Drainage Services Department

Shek Wu Hui Effluent Polishing Plant

Updated Environmental Monitoring and Audit Manual

(Version 2)

Approved By	
	(Environmental Team Leader: Mr. KS Lee)

REMARKS:

The information supplied and contained within this report is, to the best of our knowledge, correct at the time of printing.

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RAMBOLL

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By E-mail and Fax (3922 9797)

AECOM Asia Company Limited
8/F., Grand Central Plaza, Tower 2
138 Shatin Rural Committee Road, Sha Tin
New Territories, Hong Kong

Attention: Mr. CHANG Ping Wah

Dear Mr. CHANG,

Re: Contract No. SPW 08/2019
Independent Environmental Checker for
Shek Wu Hui Effluent Polishing Plant – Main Works Stage 1

Updated Environmental Monitoring and Audit Manual (Version 2)

Reference is made to the Environmental Team's submission of Updated Environmental Monitoring and Audit Manual (Version 2) received via e-mail on 2 January 2020.

Please be informed that we have no adverse comments on the captioned submission. We hereby verify the Updated Environmental Monitoring and Audit Manual in accordance with Conditions 2.3 and 3.1 of FEP-02/474/2013.

Thank you for your attention. Please feel free to contact the undersigned should you have any queries.

Yours sincerely,
For and on behalf of
Ramboll Hong Kong Limited

Ray Yan
Independent Environmental Checker

c.c.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1. INTRODUCTION

1.1 Background

1.1.1.1 The existing Shek Wu Hui Sewage Treatment Works (SWHSTW) is operated and maintained by the Drainage Services Department (DSD). It provides secondary level treatment to sewage collected from Sheung Shui, Fanling and adjacent areas. SWHSTW was completed in two stages and expanded progressively in the past years. In 1984, Stage I of SWHSTW was commissioned with design capacity of 60,000 cubic meters per day (m^3/day) at Average Dry Weather Flow (ADWF). In 2001, Stage II of SWHSTW was completed with design capacity enhanced to 80,000 m^3/day at ADWF. In 2009, the expansion of SWHSTW was completed and its design capacity was increased to 93,000m^3/day at ADWF.

1.1.1.2 In 2010, the Environmental Protection Department (EPD) commissioned Tender Ref. SI 10-120 "Shek Wu Hui Sewage Treatment Works - Further Expansion - Feasibility Study" (referred to hereinafter as the "Feasibility Study") to work out a proposal for further expansion of the SWHSTW up to 2031. The feasibility study recommended that the further expansion be carried out in 3 phases, namely Phases 1A, 1B and 2. Phase 1A is to cope with projected flow buildup in SWHSTW catchment area. Phase 1B is to cope with the forecast increase in flow from the advance phase of Fanling North and Kwu Tong North New Development Area (NDA) under the North East New Territories NDA project being implemented by CEDD. Originally, Phase 2 is to cope with the forecast increase in flow from remaining development of NDAs. With a view of rapid increase in newly planned non-NDA housing development, Phase 2 has been advanced to cope with those housing development areas. The total capacity of SWHSTW after the whole expansion scheme is 190,000 m^3/day. In view of the urgent need to provide additional treatment capacity to SWHSTW to cater for the projected increase in sewage flow, a portion of the works in Phase 1A was advanced, namely Phase 1A Advance Works. Phase 1A Advance Works was commenced in 2015 and targeted for commissioning in 2019.

1.1.1.3 After the Resource Allocation Exercise 2017, the original arrangement of Phase 1A, 1B and 2 was revised to Main Works Stage 1, Stage 2 and Stage 3 respectively to upgrade the existing SWHSTW progressively from secondary to tertiary treatment level as the new Shek Wu Hui Effluent Polishing Plant (SWHEPP). The treatment capacity of each stage and the tentative year of completion is shown in **Table 1.1**. The treatment level of SWHEPP shall be progressively upgraded from secondary treatment to tertiary treatment level using the compact and advance technology in accordance with the standards shown in **Table 1.2**.

