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1. INTRODUCTION

1.1 Background

- 1.1.1 As stated in the Chief's Executive's 2011-2012 Policy Address, the Government is committed to expanding the land resources and increasing housing land supply. To meet this policy objective, San Hing Road (SHR) and Hong Po Road (HPR) are identified as potential long-term public housing sites.
- 1.1.2 This Proposed Development Area (PDA) mainly comprises of SHR Site, SHR Site Extension and HPR Site. The total proposed development at SHR Site, SHR Site Extension, HPR Site, the proposed Road L7 and the realigned Hong Po Road has an area of about 29.7 hectares, with a total population intake of about 61,000. The proposed development area falls within an area zoned "Residential (Group E)" ("R(E)") and "Green Belt" ("GB") on the approved Lam Tei and Yick Yuen Outline Zoning Plan (OZP) No. S/TM-LTY/10 and "Residential (Group E) 1" ("R(E)1"), "GB" and "Village Type Development" ("V") and an area shown as 'Road' on the approved Tuen Mun OZP No. S/TM/35.
- 1.1.3 Black & Veatch Hong Kong Limited (B&V) was commissioned by Civil Engineering and Development Department (CEDD) to examine the technical feasibility on developing housing development at San Hing Road and Hong Po Road, Tuen Mun (the Project).
- 1.1.4 The PDA is situated in Tuen Mun between Lam Tei Light Rail Transit (LRT) Station and Siu Hong LRT/ West Rail Line (WRL) Interchange Station. On the south side of the PDA is Po Tong Ha and Tsz Tin Tsuen, while the west side is the Tsing Shan Firing Range (TSFR). The private housing site, Villa Pinada, which is a low density private residential development, is located to the north side of the PDA and is situated between HPR Site and SHR Site Extension.
- 1.1.5 SHR Site, SHR Site Extension and HPR Site are currently used for brownfield operations such as open storages, workshops, ice-making and dyeing factories, warehouses, temporary structures, etc. There are also low-rise village houses settlements, agricultural lands, graves, urns and permitted burial grounds, slopes, etc., scattering throughout the PDA. In addition, there are CLP pylons and 400kV overhead powerlines (OHL) spanning across SHR Site, SHR Site Extension, HPR Site on the southern side. SHR Site, SHR Site Extension and HPR Site are connected by Hong Po Road which is a single two-way road of 6m wide.
- 1.1.6 The location of which is shown in [Figures 1.1a & 1.1b](#). Description of the Project element have been further elaborated and presented in **Section 2**.

1.2 Purpose of the Manual

- 1.2.1 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.
- 1.2.2 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.
- 1.2.3 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).

1.2.4 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.

1.2.5 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 environmental monitoring and audit requirements.

2. PROJECT DESCRIPTION

2.1 General Description of the Project

2.1.1 This Project explores the development potential of the PDA located at San Hing Road and Hong Po Road for public housing development. The PDA and the proposed works limit of supporting infrastructure works covers about 37.5 ha. The proposed site formation and infrastructure works to support the public housing developments comprise the followings:

- a) Site formation works;
- b) Slope works and other geotechnical works;
- c) Land decontamination works;
- d) Roadworks (e.g. Proposed Road L7 and the realigned Hong Po Road);
- e) Waterworks (including service reservoirs);
- f) Sewerage works (including Sewage Pumping Station (SPS));
- g) Drainage works;
- h) Landscaping works;
- i) Public Transport Interchanges (PTIs); and
- j) Other infrastructure works including utilities and road junction improvement works.

2.2 Designated Project

2.2.1 The Study is a Designated Project (DP) under Item 1 Schedule 3 of EIAO – Engineering Feasibility Study of urban development projects with a study area covering more than 20 ha or involving a total population of more than 100,000. To implement the Project, there is one proposed work classified as DPs under Schedule 2 of the EIA Ordinance. A list of DP is summarised in **Table 2.1** below.

Table 2.1 Summary of Designated Project (DP)

Item Ref. No.	Ref. Category No.	Project Works	Work Component
DP1	F.3 (b) of Part 1 Schedule 2	A SPS with an installed capacity of more than 2,000 m ³ per day and a boundary of which is less than 150m from an existing or planned residential area	Construction of a SPS with a design capacity of 14,629m ³ /day at SHR Site and is less than 150m from an existing / planned residential area

2.3 Development Programme of the Project

2.3.1 In order to ensure a balanced and programmed development with orderly rehousing/relocation of qualified cleartees, the PDA including the associated engineering infrastructures is proposed to be divided into 4 main stages for implementation. A summary of implementation programme is shown in **Table 2.2**.

Key Developments in Stage 1

2.3.2 The proposed works to be conducted in the first stage includes the following:

- Site formation and construction of public housing at SHR Site Extension;
- Construction of SPS at SHR Site and the associated rising mains;
- Upgrading of existing sewers & modification of the existing TM54 SPS;
- Construction of the realigned Hong Po Road;
- Carrying out of junction improvement works;
- Construction of footbridge to connect SHR Site and Siu Hong WRL/LRT Interchange Station; and
- Carrying out of associated drainage works, sewerage works and waterworks etc..

Key Developments in Stage 2

2.3.3 The proposed works to be conducted in the second stage includes the following:

- Construction of proposed Road L7;
- Carrying out of Junction improvement works; and
- Laying of watermains along proposed Road L7.

Key Developments in Stage 3

2.3.4 The proposed works to be conducted in the third stage includes the following:

- Site formation and construction of public housing and PTI at SHR Site;
- Site formation and construction of school at SHR Site; and
- Carrying out of associated drainage works, sewerage works and waterworks etc..

Key Developments in Stage 4

2.3.5 The proposed works to be conducted in the fourth stage includes the following:

- Site formation and construction of public housing and PTI at HPR Site;
- Site formation and construction of school at SHR Site Extension;
- Construction of natural terrain mitigation measures at HPR Site;
- Construction of fresh/ salt water service reservoirs at HPR Site; and
- Carrying out of associated drainage works, sewerage works and waterworks etc..

Table 2.2 Summary of Implementation Programme within the PDA

Stage	Phase	Description of Works	Land Clearance & Construction Period
Stage 1	1a	<u>San Hing Road Site Extension (Residential Sites)</u> <ul style="list-style-type: none"> • Site clearance, decontamination and site formation works • Internal road, pipe works and landscaping • Construction of public housing buildings 	2025-2030
	1b	<u>Sewage Treatment Works at SHR Site</u> <ul style="list-style-type: none"> • Site clearance, decontamination and site formation works • Sewage pumping station construction and the associated rising mains • Upgrading works of existing sewers & modification of TM Area 54 SPS 	2026-2030
	1c	<u>Realigned Hong Po Road</u> <ul style="list-style-type: none"> • Site clearance, decontamination and site formation works • Road and junction improvement works • Pipe works and utilities works 	2026-2029
Stage 2	2	<u>Road L7</u> <ul style="list-style-type: none"> • Site clearance and site formation works • Road and junction improvement works • Pipe works and utilities 	2026-2029
Stage 3	3a	<u>San Hing Road Site (Residential Sites)</u> <ul style="list-style-type: none"> • Site clearance, decontamination and site formation works • Internal road and PTIs • Pipe works and landscaping • Construction of public housing buildings 	2025-2031
	3b	<u>School Site at SHR Site</u> <ul style="list-style-type: none"> • Site clearance, decontamination and site formation works • Internal road, pipe works and landscaping • Construction of school buildings 	2026-2031

Stage	Phase	Description of Works	Land Clearance & Construction Period
Stage 4	4a	<u>Hong Po Road Site</u> <ul style="list-style-type: none"> • Site clearance, decontamination and site formation works • Internal road and PTIs • Pipe works and landscaping • Natural terrain hazard mitigation measures • Construction of water service reservoirs • Construction of public housing buildings 	2026-2033
	4b	<u>School Sites at SHR Site Extension</u> <ul style="list-style-type: none"> • Site clearance, decontamination and site formation works • Internal road, pipe works and landscaping • Construction of school buildings 	2026-2033

2.4 Construction Programme

2.4.1 It is anticipated that the development will be commissioned in phases. The construction works is targeted to commence in Year 2025 and are summarised in **Table 2.3**.

Table 2.3 Works Packaging for the Development

Works Package	Item	Land Clearance & Construction Period	Description of Works
Stage 1 Works – SHR Site Extension, SHR SPS and realigned Hong Po Road	SHR Site Extension (Residential Sites)	2025 to 2030	<ul style="list-style-type: none"> • Site Clearance • Land Decontamination • Site Formation • Internal Roads • Pipe Works • Landscaping • Construction of Public Housing Buildings
	SHR SPS	2026 to 2030	<ul style="list-style-type: none"> • Site Clearance • Land Decontamination • Site Formation • Sewage Pumping Station Construction and the associated Rising Mains • Upgrading Works of Existing Sewers & Modification of TM54 SPS
	Realigned Hong Po Road	2026 to 2029	<ul style="list-style-type: none"> • Site Clearance • Land Decontamination • Site Formation • Road and Junction Improvement Works • Pipe Works • Utilities Works • Construction of footbridge and covered walkway
Stage 2 Works – Road L7	Proposed Road L7	2026 to 2029	<ul style="list-style-type: none"> • Site Clearance • Site Formation • Road and Junction Improvement Works • Pipe Works Utilities Works

Works Package	Item	Land Clearance & Construction Period	Description of Works
Stage 3 Works – SHR Site and School Site at SHR Site	SHR Site (Residential Sites)	2025 to 2031	<ul style="list-style-type: none"> • Site Clearance • Land Decontamination • Site Formation • Internal Roads and PTIs • Pipe Works • Landscaping • Construction of Public Housing Buildings
	School Site at SHR Site	2026 to 2031	<ul style="list-style-type: none"> • Site Clearance • Land Decontamination • Site Formation • Internal Roads • Pipe Works • Landscaping • Construction of School Buildings
Stage 4 Works – HPR Site and School Sites at SHR Site Extension	HPR Site (Residential Sites)	2026 to 2033	<ul style="list-style-type: none"> • Site Clearance • Land Decontamination • Site Formation • Internal Roads and PTIs • Pipe Works • Landscaping • Ecological Enhancement Works • Natural Terrain Hazard Mitigation Measures • Construction of Water Service Reservoirs • Construction of Public Housing Buildings
	School Site at SHR Site Extension	2026 to 2033	<ul style="list-style-type: none"> • Site Clearance • Land Decontamination • Site Formation • Internal Roads • Pipe Works • Landscaping • Construction of School Buildings

