 The ET shall be responsible for formulating the environmental site inspection programme as well as the deficiency and action reporting system, and for carrying out the site inspections. The proposal for rectification, if any, should be prepared and submitted to the ET Leader and IEC by the Contractor.
- 12.1.3 Regular site inspections shall be carried out and led by the ER and attended by the Contractor and ET at least once per week during the construction phase. The areas of inspection shall not be limited to the environmental situation, pollution control and mitigation measures within the site. It should also review the environmental situations outside the works area which is likely to be affected, directly or indirectly, by the construction site activities of the Project. The ET shall make reference to the following information in conducting the inspection. During the inspection, the following information should be referred to:
- a) EIA Report recommendations on environmental protection and pollution control mitigation measures;
  - b) works progress and programme;
  - c) individual works methodology proposals (which shall include the proposal on associated pollution control measures);
  - d) contract specifications on environmental protection;
  - e) relevant environmental protection and pollution control legislations; and
  - f) previous site inspection results.
- 12.1.4 The Contractor shall keep the ER and ET Leader updated with all relevant environmental related information on the construction contract necessary for him to carry out the site inspections. Site inspection results and associated recommendations for improvements to the environmental protection and pollution control efforts should be recorded and followed up by the Contractor in an agreed time-frame. The Contractor shall follow the procedures and time-frame as stipulated in the environmental site inspection, and the deficiency and action reporting system formulated by the ET, to report on any remedial measures subsequent to the site inspections.
- 12.1.5 The ER, ET and the Contractor should also carry out ad-hoc site inspections if significant environmental problems are identified. Inspections may also be required subsequent to receipt of a valid environmental complaint, or as part of the investigation work, as specified in the Event and Action Plan for the EM&A programme.

### 12.2 Environmental Compliance

- 12.2.1 There are statutory requirements on environmental protection and pollution control requirements with which construction activities must comply.
- 12.2.2 In order to ensure the works comply with corresponding requirements, all method statements of works should be submitted by the Contractor to the ER for approval and to the ET Leader to ensure sufficient environmental protection and pollution control measures have been included.

The Project Implementation schedule (PIS) is summarized in **Appendix B**. Any proposed changes to the mitigation measures shall be certified by the ET Leader and verified by the IEC as conforming to the relevant information and recommendations contained in the EIA Report.

- 12.2.3 The ER and ET shall also review the progress and programme of the works to check that relevant environmental legislations have not been violated, and that any foreseeable potential for violating laws can be prevented.
- 12.2.4 The Contractor should provide the update of the relevant documents to the ET Leader so that checking can be carried out. The document shall at least include the updated Works Progress Reports, updated Works Programme, method statements, any application letters for different licenses/permits under the environmental protection laws, and copies of all valid licenses/permits. The site diary and environmental records shall also be available for inspection by the relevant parties.
- 12.2.5 After reviewing the document, the ET shall advise the IEC and Contractor of any non-compliance with legislative requirements on environmental protection and pollution control so that they can timely take follow-up actions as appropriate. If the follow-up actions may still result in potential violation of environmental protection and pollution control requirements, the ER and ET should provide further advice to the Contractor to take remedial action to resolve the problem.
- 12.2.6 Upon receipt of the advice, the Contractor shall undertake immediate actions to correct the situation. The ER and ET shall follow up to ensure that appropriate action has been taken in order to satisfy legal requirements.

### 12.3 Choice of Construction Method

- 12.3.1 At times during the construction phase the Contractor may submit method statements for various aspects of construction. This state of affairs would only apply to those construction methods that the EIA has not imposed conditions while for construction methods that have been assessed in the EIA, the Contractor is bound to follow the requirements and recommendations in the EIA Study. The Contractor's options for alternative construction methods may introduce adverse environmental impacts into the Project. It is the responsibility of the Contractor and ET, in accordance with established standards, guidelines and EIA Study recommendations and requirements, to review and determine the adequacy of the environmental protection and pollution control measures in the Contractor's proposal in order to ensure no unacceptable impacts would result. To achieve this end, the ET shall provide a copy of the Proactive Environmental Protection Proforma as shown in **Appendix F** to the IEC for approval. The IEC should audit the review of the construction method and endorse the proposal on the basis of no adverse environmental impacts.

### 12.4 Environment Complaints

- 12.4.1 The following procedures should be undertaken upon receipt of any environmental complaint:
- The Contractor to log complaint and date of receipt onto the complaint database and inform the ER, ET and IEC immediately;
  - The Contractor to investigate, with the ER and ET, the complaint to determine its validity, and assess whether the source of the problem is due to construction works of the Project with the support of additional monitoring frequency and stations, if necessary;
  - The Contractor to identify remedial measures in consultation with the IEC, ET and ER if a complaint is valid and due to the construction works of the Project;

- The Contractor to implement the remedial measures as required by the ER and to agree with the ET and IEC any additional monitoring frequency and stations, where necessary, for checking the effectiveness of the remedial measures;
- The ER, ET and IEC to review the effectiveness of the Contractor's remedial measures and the updated situation;
- The ET to undertake additional monitoring and audit to verify the situation if necessary, and oversee that circumstances leading to the complaint do not recur;
- If the complaint is referred by the EPD, the Contractor to prepare interim report on the status of the complaint investigation and follow-up actions stipulated above, including the details of the remedial measures and additional monitoring identified or already taken, for submission to EPD within the time frame assigned by the EPD; and
- The ET to record the details of the complaint, results of the investigation, subsequent actions taken to address the complaint and updated situation including the effectiveness of the remedial measures, supported by regular and additional monitoring results in the monthly EM&A reports.

## 12.5 Event and Action Plan

12.5.1 In the event of non-compliance identified during the EM&A programme, the responsibilities of the relevant parties are detailed in the Event/Action plan provided in Table 12.1.

**Table 12.1 Event and Action Plan**

Event	Action			
	ET	IEC	ER	Contractor
Non-conformity on one occasion	1. Inform the IEC, ER and the Contractor; 2. Discuss remedial actions with IEC, ER and Contractor; and 3. Monitor remedial actions until rectification has been completed.	1. Check inspection report; 2. Check Contractor's working method; 3. Discuss with ET, ER and Contractor on possible remedial measures; 4. Advise ER on effective of proposed remedial measures; and 5. Check implementation of remedial measures.	1. Confirm receipt of notification of non-conformity in writing; 2. Review and agree on the remedial measures proposed by the Contractor; and 3. Ensure remedial measures are properly implemented.	1. Identify source and investigate the non-conformity; 2. Amend working methods agreed with ER as appropriate; and 3. Rectify damage and undertake any necessary replacement.
Repeated Non-conformity	1. Identify sources; 2. Inform the Contractor, IEC and ER; 3. Discuss inspection frequency;	1. Check inspection report; 2. Check Contractor's working method; 3. Discuss with ET, ER and Contractor on possible remedial measures; and	1. Notify the Contractor; 2. in consultation with the ET and IEC, agree with the Contractor on the remedial measures	1. Identify source and investigate the non-conformity; 2. implement remedial measures; 3. Amend working methods agreed

Event	Action			
	ET	IEC	ER	Contractor
	4. Discuss remedial actions with IEC, ER and Contractor; 5. Monitor remedial actions until rectification has been completed; and 6. If non-conformity stops, cease additional monitoring.	4. Advise ER on effectiveness of proposed remedial measures.	to be implemented; and 3. Supervise implementation of remedial measures.	with ER as appropriate; 4. Rectify damage and undertake any necessary replacement. Stop relevant portion of works as determined by ER until the non-conformity is abated.

## 13 Reporting

### 13.1 General

- 13.1.1 Reports can be provided in an electronic medium upon agreeing the format with the ER and EPD. This would enable a transition from a paper/historic and reactive approach to an electronic/real time proactive approach. All the monitoring data (baseline and impact) shall also be submitted on diskettes or other approved media. The formats for monitoring data to be submitted shall be separately agreed.
- 13.1.2 The ET is responsible for establishing and maintaining a dedicated website throughout the entire construction period for publishing all the relevant environmental monitoring data (including but not limited to the baseline and impact monitoring). The ET shall propose the format and functionality of the website for agreement with the ER and IEC prior to publishing of data. Once the monitoring data are available (e.g. air quality, water quality, etc.) and vetted by the IEC, the ET is responsible to upload the relevant data to the dedicated website.
- 13.1.3 Types of reports that the ET shall prepare and submit include baseline monitoring report, monthly EM&A report and final EM&A review report. In accordance with Annex 21 of the EIAO-TM, a copy of the monthly and final review EM&A reports shall be made available to the Director of Environmental Protection.

### 13.2 Baseline Monitoring Report

- 13.2.1 The baseline monitoring report shall include at least the following:
- i. Up to half a page executive summary;
  - ii. brief project background information;
  - iii. drawings showing locations of the baseline monitoring stations;
  - iv. 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;
    - monitoring date, time, frequency and duration; and
    - quality assurance (QA)/quality control (QC) results and detection limits;
  - v. details of influencing factors, including:
    - major activities, if any, being carried out on the site during the period;
    - weather conditions during the period; and
    - other factors which might affect monitoring results;
  - vi. determination of the Action and Limit Levels for each monitoring parameter and statistical analysis of the baseline data;
  - vii. revisions for inclusion in the EM&A Manual; and
  - viii. comments, recommendations and conclusions.

### 13.3 Monthly Monitoring Report

- 13.3.1 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 and endorsed by the IEC. The EM&A report shall be prepared and submitted to EPD within 10 working days of the end of each reporting month, with the first report due the month after construction commences. Copies of each monthly EM&A report shall be submitted to the following parties: the IEC, the ER and EPD. Before submission of the first EM&A report, the ET shall liaise with the parties on the required number of copies and format of the monthly reports in both hard copy and electronic medium.
- 13.3.2 The ET should prepare and submit a Baseline Environmental Monitoring Report at least one month before commencement of construction of the Project. Copies of the Baseline Environmental Monitoring Report should be submitted to the IEC, ER and EPD. The ET should liaise with the relevant parties on the exact number of copies require.
- 13.3.3 The ET shall review the number and location of monitoring stations and parameters every six months, or on as needed basis, in order to cater for any changes in the surrounding environment and the nature of works in progress.

#### First Monthly EM&A Report

- 13.3.4 The first monthly EM&A report shall include at least the following:
- i. Executive summary (1-2 pages);
    - breaches of Action and Limit levels;
    - complaint log;
    - notifications of any summons and successful prosecutions;
    - reporting changes; and
    - future key issues.
  - ii. Basic project information:
    - project organization including key personnel contact names and telephone numbers;
    - programme;
    - management structure; and
    - works undertaken during the month.
  - iii. Environmental status
    - advice on the status of statutory environmental compliance such as the status of compliance with the environmental permit (EP) conditions under the EIA Ordinance, submission status under the EP and implementation status of mitigation measures;
    - works undertaken during the month with illustrations (such as location of works, daily excavation rate, etc.); and
    - drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations (with co-ordinates of the monitoring locations).
  - iv. A brief summary of EM&A requirements including;
    - all monitoring parameters;
    - environmental quality performance limits (Action and Limit levels);

- Event-Action Plans;
  - environmental mitigation measures, as recommended in the project EIA Study final report; and
  - environmental requirements in contract documents.
- v. Implementation status
- advice on the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the project EIA Report.
- vi. Monitoring result (in both hard and diskette copies) together with the following information:
- monitoring methodology;
  - name of laboratory and types of equipment used and calibration details;
  - monitoring parameters;
  - monitoring locations;
  - monitoring date, time, frequency, and duration;
  - weather conditions during the period;
  - any other factors which might affect the monitoring results; and
  - QA / QC results and detection limits.
- vii. Reporting on non-compliance, complaints, and notifications of summons and successful prosecutions:
- record of all non-compliance (exceedances) of the environmental quality performance limits (Action and Limit 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 notification of summons and successful prosecutions for breaches of current environmental protection / pollution control legislation, 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-compliances, complaints, summons and prosecutions including review of pollution sources and working procedures; and
  - description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance.
- viii. Others
- an account of the future key issues as reviewed from the works programme and work method statements;
  - advice on the solid and liquid waste management status;
  - record of any project changes from the originally proposed as described in the EIA (e.g. construction methods, mitigation proposals, design changes, etc.); and
  - comments (for examples, effectiveness and efficiency of the mitigation measures), recommendations (for examples, any improvement in the EM&A programme) and conclusions.

Subsequent monthly EM&A Report

13.3.5 Subsequent monthly EM&A report shall include at least the following:

- i. Executive summary (1-2 pages);
  - breaches of Action and Limit levels;
  - complaint log;
  - notifications of any summons and successful prosecutions;
  - reporting changes; and
  - future key issues.
- ii. Basic project information:
  - project organization including key personnel contact names and telephone numbers;
  - programme;
  - management structure;
  - works undertaken during the month; and
  - any updates as needed to the scope of works and construction methodologies.
- iii. Environmental status
  - advice on the status of statutory environmental compliance such as the status of compliance with the environmental permit (EP) conditions under the EIA Ordinance, submission status under the EP and implementation status of mitigation measures;
  - works undertaken during the month with illustrations (such as location of works, daily excavation rate, etc.); and
  - drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations.
- iv. Implementation status
  - advice on the implementation status of environmental protection and pollution control/mitigation measures, as recommended in the project EIA Report.
- v. Monitoring result (in both hard and diskette copies) together with the following information:
  - monitoring methodology;
  - name of laboratory and types of equipment used and calibration details;
  - monitoring parameters;
  - monitoring locations;
  - monitoring date, time, frequency, and duration;
  - weather conditions during the period;
  - any other factors which might affect the monitoring results; and
  - QA / QC results and detection limits.
- vi. Reporting on non-compliance, complaints, and notifications of summons and successful prosecutions:
  - record of all non-compliance (exceedances) of the environmental quality

- performance limits (Action and Limit 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 notification of summons and successful prosecutions for breaches of current environmental protection / pollution control legislation, 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-compliances, complaints, summons and prosecutions including review of pollution sources and working procedures; and
  - description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance.
- vii. Others
- an account of the future key issues as reviewed from the works programme and work method statements;
  - advice on the solid and liquid waste management status;
  - record of any project changes from the originally proposed as described in the EIA (e.g. construction methods, mitigation proposals, design changes, etc.); and
  - comments (for examples, effectiveness and efficiency of the mitigation measures), recommendations (for examples, any improvement in the EM&A programme) and conclusions.
- viii. Appendices
- Action and Limit levels;
  - graphical plots of trends of the monitoring parameters at key stations over the past four reporting periods for representative monitoring stations annotated against the following:
    - a) major activities being carried out on site during the period;
    - b) weather conditions during the period; and
    - c) any other factors that might affect the monitoring results.
  - monitoring schedule for the present and next reporting period;
  - cumulative statistics on complaints, notifications of summons and successful prosecutions; and
  - outstanding issues and deficiencies.