Table 1.1 - Construction Stages for SWHEPP

Expansion Phase	Treatment Capacity (m^3/day)		Tentative Year of Completion
	Increased by	Total	
Existing	-	93,000	-
Phase 1A Advance Works	12,000	105,000	2019
Main Works Stage 1	35,000	140,000	2025
Main Works Stage 2	20,000	160,000	2029
Main Works Stage 3	30,000	190,000	2034

Table 1.2 - Treatment Standards of SWHEPP

Parameter	Unit	Existing Standards (Secondary Treatment)		Proposed Standards (Tertiary Treatment)	
		95%-tile	Upper Limit	95%-tile	Upper Limit
BOD_5	mg/L	20	40	10	20
TSS	mg/L	30	60	10	20
TN	mg/L	-	-	8	16
NH_3-N	mg/L	2	4	1.9	3.8
NO_2-N & NO_3-N	mg/L	12	24	-	-
TP	mg/L	-	-	1	2
E. coli	Count/ 100 mL	1500	100 [(a)]	1500	100 [(a)]

Notes:

(a) Monthly Geometric Mean.

Site for SWHEPP

1.1.1.4 A piece of government land to the north of Chuk Wan Street (about 3.2 hectares), together with the footprint of the existing SWHSTW (about 10 hectares), will be used for the Main Works Stage 1, Stage 2 and Stage 3 (i.e. total treatment capacity of 190,000 m^3/day or the treatment capacity to be agreed with EPD) and the proposed reclaimed water facilities (by others).

1.1.1.5 The production of reclaimed water from SWHEPP treated effluent has been studied under another project for toilet flushing and other non-potable uses in Sheung Shui/Fanling, KTN and FLN NDAs. The proposed reclaimed water treatment facilities (e.g. chlorination treatment, reclaimed water pumping station, etc.) are planned to have a total design capacity of 56,500 m^3/day reclaimed water, comprising 33,000 m^3/day for supply to Sheung Shui/Fanling and 23,500 m^3/day for supply to KTN and FLN NDAs.

1.1.1.6 The SWHEPP shall base on the proposed site utilization in **Table 1.3**.

Table 1.3 - Proposed Site Utilization for SWHEPP

Zone	Existing Usage	Proposed Usage
A	Sludge Treatment and Ancillary Facilities	Ancillary Facilities
B	Sewage Treatment Facilities	Sewage Treatment Facilities
C	Temporary Works Sites & Depots	Sludge Treatment Facilities
D	Vacant	Reclaimed Water Facilities (Reserved)

Notes:

(a) Reclaimed Water Facilities provided at Zone D would be designed and constructed by other party.

1.1.1.7 This Updated EM&A Manual is prepared for SWHEPP.

1.2 Description of Proposed Works for SWHEPP

1.2.1 General

1.2.1.1 Proposed works for SWHEPP will be carried out. General layout of SWHEPP is shown in **Figure 1.1**.

1.2.2 Scope

1.2.2.1 The major works are listed below based on the nature of works and geographic locations

(a) Construction of sewage treatment facilities;
(b) Construction of sludge and sewage treatment facilities; and
(c) Construction of ancillary facilities.

1.3 Environmental Impact Assessment (EIA) and Environmental Permit (EP)

1.3.1.1 The Further Expansion of SWHEPP is a designated project under item F.1 and F.2 of Part 1, Schedule 2 of the EIA Ordinance and an Environmental Permit is required for the construction and operation of the expanded SWHEPP.

1.3.1.2 The EIA study report for the NENT NDAs Study, which covered the assessment for the Further Expansion of SWHSTW Phase 1A, 1B and 2 has been submitted to EPD and exhibited for public to comment in mid 2013 (EIA Application Number EIA-213/2013). The report was subsequently approved with conditions by EPD on 18 October 2013 under Register No. AEIAR-175/2013 (hereinafter referred to as "the EIA Report").

1.3.1.3 An EP No. EP-474/2013 was subsequently issued to the CEDD for the SWHSTW Further Expansion (including Phases 1A, 1B and 2) on 21 November 2013. In order to assume the responsibility for the Project (i.e. Further Expansion Phase 1A), DSD has applied for a Further EP. The Further EP No. FEP-01/474/2013 was subsequently issued to DSD as permit holder on 23 January 2014.