2.5 Concurrent Projects

2.5.1 The EIA has assessed the potential cumulative impacts of the Project and associated works that may arise through interaction or in combination with other existing, committed and planned developments in the vicinity of the Project and associated works. A list of the tentative concurrent projects identified at this stage is summarised below:

- Contract No. CV/2011/01 – Site Formation and Infrastructural Works near Tsing Lun Road and Tsz Tin Road in Area 54, Tuen Mun;
- Contract No. CV/2012/02 – Construction of Sewage Pumping Station near Tsz Tin Road and Associated Sewerage Works in Area 54, Tuen Mun;
- Contract No. CV/2015/03 – Site Formation and Infrastructural Works near Tong Hang Road and Tsz Tin Road in Area 54, Tuen Mun;
- Housing Projects at Site 1 & 1A, Site 2, Site 3 & 4 (East) at Tuen Mun Area 54;

- Private Housing Development Works at Site 3/4 (West) in Area 54, Tuen Mun;
- Formation, Roads and Drains in Area 54, Tuen Mun – Site Formation at Site 4A (East), Site 4A (South), Site 5 and Associated Infrastructure Works;
- Housing Projects at Site 4A (South) and Site 5 in Area 54, Tuen Mun;
- Construction for Community Hall and Sports Centre at Site 4A (West) of Area 54, Tuen Mun;
- Construction for Primary School and Secondary School at Site 4A (East) of Area 54, Tuen Mun;
- Public Housing Development at Tuen Mun Area 29 West; and
- Tuen Mun Western Bypass (TMWB).

3. PROJECT ORGANISATION

3.1 Project Organisation

- 3.1.1 The proposed project organization and lines of communication with respect to environmental protection works are shown in [Appendix 3-1](#).
- 3.1.2 The leader of the ET shall be an independent party from the Contractor and has relevant professional qualifications, or have sufficient relevant EM&A experience subject to approval of the ER.
- 3.1.3 The responsibilities of respective parties are:

The Contractor

- Implement the EIA recommendations and requirements;
- Employ an ET to undertake monitoring, laboratory analysis and reporting of environmental monitoring and audit;
- 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

- Set up all the required environmental monitoring stations;
- Monitor various environmental parameters as required in the EM&A Manual;
- Analyse the environmental monitoring and audit 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, and take proactive actions to pre-empt problems;
- Audit and prepare audit reports on the environmental monitoring data and site environmental conditions;
- Report on the environmental monitoring and audit 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

- 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 Contingency Plan in the event of any exceedance;
- Adhere to the procedures for carrying out complaint investigations.

Independent Environmental Checker

- 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.

3.1.4 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.

3.1.5 The ET Leader shall have at least 7 years of experience in conducting EM&A for infrastructure projects. His / Her qualification shall be vetted by the ER and the IEC. And the IEC should possess at least 7 years of experience in EM&A.

4. ENVIRONMENTAL SUBMISSION

4.1 Introduction

4.1.1 The Contractor shall prepare the Environmental Management Plan (EMP) (including a Waste Management Plan, WMP), Construction Method Statement prior to the commencement of construction works and obtain approval from ER and IEC and other relevant authorities to encompass the recommended environmental protection/mitigation measures with respect to their latest construction methodology and programme.

4.2 Environmental Management Plan

4.2.1 A systematic EMP shall be set up by the Contractor to ensure effective implementation of the mitigation measures, monitoring and remedial requirements presented in EIA, EM&A Manual and Environmental Mitigation Implementation Schedule (EMIS) (See [Appendix 4.1](#)). The ER and the IEC will audit the implementation status against the EMP and advise the necessary remedial actions required. These remedial actions shall be enforced by the ER through contractual means.

4.2.2 The EMP will require the Contractor (together with its sub-contractors) to define in details how to implement the recommended mitigation measures in order to achieve the environmental performance defined in the Hong Kong environmental legislation and the EIA documentation.

4.2.3 The review of on-site environmental performance shall be undertaken by ER and IEC through a systematic checklist and audit once the construction works commences. The environmental performance review programme comprises a regular assessment on the effectiveness of the EMP. Reference should be made to ETWBTC 19/2005 “Environmental Management on Construction Sites” or its latest versions, and any other relevant Technical Circulars.

4.3 Waste Management Plan

4.3.1 As part of EMP, the Contractor shall include WMP for the construction of the Project and prior to the commencement of construction works submit to the ER and IEC for approval. Where waste generation is unavoidable, the opportunities for recycling or reusing should be maximised. If wastes cannot be recycled, recommendations for appropriate disposal routes should be provided in the WMP. A method statement for stockpiling and transportation of the excavated materials and other construction wastes should also be included in the WMP and be approved before the commencement of construction works. All mitigation measures arising from the approved WMP shall be fully implemented.

4.3.2 For the purpose of enhancing the management of Construction and Demolition (C&D) materials including rock, and minimizing its generation at source, construction works would be undertaken in accordance with the Section 4.1.3 of Chapter 4 in the Project Administration Handbook for Civil Engineering Works (PAH).

4.4 Construction Method Statement

4.4.1 In case the Contractor would like to adopt alternative construction methods or implementation schedules, it is required to submit details of methodology and equipment to the ER for approval before the work commences. Any changes in construction method shall be reflected in a revised EMP or the Contractor will be required to demonstrate the manner in which the existing EMP should accommodate the proposed changes. The Contractor may need to apply for a Variation of Environmental Permit (VEP) from EPD before commencement of any construction activities.

5. AIR QUALITY IMPACT

5.1 Introduction

5.1.1 The EIA has considered the potential air quality impacts during both the construction and operation phases of the project. Fugitive dust would be the key impacts during the construction phase, while potential odour impact from the San Hing Road Sewage Pumping Station (SHR SPS) shall be effectively controlled during the operation phase.

5.2 Air Quality Parameters

5.2.1 Monitoring and audit of the Total Suspended Particulate (TSP) levels shall be carried out by the ET to ensure that construction works are not generating dust that exceeds the acceptable level. Timely action should be taken to rectify the situation if an exceedance is detected.

5.2.2 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.

5.2.3 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 5.1](#).

5.3 Monitoring Equipment

5.3.1 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 m³ per minute (20 - 60 standard cubic feet per minute) adjustable flow range;
- equipped with a timing / control device with ± 5 minutes accuracy for 24 hours operation;
- installed with elapsed-time meter with ± 2 minutes accuracy for 24 hours operation;
- capable of providing a minimum exposed area of 406 cm²;
- 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.

5.3.2 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.

- 5.3.3 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 5.1](#).
- 5.3.4 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 regularly, and the 1-hour sampling shall be determined periodically by the HVS to check the validity and accuracy of the results measured by direct reading method.
- 5.3.5 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.
- 5.3.6 In exceptional situations, the ET may propose alternative methods to obtain representative wind data upon approval from the Engineer and agreement from the IEC.

5.4 Laboratory Measurement / Analysis

- 5.4.1 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.
- 5.4.2 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.
- 5.4.3 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.
- 5.4.4 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.
- 5.4.5 All the collected samples shall be kept in a good condition for 6 months before disposal.

5.5 Monitoring Locations

5.5.1 The selected 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 5.1** below and shown in [Figure 5.1](#).

Table 5.1 Construction Dust Monitoring Locations

ID	ASR ID	Location	Impact Monitoring Period ^[1]
Existing Air Sensitive Receivers			
A1	R37	House no. 272, Tsz Tin Tsuen	Stage 1, Stage 3 and Stage 4
A2	R39	Village House near Villa Pinada	Stage 4
A3	R45	House no. 157, Villa Pinada	Stage 1, Stage 3 and Stage 4
A4	R49	Village House near Villa Pinada	Stage 1, Stage 3 and Stage 4
A5	R53	House no. 240, San Hing Tsuen	Stage 1, Stage 3 and Stage 4
A6	R64	House no. 37, San Hing Tsuen	Stage 1, Stage 3 and Stage 4
Note: [1] The impact monitoring period is determined based on the distance between the stages of development and the monitoring locations. Impact monitoring is recommended when the stages in the vicinity of the monitoring locations are under construction. The stages of the Project will subject to adjustment based on the actual construction programme of the relevant contracts in the Construction Stage.			

5.5.2 The status and locations of the air quality 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.

5.5.3 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.

5.5.4 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 metres apart.

5.5.5 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.

5.6 Baseline Monitoring

5.6.1 The ET shall carry out the baseline monitoring at all of the designated monitoring locations (**Table 5.1**) 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 monitoring stations. One-hour sampling should also be done at least 3 times per day while the highest dust impact is expected.

5.6.2 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.

5.6.3 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.

5.6.4 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.

5.6.5 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.

5.7 Impact Monitoring

5.7.1 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 summarized in **Table 5.2**.

Table 5.2 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

5.8 Event and Action Plan

5.8.1 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 5.3** shows the air quality criteria, namely action and limit levels to be used.

Table 5.3 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 $\mu\text{g}/\text{m}^3$

5.8.2 Should non-compliance of the air quality criteria occur, action in accordance with the action plan in **Table 5.4** shall be carried out.

Table 5.4 Event and Action Plan for Air Quality (Dust)

Event	Action			
	ET	IEC	ER	Contractor
Action level exceedance for one sample	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by ET; 2. Check Contractor's working method. 	<ol style="list-style-type: none"> 1. Notify Contractor. 	<ol style="list-style-type: none"> 1. Rectify any unacceptable practice; 2. Amend working methods if appropriate.
Action level exceedance for two or more consecutive samples	<ol style="list-style-type: none"> 1. Identify source; 2. Inform IEC and ER; 3. Advise the ER on the effectiveness of the proposed remedial measures; 4. Repeat measurements 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. 	<ol style="list-style-type: none"> 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 ET on the effectiveness of the proposed remedial measures; 5. Supervise Implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. Ensure remedial measures properly implemented. 	<ol style="list-style-type: none"> 1. Submit proposals for remedial actions to ER within 3 working days of notification; 2. Implement the agreed proposals; 3. Amend proposal if appropriate.