## 13.4 Final EM&A Review Reports

### General

- 13.4.1 The EM&A programme for construction stage should be terminated upon the completion of the construction activities, while the EM&A programme for operation stage should be terminated upon the completion of operation monitoring.

13.4.2 The proposed termination should only be implemented after the proposal has been endorsed by the IEC, the Engineer and the Project Proponent followed by approval from the Director of Environmental Protection.

Final EM&A Review Report for Construction Stage

13.4.3 The final EM&A review report for construction stage (to be submitted after completion of construction activities) should contain at least the following information:

- i. Executive summary (1-2 pages);
- ii. Drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;
- iii. 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;
- iv. A brief summary of EM&A requirements including:
  - environmental mitigation measures for construction stage, as recommended in the project EIA Report;
  - environmental impact hypotheses tested;
  - environmental quality performance limits (Action and Limit levels);
  - all monitoring parameters;
  - Event and Action Plans;
- v. A summary of the implementation status of environmental protection and pollution control/mitigation measures for construction stage, as recommended in the project EIA Report and summarised in the updated implementation schedule;
- vi. Graphical plots and the statistical analysis of the trends of monitoring parameters over the course of the project, including:
  - 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;
- vii. A summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
- viii. A review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures as appropriate;
- ix. A description of the actions taken in the event of non-compliance;
- x. A summary record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up actions taken and results;
- xi. A review of the validity of EIA predictions for construction stage and identification of shortcomings in EIA recommendations;
- xii. Comments (for example, a review of the effectiveness and efficiency of the mitigation measures and of the performance of the environmental management system, that is, of the overall EM&A programme for construction stage); and
- xiii. Recommendations and conclusions (for example, a review of success of the overall EM&A programme for construction stage to cost-effectively identify deterioration and to initiate prompt effective mitigatory action when necessary).

### Final EM&A Review Report for Operation Stage

- 13.4.4 The final EM&A review report for operation stage (to be submitted after completion of operation monitoring) should contain at least the following information:
- i. Executive summary (1-2 pages);
  - ii. Drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;
  - iii. 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;
  - iv. A brief summary of EM&A requirements including:
    - environmental measures for operational stage, as recommended in the project EIA Report;
    - environmental impact hypotheses tested;
    - environmental quality performance limits (Action and Limit levels);
    - all monitoring parameters;
    - Event and Action Plans;
  - v. A summary of the implementation status of environmental protection and pollution control/mitigation measures for operation stage, as recommended in the project EIA Report and summarised in the updated implementation schedule;
  - vi. Graphical plots and the statistical analysis of the trends of monitoring parameters over the course of the project, including:
    - 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;
  - vii. A summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
  - viii. A review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures as appropriate;
  - ix. A description of the actions taken in the event of non-compliance;
  - x. A summary record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up actions taken and results;
  - xi. A review of the validity of EIA predictions for operation stage and identification of shortcomings in EIA recommendations;
  - xii. Comments (for example, a review of the effectiveness and efficiency of the mitigation measures and of the performance of the environmental management system, that is, of the overall EM&A programme for operation stage); and
  - xiii. Recommendations and conclusions (for example, a review of success of the overall EM&A programme for operational stage to cost-effectively identify deterioration and to initiate prompt effective mitigatory action when necessary).

## **13.5 Data Keeping**

- 13.5.1 No site-based documents (such as monitoring field records, laboratory analysis records, site inspection forms, etc.) are required to be included in the monthly EM&A reports. However, any such document shall be well kept by the ET and be ready for inspection upon request. All

relevant information shall be clearly and systematically recorded in the document. Monitoring data shall also be recorded in magnetic media form, and the software copy must be available upon request. Data format shall be agreed with EPD. All documents and data shall be kept for at least one year following completion of the construction contract and one year following completion of the operational phase monitoring for construction phase EM&A and operational EM&A respectively.

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

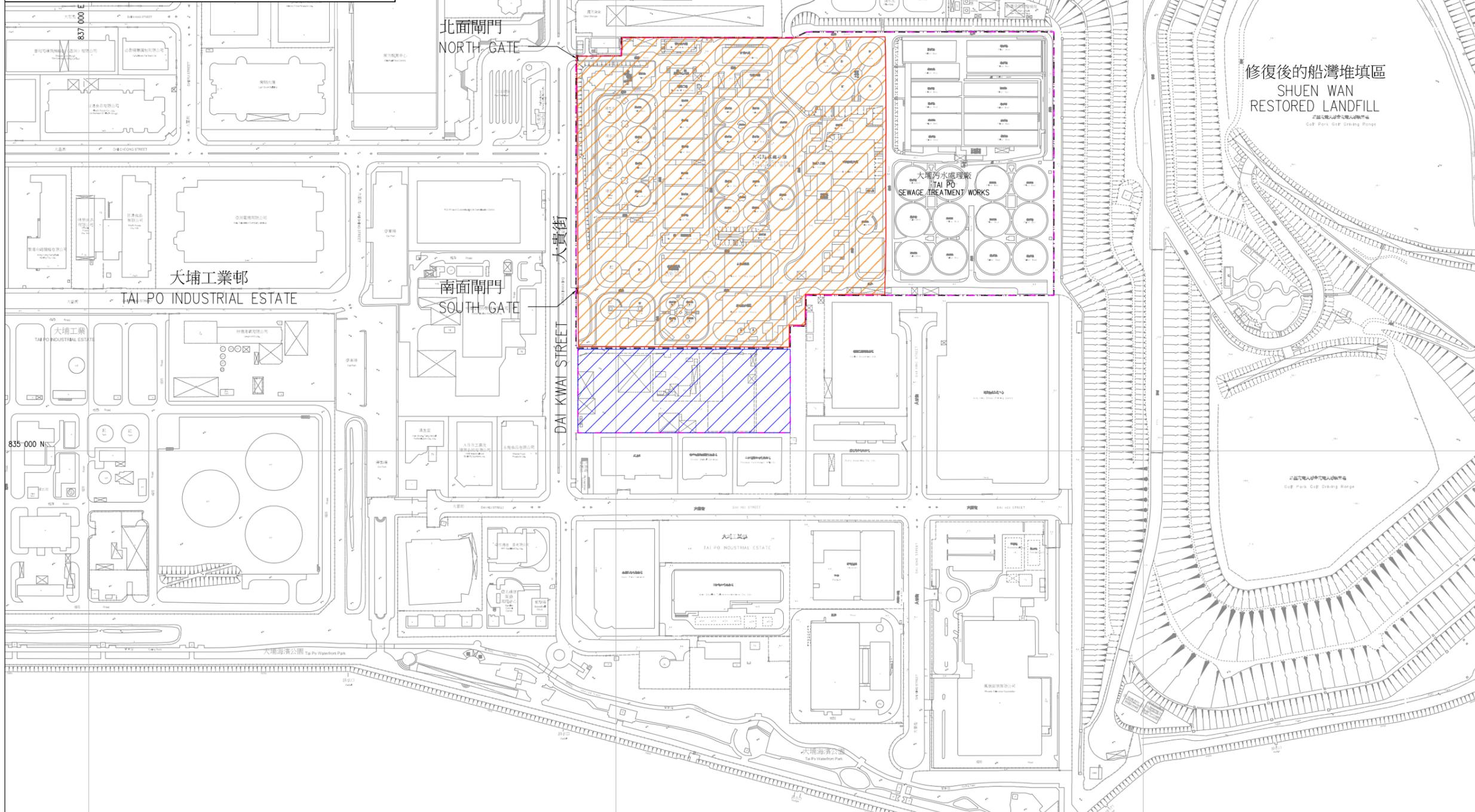
- 13.6.1 With reference to the Event and Action Plans, when the environmental quality performance limits are exceeded and if they are proven to be valid, the ET should immediately notify the IEC and EPD, as appropriate. The notification should be followed up with advice to the IEC and EPD on the results of the investigation, proposed actions and success of the actions taken, with any necessary follow-up proposals. A sample template for the interim notification is presented in **Appendix G**.

***END OF TEXT***

**FIGURES**



索引圖 KEY PLAN  
比例 SCALE A1 1 : 25000  
A3 1 : 50000



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LEGEND:

-  PROJECT BOUNDARY
-  EXISTING SITE BOUNDARY OF TAI PO SEWAGE TREATMENT WORKS
-  PROPOSED UPGRADING WORKS WITHIN EXISTING TAI PO SEWAGE TREATMENT WORKS
-  PROPOSED EXPANSION SITE

Revision	Date	Description			Initial
		Designed	Checked	Drawn	
Initial	-	-	-	-	-
Date	05/20	05/20	05/20	05/20	05/20

Approved

Agreement no. CE 50/2019 (DS)

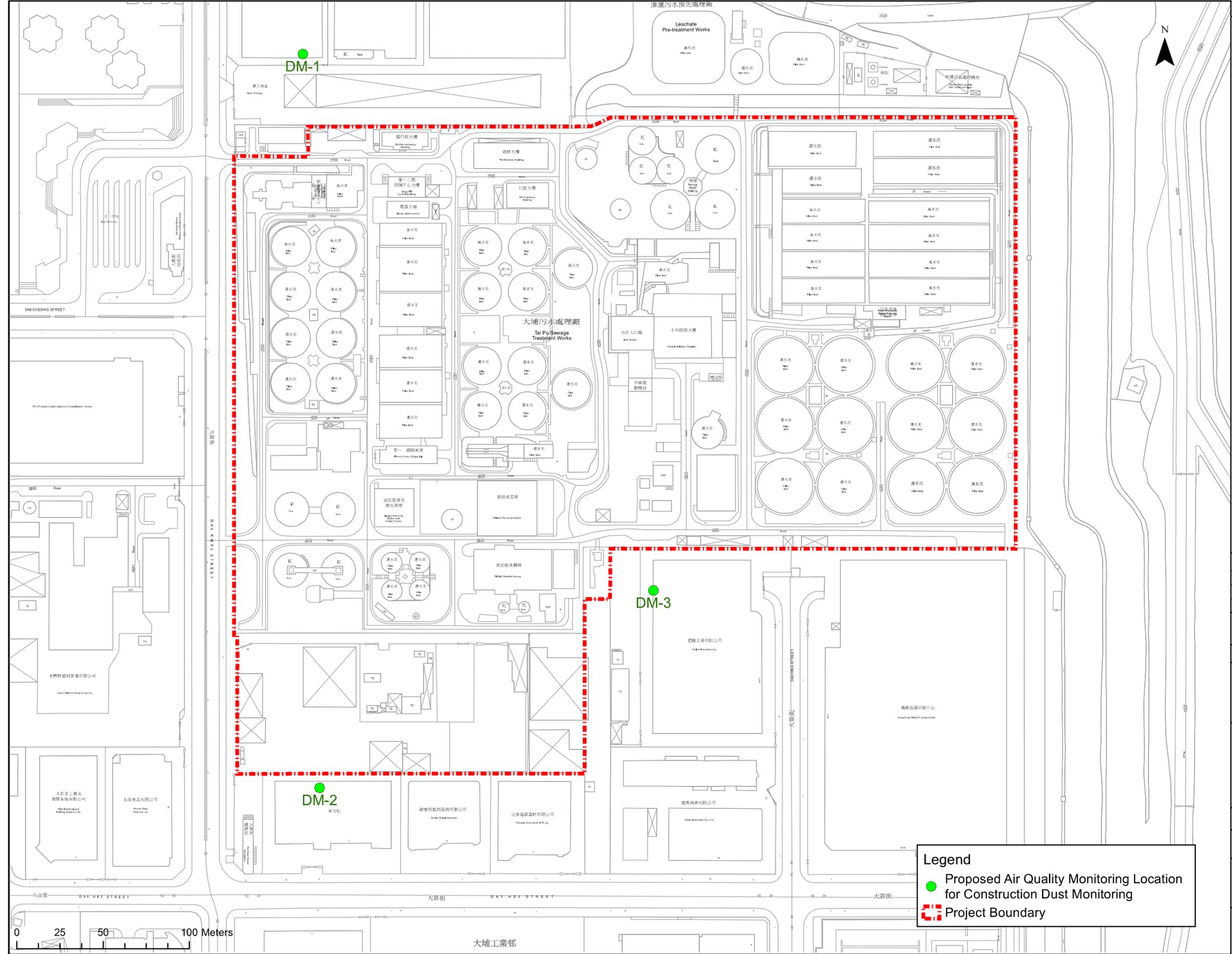
Project title  
UPGRADING OF TAI PO SEWAGE TREATMENT WORKS - INVESTIGATION

Drawing title  
PROJECT LOCATION PLAN

Drawing no. **FIGURE 1.1** Revision -

Scale A1 1 : 2000  
A3 1 : 4000





Revision	Description			
	Designed	Reviewed	Drawn	Checked
Initial	PSY	Amy	PSY	Amy
Date	06/22	06/22	06/22	06/22

Approved

Agreement No. **CE 50/2019 (DS)**

Project Title  
**Upgrading of Tai Po Sewage Treatment Works - Investigation**

Figure Title  
**Proposed Air Quality Monitoring Locations for Construction Dust Monitoring**

Drawing No. **Figure 2.1** Revision **-**

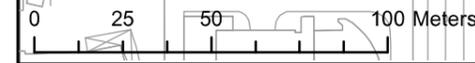
Scale **A3: 1:2,000**

Client  
**香港特別行政區政府渠務署**  
THE GOVERNMENT OF THE HONG KONG  
SPECIAL ADMINISTRATIVE REGION  
DRAINAGE SERVICES DEPARTMENT