Event	Action			
	ET	IEC	ER	Contractor
Limit level exceedance for one sample	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. Ensure remedial measures properly implemented. 	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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; 8. If exceedance stops, cease additional monitoring. 	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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 Contractor to stop that portion of work until the exceedance is abated. 	<ol style="list-style-type: none"> 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.

Notes:

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

5.9 Performance Compliance Test of San Hing Road Sewage Pumping Station

5.9.1 Performance compliance test for the deodorising unit of the planned SHR SPS is recommended to determine whether the odour removal efficiency meet the requirements as stated in the EIA report. Hydrogen sulphide (H₂S) meter shall be installed at the inlet and exhaust vents of the deodorisation unit to monitor the odour removal efficiency.

5.10 Mitigation Measures

5.10.1 Mitigation measures for construction phase air quality impacts and appropriate design for minimising potential operational odour impact have been recommended in the EIA Report. All the recommended mitigation measures and designs are detailed in the implementation schedule in [Appendix 4.1](#).

6. NOISE IMPACT

6.1 Introduction

- 6.1.1 In the EIA Report, construction noise monitoring and regular site audit have been recommended to be carried out during construction phase to ensure the construction noise level will comply with the relevant noise criteria.
- 6.1.2 Road traffic noise levels should also be monitored at representative noise sensitive receivers (NSRs), which are in the vicinity of the recommended direct mitigation measures, upon the population intake of the proposed development. The purpose of the monitoring is to compare the measured noise levels with the predicted noise levels, appropriate conversion corrections shall be applied to allow for the traffic conditions at the time of measurement.
- 6.1.3 Monitoring of fixed noise sources of the planned SHR SPS and the public transport interchanges (PTIs) during the testing and commissioning stage was also recommended to verify the compliance with the EIAO-TM criteria.

6.2 Noise Monitoring Parameters for Construction Noise

- 6.2.1 Construction noise level shall be monitored by the ET and shall be measured in terms of the A-weighted equivalent continuous sound pressure level (L_{eq}). $L_{eq(30-min)}$ shall be used as the monitoring parameter for the time period between 0700 and 1900 hours on normal weekdays. For all other time periods, $L_{eq(5-min)}$ shall be employed for comparison with the Noise Control Ordinance (NCO) criteria. A sample data sheet is shown in [Appendix 6.1](#).
- 6.2.2 As supplementary information for data auditing, statistical results such as L_{10} and L_{90} shall also be obtained for reference.

6.3 Monitoring Equipment for Construction Noise

- 6.3.1 As referred to in the technical memorandum (TM) issued under the NCO, sound level meters in compliance with the International Electrotechnical Commission Publications 651: 1979 (Type 1) and 804: 1985 (Type 1) specifications shall be used for carrying out the noise monitoring. Immediately prior to and following each noise measurement, the accuracy of the sound level meter shall be checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Measurements may be accepted as valid only if the calibration level from before and after the noise measurement agrees to within 1.0 dB.
- 6.3.2 Noise measurements shall not be made in fog, rain, wind with a steady speed exceeding 5 m/s or wind with gusts exceeding 10 m/s. The wind speed shall be checked with a portable wind speed meter capable of measuring the wind speed in m/s.
- 6.3.3 The ET is responsible for the provision, installation, operation, maintenance, dismantling of the monitoring equipment. He shall ensure that sufficient noise measuring equipment and associated instrumentation are available for carrying out the baseline monitoring, regular impact monitoring and *ad hoc* monitoring. All the equipment and associated instrumentation shall be clearly labelled.

6.4 Monitoring Locations for Construction Noise

- 6.4.1 NSRs that are anticipated to have the highest construction noise level when without mitigation measures were selected as monitoring stations. The locations of construction noise monitoring stations are summarised in **Table 6.1** and shown in [Figure 6.1](#).

Table 6.1 Proposed Construction Noise Monitoring Locations

ID	NSR ID	Description	Impact Monitoring Period ^[1]
Existing Noise Sensitive Receivers			
CN1	E5_CN01	Village House near Realigned Hong Po Road	Stage 1, Stage 3 and Stage 4
CN2	E6_CN02	House no.152, Villa Pinada	Stage 1, Stage 3 and Stage 4
CN3	E9_CN03	House no. 99, San Hing Tsuen	Stage 1, Stage 3 and Stage 4
CN4	E11_CN01	TWGHs Yau Tze Tin Memorial College	Stage 1, Stage 3 and Stage 4
CN5	E15_CN01	Secondary School a TM54 Site 4A (East)	Stage 1
CN6	E16_CN03	Luk Tin House, Yan Tin Estate	Stage 1
CN7	E30_CN01	C.C.C. Mong Wong Far Yok Memorial Primary School	Stage 1, Stage 3 and Stage 4
<p>Note: [1]The impact monitoring period is determined based on the distance between the stages of development and the monitoring locations. Impact monitoring is recommended when the stages in the vicinity of the monitoring locations are under construction. The stages of the Project will subject to adjustment based on the actual construction programme of the relevant contracts in the Construction Stage.</p>			

6.4.2 If the status or location of a NSR changes after issuing this manual, the ET shall propose the updated monitoring location and seek approval from the ER and agreement from the IEC and the EPD of the proposal to amend the monitoring location.

6.4.3 When alternative monitoring locations are proposed, the monitoring locations shall be chosen taking account of the following criteria:

- a) All locations close to the major site activities that are likely to have noise impacts;
- b) Close to the NSRs as defined in the EIAO-TM; and
- c) Assurance of minimal disturbance to the occupants during monitoring.

6.4.4 The monitoring station shall normally be at a point 1 m from the exterior of the sensitive receiver building facade and be at a position 1.2 m above the ground. If there is problem with access to the normal monitoring position, an alternative position may be chosen, and a correction to the measurements shall be made. For reference, a correction of +3 dB(A) shall be made to the free field measurements. The ET shall agree with the IEC on the monitoring position and the corrections adopted prior to the commencement of the works. Once the positions for the monitoring stations are chosen, the baseline monitoring and the impact monitoring shall be carried out at the same positions.

6.5 Baseline Monitoring for Construction Noise

6.5.1 In accordance with Section 4.2 of Appendix D2 of Guidelines for Development Projects in Hong Kong published by EPD, Baseline noise monitoring before commencement of construction works is not normally required.

6.6 Impact Monitoring for Construction Noise

6.6.1 Construction noise monitoring should be carried out at the designated monitoring stations (**Table 6.1**) directly affected by the construction works once every week after the commencement of construction. During construction works, one set of $L_{eq(30-min)}$ measurement at each station between 0700 and 1900 hours on normal weekdays shall be taken. If construction works are extended to include works during the period between 1900 and 0700 hours, additional weekly impact monitoring shall be carried out during evening and night-time works. Applicable permits under NCO shall be obtained by the Contractor.

6.6.2 In case of non-compliance with the construction noise criteria, more frequent monitoring, as specified in the Event and Action Plan in **Table 6.3**, shall be carried out. This additional

monitoring shall be continued until the recorded noise levels are rectified or proved to be unrelated to the construction activities.

6.7 Action and Limit Levels for Construction Noise

6.7.1 The Action and Limit levels for construction noise are defined in **Table 6.2**. Should non-compliance of the criteria occur, the ET, the IEC, the ER and the Contractor shall undertake their specified actions in accordance with the Event and Action Plan shown in **Table 6.3**.

Table 6.2 Action and Limit Levels for Construction Noise

Time Period	Action Level	Limit Level
0700 - 1900 hours on normal weekdays	When one documented complaint is received	75 dB(A) *

Notes:

If works are to be carried out during restricted hours, the conditions stipulated in the construction noise permit issued by the Noise Control Authority have to be followed.

* Reduce to 70 dB(A) for schools and 65 dB(A) during school examination periods.

6.8 Event and Action Plan for Construction Noise

6.8.1 Should non-compliance of the noise criteria occur, actions in accordance with the event and action plan in **Table 6.3** shall be carried out.

Table 6.3 Event/Action Plan for Construction Noise

Event	Action			
	ET	IEC	ER	Contractor
Action Level Exceedance	<ol style="list-style-type: none"> 1. Notify IEC, ER and Contractor; 2. Carry out investigation; 3. Report the results of investigation to the IEC, ER and Contractor; 4. Discuss with the Contractor and formulate remedial measures; 5. Increase monitoring frequency to check mitigation effectiveness. 	<ol style="list-style-type: none"> 1. Review the analysed results submitted by the ET; 2. Review the proposed remedial measures by the Contractor and advise the ER accordingly; 3. Supervise the implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. Require Contractor to propose remedial measures for the analysed noise problem; 4. Ensure remedial measures are properly implemented. 	<ol style="list-style-type: none"> 1. Submit noise mitigation proposals to IEC and ER; 2. Implement noise mitigation proposals.
Limit Level Exceedance	<ol style="list-style-type: none"> 1. Identify source; 2. Inform IEC, ER, EPD and Contractor; 3. Repeat measurements to confirm findings; 4. Increase monitoring frequency; 5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented; 6. Inform IEC, ER and EPD the causes and actions taken for the exceedances; 7. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results; 8. If exceedance stops, cease additional monitoring. 	<ol style="list-style-type: none"> 1. Discuss amongst ER, ET, and Contractor on the potential remedial actions; 2. Review Contractors remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly; 3. Supervise the implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. Require Contractor to propose remedial measures for the analysed noise problem; 4. Ensure remedial measures properly implemented; 5. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated. 	<ol style="list-style-type: none"> 1. Take immediate action to avoid further exceedance; 2. Submit proposals for remedial actions to the IEC within three 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.

Notes:

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

6.9 Noise Monitoring Parameters for Operation Road Traffic Noise

6.9.1 The ET should carry out monitoring of road traffic noise after the works under the Project are completed and upon the population intake of the proposed development. The road traffic noise during operation of the Project should be measured in terms of the A-weighted equivalent of $L_{10(1\text{-hour})}$. During the road traffic noise measurement, traffic count should be undertaken concurrently. Supplementary information for data auditing and statistical results such as L_{eq} and L_{90} should also be obtained for reference.

6.10 Monitoring Equipment for Operation Road Traffic Noise and Fixed Plant Noise

6.10.1 The requirement of monitoring equipment for both operational road traffic noise and fixed plant noise could be referred to **Section 6.3**.

6.11 Monitoring Locations for Operation Road Traffic Noise

6.11.1 Those most affected NSRs identified in the EIA report are selected as the noise monitoring locations in this EM&A Manual. The traffic noise monitoring locations during operation phase are listed in **Table 6.4** and shown in **Figure 6.2**. In addition, noise monitoring shall be carried out for one year following the population intake of the proposed development. The locations for operational noise monitoring shall be defined during detailed design on the basis of the status of the most up-to-date information on proposed developments surrounding the Project.

Table 6.4 Proposed Road Traffic Noise Monitoring Locations

ID	NSR ID	Location	Proposed Direct Mitigation Measures ^[1]
ON1	E4_TN01	Village House near Realigned Hong Po Road	PNB01, LNRS
ON2	E5_TN01	Village House near Realigned Hong Po Road	PNB01, LNRS
ON3	E18_TN01	House no. 272, Tsz Tin Tsuen	PNB02, LNRS
ON4	E18_TN04	Village House near no. 151, Tsz Tin Tsuen	PNB03, LNRS
ON5	P4_TN02	Block 4, San Hing Road Site	LNRS, PNB04
ON6	E23_TN03	TM Area 54 Site 5	PNB07, PNB08
ON7	E24_TN01	TM54 Site3/4 (West)	PNB07, PNB08

Note:

[1] “PNB” denotes ID of proposed noise barrier and “LNRS” denotes Low Noise Road Surfacing. The locations of the proposed direct mitigation measures are indicated in **Figure 6.3** and **6.4**.

6.11.2 The status and locations of NSRs may change after issuing this Manual. In this event, the ET leader shall propose updated monitoring locations and seek approval from the IEC and agreement from the EPD of the proposal.

6.11.3 When alternative monitoring locations are proposed, the monitoring locations should be chosen based on the following criteria in that they should be:

- At locations close to the major site activities which are likely to have noise impacts;
- Close to the NSRs; and
- For monitoring locations located in the vicinity of the sensitive receivers, care should be taken to cause minimal disturbance to the occupants during monitoring.

6.11.4 The monitoring station shall normally be at a point 1 m from the exterior of the sensitive receiver building facade and be at a position 1.2 m above the ground. If there is problem with access to the normal monitoring position, an alternative position may be chosen, and a correction to the measurements shall be made. For reference, a correction of +3 dB(A) shall

be made to the free field measurements. The ET shall agree with the IEC on the monitoring position and the corrections adopted before commencement of monitoring.

6.12 Impact Monitoring for Operational Road Traffic Noise

6.12.1 The ET should prepare and deposit to the EPD, at least 6 months before the operation of the proposed roads under the Project, a monitoring plan for the purpose of overseeing the environmental performance of the development project by comparing the noise impact predictions with the actual impacts. The monitoring plan should contain monitoring locations, monitoring schedules, methodology of noise monitoring including noise measurement procedures, traffic counts and speed checks, and methodology of comparison with the predicted levels. The ET should implement the monitoring plan in accordance with the deposited monitoring plan unless with prior justifications. Monitoring details and results including the comparison between the measured noise levels and the predicted levels should be recorded in a report to be deposited with the EPD within one month of the completion of the monitoring. The report should be certified by the ET leader before it is deposited with the EPD.

6.12.2 Road traffic noise monitoring shall be carried out at all the designated road traffic noise monitoring stations upon the population intake of the proposed development. The following is an initial guide on the road traffic noise monitoring requirements during the operation phase:

- one set of measurements at the morning traffic peak hour on normal days;
- one set of measurements at the evening traffic peak hour on normal days;
- a concurrent census of traffic flow and percentage of heavy vehicles shall be conducted for the Project Road and the existing road network in the vicinity of each measurement point;
- average vehicle speed estimated for Project Road and the existing road network in the vicinity of each measuring point; and
- the two sets of monitoring data shall be obtained within the first year following the population intake of the proposed development.

6.12.3 Measured noise levels shall be compared with the predicted noise levels by applying appropriate conversion corrections to allow for the traffic conditions at the time of measurement.

6.13 Event and Action Plan for Operational Road Traffic Noise

6.13.1 The measured/monitored road traffic noise levels shall be compared with the predicted results and the predicted traffic flow conditions (calculated noise levels based on concurrent traffic census obtained). In cases discrepancies are observed, explanation shall be given to justify the discrepancies.

6.14 Commissioning Test for Operational Fixed Plant Noise

6.14.1 The maximum allowable sound power levels of the identified fixed noise sources have been predicted in the EIA report. The contractor should implement and refine the specified sound power levels as appropriate to ensure compliances with the noise standards stipulated in the EIAO-TM and NCO for the fixed plant operations.

6.14.2 The contractor should also carry out a noise commissioning test for all fixed noise sources before operation of the Project, in order to ensure compliance of the noise levels with the EIAO-TM's stipulated noise standard. The ET should prepare and deposit a commissioning test plan for the fixed plant noise to the EPD, at least six months before the operation of the planned fixed plants. The plan should contain locations, measurement schedules,

methodology of noise measurement including noise measurement procedures and data analysis of measured noise level. The commissioning test should be certified by the ET leader and verified by the IEC before submission to the EPD.

6.15 Mitigation Measures

- 6.15.1 To alleviate the construction noise impact on the affected NSRs, adoption of quieter construction method, use of Quality Powered Mechanical Equipment (QPME), adoption of noise barriers, noise insulating fabrics, or enclosures for particular items of plant and recommendation on workfront management are proposed for the Project during construction phase.
- 6.15.2 To further alleviate the operation noise impact, vertical noise barriers of various heights were proposed along some sections of the Project roads. A solid concrete boundary wall at the planned housing site near the Welfare Facilities at SHR Site have also been considered. Low noise road surface was proposed for some section of the Project roads and other roads. A fully enclosed pedestrian walkway (~15m long) is proposed at Hing Kwai Street behind the barrier opening for road crossing. Acoustic windows were also proposed to protect the planned residential dwellings. The provision of the solid concrete boundary wall and acoustic windows are subject to further study by the Hong Kong Housing Authority (HKHA). HKHA can further explore alternative options which can achieve corresponding traffic noise reduction during the detailed design stage. The location of the proposed mitigation measures is shown in [Figure 6.3](#) and [Figure 6.4](#) of the EIA Report.
- 6.15.3 The recommended maximum allowable Sound Power Level of the ventilation fans potentially to be installed at the PTIs should be reviewed with the final design of the PTIs during the detailed design stage. It is recommended that a canopy and hanger wall should be provided at the ingress and egress of the PTIs and solid panels to be erected as necessary next to the vehicle bays to screen the line-of-sight of the PTI from the nearby NSRs. Acoustic windows are proposed at Block 1 of SHR site, as shown in [Figure 6.5](#) to protect the NSRs from adverse rail noise impact.
- 6.15.4 A Construction Noise Management Plan (CNMP) with reference to Section 8 and Annex 21 of the EIAO-TM as well as this EM&A Manual and the EIA Report should be prepared by the future contractor. In the CNMP, the inventory of noise sources should be verified, and the effectiveness and practicality of all identified measures for mitigating the construction noise impact should be assessed. Mitigation measures proposed in the EIA Report, such as the adoption of quiet construction methods and QPME, should be considered during the design and tendering stage of the Project. The CNMP should confirm the implementation of the mitigation measures, and submitted to EPD for approval six months prior to the commencement of construction. By referring to the measures proposed in the CNMP, the implementation schedule of mitigation measures should also be updated and reflected in the construction program accordingly.
- 6.15.5 All the recommended mitigation measures and designs are detailed in the implementation schedule in [Appendix 4.1](#).

7. WATER QUALITY IMPACT

7.1 Introduction

7.1.1 As identified in the EIA report, the key water quality impacts caused by the project would be associated with the land-based construction activities. To ensure no adverse water quality impact to the nearby watercourses due to the discharges from construction activities, water quality monitoring at all major watercourses identified at the vicinity of the construction sites should be carried out before and during the construction phase. It is also recommended that regular weekly site inspections should be undertaken to inspect the construction activities and works areas in order to ensure the mitigation measures recommended in the EIA Report are properly implemented. The water quality monitoring and audit programme should be suitably adjusted according to the phased implementation of the project.

7.1.2 No water quality monitoring and audit programme specific to the operation phase is proposed for the Project.

7.2 Water Quality Parameters

7.2.1 The monitoring shall normally be established by measuring the dissolved oxygen (DO), dissolved oxygen saturation (DO%), temperature, turbidity, salinity, pH and suspended solids (SS) in water bodies at all designated locations as specified in **Section 7.5**.

7.2.2 The measurements shall be taken at all designated monitoring stations 3 days per week during construction phase. The interval between two sampling surveys shall not be less than 36 hours.

7.2.3 Replicate in-situ measurements and samples collected from each independent sampling event shall be collected to ensure a robust statistically interpretable database. DO, pH value, salinity, temperature and turbidity should be measured in-situ whereas other parameters should be determined by an accredited laboratory.

7.2.4 Other relevant data shall also be recorded, including monitoring location / position, time, water depth, tidal stages, weather conditions and any special phenomena or work underway at the construction site.

7.3 Monitoring Equipment

Dissolved Oxygen, Dissolved Oxygen Saturation and Temperature Measuring Equipment

7.3.1 The dissolved oxygen (DO) measuring instruments should be portable and weatherproof. The equipment should also complete with cable and sensor, and dc power source. It should be capable of measuring:

- A DO level in the range of 0 – 20 mg/L and 0 – 200% saturation; and
- A temperature of 0 – 45 degree Celsius.

7.3.2 The equipment should have a membrane electrode with automatic temperature compensation complete with a cable.

7.3.3 Should salinity compensation not be built-in to the do equipment, in-situ salinity should be measured to calibrate the do measuring instruments prior to each measurement.