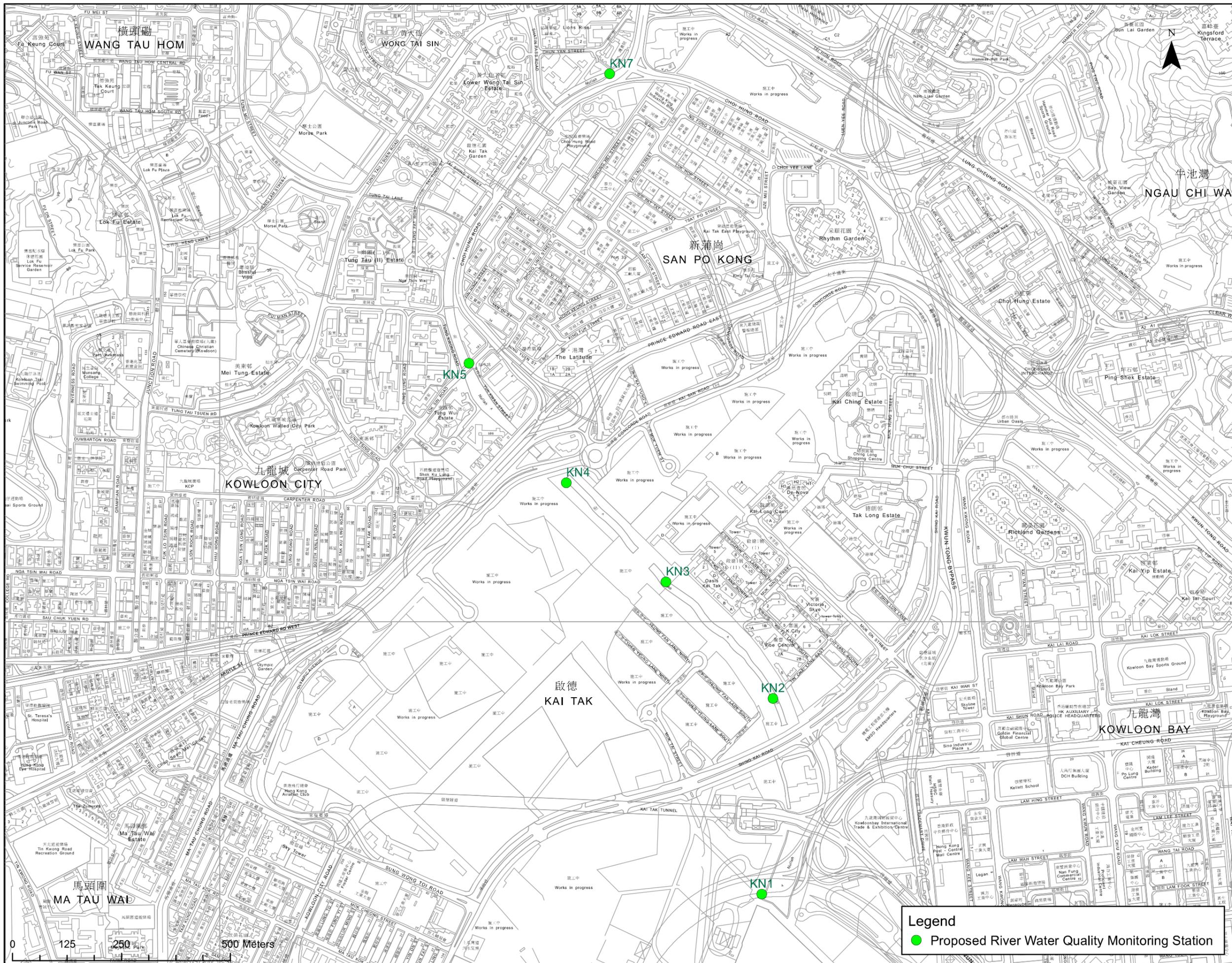
Consultant  
**binnies**  
BINNIES HONG KONG LIMITED  
賓尼新工程顧問有限公司

**Legend**

- Proposed Air Quality Monitoring Location for Construction Dust Monitoring
- Project Boundary



大埔工業邨



**Legend**  
 Proposed River Water Quality Monitoring Station

Revision	Description			
	Designed	Reviewed	Drawn	Checked
Initial	PSY	Amy	PSY	Amy
Date	06/22	06/22	06/22	06/22

Approved

Agreement No. **CE 50/2019 (DS)**

Project Title  
**Upgrading of Tai Po Sewage Treatment Works - Investigation**

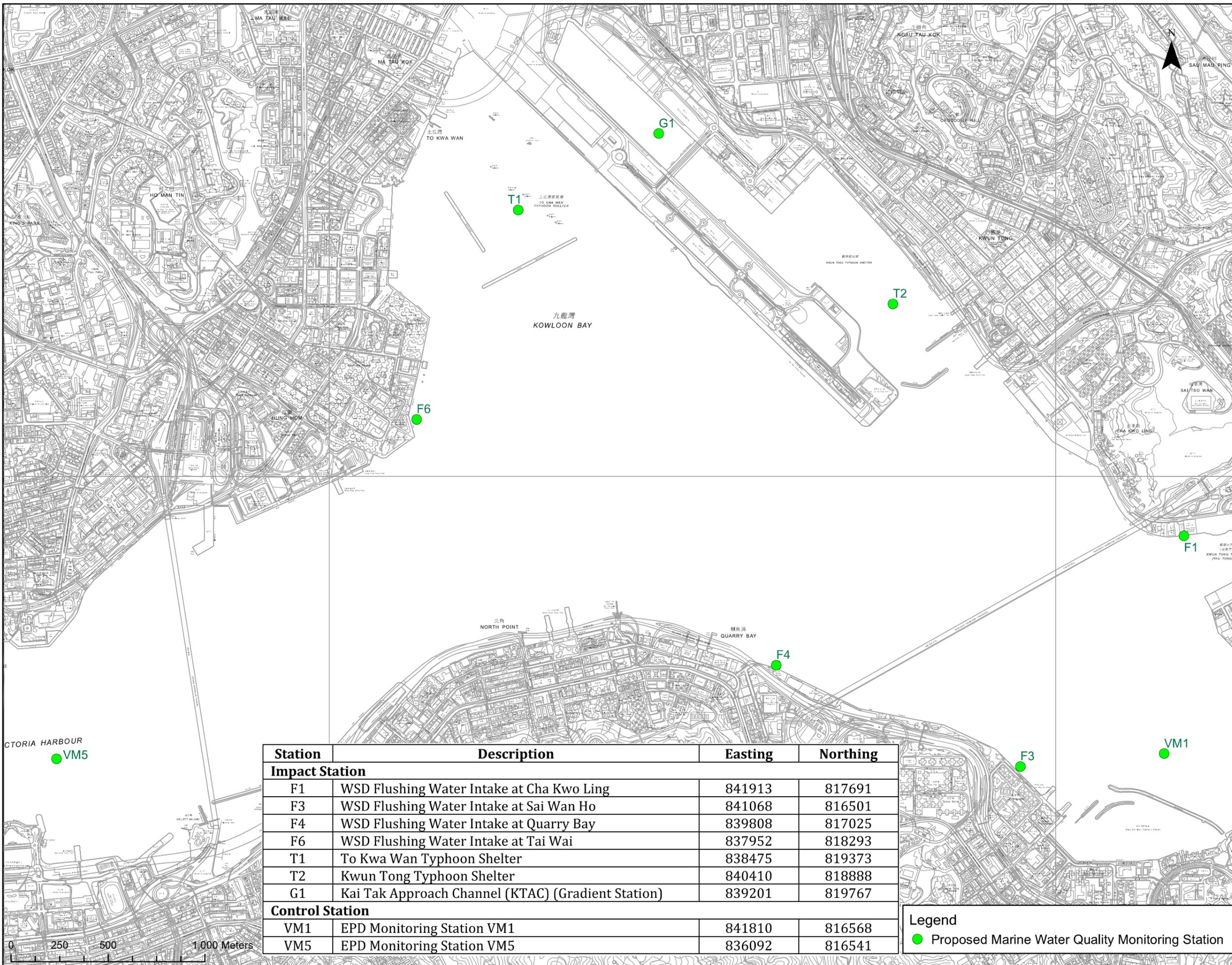
Figure Title  
**Proposed River Water Quality Monitoring Stations in Kai Tak River**

Drawing No.	Revision
Figure 3.1	-

Scale  
**A3: 1:8,000**

Client  
 香港特別行政區政府渠務署  
 THE GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION  
 DRAINAGE SERVICES DEPARTMENT

Consultant  
**binnies**  
 BINNIES HONG KONG LIMITED  
 寶尼新工程顧問有限公司



Station	Description	Easting	Northing
<b>Impact Station</b>			
F1	WSD Flushing Water Intake at Cha Kwo Ling	841913	817691
F3	WSD Flushing Water Intake at Sai Wan Ho	841068	816501
F4	WSD Flushing Water Intake at Quarry Bay	839808	817025
F6	WSD Flushing Water Intake at Tai Wai	837952	818293
T1	To Kwa Wan Typhoon Shelter	838475	819373
T2	Kwun Tong Typhoon Shelter	840410	818888
G1	Kai Tak Approach Channel (KTAC) (Gradient Station)	839201	819767
<b>Control Station</b>			
VM1	EPD Monitoring Station VM1	841810	816568
VM5	EPD Monitoring Station VM5	836092	816541

**Legend**  
 Proposed Marine Water Quality Monitoring Station

Revision	Description			
	Designed	Reviewed	Drawn	Checked
Initial	PSY	Amy	PSY	Amy
Date	06/22	06/22	06/22	06/22

Approved: \_\_\_\_\_

Agreement No. **CE 50/2019 (DS)**

Project Title  
**Upgrading of Tai Po Sewage Treatment Works - Investigation**

Figure Title  
**Proposed Marine Water Quality Monitoring Stations in Victoria Harbour**

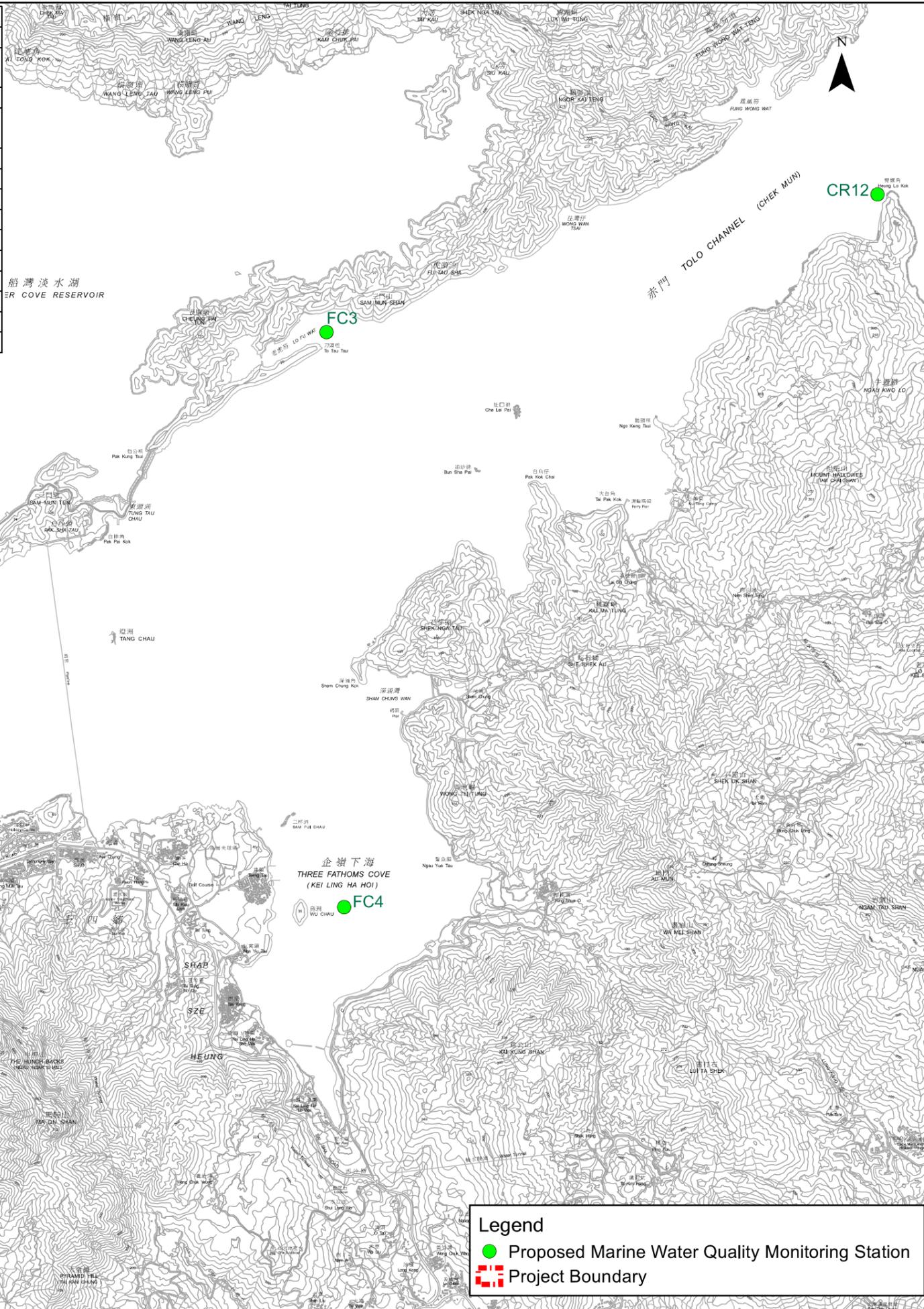
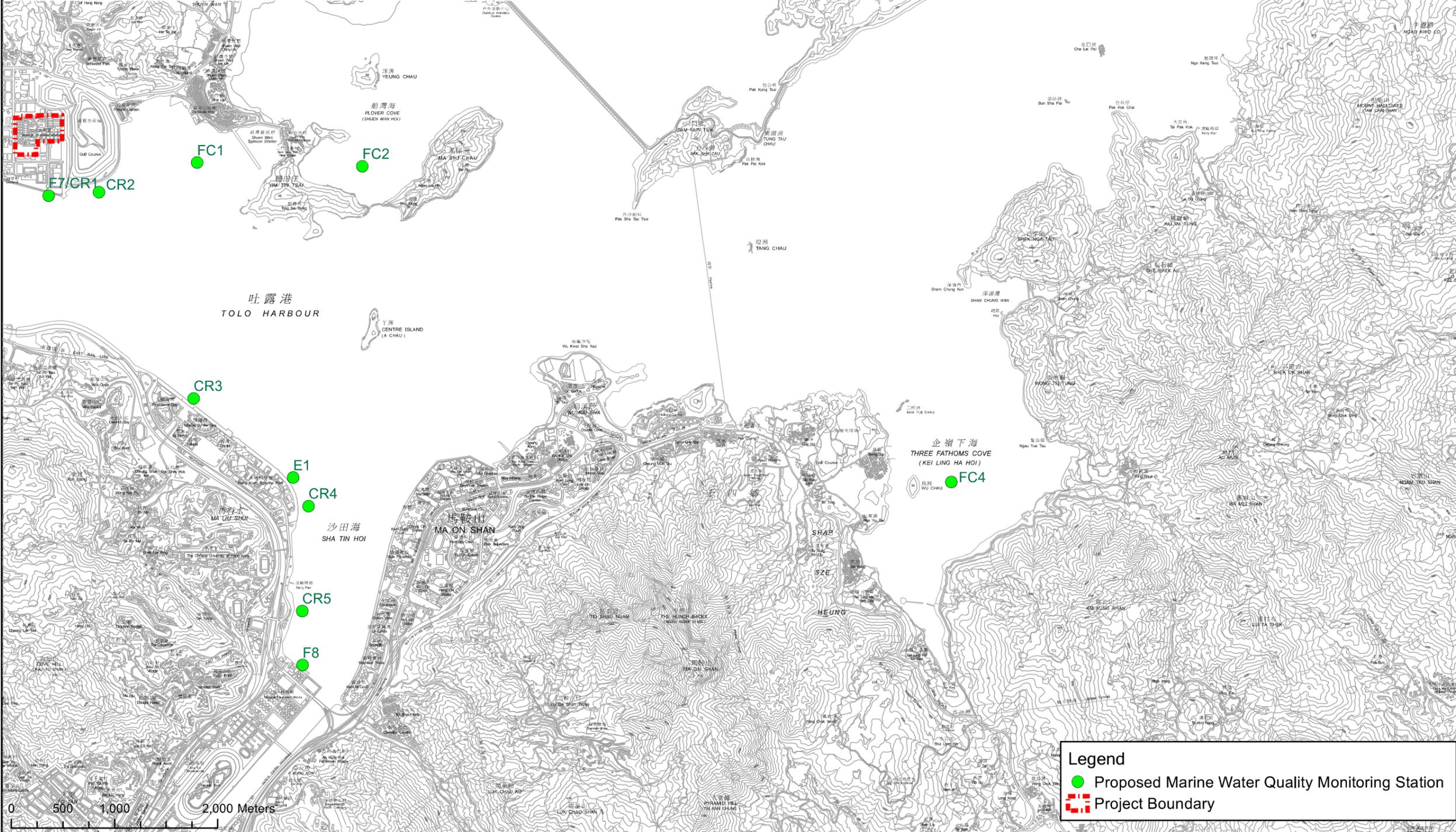
Drawing No. **Figure 3.2** Revision **-**