Turbidity Measuring Equipment

7.3.4 The instrument should be a portable and weatherproof turbidity-measuring instrument using a DC power source. It should have a photoelectric sensor capable of measuring turbidity between 0 – 1000 NTU (for example, Hach model 2100P or an approved similar instrument).

Salinity Measuring Equipment

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

pH Measuring Equipment

- 7.3.6 A portable pH meter capable of measuring a pH range between 0.0 and 14.0 shall be provided under the specified conditions (e.g., Orion Model 250A or an approved similar instrument).

Water Depth Detector

- 7.3.7 A portable, battery-operated echo sounder should be used for water depths determination at each designated monitoring station. The detector can either be hand held or affixed to the bottom of the work boat, if the same vessel is to be used throughout the monitoring programme.

Water Sampling Equipment

- 7.3.8 A water sampler is required for SS monitoring. It should comprise a transparent PVC cylinder, with a capacity of not less than 2 litres, which can be effectively sealed with latex cups at both ends. The sampler should 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).

Sample Containers and Storage

- 7.3.9 Water samples for SS should be stored in high density polythene bottles with no preservative added, packed in ice (cooled to 4°C without being frozen) and keep in dark during both on-site storage and shipment to the testing laboratory. The samples shall be delivered to the laboratory within 24 hours of collection and be analysed as soon as possible after collection.

Calibration of In-Situ Instruments

- 7.3.10 The pH meter, DO meter and turbidimeter shall be checked and calibrated before use. DO meter and turbidimeter shall be certified by a laboratory accredited under HOKLAS or any other international accreditation scheme, and subsequently re-calibrated at quarterly basis throughout all stages of the water quality monitoring. Responses of sensors and electrodes should 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 station.

Back-Up Equipment and Vessels

- 7.3.11 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, malfunction, etc.
- 7.3.12 The water quality monitoring will involve 10 monitoring stations and measurements should be conducted within the prescribed tidal conditions in order to ensure the measurement / samples are representative. A multi-probe monitoring equipment set integrated with water sampler(s) is highly recommended to improve the monitoring efficiency. The ET shall also consider the use of unattended automatic sampling / monitoring devices at fixed stations where monitoring is required throughout the construction period. The use of such unattended automatic devices, however, shall be subject to the approval of the ER, IEC and EPD.

7.4 Laboratory Measurement / Analysis

- 7.4.1 At least 3 replicate samples from each independent sampling event are required for the SS measurement that shall be carried out in a HOKLAS or international accredited laboratory.

Where water depth is allowed, sampling should be conducted at three water depths which are 1 m below water surface, mid-depth, and 1 m above the river bed. If the sampling water depth is less than 6m, the mid-depth may be omitted. If the water depth is less than 3 m, only the mid-depth sample will be taken. Sufficient water samples shall be collected at the monitoring stations for carrying out the laboratory measurement and analysis. The laboratory determination work shall start within 24 hours after collection of the water samples. The analyses should follow the American Public Health Association (APHA) Standard Methods for the Examination of Water and Wastewater or an equivalent method subject to the approval of EPD. Analytical methods and reporting limits for SS are present in **Table 7.1**.

Table 7.1 Analytical Methods to be applied to Water Quality Samples

Parameters	Analytical Method	Reporting Limit
Suspended Solid (SS)	APHA 17ed 2540-D *	0.5 mg/L

* APHA - American Public Health Association Standard Methods for the Examination of Water and Wastewater.

- 7.4.2 The testing of SS should be HOKLAS accredited (or if not, approved by the EPD) and comprehensive quality assurance and control procedures in place to ensure quality and consistency in results.
- 7.4.3 If in-house or non-standard methods are proposed, details of the method verification may also be required to submit to the EPD. In any circumstance, the sample testing should have comprehensive quality assurance and quality control programmes. The laboratory should prepare to demonstrate the programme to the EPD or his representatives when requested.

7.5 Monitoring Locations

- 7.5.1 Water quality monitoring will be carried out at 11 locations of the inland water nearby the Project site.
- 7.5.2 The proposed water quality monitoring locations are shown in [Figure 7.1](#) and listed in **Table 7.2**. The upstream monitoring stations will act as control stations. Monitoring at the control station is for comparing the water quality from potentially impacted sites with the ambient water quality. The ET shall seek approval from the IEC and the EPD for any alternative monitoring locations. Control stations shall be located within the same body of water as the impact monitoring stations but shall be outside the area of influence of the works and, as far as practicable, not affected by any other works. The gradient monitoring stations are located closer to the worksites and would assist in the identification of sources of any impact at the downstream impact stations.

Table 7.2 Locations of Proposed Water Quality Monitoring Stations

WSR	Monitoring Station ID	Description	Easting	Northing
S01	U1	Upstream monitoring (Control)	814950.7	831390.7
	U2	Upstream monitoring (Control)	815048.3	831387.8
	G1	Gradient monitoring	815039.3	831325.8
	G2	Gradient monitoring	815369.5	830986.2
	G3	Gradient monitoring	815562.6	830953.4
	D1	Impact monitoring	815991.8	830622.2
	D2	Impact monitoring	816002.7	830646.8
S02	U3	Upstream monitoring (Control)	815404.0	831333.9
Tuen Mun River	U4	Upstream monitoring (Control)	816109.3	830941.8
	G4	Gradient monitoring	816029.0	830684.7

WSR	Monitoring Station ID	Description	Easting	Northing
	D3	Impact monitoring	815997.6	830583.1

7.6 Baseline Monitoring

- 7.6.1 Baseline conditions in the watercourses should be established and agreed with the EPD prior to the commencement of construction works. The purpose of the baseline monitoring is to establish ambient conditions prior to the commencement of the works and to demonstrate the suitability of the proposed monitoring stations. The baseline conditions should normally be established by measuring the water quality parameters specified in **Section 7.2**.
- 7.6.2 The baseline monitoring shall be conducted at all designated monitoring stations for at least 4 weeks prior to the commencement of construction works. The proposed water quality monitoring schedule shall be submitted to the EPD by the ET at least 2 weeks before the first day of the monitoring month. The interval between two sets of monitoring shall not be less than 36 hours. The EPD shall also be notified immediately for any changes in schedule.
- 7.6.3 In general, where the difference in value between the first and second in-situ measurement of DO or turbidity parameters is more than 25% of the value of the first reading, the reading shall be discarded and further readings should be taken.
- 7.6.4 There should be no construction work in the vicinity of the stations during the baseline monitoring. The baseline data will be used to establish the Action and Limit Levels. The determination of Action and Limit Levels will be discussed in Section 7.9.
- 7.6.5 **Table 7.3** below summarizes the proposed monitoring frequency and water quality parameters for baseline monitoring.

Table 7.3 Proposed Water Quality Monitoring Programme for Baseline Monitoring

Item	Baseline Monitoring
Monitoring Period	At least 4 weeks prior to the commencement of construction work
Monitoring Frequency	3 Days in a Week (all stations) and at mid-ebb (for D1, D2, D3 and G4 only)
Monitoring Locations	All stations listed in Table 7.2
Monitoring Parameters	Dissolved oxygen (DO), dissolved oxygen saturation (DO%), temperature, turbidity, salinity, pH and suspended solids (SS).
Intervals between 2 Sets of Monitoring	Not less than 36 hours

7.7 Impact Monitoring

- 7.7.1 During the construction phase of the project, impact monitoring should be undertaken at all designated monitoring stations three days per week with sampling/ measurement at the designated monitoring stations in the three watercourses. Upon completion of the construction phase, the monitoring exercise at the designated monitoring locations should be continued for four weeks in the same manner as the impact monitoring. The interval between two sets of monitoring should not be less than 36 hours except where there are exceedances of action and/or limit levels, in which case the monitoring frequency will be increased.
- 7.7.2 The proposed water quality monitoring schedule shall be submitted to the EPD by the ET at least one week before the first day of the monitoring month. The interval between two sets

of monitoring shall not be less than 36 hours. The EPD shall also be notified immediately for any changes in schedule.

- 7.7.3 In general, where the difference in value between the first and second in-situ measurement of DO or turbidity parameters is more than 25% of the value of the first reading, the reading shall be discarded and further readings should be taken.
- 7.7.4 If project-related exceedances of Action and/or Limit Levels are confirmed, the impact monitoring frequency shall be increased according to the requirement of Event and Action Plan. The details of Event and Action Plan will be discussed in **Section 7.10**.
- 7.7.5 **Table 7.4** below summarises the proposed monitoring frequency and water quality parameters for impact monitoring.

Table 7.4 Proposed Water Quality Monitoring Programme for Impact Monitoring

Item	Impact Monitoring
Monitoring Period	During entire construction period
Monitoring Frequency	3 Days in a Week (all stations) and at mid-ebb (for D1, D2, D3 and G4 only)
Monitoring Locations	All stations listed in Table 7.2
Monitoring Parameters	Dissolved oxygen (DO), dissolved oxygen saturation (DO%), temperature, turbidity, salinity, pH and suspended solids (SS)
Intervals between two Sets of Monitoring	Not less than 36 hours

7.8 Field Log

- 7.8.1 Other relevant data should also be recorded, such as, monitoring location / position, time, water depth, weather conditions and any special phenomena underway near the monitoring station. A sample data record sheet is shown in [Appendix 7.1](#) for reference.

7.9 Action and Limit Levels

- 7.9.1 The Action and Limit Levels for water quality are defined in **Table 7.5** below.

Table 7.5 Action and Limit Levels for Water Quality Impact Monitoring Stations

Parameters	Action Level	Limit Level
DO in mg/L (Surface, Middle & Bottom)	<u>Surface and Middle</u> 5 percentile of baseline data. ⁽¹⁾	<u>Surface and Middle</u> 4 mg/L or 1 percentile of baseline data. ⁽¹⁾
	<u>Bottom</u> 5 percentile of baseline data	<u>Bottom</u> 2 mg/L or 1 percentile of baseline data
SS in mg/L	95 percentile of baseline data or 120% of upstream control station. ⁽²⁾	99 percentile of baseline data or 130% of upstream control station. ⁽²⁾
Turbidity in NTU	95 percentile of baseline data or 120% of upstream control station. ^[2]	99 percentile of baseline data or 130% of upstream control station. ^[2]
pH	Beyond the range of 6.6 to 8.4	Beyond the range of 6.5 to 8.5

Parameters	Action Level	Limit Level
Notes: (1) For DO, non-compliance occurs when monitoring results is lower than the limits. (2) For SS and turbidity, non-compliance occurs when monitoring results is larger than the limits.		