Scale **A3: 1:18,000**

Client  
 香港特別行政區政府渠務署  
 THE GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION  
 DRAINAGE SERVICES DEPARTMENT

Consultant  
**binnies**  
 BINNIES HONG KONG LIMITED  
 寶尼新工程顧問有限公司

Station	Description	Easting	Northing
<b>Impact Station</b>			
F7 / CR1	WSD Flushing Water Intake at Tai Po / Corals at Tai Po Industrial Estate	837786	834619
F8	WSD Flushing Water Intake at Sha Tin	840249	830072
E1	Seawater Intake for Experimental Mariculture at Marine Science Laboratory of CUHK	840160	831888
FC1	Yim Tin Tsai Fish Culture Zone	839228	834940
FC2	Yim Tin Tsai (East) Fish Culture Zone	840830	834904
FC3	Lo Fu Wat Fish Culture Zone	846391	836694
FC4	Yung Shue Au Fish Culture Zone	846537	831845
CR2	Corals at Shuen Wan Golf Course	838276	834652
CR3	Corals at Providence Bay	839193	832655
CR4	Corals at Ma Liu Shui	840308	831611
CR5	Corals at Sha Tin Hoi	840247	830596
<b>Control Station</b>			
CR12	Corals at Gruff Head	851041	837859

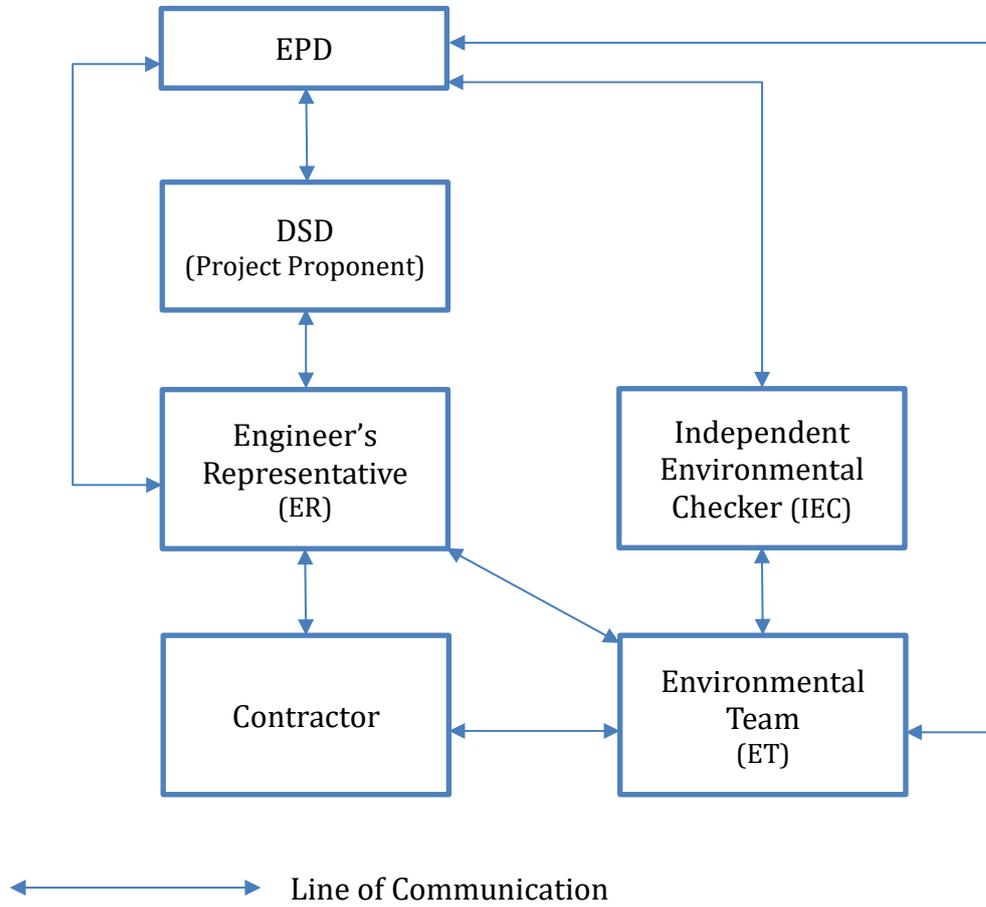


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Revision	Description			
	Designed	Reviewed	Drawn	Checked
Initial	PSY	Amy	PSY	Amy
Date	03/22	03/22	03/22	03/22
Approved				
Agreement No.	CE 50/2019 (DS)			
Project Title	Upgrading of Tai Po Sewage Treatment Works - Investigation			
Figure Title	Proposed Marine Water Quality Monitoring Stations in Tolo Harbour and Tolo Channel			
Drawing No.	Figure 3.3	Revision -		
Scale	A3: 1:40,000			
Client	 香港特別行政區政府渠務署 THE GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION DRAINAGE SERVICES DEPARTMENT			
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**APPENDIX A**  
**PROJECT ORGANIZATION FOR ENVIRONMENTAL WORKS**

## Project Organization for Environmental Works



**APPENDIX B**  
**PROJECT IMPLEMENTATION SCHEDULE**

**Appendix B Project Implementation Schedule (PIS)**

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Locations of Measures	Implementation Agent(s)	Implementation Stage *			Relevant Legislation & Guidelines
					Des	C	O	
<b>Air Quality Impact</b>								
Construction Phase								
3.10.1.1	2.2	Dust control measures stipulated in the Air Pollution Control (Construction Dust) Regulation should be implemented during the construction of the Project to control potential fugitive dust emissions. Standard construction practices for dust minimisation, including a number of practical measures such as regular water spraying, provision of vehicle wheel-washing and body washing facilities and shielding or covering with impervious sheet of stockpiled materials or exposed area when it is not use, should be implemented to reduce dust nuisance.	Construction site	Contractor		√		Air Pollution Control Ordinance (APCO), Hong Kong Air Quality Objectives (HKAQOs), Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM)
3.10.1.2	2.2	In order to avoid potential odour emissions from the decommissioning activities, the existing sewage pumping station and main should be flushed out and sludge should be pumped away before the start of decommissioning works.	Construction site	Contractor		√		EIAO-TM
3.10.1.3	2.2	Site practices such as regular maintenance and checking of the diesel-driven Powered Mechanical Equipment (PME) should be adopted to avoid any black smoke emissions and to reduce gaseous emissions. Good site practices listed below should be carried out to minimize construction dust impact: <ul style="list-style-type: none"> <li>▪ Use of hourly watering to reduce dust emissions from exposed site surfaces and unpaved roads, particularly during dry weather.</li> <li>▪ The maximum percentage of active construction works area shall be 50% during construction.</li> </ul>	Construction site	Contractor		√		APCO, HKAQOs, EIAO-TM

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Locations of Measures	Implementation Agent(s)	Implementation Stage *			Relevant Legislation & Guidelines
					Des	C	O	
		<ul style="list-style-type: none"> <li>▪ Use of frequent watering for particularly dusty construction areas and areas close to Air Sensitive Receivers (ASRs).</li> <li>▪ Side enclosure and covering of any aggregate or dusty material storage piles to reduce emissions. Where this is not practicable owing to frequent usage, watering shall be applied to aggregate fines.</li> <li>▪ Open stockpiles shall be avoided or covered. Where possible, placing dusty material storage piles near ASRs should be prevented.</li> <li>▪ Tarpaulin covering of all dusty vehicle loads transported to, from and between site locations.</li> <li>▪ Establishment and use of vehicle wheel and body washing facilities at the exit points of the site.</li> <li>▪ Provision of wind shield and dust extraction units or similar dust mitigation measures at the loading area of barging point, and use of water sprinklers at the loading area where dust generation is likely during the loading process of loose material, particularly in dry seasons/ periods.</li> <li>▪ Provision of not less than 2.4m high hoarding from ground level along site boundary where adjoins a road, streets or other accessible to the public except for a site entrance or exit.</li> <li>▪ Imposition of speed controls for vehicles on site haul roads.</li> <li>▪ Where possible, routing of vehicles and positioning of construction plant should be at the maximum possible distance from ASRs.</li> <li>▪ Instigation of an environmental monitoring and auditing program to monitor the construction process in order to enforce controls and modify method of work if dusty conditions arise.</li> </ul>						

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Locations of Measures	Implementation Agent(s)	Implementation Stage *			Relevant Legislation & Guidelines
					Des	C	O	
Operational Phase								
3.6.2.2	2.2	Biogas generated should go through the gas treatment facility to remove hydrogen sulphide (H <sub>2</sub> S) before passing to the combined heat and power (CHP) generator. Sidestream should be treated by using Anammox technology in order to remove the ammonium nitrogen content.	New development area of the Project	Project Proponent	√		√	EIAO-TM
3.10.2.2	2.2	The major process equipment of the upgraded TPSTW and Co-digestion Facilities will be confined inside the substructure/superstructure, except for the final sedimentation tanks at the existing East Plant, to minimize odour nuisance to the surrounding air sensitive receivers. Two stages de-odourization system (bio tricking filter and carbon adsorption) will be installed to treat the collected odourous gases. The overall odour removal efficiency would be not less than 99%.	New development area of the Project	Project Proponent	√		√	EIAO-TM
<b>Water Quality Impact</b>								
Construction Phase								
4.11.2	3.2	<u>Construction Site Run-off and General Construction Activities</u> Water used in ground boring and drilling for site investigation or rock / soil anchoring should as far as practicable be re-circulated after sedimentation. When there is a need for final disposal, the wastewater should be discharged into storm drains via silt removal facilities.	Construction site	Contractor		√		Water Pollution Control Ordinance (WPCO), EIAO-TM, The Professional Persons Environmental Consultative Committee Practice Note on Construction Site Drainage

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Locations of Measures	Implementation Agent(s)	Implementation Stage *			Relevant Legislation & Guidelines
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								(ProPECC PN 1/94)
4.11.3	3.2	All vehicles and plant should be cleaned before they leave a construction site to minimize the deposition of earth, mud, debris on roads. A wheel washing bay should be provided at every site exit if practicable and wash-water should have sand and silt settled out or removed before discharging into storm drains. The section of construction road between the wheel washing bay and the public road should be paved with backfall to reduce vehicle tracking of soil and to prevent site run-off from entering public road drains.	Construction site	Contractor		√		WPCO, ProPECC PN 1/94, EIAO-TM
4.11.4	3.2	Good site practices should be adopted to remove rubbish and litter from construction sites so as to prevent the rubbish and litter from spreading from the site area. It is recommended to clean the construction sites on a regular basis.	Construction site	Contractor		√		WPCO, EIAO-TM, Waste Disposal Ordinance (WDO)
4.11.5 - 4.11.6	3.2	The site practices outlined in ProPECC PN 1/94 "Construction Site Drainage" should be followed as far as practicable to minimize surface run-off and the chance of erosion. Surface run-off from construction sites should be discharged into storm drains via adequately designed sand/silt removal facilities such as sand traps, silt traps and sedimentation basins. Channels, earth bunds or sandbag barriers should be provided on site to properly direct stormwater to such silt removal facilities. Perimeter channels at site boundaries should be provided on site boundaries where necessary to intercept storm run-off from outside the site so that it will not wash across the site. Catchpits and perimeter channels should be constructed in advance of site formation works and earthworks.	Construction site	Contractor		√		WPCO, EIAO-TM, ProPECC PN 1/94

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Locations of Measures	Implementation Agent(s)	Implementation Stage *			Relevant Legislation & Guidelines
					Des	C	O	
4.11.7	3.2	Silt removal facilities, channels and manholes should be maintained and the deposited silt and grit should be removed regularly, at the onset of and after each rainstorm to prevent local flooding. Before disposal at the public fill reception facilities, the deposited silt and grit should be solicited in such a way that it can be contained and delivered by dump truck instead of tanker truck. Any practical options for the diversion and re-alignment of drainage should comply with both engineering and environmental requirements in order to provide adequate hydraulic capacity of all drains. Minimum distance of 100m should be maintained between the discharge points of construction site run-off and the existing saltwater intakes.	Construction site	Contractor		√		WPCO, EIAO-TM, ProPECC PN 1/94
4.11.8	3.2	Construction works should be programmed to minimize soil excavation works in rainy seasons (April to September). If excavation in soil cannot be avoided in these months or at any time of year when rainstorms are likely, for the purpose of preventing soil erosion, temporary exposed slope surfaces should be covered e.g. by tarpaulin, and temporary access roads should be protected by crushed stone or gravel, as excavation proceeds. Intercepting channels should be provided (e.g. along the crest / edge of excavation) to prevent storm runoff from washing across exposed soil surfaces. Arrangements should always be in place in such a way that adequate surface protection measures can be safely carried out well before the arrival of a rainstorm.	Construction site	Contractor		√		WPCO, EIAO-TM, ProPECC PN 1/94
4.11.9	3.2	Earthworks final surfaces should be well compacted and the subsequent permanent work or surface protection should be carried out immediately after the final surfaces are formed to prevent erosion caused by rainstorms. Appropriate drainage like intercepting channels should be provided where necessary.	Construction site	Contractor		√		WPCO, EIAO-TM, ProPECC PN 1/94

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Locations of Measures	Implementation Agent(s)	Implementation Stage *			Relevant Legislation & Guidelines
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4.11.10	3.2	Measures should be taken to minimize the ingress of rainwater into trenches. If excavation of trenches in wet seasons is necessary, they should be dug and backfilled in short sections. Rainwater pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities.	Construction site	Contractor		√		WPCO, EIAO-TM, ProPECC PN 1/94
4.11.11	3.2	Construction materials (e.g. aggregates, sand and fill material) on sites should be covered with tarpaulin or similar fabric during rainstorms.	Construction site	Contractor		√		WPCO, EIAO-TM, ProPECC PN 1/94
4.11.12	3.2	Manholes (including newly constructed ones) should always be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris from getting into the drainage system, and to prevent storm run-off from getting into foul sewers. Discharge of surface run-off into foul sewers must always be prevented in order not to unduly overload the foul sewerage system.	Construction site	Contractor		√		WPCO, EIAO-TM, ProPECC PN 1/94
4.11.13	3.2	A discharge license should be applied from the EPD for discharge of effluent from the construction site under the WPCO. The discharge quality must meet the requirements specified in the discharge license. All the runoff and wastewater generated from the works areas should be treated so that it satisfies all the standards listed in the Technical Memorandum on Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters (TM-DSS). The beneficial uses of the treated effluent for other on-site activities such as dust suppression, wheel washing and general cleaning etc., can minimize water consumption and reduce the effluent discharge volume. If monitoring of the treated effluent quality from the works areas is required during the construction phase of the Project, the monitoring should be carried out in accordance with the relevant WPCO	Construction site	Contractor		√		WPCO, EIAO-TM, ProPECC PN 1/94, Technical Memorandum on Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters (TM-DSS)

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Locations of Measures	Implementation Agent(s)	Implementation Stage *			Relevant Legislation & Guidelines
					Des	C	O	
		license which is under the ambit of regional office (RO) of EPD.						
4.11.14	3.2	<p><u>Accidental Chemical Spillage</u></p> <p>Contractor must register as a chemical waste producer if chemical wastes would be produced from the construction activities. The Waste Disposal Ordinance (WDO) and its subsidiary regulations in particular the Waste Disposal (Chemical Waste) (General) Regulation, should be observed and complied with for control of chemical wastes.</p>	Construction site	Contractor		√		WPCO, EIAO-TM, WDO
4.11.15	3.2	Any service shop and maintenance facilities should be located on hard standings within a bunded area, and sumps and oil interceptors should be provided. Maintenance of vehicles and equipment involving activities with potential for leakage and spillage should only be undertaken within the areas appropriately equipped to control these discharges.	Construction site	Contractor		√		WPCO, EIAO-TM, WDO
4.11.16	3.2	Disposal of chemical wastes should be carried out in compliance with the WDO. The Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes published under the WDO should be followed to avoid leakage or spillage of chemicals.	Construction site	Contractor		√		WPCO, EIAO-TM, WDO, Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes
4.11.17	3.2	<p><u>Sewage Effluent from Construction Workforce</u></p> <p>Sufficient chemical toilets should be provided in the works areas. A licensed waste collector should be deployed to clean the chemical toilets on a regular basis.</p>	Construction site	Contractor		√		WPCO, EIAO-TM, WDO
4.11.18	3.2	Notices should be posted at conspicuous locations to remind the workers not to discharge any sewage or wastewater into the surrounding environment.	Construction site	Contractor		√		WPCO, EIAO-TM

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Locations of Measures	Implementation Agent(s)	Implementation Stage *			Relevant Legislation & Guidelines
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4.11.19	3.2	<p><u>Contaminated Site Run-off</u></p> <p>Any excavated contaminated material and exposed contaminated surface should be properly housed and covered to avoid generation of contaminated run-off. Open stockpiling of contaminated materials should not be allowed. Any contaminated run-off should be properly collected and treated to reduce the pollution level to an acceptable standard and remove any prohibited substances (such as total petroleum hydrocarbon) to an undetectable range. All treated effluent shall meet the conditions of the discharge license and the requirements as stated in the TM-DSS.</p>	Construction site	Contractor		√		WPCO, EIAO-TM, TM-DSS
4.11.20	3.2	<p><u>Demolition Works</u></p> <p>The decommissioned treatment facilities shall be cleaned prior to their demolition or removal. All wastewater residues, if any, in the decommissioned facilities shall be properly collected, contained and treated within the plant and shall not be discharged directly into the drainage system or the environment. Chemical residues, if any, in the decommissioned facilities shall be properly collected, handled and disposed in accordance with the Waste Disposal (Chemical Waste) (General) Regulations and the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes published by EPD, and should be collected by a licensed chemical waste collector for proper disposal at the Chemical Waste Treatment Centre at Tsing Yi.</p>	Construction site	Contractor		√		WPCO, EIAO-TM, WDO, Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes
4.11.21	3.2	<p>Proper site practice and good site management (as specified in the ProPECC PN 1/94 "Construction Site Drainage") and presented in EIA Reference Sections 4.11.2 to 4.11.13 above shall be followed to prevent polluted run-off and site effluent generated from the demolition works areas from directly entering the surrounding waters.</p>	Construction site	Contractor		√		WPCO, EIAO-TM, ProPECC PN 1/94

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Locations of Measures	Implementation Agent(s)	Implementation Stage *			Relevant Legislation & Guidelines
					Des	C	O	
Operational Phase								
4.12.3	3.2	<p><u>THEES Maintenance</u></p> <p>The THEES should be regularly maintained to ensure that it is functioning properly. This will avoid any emergency repair of the THEES or unexpected discharge of treated sewage into the Tolo Harbour.</p>	THEES	THEES operator	√		√	WPCO, EIAO-TM
4.12.4	3.2	<p>The regular THEES maintenance event should be carefully planned and scheduled outside the peak algae blooming season. (i.e. December to April/May) to minimize the risk of red tides. Relevant parties including the EPD, Agriculture, Fisheries and Conservation Department (AFCD), Water Supplies Department (WSD) and the key stakeholders for mariculture and fisheries in Tolo Harbour should be informed of the THEES maintenance event prior to any discharge. The number of red tide incidents was found lowest from July to November according to the data from past record. It is recommended that shutdown of the THEES, if unavoidable, should be arranged within the period from July to November and should be shortened as far as possible. The scheduling of the maintenance discharge should also take into account any ongoing blooming event in the area, which may occur outside the blooming season. In planning of the maintenance work and before the maintenance discharge, AFCD should be consulted to seek advice on the potential for red tide occurrence in the receiving water. The maintenance discharge should be rescheduled or postponed based on AFCD's advice, as necessary.</p>	THEES	THEES operator	√		√	WPCO, EIAO-TM
4.12.5	3.2	<p><u>Emergency Discharge</u></p> <p>Dual power supply or ring main supply from CLP should be provided for the Project to prevent the occurrence of power failure. In addition, standby facilities for the main</p>	Project site	Project Proponent	√		√	WPCO, EIAO-TM

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Locations of Measures	Implementation Agent(s)	Implementation Stage *			Relevant Legislation & Guidelines
					Des	C	O	
		treatment units and standby equipment parts / accessories should also be provided in order to minimize the chance of emergency discharge.						
4.12.6	3.2	To provide a mechanism to minimize the impact of emergency discharges and facilitate subsequent management of any emergency, an emergency contingency plan has been formulated by the DSD to clearly state the response procedure in case of pumping stations or sewage treatment works failure. The plant operators of the Project should carry out necessary follow-up actions according to the procedures of this existing contingency plan to minimize any water quality impact due to emergency discharge. The plant operators of the Project should also closely communicate with WSD in order to minimize any impact on WSD seawater intake due to emergency discharge. WSD may consider shutting down the Tai Po seawater pumping station or provision of a higher disinfection level for a short period of time in order to minimize any adverse impacts, should such be necessary.	Project site	Plant operators	√		√	WPCO, EIAO-TM
4.12.7	3.2	<u>Handling and Transportation of Pre-treated Food Waste</u> The incoming pre-treated food waste should be transferred to the Project facilities through enclosed pipelines. The pre-treated food waste loading and handling areas of this Project should be enclosed within buildings to contain any accidental spills.	Project site	Project Proponent	√		√	WPCO, EIAO-TM
4.12.8	3.2	<u>Wastewater from Sludge / Pre-treated Food Waste</u> All wastewater generated from the sludge dewatering process and the pre-treated food waste related facilities should be fed back into the upgraded Tai Po Sewage Treatment Works (TPSTW) for treatment before final	Project site	Project Proponent / plant operators	√		√	WPCO, EIAO-TM

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Locations of Measures	Implementation Agent(s)	Implementation Stage *			Relevant Legislation & Guidelines
					Des	C	O	
		disposal. No direct discharge of wastewater shall be allowed under this Project.						
4.12.9	3.2	<p>Best Management Practices (BMPs) to reduce storm water and non-point source pollution are also proposed as follows:</p> <p><u>Design Measures</u></p> <ul style="list-style-type: none"> <li>▪ Exposed surface shall be avoided within the proposed Project site to minimize soil erosion. Development site shall be either hard paved or covered by landscaping area where appropriate to reduce soil erosion.</li> <li>▪ The drainage system of the Project should be designed to avoid any case of flooding.</li> </ul> <p><u>Devices/ Facilities to Control Pollution</u></p> <ul style="list-style-type: none"> <li>▪ Screening facilities such as standard gully grating and trash grille, with spacing which is capable of screening off large substances such as fallen leaves and rubbish should be provided at the inlet of drainage system.</li> <li>▪ Road gullies with standard design and silt traps should be incorporated during the detailed design of any new access roads to remove particles present in storm water runoff.</li> </ul> <p><u>Administrative Measures</u></p> <ul style="list-style-type: none"> <li>▪ Good management measures such as regular cleaning and sweeping of road surface / open areas is proposed. The road surface / open area cleaning should also be carried out prior to occurrence of rainstorm.</li> <li>▪ Manholes, as well as storm water gullies, ditches provided among the development areas should be regularly inspected and cleaned (e.g. monthly). Additional inspection and cleansing should be carried out before forecast heavy rainfall.</li> </ul>	Project site	Project Proponent	√		√	WPCO, EIAO-TM, ProPECC PN 5/93

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Locations of Measures	Implementation Agent(s)	Implementation Stage *			Relevant Legislation & Guidelines
					Des	C	O	
4.12.10	3.2	<p><u>Chemical Spillage</u></p> <p>Chemical storage and handling areas should be bunded and enclosed within buildings. Separate drainage system should be provided as appropriate to avoid any spilled chemicals from entering into the storm drain in case of accidental spillage. Also, adequate tools for cleanup of spilled chemicals should be stored on site and appropriate training shall be provided to staff to reduce the chance of water pollution.</p>	Project site	Project Proponent / plant operators	√		√	WPCO, EIAO-TM, WDO, Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes
<b>Ecological Impact</b>								
Terrestrial Ecology								
5.11.3	4.2	<p><u>Mitigation for Direct Impact to Roosting Non-breeding Ardeids</u></p> <p>During the demolition, site clearance works would cause a loss of an occasional night roost habitat for ardeids. Before the removal (transplantation if practicable) of the tree group, the trees should be well-separated from construction works (use of hoarding). All noisy construction works within 100m of the tree group should cease at least 1 hour before sunset.</p>	Construction site	Contractor		√		EIAO-TM
5.11.4	4.2	<p>As the trees are to be removed, mitigation could be by way of transplantation (if practicable) or compensatory planting of suitable trees within the new TPSTW layout. Transplantation Proposal shall be prepared to confirm the location, quantity and condition of the trees within the tree group, and propose methodology and receptor site(s) to transplant any of these trees that are to be affected by the construction works. Compensatory planting of suitable trees within TPSTW shall be implemented if transplanting the identified tree group is impracticable based on the tree assessment. A detailed Compensation Plan shall be prepared by a qualified botanist/ plant</p>	Construction site	Project Proponent / Contractor	√	√		EIAO-TM

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Locations of Measures	Implementation Agent(s)	Implementation Stage *			Relevant Legislation & Guidelines
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		ecologist with relevant experience. It is recommended that compensatory planting should be completed before the removal of the roosting trees and the removal of trees should be arranged in wet season when the number of roosting ardeids is generally lower. Tree species to be replanted will make reference to those utilised by ardeids and shall be in heavy standard. The new tree group can provide longer term roosting opportunities. The noisy construction works within 100 m from the relevant transplantation / compensation area should cease at least 1 hour before sunset, after the transplantation / compensatory planting.						
5.11.5	4.2	Avoidance of tree felling/removal/transplantation works at least 1 hour before the sunset is recommended to avoid any direct disturbances to the night roosting activities.	Construction site	Contractor		√		EIAO-TM
5.11.6	4.2	<u>Mitigation for Disturbance during Construction Phase</u> <i>Environmental Awareness and Construction Works Boundary</i> Construction workers should be briefed regarding the sensitivity of the areas before the commencement of the works, and requested not to disturb any areas nearby (e.g. plantation adjacent to eastern boundary of TPSTW). Furthermore, the works boundary of different phases should be clearly defined (i.e. fenced with screening materials) and any works beyond the boundary should be strictly prohibited.	Construction site	Contractor		√		EIAO-TM
5.11.7 & 5.11.8	4.2	<i>Consideration of Alternative Piling Method</i> Quieter non-percussive piling method, e.g. pre-bored steel H piles, is proposed to be adopted under this Project to minimize the noise impact where practicable. Alternatively, in case the future detailed design of the Project reveals that the quieter piling methods are not	Construction site	Contractor		√		EIAO-TM

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Locations of Measures	Implementation Agent(s)	Implementation Stage *			Relevant Legislation & Guidelines
					Des	C	O	
		practical, conventional percussive piling should be used within non-sensitive hours (e.g. close to noon or at least 1 hour before the sunset) as far as practicable.						
5.11.9	4.2	<p><i>Good Site Practices</i></p> <p>The following measures should be practised during each phase of construction.</p> <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 programme;</li> <li>▪ Machines and plant (such as trucks, breakers) that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum;</li> <li>▪ Plant known to emit noise strongly in one direction, where possible, be orientated so that the noise is directed away from the plantation of Shuen Wan Restored Landfill (SWRL);</li> <li>▪ Silencers or mufflers on construction equipment should be properly fitted and maintained during the construction works;</li> <li>▪ Noisy construction activities such as concrete breaking, should be scheduled to less sensitive hours during the day, e.g. midday as far as possible;</li> <li>▪ Mobile plant should be sited as far away from the plantation of SWRL as possible and practicable; and</li> <li>▪ Material stockpiles, site office and other structures should be effectively utilized, where practicable, to screen noise from on-site construction activities.</li> </ul>	Construction site	Contractor		√		EIAO-TM
5.11.10	4.2	<p><i>Use of Quality Powered Mechanical Equipment</i></p> <p>The Contractor should source quiet plant associated with the construction works from the Powered Mechanical Equipment (PME) listed in the Quality PME (QPME)</p>	Construction site	Contractor		√		EIAO-TM