7.10 Event and Action Plan

7.10.1 Should non-compliance of the criteria occur, action in accordance with the Event and Action Plan in **Table 7.6** below shall be carried out.

Table 7.6 Event and Action Plan for Water Quality

Event	ET	IEC	ER	Contractor
	Action level exceedance for one sampling day	<ol style="list-style-type: none"> 1. Inform IEC, Contractor and ER; 2. Check monitoring data, all plant, equipment and Contractor's working methods; and 3. Discuss remedial measures with IEC and Contractor and ER. 	<ol style="list-style-type: none"> 1. Discuss with ET, ER and Contractor on the implemented mitigation measures; 2. Review proposals on remedial measures submitted by Contractor and advise the ER accordingly; and 3. Review and advise the ET and ER on the effectiveness of the implemented mitigation measures. 	<ol style="list-style-type: none"> 1. Discuss with IEC, ET and Contractor on the implemented mitigation measures; 2. Make agreement on the remedial measures to be implemented; 3. Supervise the implementation of agreed remedial measures.
Action level exceedance for more than one consecutive sampling days	<ol style="list-style-type: none"> 1. Repeat in-situ measurement on next day of exceedance to confirm findings; 2. Inform IEC, contractor and ER; 3. Check monitoring data, all plant, equipment and Contractor's working methods; 4. Discuss remedial measures with IEC, contractor and ER 5. Ensure remedial measures are implemented 	<ol style="list-style-type: none"> 1. Discuss with ET, Contractor and ER on the implemented mitigation measures; 2. Review the proposed remedial measures submitted by Contractor and advise the ER accordingly; and 3. Review and advise the ET and ER on the effectiveness of the implemented mitigation measures. 	<ol style="list-style-type: none"> 1. Discuss with ET, IEC and Contractor on the proposed mitigation measures; 2. Make agreement on the remedial measures to be implemented; and 3. Discuss with ET, IEC and Contractor on the effectiveness of the implemented remedial measures. 	<ol style="list-style-type: none"> 1. Identify source(s) of impact; 2. Inform the ER and confirm notification of the non-compliance in writing; 3. Rectify unacceptable practice; 4. Check all plant and equipment and consider changes of working methods; 5. Discuss with ET, IEC and ER and submit proposal of remedial measures to ER and IEC within 3 working days of notification; and 6. Implement the agreed

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Event	ET	IEC	ER	Contractor
				mitigation measures.
Limit level exceedance for one sampling day	<ol style="list-style-type: none"> 1. Repeat measurement on next day of exceedance to confirm findings; 2. Inform IEC, contractor, ER and EPD; 3. Rectify unacceptable practice; 4. Check monitoring data, all plant, equipment and Contractor's working methods; 5. Consider changes of working methods; 6. Discuss mitigation measures with IEC, ER and Contractor; and 7. Ensure the agreed remedial measures are implemented. 	<ol style="list-style-type: none"> 1. Discuss with ET, Contractor and ER on the implemented mitigation measures; 2. Review the proposed remedial measures submitted by Contractor and advise the ER accordingly; and 3. Review and advise the ET and ER on the effectiveness of the implemented mitigation measures. 	<ol style="list-style-type: none"> 1. Discuss with ET, IEC and Contractor on the implemented remedial measures; 2. Request Contractor to critically review the working methods; 3. Make agreement on the remedial measures to be implemented; and 4. Discuss with ET, IEC and Contractor on the effectiveness of the implemented remedial measures. 	<ol style="list-style-type: none"> 1. Identify source(s) of impact; 2. Inform the ER and confirm notification of the non-compliance in writing; 3. Rectify unacceptable practice; 4. Check all plant and equipment and consider changes of working methods; 5. Discuss with ET, IEC and ER and submit proposal of additional mitigation measures to ER and IEC within 3 working days of notification; and 6. Implement the agreed remedial measures.
Limit level being exceeded for more than one consecutive sampling day	<ol style="list-style-type: none"> 1. Inform IEC, contractor, ER and EPD; 2. Check monitoring data, all plant, equipment and Contractor's working methods; 3. Discuss mitigation measures with IEC, ER and Contractor; and 4. Ensure mitigation measures 	<ol style="list-style-type: none"> 1. Discuss with ET, Contractor and ER on the implemented mitigation measures; 2. Review the proposed remedial measures submitted by Contractor and advise the ER accordingly; and 3. Review and advise the ET and ER on the effectiveness of 	<ol style="list-style-type: none"> 1. Discuss with ET, IEC and Contractor on the implemented remedial measures; 2. Request Contractor to critically review the working methods; 3. Make agreement on the remedial measures to be implemented; 	<ol style="list-style-type: none"> 1. Identify source(s) of impact; 2. Inform the ER and confirm notification of the non-compliance in writing; 3. Rectify unacceptable practice; 4. Check all plant and equipment and consider changes of working methods; 5. Discuss with ET, IEC and ER

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Event	ET	IEC	ER	Contractor
	are implemented; and 5. Increase the monitoring frequency to daily until no exceedance of Limit Level for two consecutive days	the implemented mitigation measures.	4. Discuss with ET and IEC on the effectiveness of the implemented mitigation measures; and 5. Consider and instruct, if necessary, the Contractor to slow down or to stop all or part of the dredging activities until no exceedance of Limit level.	and submit proposal of additional mitigation measures to ER and IEC within 3 working days of notification; and 6. Implement the agreed remedial measures. 7. As directed by the ER, to slow down or stop all or part of the dredging activities until no exceedance of Limit level.

Notes:

ET – Environmental Team

IEC – Independent Environmental Checker

ER – Engineer’s Representative

7.11 Mitigation Measures

- 7.11.1 Mitigation measures for water quality control have been recommended in the EIA report. The contractor should be responsible for the design and implementation of these measures. All the recommended mitigation measures and designs are detailed in the implementation schedule in [Appendix 4.1](#).

8. SEWAGE & SEWERAGE TREATMENT IMPLICATIONS

8.1 Introduction

8.1.1 An assessment of potential impacts due to the sewage arising from the proposed Project has been assessed in Section 7 of the EIA Report.

8.2 Mitigation Measures

Construction Phase

8.2.1 The sewage generated during the construction stage from the on-site workers will be collected in chemical toilets and disposed of off-site. Therefore, no sewerage impacts are expected from the site during the construction phase. As such, environmental monitoring and audit of the sewerage system is considered not required.

Operation Phase

Contingency plan for the proposed SPS

8.2.2 In order to avoid the occurrence for emergency discharges, the design of SPS shall comprise additional provisions, including:

- Twin rising mains in case of one of the duty mains be taken out of operation, the remaining one would still be able to deliver flow;
- Standby pumps in case of unexpected breakdown of pumping facilities such that the standby pumps could take over and function to replace the broken pumps;
- Dual electricity supply or backup power supply facilities such as diesel generator in case of power failure to sustain the function of pumping facilities; and
- An emergency storage tank to cater for breakdown and maintenance of duty pump.

8.2.3 In addition, a contingency plan to deal with the emergency discharge that may occur during the operation of the SPS should include the following items:

- Locations of waterbodies or WSRs in the vicinity of the emergency discharge;
- A list of relevant government departments (including name, address, email address phone and fax number of the key persons) to be informed and their respective follow up action in the event of emergency discharge, including key contact person and telephone numbers;
- A framework of emergency response and reporting procedures required in the event of emergency discharges; and
- Procedures listing the most effective means in rectifying the breakdown of the SPS in order to minimise the discharge duration.

8.2.4 In view of the above mitigation measures, environmental monitoring and audit of the sewage system is considered not required. The implementation schedule of the relevant mitigation measures is presented in [Appendix 4.1](#).

9. ECOLOGICAL IMPACT

9.1 Introduction

9.1.1 The EIA has recommended mitigation measures to avoid, minimize and compensate identified potential ecological impacts arising from the proposed project. The implementation of these measures shall be checked as part of the environmental monitoring and audit (EM&A) programme during the construction period.

9.2 Ecological Mitigation Measures and Enhancement Planting

9.2.1 Major ecological mitigation measures and enhancement planting recommended to be implemented during the construction phase are summarised below:

a) **Ecological enhancement by provision of woodland planting**

9.2.2 The enhancement planting shall be monitored throughout the establishment period (i.e. period after the completion of the planting works of the proposed enhancement planting). According to the preliminary woodland compensation plan as shown in Appendix 8.6 of EIA report, 3-years monitoring is proposed and the parameters to be monitored shall include health condition (good/fair/poor/dead) and survival (%) of the planted trees. The frequency of the monitoring is proposed to be bi-monthly during the first year while quarterly for the following years.

9.2.3 The proposed woodland enhancement planting area is indicated in [Figure 9.1](#).

b) **Transplanting directly affected individuals of *Aquilaria sinensis***

9.2.4 According to the ecological impact assessment (**Section 8**) of the EIA Report, two unavoidably affected individuals of *Aquilaria sinensis* (including one seedling and one sapling) were recommended to be preserved by transplanting.

9.2.5 In order to confirm and update the condition of the affected *Aquilaria sinensis* in woodland W3, an update vegetation survey on the species prior to the commencement of the site clearance works is recommended. The update vegetation survey shall include the following:

- i) Confirm and update the presence, condition and locations of *Aquilaria sinensis*;
- ii) Identify suitable receptor site(s) for the plants (according to the current proposal stated in **Section 8.8** of the EIA Report, suitable unaffected area in woodland W3 is recommended). Receptor site recommended in the EIA Report for the transplanting is indicated in [Figure 9.1](#). Deviation from the proposal shall be fully justified and agreed with AFCD before commencement);
- iii) Propose implementation and monitoring programme for the transplanting as well as those temporarily affected individuals.