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Locations of Measures	Implementation Agent(s)	Implementation Stage *			Relevant Legislation & Guidelines
					Des	C	O	
		system and other commonly used PME listed in EPD web pages as far as possible.						
5.11.12, 5.11.13, Figure 5.5	4.2	<p><i>Use of Movable and Non-reflective Temporary Noise Barriers</i></p> <p>Movable and non-reflective temporary noise barriers with sound absorptive materials can be placed close to noisy plant and be moved concurrently with the plant along a worksite for effective noise screening from the plantation adjacent to the eastern boundary of TPSTW where the pre-roosting sites of Collared Crow were identified (see Figure 5.5). Typical design of the noise barrier could be in the form of a vertical barrier with a small-cantilevered upper portion. A cantilevered top cover would also be adopted as required to block the direct line of sight towards the pre-roosting sites of Collared Crow.</p> <p>These movable and non-reflective temporary noise barriers with sound absorptive materials are recommended to be used for noisy PME including breakers, excavators and generators as far as practicable.</p>	Construction site	Contractor		√		EIAO-TM
5.11.14	4.2	<p><i>Control of Construction Site Run-off</i></p> <p>The relevant best practices including the requirements specified in the Professional Persons Environmental Consultative Committee Practice Note on Construction Site Drainage (ProPECC PN 1/94) should be followed to minimize the water quality impacts.</p>	Construction site	Contractor		√		EIAO-TM
5.11.15	4.2	<p><i>Construction Dust Suppression Measures</i></p> <p>The dust control measures stipulated in the Air Pollution Control (Construction Dust) Regulations should be implemented for the construction of the proposed Project, where applicable, to minimize the construction dust impacts.</p>	Construction site	Contractor		√		EIAO-TM

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Locations of Measures	Implementation Agent(s)	Implementation Stage *			Relevant Legislation & Guidelines
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5.11.16 & 5.11.17	4.2	<p><i>Mitigation of Indirect Disturbance to Roosting Non-breeding Ardeids</i></p> <p>The concerned tree group located at the southwest portion of TPSTW supports occasional ardeid night roosting. The mitigation measures and good site practices as described above would also serve to protect the roosting non-breeding ardeids from indirect disturbance during the construction phase. Before the removal (or transplantation if practicable) of the concerned tree group at the interim construction stage, the trees should be well-separated from construction works (use of hoarding). Noisy construction works within 100m of the concerned tree group should cease at least 1 hour before sunset.</p> <p>The intensity of the construction lighting, if required, should be controlled to the lowest possible level. Unnecessary lighting should be turned off outside working hours of the construction sites.</p>	Construction site	Contractor		√		EIAO-TM
<b>Marine Ecology</b>								
4.11 & 4.12	4.2	Mitigation measures recommended in the Water Quality Impact Assessment of this EIA for controlling water quality impact (as presented above) would also serve to protect marine ecological resources from indirect impacts.	Construction site / Project site / THEES	Contractor / Project Proponent / THEES and TPSTW operators	√	√	√	-
<b>Fisheries Impact</b>								
4.11 & 4.12	5.2	Mitigation measures recommended in the Water Quality Impact Assessment of this EIA for controlling water quality impact (as presented above) would also serve to protect fisheries resources and activities from indirect impacts.	Construction site / Project site / THEES	Contractor / Project Proponent / THEES and TPSTW operators	√	√	√	-

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Locations of Measures	Implementation Agent(s)	Implementation Stage *			Relevant Legislation & Guidelines
					Des	C	O	
<b>Landscape and Visual Impact</b>								
Construction Phase								
Table 7.13	6.2	<u>Good Site Management and Practice</u> Construction site should be kept clean and tidy and construction material should be stored in order. All stockpiling areas and idled area shall be covered by tarpaulin sheet as far as possible.	Construction site	Contractor		√		EIAO-TM
Table 7.13	6.2	<u>Erection of Decorative Screen Hoarding</u> Each site should be provided with decorative screen hoarding compatible with surrounding setting.	Construction site	Contractor		√		EIAO-TM
Table 7.13	6.2	<u>Tree Preservation</u> The existing trees shall be preserved as far as possible. The retained existing trees on site shall be protected carefully during construction. The requirement specified DEVB TCW No. 4/2020 and “Guidelines on Tree Preservation during Development” issued by Development Bureau shall be followed. Any existing vegetation in landscaped areas and natural terrain not to be affected by the Project shall be carefully preserved.	Project site	Project Proponent	√	√		EIAO-TM, DEVB TCW No. 4/2020, Guidelines on Tree Preservation during Development Transplanting issued DEVB
Table 7.13	6.2	<u>Tree Transplanting / Compensatory Tree Planting</u> Trees unavoidably affected by the Project shall be transplanted in accordance with “Guidelines on Tree Transplanting” issued by Development Bureau as far as possible. Any unavoidable tree felling shall be mitigated by compensatory tree planting in accordance with DEVB TCW No. 4/2020.  In particular, compensatory planting for the same species of the mature trees (in LR1.1 and LR1.2) to be felled would be provided with sufficient planting space within the	Project site	Project Proponent / LCSD / AFCD / LandsD / Allocatee department  (Dependent on location of new planting in accordance with DEVB TC(W) No. 6/2015)	√	√		EIAO-TM, DEVB TCW No. 4/2020, Guidelines on Tree Transplanting issued by DEVB

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Locations of Measures	Implementation Agent(s)	Implementation Stage *			Relevant Legislation & Guidelines
					Des	C	O	
		Project site or nearby off-site area.						
<b>Operational Phase</b>								
Table 7.14	6.2	<u>Tree Planting along Site Boundary</u> Tree planting shall be provided along the site boundary as far as practicable to provide visual screening effect.	Project site	Project Proponent	√		√	EIAO-TM
Table 7.14	6.2	<u>Infill Planting</u> Infill planting of trees, shrubs and/or groundcovers shall be provided where space is available.	Project site	Project Proponent	√		√	EIAO-TM
Table 7.14	6.2	<u>Green Roof and Vertical Greening</u> Where practicable, green roof and vertical greening on the external walls without the coverage of architectural elements will be provided.	Proposed development area of the Project	Project Proponent	√		√	EIAO-TM
Table 7.14	6.2	<u>Responsive Building Design</u> Aesthetically pleasing design as regard to the form, material and finishes shall be incorporated to all buildings, engineering structures and associated infrastructure facilities so as to blend in the buildings and structures to the adjacent landscape and visual context.	Proposed development area of the Project	Project Proponent	√		√	EIAO-TM
<b>Hazard to Life</b>								
8.12.1	7.2	It is recommended to develop a joint emergency response plan between the building management team of development, The Hong Kong and China Gas Company Limited (Towngas), Fire Services Department and TPSTW in case of emergency in the Tai Po Gas Production Plant (TPGPP). The joint emergency response plan should detail the communication protocol between TPGPP and emergency responders as well as between	Project site	Project Proponent	√	√	√	EIAO-TM

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Locations of Measures	Implementation Agent(s)	Implementation Stage *			Relevant Legislation & Guidelines
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		TPGPP and TPSTW (if required), and also review if drill is required periodically.						
8.12.1	7.2	Flammable Gas and H <sub>2</sub> S detectors shall be provided in the biogas area to alert people to initiate the appropriate emergency actions including suspension of construction work and machine shutdown which may act as ignition sources when there is leak detection.	Project site	Project Proponent	√	√	√	EIAO-TM
8.12.1	7.2	Emergency response plan with details of on-site emergency procedures shall be developed for both construction phase and operational phase of the Project to cover the potential accident due to biogas releases. This plan should be extended to cover the concurrent construction project on site, and regular drills should also be performed.	Project site	Project Proponent	√	√	√	EIAO-TM
8.12.1	7.2	Only authorized vehicles shall be permitted to enter the Project site with restriction of speed for vehicle movements in the site. Safety markings and marked crash barriers shall be provided to the above ground piping, digesters and gas holders near the access road.	Project site	Plant operators / Contractor	√	√	√	EIAO-TM
8.12.1	7.2	Prior to the Project construction, suitable concurrent construction and operations risk and safety assessment shall be carried out to identify the potential hazards arising from the simultaneous Project construction and operation of biogas facilities onsite. Suitable risk mitigation measure shall be implemented for any significant risk activity identified. For examples, all major construction activities should be arranged with either adequate setback or physical barrier from the existing gas installations; implementation of major construction works and movement of plants and vehicles would be stringently controlled to have suitable setback clearance,	Project site	Project Proponent, plant operators and Contractor	√	√	√	EIAO-TM

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Locations of Measures	Implementation Agent(s)	Implementation Stage *			Relevant Legislation & Guidelines
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		or physical barrier with an empty digester / gas holder from the digesters / gas holders in operation. This hazard control assessment should be extended to cover the concurrent construction project on site.						
<b>Landfill Gas Hazard</b>								
Construction Phase								
9.7.2	8.2	<p><u>Safety Measures</u></p> <p>The following safety measures shall be implemented during the construction phase:</p> <ul style="list-style-type: none"> <li>▪ All personnel who work on site and all visitors to the site should be made aware of the possibility of ignition of gas in the vicinity of excavations. Safety notices should be posted warning of the potential hazards.</li> <li>▪ A Safety Officer, trained in the use of gas detection equipment and landfill gas-related hazards, should be present on site during the groundworks trenching and construction stages.</li> <li>▪ All staff working in the Consultation Zone should receive appropriate training on working in areas susceptible to landfill gas, fire and explosion hazards.</li> <li>▪ An excavation procedure or code of practice to minimize landfill gas related risk should be devised and carried out.</li> <li>▪ No worker should be allowed to work alone at any time in or near to any excavation areas within the Consultation Zone. At least one other worker should be available to assist with a rescue if needed.</li> <li>▪ Smoking, naked flames and all other sources of ignition should be prohibited within 15m of any excavation or ground-level confined space. 'No smoking' and 'No naked flame' notices should be posted prominently on the construction site, especially in excavation or trenches.</li> </ul>	Construction site	Contractor		√		Landfill Gas Hazard Assessment Guidance Note (EPD/TR8/ 97)

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Locations of Measures	Implementation Agent(s)	Implementation Stage *			Relevant Legislation & Guidelines
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		<ul style="list-style-type: none"> <li>▪ Welding, flame-cutting or other hot works should be confined to open areas at least 15m from any trench or excavation.</li> <li>▪ Welding, flame-cutting or other hot works may only be carried out in trenches or confined spaces when controlled by a 'permit to work' procedure, properly authorized by the Safety Officer.</li> <li>▪ The permit to work procedure should set down clearly the requirements for continuous monitoring for methane, carbon dioxide and oxygen throughout the period during which the hot works are in progress. The procedure should also require the presence of an appropriately qualified person, in attendance outside the 'confined area', who shall be responsible for reviewing the gas measurements as they are made, and who shall have executive responsibility for suspending the work in the event of unacceptable or hazardous conditions. Only those workers who are appropriately trained and fully aware of the potentially hazardous conditions which may arise should be permitted to carry out hot works in confined areas.</li> <li>▪ Ground level construction plant used within in Consultation Zone should be fitted with vertical exhausts at least 0.6m above ground level and with spark arrestors.</li> <li>▪ Any electrical equipment, such as motors and extension cords, should be intrinsically safe.</li> <li>▪ During piping assembly or conduiting construction within Consultation Zone, all valves/seals should be closed immediately after installation. As construction progresses, all valves/seals should be closed as installed to prevent the migration of gases through the pipeline/conduit. All piping/conduiting should be capped at the end of each working day.</li> </ul>						

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Locations of Measures	Implementation Agent(s)	Implementation Stage *			Relevant Legislation & Guidelines
					Des	C	O	
		<ul style="list-style-type: none"> <li>▪ Mobile offices, equipment stores, mess rooms etc. should be located on an area which has been proven to be gas free (by survey with portable gas detectors) and ongoing monitoring / measurement should be carried out, preferably at least at the beginning of every working day, to ensure that these areas remain gas free. Alternatively, such buildings should be raised clear of the ground. If buildings are raised clear of the ground, a minimum, clear separation distance (as measured from the highest point on the ground surface to the underside of the lowest floor joist) should be 500mm.</li> <li>▪ Adequate fire extinguishing equipment, fire-resistant clothing and breathing apparatus sets should be made available on site. Fire drills should be organized at not less than six monthly intervals.</li> </ul>						
9.7.3 & Table 9.8	8.3	<p><b>Landfill Gas (LFG) Monitoring</b></p> <p>LFG Monitoring shall be undertaken during construction phase as described below:</p> <ul style="list-style-type: none"> <li>▪ Periodically during ground-works construction, the works area should be monitored for methane, carbon dioxide and oxygen using appropriately calibrated portable gas detection equipment.</li> <li>▪ The monitoring frequency and areas to be monitored should be set down prior to commencement of ground-works either by the Safety Officer or by an appropriately qualified person.</li> <li>▪ Routine monitoring should be carried out in all excavations, manholes and chambers and any other confined spaces that may have been created by, for example, the temporary storage of building materials on the site surface.</li> <li>▪ All measurements in excavations should be made with the monitoring tube located not more than 10mm from the exposed ground surface.</li> </ul>	Construction site	Contractor		√		Landfill Gas Hazard Assessment Guidance Note (EPD/TR8/ 97)

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Locations of Measures	Implementation Agent(s)	Implementation Stage *			Relevant Legislation & Guidelines
					Des	C	O	
		<ul style="list-style-type: none"> <li>▪ For excavations deeper than 1m, measurements should be made:                             <ul style="list-style-type: none"> <li>- at the ground surface before excavation commences;</li> <li>- immediately before any worker enters the excavation;</li> <li>- at the beginning of each working day for the entire period the excavation remains open; and</li> <li>- periodically through the working day whilst workers are in the excavation.</li> </ul> </li> <li>▪ For excavations between 300mm and 1m deep, measurements should be made:                             <ul style="list-style-type: none"> <li>- directly after the excavation has been completed; and</li> <li>- periodically whilst the excavation remains open.</li> </ul> </li> <li>▪ For excavations less than 300mm deep, monitoring may be omitted, at the discretion of the Safety Officer or other appropriately qualified person.</li> <li>▪ Depending on the results of the measurements, actions required will vary and should be set down by the Safety Officer or other appropriately qualified person. As a minimum these shall encompass those actions specified in Table 9.8 of this EIA Report.</li> <li>▪ The hazards from landfill gas during the construction phase shall be minimized by precautionary measures recommended in the Landfill Gas Hazard Assessment Guidance Note (EPD/TR8/97).</li> <li>▪ In any emergency situation, the Safety Officer or other appropriately qualified person, shall have the necessary authority and shall ensure that the confined space is evacuated and the necessary works implemented for reducing the concentrations of gas. The following organizations should also be contacted as appropriate:                             <ul style="list-style-type: none"> <li>- Hong Kong Police Force (HKPF);</li> <li>- Fire Services Department (FSD); and</li> </ul> </li> </ul>						

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Locations of Measures	Implementation Agent(s)	Implementation Stage *			Relevant Legislation & Guidelines
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		- Landfill Operator						
Operational Phase								
9.7.4	8.2	<u>Building Protection Design</u> Where below ground service entries are necessary to the buildings/facilities, the entry point should be sealed to prevent gas entry.	Proposed development area of the Project	Project Proponent	√		√	Landfill Gas Hazard Assessment Guidance Note (EPD/TR8/ 97)
9.7.5	8.2	Where practicable, natural ventilation through windows and openings, coupled with wind driven cowls and other devices as required, should be provided at or below the ground floor of new permanent building structures of the Project.	Proposed development area of the Project	Project Proponent	√		√	Landfill Gas Hazard Assessment Guidance Note (EPD/TR8/ 97)
9.7.6	8.2	Where natural ventilation is not feasible, the floors and walls at the ground level and the below ground rooms / voids of any proposed permanent structures should consist of gas resistant material with low gas permeability. Gas detection systems with audio alarm and forced ventilation should also be provided in such area of the Project. In addition, a clear void or a gas vent (e.g. in the form of no-fines gravel in trenches) should be created under these structures to vent and dilute any gas emitted from the ground.	Proposed development area of the Project	Project Proponent	√		√	Landfill Gas Hazard Assessment Guidance Note (EPD/TR8/ 97)
9.7.7	8.2	The aforementioned gas detection systems should be calibrated and maintained at regular basis in according to the recommendation of manufacturer's instruction. The operators of the Project should also make sure that the gas detection systems are in functions during the operational phase of the Project.	Proposed development area of the Project	Plant operators	√		√	Landfill Gas Hazard Assessment Guidance Note (EPD/TR8/ 97)
9.7.8	8.2	Forced ventilation should be used if methane of more than 0.5 % (by volume) in the internal atmosphere (e.g. in voids or rooms as mentioned above) is detected.	Proposed development area of the Project	Plant operators	√		√	Landfill Gas Hazard Assessment

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Locations of Measures	Implementation Agent(s)	Implementation Stage *			Relevant Legislation & Guidelines
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								Guidance Note (EPD/TR8/ 97)
9.7.9	8.2	No person should enter or remain in any confined spaces (e.g. in voids or rooms as mentioned above) where the carbon dioxide concentration exceeds 1.5 % (by volume).	Proposed development area of the Project	Plant operators	√		√	Landfill Gas Hazard Assessment Guidance Note (EPD/TR8/ 97)
9.7.10	8.2	Oxygen concentration should be monitored and no person shall enter or remain in any confined spaces (e.g. in voids or rooms as mentioned above) where the oxygen content of air has fallen below 18 % by volume.	Proposed development area of the Project	Plant operators	√		√	Landfill Gas Hazard Assessment Guidance Note (EPD/TR8/ 97)
9.7.11	8.2	All the access to these confined spaces (e.g. in rooms or voids as mentioned above) should be restricted only to authorised personnel who should be aware of the LFG hazard. No member of general public should be permitted or allowed to access these confined spaces, manholes or inspection chambers.	Proposed development area of the Project	Plant operators			√	Landfill Gas Hazard Assessment Guidance Note (EPD/TR8/ 97)
9.7.12	8.2	<u>Guidance for Entry into Manholes and Chambers</u> When service voids, manholes or inspection chambers within the proposed site are entered for maintenance, monitoring and a checklist system of safety requirements should be performed before entry in accordance with Code of Practice on Safety and Health at Work in Confined Spaces published by Labour Department.	Proposed development area of the Project	Plant operators			√	Landfill Gas Hazard Assessment Guidance Note (EPD/TR8/ 97)
9.7.13	8.2	All the access to the confined spaces would be restricted only to authorized personnel who should be aware of the LFG hazard. No member of general public should be permitted or allowed to access these confined spaces, manholes or inspection chambers.	Proposed development area of the Project	Plant operators			√	Landfill Gas Hazard Assessment Guidance Note (EPD/TR8/ 97)

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Locations of Measures	Implementation Agent(s)	Implementation Stage *			Relevant Legislation & Guidelines
					Des	C	O	
<b>Waste Management Implications</b>								
Construction Phase								
10.6.2 & 10.6.6	9.2	<u>General</u> An Environmental Management Plan (EMP) incorporating waste management shall be prepared and submitted to the Engineer for approval before construction works in accordance with ETWB TC(W) No. 19/2005.	Construction site	Contractor		√		EIAO-TM, WDO, ETWB TC(W) No. 19/2005
10.6.2	9.2	Training of construction staff should be undertaken about the concept of site cleanliness and appropriate waste management procedures. Toolbox talk for on-site sorting of Construction and Demolition (C&D) materials should be developed and provided to enhance workers' awareness in handling, sorting, reuse and recycling of C&D materials. Requirements for staff training should be included in the EMP.	Construction site	Contractor		√		EIAO-TM, WDO, ETWB TC(W) No. 19/2005
10.6.3	9.2	Good planning and site management practice should be employed to eliminate over ordering or mixing of construction materials to reduce wastage. Proper storage and site practices should be implemented to minimize the damage or contamination of construction materials.	Construction site	Contractor		√		EIAO-TM, WDO, ETWB TC(W) No. 19/2005
10.6.4	9.2	Where waste generation is unavoidable, the potential for recycling or reuse should be rigorously explored. If waste cannot be recycled, disposal routes described in the EMP shall be followed. A recording system for the amount of wastes generated, recycled and disposed (including the disposal sites) should be implemented. In order to monitor the disposal of C&D material and solid wastes at public filling facilities and landfills and to control fly-tipping, a trip-ticket system should be	Construction site / transportation routes of wastes	Contractor		√		EIAO-TM, WDO, ETWB TC(W) No. 19/2005, DEVB TC(W) No. 6/2010

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Locations of Measures	Implementation Agent(s)	Implementation Stage *			Relevant Legislation & Guidelines
					Des	C	O	
		included. DEVB TC(W) No. 6/2010 shall be referenced for details.						
10.6.5	9.2	Regular cleaning and maintenance of the waste storage area should be provided.	Construction site	Contractor		√		EIAO-TM, WDO, ETWB TC(W) No. 19/2005
10.6.4 & 10.6.6	9.2	An on-site environmental coordinator should be identified at the outset of the works. A waste recording system including the monthly and yearly Waste Flow Tables (WFT) should be included in the EMP to indicate the amounts of waste generated, recycled and disposed of (including final disposal site), and which shall be regularly updated. The reuse/recycling of all materials on site shall be investigated prior to treatment/ disposal off-site. Good site practices shall be adopted from the commencement of works to avoid the generation of waste, reduce cross contamination of waste and to promote waste minimization.	Construction site	Contractor		√		EIAO-TM, WDO, ETWB TC(W) No. 19/2005
10.6.7	9.2	<p><u>On-site Sorting, Reuse and Recycling</u></p> <p>All waste materials should be segregated into categories covering:</p> <ul style="list-style-type: none"> <li>▪ Inert C&amp;D materials suitable for reuse on-site.</li> <li>▪ Inert C&amp;D materials suitable for Public Fill Reception Facilities (PFRFs).</li> <li>▪ Recyclable non-inert C&amp;D materials for recycling.</li> <li>▪ Remaining non-inert C&amp;D materials for landfill.</li> <li>▪ Chemical waste.</li> <li>▪ General refuse for landfill.</li> </ul>	Construction site	Contractor		√		EIAO-TM, WDO, ETWB TC(W) No. 19/2005
10.6.8	9.2	Proper segregation and disposal of construction waste should be implemented. Separate containers should be provided for inert and non-inert C&D materials.	Construction site	Contractor		√		EIAO-TM, WDO, ETWB TCW No.19/2005
10.6.9	9.2	Specific area should be allocated for on-site sorting of C&D materials and to provide a temporary storage area	Construction site	Contractor		√		EIAO-TM, WDO, ETWB TC(W) No.

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Locations of Measures	Implementation Agent(s)	Implementation Stage *			Relevant Legislation & Guidelines
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		for those sorted materials. If area is limited, all C&D materials should at least be sorted on-site into inert and non-inert components. Non-inert C&D materials should be reused and recycled to local recycler wherever possible and disposed to the designated landfill only as a last resort. Inert C&D materials should be separated and reused in this or other projects (subject to approval by the relevant parties in accordance with the DEVB TC(W) No. 6/2010) before disposed of at a PFRF operated by Civil Engineering and Development Department (CEDD). Steel and other metals should be recovered from demolition waste stream and recycled.						19/2005, DEVB TC(W) No. 6/2010
10.6.10	9.2	<p><u>Construction and Demolition Material</u></p> <p>Inert C&amp;D materials should be temporarily stored on-site for use as backfill as far as possible. It should be properly covered with tarpaulin or similar impervious sheeting to prevent dust nuisance and site runoff. Surplus inert C&amp;D materials should be disposed of at PFRFs.</p>	Construction site	Contractor		√		EIAO-TM, WDO, ETWB TCW No.19/2005, APCO, WPCO
10.6.11	9.2	<p>Control measures for temporary stockpiles on-site should be taken in order to minimize the noise, generation of dust, pollution of water and visual impact. These measures include:</p> <ul style="list-style-type: none"> <li>▪ Surface of stockpiled soil should be regularly wetted with water especially during dry season;</li> <li>▪ Disturbance of stockpiled soil should be minimized;</li> <li>▪ Stockpiled soil should be properly covered with tarpaulin especially when heavy rain storms are predicted;</li> <li>▪ Stockpiling areas should be enclosed where space is available;</li> <li>▪ Stockpiling location should be away from the water bodies; and</li> </ul>	Construction site	Contractor		√		WDO, ETWB TCW No.19/2005, APCO, WPCO, NCO, EIAO-TM

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Locations of Measures	Implementation Agent(s)	Implementation Stage *			Relevant Legislation & Guidelines
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		<ul style="list-style-type: none"> <li>An independent surface water drainage system equipped with silt traps should be installed at the stockpiling area.</li> </ul>						
10.6.12	9.2	The Public Fill Committee of CEDD should be consulted for disposal of inert C&D materials to PFRFs while EPD should be consulted for disposal of non-inert C&D materials to landfill. Disposal of C&D materials to landfill must not have more than 50% (by weight) inert material. The C&D materials delivered for landfill disposal should contain no free water and the liquid content should not exceed 70% by weight.	Construction site / designated disposal sites of C&D materials	Contractor		√		EIAO-TM, WDO
10.6.13	9.2	In order to avoid dust impacts, any vehicle leaving a works area carrying inert or non-inert C&D materials should have their load covered up before leaving the construction site.	Construction site / transportation route of waste	Contractor		√		EIAO-TM, WDO, APCO
10.6.14	9.2	C&D materials should be disposed of at designated PFRFs or landfills. Disposal of these materials for the use at other construction projects is subject to the approval of the Engineer and/or other relevant reception authorities. Furthermore, unauthorized disposal of C&D materials in particular on private agricultural land is prohibited and may be subject to relevant enforcement and regulating actions. The disposal of C&D materials will be controlled through trip-ticket system in accordance with DEVB TC(W) No. 6/2010.	Construction site / designated disposal sites of C&D materials	Contractor		√		EIAO-TM, WDO
10.6.15	9.2	<u>Excavated Sediments</u> The sediment should be excavated, handled, transported and disposed of in a manner that would minimize adverse environmental impacts.	Construction site / transportation route of excavated sediment	Contractor		√		WDO, APCO, WPCO, EIAO-TM
10.6.16	9.2	Requirements of the Air Pollution Control (Construction Dust) Regulation, where relevant, shall be adhered to	Construction site	Contractor		√		EIAO-TM, APCO

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Locations of Measures	Implementation Agent(s)	Implementation Stage *			Relevant Legislation & Guidelines
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		during excavation, transportation and disposal of the sediment.						
10.6.17	9.2	In order to minimize the exposure to contaminated materials, workers shall, if necessary, wear appropriate personal protective equipment (PPE) when handling contaminated sediments. Adequate washing and cleaning facilities shall also be provided on site.	Construction site	Contractor		√		-
10.6.18	9.2	For off-site disposal, the requirements and procedures specified under ETWB TC(W) No. 34/2002 shall be followed. Marine Fill Committee (MFC) of CEDD is managing the disposal facilities in Hong Kong for the excavated sediment, while EPD is the authority of issuing marine dumping permit under the DASO.	Construction site / designated sediment disposal site	Contractor		√		Dumping at Sea Ordinance (DASO), ETWB TC(W) No. 34/2002
10.6.19	9.2	To ensure disposal space is allocated for the Project, the Project Proponent should be responsible for obtaining agreement from MFC on the rationale for sediment removal and the allocation of the disposal site. The contractor(s), on the other hand, should be responsible for the application of the marine dumping permit under DASO from EPD for the sediment disposal.	Construction site / designated sediment disposal site	Contractor		√		DASO, ETWB TC(W) No. 34/2002
10.6.20	9.2	The excavated sediments are expected to be loaded onto the barge at public barging point of which the exact location should be determined by the contractor(s) and agreed by EPD/CEDD and transported to the designated disposal sites allocated by MFC. The excavated sediment would be disposed of according to its determined disposal options and ETWB TC(W) No. 34/2002.	Loading point, transportation route and designated disposal site of sediments	Contractor		√		DASO, ETWB TC(W) No. 34/2002
10.6.21	9.2	Stockpiling of contaminated sediments should be avoided as far as possible. If temporary stockpiling of contaminated sediments is necessary, the excavated sediment should be covered by tarpaulin and the area should be placed within earth bunds or sand bags to	Construction site	Contractor		√		EIAO-TM, WPCO