9.2.6 Qualified ecologist(s) shall be in place to conduct the monitoring recommended in the update vegetation survey report. The monitoring would be conducted after the completion of the transplanting. Monthly monitoring for the first year following transplanting and quarterly for the second year is recommended. The details will be provided in the update vegetation survey report for AFCD's review and prior agreement.

9.2.7 The findings of the update vegetation survey shall be well presented in the *Vegetation Survey Report* for AFCD's review and agreement; while the subsequent routine monitoring findings shall be properly reported in the corresponding Monthly EM&A Report.

c) **Ecological Enhancement for the Retained Section of Stream R1f**

9.2.8 Apart from the direct avoidance of 208m semi-natural stream R1f to preserve the habitat of the crab species of conservation interest, ecological enhancement is recommended for the

retained section onsite ([Figure 9.1](#)). Proposed ecological enhancement includes reinstatement of the disturbed stream bank by demolition of all artificial structures and the provision of 6m buffer zone, following by planting of native plants:

- i) To demolish artificial bank structures and reinstate natural state of stream bank for reintroduction of riparian vegetation (the demolition works are only undertaken at sections with modified bank structure. Diagram D1 in [Appendix 9.1](#) indicates the extent of the recommended works);
- ii) To demolish artificial structures e.g. temporary storage structure/buildings, and paved grounds inside the 6m buffer zone to allow planting; and
- iii) To plant the recommended native plant species along the reinstated bank and 6m buffer zone.

9.2.9 In order to minimise the disturbance on the habitat and the crab species, temporary partition along the southern bank of the stream R1f to be reinstated will be provided to, on the one hand, confine the works inside the area enclosed by the temporary partition, and on the other hand, retain the waterflow of R1f to minimise the construction impact on the ecological and hydrological function of the watercourse. Since the demolition of modified banks is small scale works which would not require large works area. The temporary partition is proposed to be set at 1.5m from the southern bank. Demolition works will only be undertaken within the enclosed area.

9.2.10 Since the stream bed of the onsite R1f is basically natural, no further reinstatement works is required.

9.2.11 Recommended native plant species for the riparian planting on the reinstated banks and 6m buffer zone are summarised below:

Species	Proposed Coverage (%)
Stream Bank (approx. 2m wide within the 6m buffer zone)	
<i>Alternanthera sessilis</i>	25
<i>Commelina diffusa</i>	25
<i>Isachne globosa</i>	10
<i>Ludwigia adscendens</i>	5
<i>Microstegium ciliatum</i>	5
<i>Persicaria hydropiper</i>	5
<i>Rotala rotundifolia</i>	25
Other Area within 6m buffer (approx. 4m in width)	
<i>Bridelia tomentosa</i>	10
<i>Celtis sinensis</i>	5
<i>Cleistocalyx nervosum</i>	20
<i>Ficus hispida</i>	15
<i>Litsea rotundifolia</i>	15
<i>Mallotus paniculatus</i>	5
<i>Microcos nervosa</i>	10
<i>Schefflera heptaphylla</i>	20

9.2.12 The ecological enhancement works will be an integral part of the detailed design of the proposed development. Relevant works plans and the planting plan shall be reviewed by the responsible qualified ecologist. This qualified ecologist shall be a member of the ET.

9.2.13 A 12-months establishment period shall be provided after the planting works. Monitoring of the plants once a month is recommended. Species planted along the bank and buffer zone shall be checked by a qualified ecologist to ensure correct species are used in accordance with the recommendation in the EIA. Apart from the species identity, monitoring parameters shall include the overall survival rate and general health condition of each species. The monthly

monitoring shall be conducted by a qualified ecologist and provide advice whether necessary actions, such as replacement of dead plants, removal of invasive species, etc. are required to ensure the performance of the planting works. The monitoring findings shall be properly reported in the corresponding monthly EM&A report.

d) Translocation of affected crab species of conservation interest *Cryptopotamon anacoluthon* and *Somanniathelphusa zanklon*

- 9.2.14 The enhancement works at R1f will be confined in areas enclosed by temporary partitions about 1.5m from the bank. Majority of the original section of R1f to be retained (about 75% of its area) will be unaffected. During the erection of the temporary partition in the watercourse, most of the individuals of the two crab species *Cryptopotamon anacoluthon* and *Somanniathelphusa zanklon* would move away from the works activities to avoid disturbance but, some individuals would be accidentally moved into the demolition works area. Translocation of these affected individuals to the unaffected portion of R1f is therefore recommended.
- 9.2.15 One locality of *Cryptopotamon anacoluthon* in R1f ([Figure 9.1](#)) is unavoidably affected by the project due to its relevant section of the watercourse is unable to be preserved onsite. In order to minimise the impact on the individuals of this locality, same translocation practice recommended above is also applicable to this section.
- 9.2.16 A confirmation survey is recommended to be undertaken prior to erection of the temporary partition for the ecological enhancement works for the retained section of stream R1f, which aims to update the condition of the crab localities identified in the EIA stage, and to confirm recommended receptor site(s) (the unaffected section along the retained section of stream R1f is recommended as the preferred receptor site. Other potential receptor sites for consideration are indicated in [Figure 9.1](#)); and to advise the translocation methodology according to the survey results and post-translocation monitoring requirements to be agreed with AFCDC. The confirmation findings shall be well presented in a *Confirmation Survey Report (for *Cryptopotamon anacoluthon* and *Somanniathelphusa zanklon*)*.
- 9.2.17 It is expected that the translocation practice is to be conducted by the qualified ecologist at the same day of the completion of the erection of the temporary partitions along the bank to be reinstated. The qualified ecologist shall inspect whether individuals of the two crab species are trapped in the enhancement works area defined by the temporary partitions, and carry out translocation immediately according the agreed methodology with AFCDC stated in the *Confirmation Survey Report (for *Cryptopotamon anacoluthon* and *Somanniathelphusa zanklon*)*.
- 9.2.18 Collection permit for target species would be applied from AFCDC prior to commencement of translocation. Direct capture, hand netting, and baited traps would be applied at the semi-natural stream where the two crab species would be affected by proposed development. Capture would be carried out in wet season when the crabs are more active. At least 3 capture days are proposed, depending on the project programme, site and weather condition, and number of individuals captured. All captured crabs would be temporarily stored in containers with stream water with leaves and over-crowding in the containers should be avoided. They would be translocated to the finalized receptor site(s) within the same day. The ecological enhancement works for the retained section of stream R1f shall only be started when the whole translocation is completed.
- 9.2.19 A post-translocation monitoring agreed with AFCDC through the *Confirmation Survey Report (for *Cryptopotamon anacoluthon* and *Somanniathelphusa zanklon*)* would be carried out by qualified ecologist(s) by the end of wet season after translocation to assess the recapture rate. The monitoring findings shall be properly reported in the corresponding monthly EM&A report.

10. IMPACTS FROM ELECTRIC AND MAGNETIC FIELDS

10.1 Introduction

10.1.1 An assessment of potential health hazard to humans due to exposure of electric field and magnetic field generated by overhead lines have been assessed in Section 9 of the EIA Report.

10.1.2 Based on the assessment, the strength of the electric and magnetic fields generated from the 400kV overhead cables are well below the stipulated guideline limits issued by the ICNIRP in 1998, thus, no significant impacts arising from construction and operation phases of the Project on electric field and magnetic field are anticipated. No specific monitoring programme for electric field and magnetic field is required.

11. LANDSCAPE AND VISUAL IMPACTS

11.1 Introduction

11.1.1 The EIA has recommended EM&A for landscape and visual mitigation measures to be undertaken during the design, construction and operational stages of the project. The design, implementation and maintenance of landscape mitigation measures is a key aspect of this and should be checked to ensure that they are fully realised and that potential conflicts between the proposed landscape measures and any other project works and operational requirements are resolved at the earliest possible date and without compromise to the intention of the mitigation measures. In addition, implementation of the mitigation measures recommended by the EIA will be monitored through the site audit programme.

11.2 Mitigation Measures

11.2.1 A specialist landscape sub-contractor should be employed by the Contractor for the construction of the landscape works and subsequent maintenance operation during establishment period. A detailed tree survey and topographic survey showing the site conditions should be prepared prior to commencement of works. Detailed tree survey should be prepared by an Arborist accredited by the Hong Kong Institute of Landscape Architects or equivalent employed by the Contractor. For proper implementation of the mitigation measures, a Registered Landscape Architect (RLA) should be employed to check the detailed tree survey and to prepare the Tree Preservation and Removal Proposal (TPRP) in accordance with the EIA Report.

11.2.2 The landscape and visual mitigation measures proposed should be incorporated in the detailed landscape and engineering design. The construction phase mitigation measures should be implemented as early as possible during construction and should be in place throughout the entire construction period. Mitigation measures for the operational phase should be implemented during the detailed design and be built as part of the construction works so that they are in place on commissioning of the Project.

11.2.3 All the recommended mitigation measures and designs are detailed in the implementation schedule in [Appendix 4.1](#).

11.3 Audit Requirement

11.3.1 A RLA of the ET should monitor all of the landscape and visual mitigation measures undertaken during the construction phase and throughout establishment period of the operation phase. Site inspection and audit should be undertaken by the RLA at least once every two weeks throughout the construction phase and at least once a month during establishment period. Ad-hoc inspections and audits should also be carried out in case of tree transplantation, adverse weather where significant damage to existing trees is anticipated, and when significant environmental problems are identified. The broad scope of site inspection and audit is detailed below:

11.3.2 Site audits should be undertaken during the construction phase of the Project to check that the proposed landscape and visual mitigation measures are properly implemented and maintained as per their intended objectives. Site inspections should be undertaken by the ET at least once every two weeks during the construction period, by a RLA. Particularly audits should be carried out during site clearance when tree felling, and transplantation may occur. For all soft landscaping work, including measures involving trees such as tree transplantation, compensatory planting and woodland restoration, there should be at least a 12-month establishment period (however an extended establishment period and audit mechanism shall be considered where the transplanting of important trees are involved) and maintenance which will commence once soft landscaping in an area has been planted. The broad scope of the audit is detailed below.