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Locations of Measures	Implementation Agent(s)	Implementation Stage *			Relevant Legislation & Guidelines
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		prevent leachate from entering the ground, nearby drains and surrounding water bodies. The stockpiling areas for contaminated sediments should be paved with impermeable linings to avoid contamination to underlying soil or groundwater. Separate and clearly defined areas should be provided for stockpiling of contaminated and uncontaminated materials. Leachate, if any, should be collected and discharged according to the WPCO.						
10.6.22	9.2	In order to minimize the potential odour / dust emissions during excavation and transportation of the sediment, the excavated sediments shall be wetted during excavation / material handling and shall be properly covered when placed on trucks or barges. Loading of the excavated sediment to the barge shall be controlled to avoid splashing and overflowing of the sediment slurry to the surrounding water.	Construction site / transportation route of sediments	Contractor		√		EIAO-TM, APCO, WPCO
10.6.23	9.2	The barge transporting the sediments to the designated disposal sites shall be equipped with tight fitting seals to prevent leakage and shall not be filled to a level that would cause overflow of materials or laden water during loading or transportation. In addition, monitoring of the barge loading shall be conducted to ensure that loss of material does not take place during transportation. Transport barges or vessels shall be equipped with automatic self-monitoring devices as specified by the EPD.	Construction site / transportation route of sediments	Contractor		√		EIAO-TM, WPCO
10.6.24	9.2	<u>Chemical Waste</u> Should any chemical waste be generated, the contractor/operator must register with EPD as a chemical waste producer. Wastes classified as chemical wastes are listed in the Waste Disposal (Chemical Waste) (General) Regulation. These wastes are subject to stringent disposal routes. EPD requires information on	Construction site	Contractor		√		EIAO-TM, WDO

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Locations of Measures	Implementation Agent(s)	Implementation Stage *			Relevant Legislation & Guidelines
					Des	C	O	
		the particulars of the waste generation processes including the types of waste produced, their location, quantities and generation rates.						
10.6.25	9.2	Storage, handling, transport and disposal of chemical waste should be arranged in accordance with the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes published by EPD, and should be collected by a licensed chemical waste collector.	Construction site	Contractor		√		EIAO-TM, WDO, Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes
10.6.26	9.2	Suitable containers should be used for specific types of chemical wastes. The containers should be properly labelled (in English and Chinese in accordance with instructions prescribed in Schedule 2 of the Regulations), resistance to corrosion, stored safely and closely secured. Stored volume should not be kept more than 450 liters unless the specification has been approved by the EPD. Storage area should be enclosed by three sides by a wall, partition of fence that is at least 2 m height or height of tallest container with adequate ventilation and space.	Construction site	Contractor		√		EIAO-TM, WDO, Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes
10.6.27	9.2	Hard standing, impermeable surfaces draining via oil interceptors should be provided in works area compounds. Interceptors should be regularly emptied to prevent release of oils and grease into the surface water drainage system after accidental spillages. The interceptor should have a bypass to prevent flushing during periods of heavy rain. Oil and fuel bunkers should be bunded and/or enclosed on three sides to prevent discharge due to accidental spillages or breaches of tanks. Bunding should be of sufficient capacity to accommodate 110% of the volume of the largest container or 20% of the total volume of waste, whichever is largest. Waste collected from any oil interceptors should be collected and disposed of by a licensed collector.	Construction site			√		EIAO-TM, WDO, Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes, WPCO

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Locations of Measures	Implementation Agent(s)	Implementation Stage *			Relevant Legislation & Guidelines
					Des	C	O	
10.6.28	9.2	Lubricants, waste oils and other chemical wastes are likely to be generated during the maintenance of vehicles and mechanical equipment. Used lubricants should be collected and stored in individual containers which are fully labelled in English and Chinese and stored in a designated secure place. The chemical waste shall be collected by licensed chemical waste collectors.	Construction site	Contractor		√		EIAO-TM, WDO, Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes, WPCO
10.6.29	9.2	The registered chemical waste producer (i.e. the contractor) shall arrange for the chemical waste to be collected by licensed collectors. The licensed collector should regularly take chemical waste to a licensed chemical waste treatment facility (i.e. the CWTC in Tsing Yi). A trip ticket system operates to control the movement of chemical wastes.	Construction site	Contractor		√		EIAO-TM, WDO
10.6.30	9.2	No lubricants, oils, solvents or paint products should be allowed to discharge into water courses, either by direct discharge, or as contaminants carried in surface water runoff from the construction site.	Construction site	Contractor		√		EIAO-TM, WDO, WPCO
10.6.31	9.2	<u>General Refuse</u> General refuse should be disposed of to landfill as designated by EPD only after recyclable materials (e.g. paper, metals, aluminum cans, etc.) have been sorted out.	Construction site	Contractor		√		EIAO-TM, WDO
10.6.32	9.2	The contractor should nominate approved site personnel to be responsible for good site practices, arrangements for collection and effective disposal to an appropriate facility of all wastes generated at the site. Training of site personnel about site cleanliness, proper waste management and chemical handling procedures should be provided. Recyclable materials such as papers and aluminum cans should be separated and delivered to the local recyclers. An adequate number of waste containers should be provided to avoid spillage of waste.	Construction site	Contractor		√		EIAO-TM, WDO

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Locations of Measures	Implementation Agent(s)	Implementation Stage *			Relevant Legislation & Guidelines
					Des	C	O	
10.6.33	9.2	General refuse generated on-site should be stored in enclosed bins or skips and collected separately from other construction and chemical wastes and disposed of at designated landfill by reputable waste collector. The removal of waste from the site should be arranged on a daily basis or at least on every second day by the contractor to minimize any potential odour impacts, minimize the presence of pests, vermin and other scavengers and prevent unsightly accumulation of waste.	Construction site	Contractor		√		EIAO-TM, WDO, DEVB TC(W) No. 8/2010
Operational Phase								
10.6.34	9.2	<u>Screenings, Grits and Dewatered Sludge</u> The screenings and grits should be collected and disposed of at landfill by a reputable waste collector while the dewatered sludge would be disposed of at T-Park in Tuen Mun regularly. The screenings, grits and dewatered sludge shall be transported in sealed containers to minimize associated odour impact. The trucks and containers should be washed thoroughly before leaving the Project site to avoid odour nuisance during transportation.	Project site / transportation route of screenings, grits and dewatered sludge	Plant operators			√	EIAO-TM, WDO
10.6.35	9.2	<u>Chemical Waste and General Refuse</u> The chemical waste and general refuse generated during the operational phase would follow the same handling procedures and disposal method presented in Sections 10.6.24 to 10.6.33. Chemical waste and general refuse to be generated from the operation of the Project should be properly handled by licensed chemical waste collectors and reputable waste collector.	Project site	Plant operators			√	EIAO-TM, WDO, Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Locations of Measures	Implementation Agent(s)	Implementation Stage *			Relevant Legislation & Guidelines
					Des	C	O	
<b>Land Contamination</b>								
11.10.1 to 11.10.3	10.2	<p>Prior to the commencement of the SI works, site re-appraisal and a review of the Contamination Assessment Plan (CAP) prepared under the EIA should be conducted to confirm whether the proposed SI works (e.g. sampling locations, testing parameters etc.) are still valid. Supplementary CAP(s), presenting findings of the review, the latest site conditions and updated sampling strategy and testing protocol, should be submitted to EPD for endorsement. The SI works should be carried out according to EPD's agreed supplementary CAP(s).</p> <p>SI works should be carried out according to the supplementary CAP endorsed by EPD. Following completion of SI works and receipt of laboratory test results, Contamination Assessment Report(s) ((CAR)(s)) should be prepared to present the findings of the SI works and to discuss the presence, nature and extent of contamination.</p> <p>If contamination is identified, Remedial Action Plan(s) ((RAP)(s)) which provides details of the remedial actions for the identified contaminated soil and / or groundwater should be endorsed by EPD.</p> <p>Remediation action, if necessary, should be carried out according to EPD endorsed RAP(s) and Remediation Report(s) (RR(s)) should be submitted after completion of the remediation action. The RR(s) should be endorsed by EPD prior to the commencement of construction works at the respective identified contaminated areas (if any).</p>	Construction site	Project Proponent		√		Guidance Note for Contaminated Land Assessment and Remediation, Practice Guide for Investigation and Remediation of Contaminated Land, Guidance Manual for Use of Risk-based Remediation Goals for Contaminated Land Management
11.10.5	10.2	The mitigation measures will be recommended in the RAP and would typically include the following:	Construction site	Contractor		√		Guidance Note for Contaminated Land Assessment

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Locations of Measures	Implementation Agent(s)	Implementation Stage *			Relevant Legislation & Guidelines
					Des	C	O	
		<ul style="list-style-type: none"> <li>▪ Excavation profiles must be properly designed and executed with attention to the relevant requirements for environment, health and safety.</li> <li>▪ Excavation shall be carried out during dry season as far as possible to minimise contaminated runoff from contaminated soils.</li> <li>▪ Supply of suitable clean backfill material (or treated soil) after excavation.</li> <li>▪ Stockpiling site(s) shall be lined with impermeable sheeting and bunded. Stockpiles shall be fully covered by impermeable sheeting to reduce dust emission. If this is not practicable due to frequent usage, regular watering shall be applied. However, watering shall be avoided on stockpiles of contaminated soil to minimise contaminated runoff.</li> <li>▪ Vehicles containing any excavated materials shall be suitably covered to limit potential dust emissions or contaminated wastewater run-off, and truck bodies and tailgates shall be sealed to prevent any discharge during transport or during wet conditions.</li> <li>▪ Speed control for the trucks carrying contaminated materials shall be enforced.</li> <li>▪ Vehicle wheel and body washing facilities at the site's exist points shall be established and used.</li> <li>▪ Pollution control measures for air emissions (e.g. from biopile blower and handling of cement), noise emissions (e.g. from blower or earthmoving equipment), and water discharges (e.g. runoff control from treatment facility) shall be implemented and complied with relevant regulations and guidelines.</li> </ul>						and Remediation, APCO, WPCO, EIAO-TM

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Locations of Measures	Implementation Agent(s)	Implementation Stage *			Relevant Legislation & Guidelines
					Des	C	O	
<b>Noise Impact</b>								
Construction Phase								
12.7.1	11.2	<p>The following good site practices should be adopted during construction of the Project to minimise noise impact to the surroundings:</p> <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 phase.</li> <li>▪ Silencers or mufflers on construction equipment should be utilised and should be properly maintained during the construction phase.</li> <li>▪ Mobile plant should be sited as far away from sensitive uses as possible.</li> <li>▪ Machines and plant (such as trucks) that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum.</li> <li>▪ Plant known to emit noise strongly in one direction should, wherever possible, be orientated so that the noise is directed away from sensitive uses.</li> <li>▪ Material stockpiles and other structures should be effectively utilised, wherever practicable, in screening noise from on-site construction activities.</li> <li>▪ Noisy construction activities such as road surface breaking, should be scheduled to less sensitive hours during the day, e.g. midday, as far as practicable.</li> </ul>	Construction site	Contractor		√		Noise Control Ordinance (NCO), EIAO-TM
12.7.2		The feasibility of adopting quieter construction methods and use of quieter and more environmentally friendly construction equipment listed in the website of Environmental Protection Department should be considered and explored to minimize the construction noise impact to the surroundings.	Construction site	Contractor		√		NCO, EIAO-TM

EIA Ref.	EM&A Ref.	Environmental Protection Measures	Locations of Measures	Implementation Agent(s)	Implementation Stage *			Relevant Legislation & Guidelines
					Des	C	O	
Operational Phase								
12.7.3	11.2	The noise emitting plants of the Project (pumps, air blowers, etc.) should be enclosed within building structures.	New development area of the Project	Project Proponent	√		√	NCO, EIAO-TM

\*Des = Design; C = Construction; O = Operation

**APPENDIX C**  
**DATA SHEET FOR TSP MONITORING**

**Data Sheet for TSP Monitoring**

Monitoring Location		
Details of Location		
Sampler Identification		
Date & Time of Sampling		
Elapsed-time Meter Reading	Start (min.)	
	Stop (min.)	
Total Sampling Time (min.)		
Weather Conditions		
Site Conditions		
Initial Flow Rate, Qsi	Pi (mmHg)	
	Ti (C)	
	Hi (in.)	
	Qsi (Std. m <sup>3</sup> )	
Final Flow Rate, Qsf	Pf (mmHg)	
	Tf (C)	
	Hf (in.)	
	Qsf (Std. m <sup>3</sup> )	
Average Flow Rate (Std. m <sup>3</sup> )		
Total Volume (Std. m <sup>3</sup> )		
Filter Identification No.		
Initial Wt. of Filter (g)		
Final Wt. of Filter (g)		
Measured TSP Level (µg/m <sup>3</sup> )		

Name & Designation

Signature

Date

Field Operator :

Laboratory Staff :

Checked by :

**APPENDIX D**  
**ODOUR COMPLAINT REGISTRATION FORM**

### Sample of Odour Complaint Registration Form

Subject	Description
Name of Complainant:	
Complainant's Contact Information:	Tel: Fax: Address:
Location of Odour Nuisance:	
Date of Odour Nuisance:	
Time of Odour Nuisance:	
Type of Odour Nuisance:	
Extent of Odour Strength: (delete as appropriate)	Highly Offensive/ Offensive/ Slightly Offensive/ Continuously Detectable/ Intermittently Detectable/
Meteorological Conditions:	
<i>Temperature</i>	
<i>Wind Speed Relative</i>	
<i>Humidity</i>	
<i>Wind Direction</i>	
STW Operation Conditions:	Normal / Abnormal
Details of Operation Conditions:	

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**APPENDIX E**  
**WATER QUALITY MONITORING DATA RECORD SHEET**

### Water Quality Monitoring Data Record Sheet

Location	Surface	Middle	Bottom
Monitoring Station			
Date			
Weather			
Sea Condition			
Tide Mode			
Start Time (hh:mm)			
Water Depth (m)			
pH			
Temperature (°C)			
Salinity (ppt)			
Turbidity (NTU)			
Sample Identification			
SS (mg/l)			
DO (mg/l)			
DO Saturation (%)			
Current Velocity (m/s)			
Current Direction			
Observed Construction Activities	<100m from location		
	>100m from location		
Other Observations			

*Note: The SS results are to be entered once they are available from the laboratory.*

Name & Designation

Signature

Date

Recorded by: \_\_\_\_\_

Checked by: \_\_\_\_\_

**APPENDIX F**  
**PROACTIVE ENVIRONMENTAL PROTECTION PROFORMA**



**APPENDIX G**  
**SAMPLE TEMPLATE FOR INTERIM NOTIFICATION**

Sample Template for Interim Notification of Environmental Quality Limits Exceedances

**Incident Report on Action Level or Limit Level Non-compliance**

Project	
Date	
Time	
Monitoring Location	
Parameter	
Action & Limit Levels	
Measured Level	
Possible reason for Action or Limit level Non-compliance	
Actions taken / to be taken	
Remarks	

Location Plan

Prepared by: \_\_\_\_\_

Designation: \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