- The extent of the agreed works areas should be regularly checked during the construction phase. Any trespass by the contractor outside the limit of the works, including any damage to existing trees and woodland shall be noted and reported to the ER.
- The progress of the engineering works should be regularly reviewed on site to identify the earliest practical opportunities for the landscape works to be undertaken.
- The tree and shrub transplanting and planting operations.
- Topsoil protection and storage operations.
- All existing trees and vegetation within the study area which are not directly affected by the works are retained and protected.
- The methods of protecting existing vegetation proposed by the Contractor are acceptable and enforced.
- All landscaping works are carried out in accordance with the specifications.
- The newly planted trees, shrubs and grassed areas are properly maintained throughout the establishment period.

11.4 Event and Action Plan

11.4.1 In the event of non-compliance, the responsibilities of the relevant parties are detailed in the Event/Action plan provided in **Table 11.1**.

Table 11.1 Event and Action Plan for Landscape and Visual

Event	Action			
	ET	IEC	ER	Contractor
Design Check	1. Check final design conforms to the requirements of EP and prepare report.	1. Check report. 2. Recommend remedial design if necessary.	1. Undertake remedial design if necessary.	-
Non-conformity on one occasion	1. Inform the IEC, ER and the Contractor 2. Discuss remedial actions with IEC, ER and Contractor 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. 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 3. Ensure remedial measures are properly implemented	1. Identify source and investigate the non-conformity 2. Amend working methods agreed with ER as appropriate 3. Rectify damage and undertake any necessary replacement

Event	Action			
	ET	IEC	ER	Contractor
Repeated Non-conformity	<ol style="list-style-type: none"> 1. Identify sources 2. Inform the Contractor, IEC and ER 3. Discuss inspection frequency 4. Discuss remedial actions with IEC, ER and Contractor 5. Monitor remedial actions until rectification has been completed 6. If non-conformity stops, cease additional monitoring 	<ol style="list-style-type: none"> 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 effectiveness of proposed remedial measures 	<ol style="list-style-type: none"> 1. Notify the Contractor 1. In consultation with the ET and IEC, agree with the Contractor on the remedial measures to be implemented 2. Supervise implementation of remedial measures 	<ol style="list-style-type: none"> 1. Identify source and investigate the non-conformity 2. Amend working methods agreed with ER as appropriate 3. Rectify damage and undertake any necessary replacement. Stop relevant portion of works as determined by ER until the non-conformity is abated.

12. WASTE MANAGEMENT IMPLICATIONS

12.1 Introduction

12.1.1 The quantity and timing for the generation of waste during the construction phase have been estimated. Measures including the opportunity for on-site sorting, reusing excavated materials etc., are devised in the construction methodology to minimise the surplus materials to be disposed off-site. Proper disposal of chemical waste should be via a licensed waste collector.

12.2 Site Audit Requirements

12.2.1 Regular audits and site inspections should be carried out during construction phase by the ET to ensure that the recommended good site practices and other recommended mitigation measures 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. Apart from site inspection, documents including licences, permits, disposal and recycling records should be reviewed and audited for compliance with the legislation and contract requirements.

12.2.2 The requirements of the environmental audit programme are set out in **Section 14.2.6** of this Manual. The audit programme will verify the implementation status and evaluate the effectiveness of the mitigation measures.

12.3 Mitigation Measures

12.3.1 Mitigation measures for waste management recommended in the EIA Report should form the basis of the Waste Management Plan (WMP) to be developed by the Contractor in the construction stage. [Appendix 4.1](#) provides the implementation schedule of the recommended mitigation measures during construction and operation phases.

12.3.2 Waste generated during the construction activities should be audited regularly by the ET to determine if waste is being managed in accordance with approved procedures and the site WMP. The audit should look at all aspects of on-site waste management practices including waste generation, storage, recycling, transport and disposal. Apart from site inspection, documents including licences, permits, disposal and recycling records should be reviewed and audited for compliance with the legislations and contract requirements. In addition, the routine site inspections should check the implementation of the recommended good site practices, waste reduction measures, and other waste management mitigation measures.

12.3.3 With the appropriate handling, storage and removal of waste arisings during the construction and operation of the Project, the potential to cause adverse environmental impacts would be minimized. During the site inspections, the ET shall pay special attention to the issues relating to waste management and check whether the Contractor has implemented the recommended good site practices, waste reduction measures and other mitigation measures.

13. LAND CONTAMINATION IMPACT

13.1 Introduction

13.1.1 The EIA report has reviewed the potential contaminated land uses associated with the Project, within the land contamination assessment area and the potential impacts on the future land uses.

13.2 Mitigation Measures

- 13.2.1 The land contamination assessment examined the potential contaminative land use within the assessment area and their potential impacts to future land use. The potentially contaminated sites could not be accessed to assess the site conditions by site walkover, at the time of reporting. As the identified potentially contaminated sites are still in operation and the development will only commence in stages from 2025 to 2033, and there may be change in land use prior to development within both the potentially contaminated and non-contaminated sites, it is recommended to conduct further works. This would include site re-appraisal, SI works as well as submission of supplementary Contamination Assessment Plan(s), Contamination Assessment Report(s) and Remediation Action Plan(s) (RAP(s)) for the EPD approval after the sites are handed over to Project Proponent for development. If contaminated soil and/or groundwater were identified, remediation should be carried out according to EPD's approved RAP(s) and Remediation Report(s) (RR(s)) should be submitted to EPD for agreement after completion of the remediation works. No development works shall be commenced prior to EPD's agreement of the RR(s).
- 13.2.2 Remediation works, if necessary, would be carried out at the contaminated sites identified in the future contamination assessment as detailed in Section 12 of the EIA Report during construction. Mitigation measures as outlined in the future RAP approved by EPD should be implemented to throughout the remediation works ([Appendix 4.1](#)). The EM&A requirements should be carried out in the form of regular site inspection to ensure the recommended mitigation measures are properly implemented and findings of the audit should be reported in the EM&A reports.
- 13.2.3 Given that any contaminated soil/ groundwater would be remediated prior to the development, there is no land contamination issue anticipated in the operation phase. As such, EM&A during operation phase for land contamination is not considered necessary.

14. CULTURAL HERITAGE IMPACT

14.1 Introduction

14.1.1 The cultural heritage impact assessment includes both built heritage and archaeology. No mitigation will be required based for built heritage, but it is anticipated that potential archaeology will be affected by the proposed development. The extent both laterally and significance of the potential archaeology needs to be established in an archaeological field survey prior to the construction phase. Mitigation such as rescue excavation or archaeological monitoring programmes may be required after the archaeological field survey results are known.

14.2 Mitigation Measures

Built Heritage

14.2.1 There are no monitoring or audit requirements for built heritage for both construction and operation phases.

Terrestrial Archaeology

Construction Phase

14.2.2 An archaeological field survey in the identified area of archaeological potential (AREA 2) cannot be conducted at this stage as the area is currently in use by light industrial activities and structures. It is marked on [Figure 14.1](#). The archaeological field survey should be undertaken prior to the construction phase but after resumption of the land and clearance of the structures in the northern part of AREA 2. The methodology should include field walking, auger testing and test pit excavations. The recommended archaeological field survey scope within this report may have to be reviewed after the resumption of the area and clearance of the structures and is subject to agreement with AMO. Mitigation may be required for this area after the results of the archaeological field survey are known.

14.2.3 The archaeological field survey should be undertaken by a qualified and licenced archaeologist (under Cap.53). The licencing process includes the drafting of an Archaeological Action Plan to the satisfaction of AMO and submission of Licence application by the archaeologist. The process may require 2-3 months. AMO, subject to their discretion, may audit the archaeological field investigation works.

14.2.4 Depending on the results of the archaeological field survey, further works may be necessary prior to construction phase. Further works may include rescue excavation prior to the commencement of construction works or archaeological watching brief in the course of construction phase. The implementation, scope and methodology of further mitigation works needs to be agreed in the Archaeological Field Survey Report with AMO and implemented at the appropriate stage by a licenced archaeologist.

14.2.5 For development areas identified with low or no archaeological potential in the Project Site, it is advised that precautionary measure be in place in case of discovery of antiquities or supposed antiquities in the course of the construction works. It is recommended therefore that AMO be notified in the in case of discovery of antiquities or supposed antiquities and works be halted until the significance of the findings can be established and necessity of follow up works, if necessary, can be confirmed.

Operation Phase

14.2.6 No adverse impact is anticipated for terrestrial archaeology and thus no further action or mitigation is required during the operation phase.

15. SITE ENVIRONMENTAL AUDIT

15.1 Site Inspection

15.1.1 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.

15.1.2 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.

15.1.3 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.

15.1.4 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.

15.1.5 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.

15.2 Environmental Compliance

15.2.1 There are statutory requirements on environmental protection and pollution control requirements with which construction activities must comply.

15.2.2 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 Environmental Mitigation Implementation schedule (EMIS) is summarised in [Appendix 4.1](#). 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.

- 15.2.3 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.
- 15.2.4 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 licences/permits under the environmental protection laws, and copies of all valid licences/permits. The site diary and environmental records shall also be available for inspection by the relevant parties.
- 15.2.5 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.
- 15.2.6 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.

15.3 Choice of Construction Method

- 15.3.1 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 15.1](#) 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.

15.4 Environment Complaints

- 15.4.1 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.

16. REPORTING

16.1 General

- 16.1.1 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 air quality, noise and water quality monitoring data to be submitted shall be separately agreed.
- 16.1.2 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. noise, dust, water quality etc) and vetted by the IEC, the ET is responsible to upload the relevant data to the dedicated website.
- 16.1.3 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.

16.2 Baseline Monitoring Report

- 16.2.1 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.

16.3 Monthly Monitoring Report

- 16.3.1 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.

- 16.3.2 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.
- 16.3.3 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

- 16.3.4 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

16.3.5 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.

16.4 Final EM&A Review Reports

General

- 16.4.1 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.
- 16.4.2 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

- 16.4.3 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 summarized 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 Construction Stage

16.4.4 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 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 operation stage, as recommended in the project EIA Report and summarized 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).

16.5 Data Keeping

- 16.5.1 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 operation phase monitoring for construction phase EM&A and operational EM&A respectively.

16.6 Interim Notifications of Environmental Quality Limit Exceedances

- 16.6.1 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 16.1](#).

END OF TEXT