1.3.1.4 A Further EP was applied on 18 January 2018 to assume the responsibility for constructing and operating the SWHEPP Project up to a capacity of 190,000 m^3/day. The Further EP No. FEP-02/474/2013 was issued to DSD as permit holder on 15 February 2018. Due to overlapping of scope with the Further EP currently in force, the Further EP No. FEP-01/474/2013 was subsequently surrendered on 15 August 2018.

1.3.1.5 In accordance with Condition 2.3 of the Further EP No. FEP-02/474/2013, an Updated Environmental Monitoring and Audit (EM&A) Manual, which shall be certified by the Environmental Team (ET) Leader and verified by the Independent Environmental Checker (IEC), shall be submitted at least one month before the commencement of construction of the Project.

1.4 Purpose of this Manual

1.4.1.1 The Environmental Monitoring and Audit Manual prepared under Agreement No. CE40/2012 (DS) in the investigation stage of the Project, together with the EIA Study for NENT NDAs Study, were referenced by the Project team during the preparation of the Updated EM&A Manual in accordance with Condition 2.3 of the Further EP No. FEP-02/474/2013 mentioned above. This Manual will take into account the latest EM&A requirements in accordance with the information and recommendations described in the EIA Report as well as the specific site conditions and development details of the Project.

1.4.1.2 The purpose of this Updated EM&A Manual is to guide the setup of an EM&A programme to assess the effectiveness of the recommended mitigation measures and to identify any further need for additional mitigation measures or remedial action. This Manual outlines the monitoring and audit programme for the construction phase of the proposed Project. It aims to provide systematic procedures for monitoring, auditing and minimising environmental impacts associated with construction works.

1.4.1.3 Hong Kong environmental regulations and the Hong Kong Planning Standards and Guidelines have served as environmental standards and guidelines in the preparation of this Manual. This Manual contains the following information:

- responsibilities of the Contractor, the Project Manager, the Supervisor or Engineers' Representative (ER), Environmental Team (ET) and Independent Environment Checker (IEC) with respect to the environmental monitoring and audit requirements during the course of the Project;
- Project organisation for the EM&A works;
- the basis for, and description of the broad approach underlying the EM&A programme;
- requirements with respect to the construction programme schedule and the necessary environmental monitoring and audit programme to track the varying environmental impact;
- details of the methodologies to be adopted, including all field 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;
- requirements for presentation of environmental monitoring and audit data and appropriate reporting procedures;
- requirements for review of EIA predictions and the effectiveness of the mitigation measures / environmental management systems and the EM&A programme.

1.4.1.4 For the purpose of this Manual, the ET leader, who shall be responsible for and in charge of the ET, shall refer to the person delegated the role of executing the EM&A requirements.

1.4.1.5 The mitigation measures and EM&A requirements as recommended in this Manual shall apply to the Project, unless otherwise stated.

1.5 Project Organisation

1.5.1 General

1.5.1.1 The roles and responsibilities of the various parties involved in the EM&A process and the organisational structure of the organisations responsible for implementing the EM&A programme are outlined below. The proposed project organisation and lines of communication with respect to environmental protection works are shown in **Figure 1.2.**

1.5.2 The Contractor

1.5.2.1 The Contractor shall report to the Supervisor. The duties and responsibilities of the Contractor are:

- implement the recommendations and requirements of the EIA study;
- provide assistance to ET in carrying out monitoring;
- 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 until the events are resolved;
- implement the corrective actions instructed by the Supervisor;
- accompany joint site inspection undertaken by the ET; and
- adhere to the procedures for carrying out complaint investigation.

1.5.3 Environmental Team

1.5.3.1 The Environmental Team (ET) Leader and the ET shall be employed to conduct the EM&A programme and ensure the Contractor's compliance with the project's environmental performance requirements during construction. The ET Leader shall be an independent party from the Contractor and have relevant professional qualifications, or have sufficient relevant EM&A experience subject to approval of the ER and EPD. The ET shall be led and managed by the ET leader. The ET leader shall possess at least 7 years of experience in EM&A and/or environmental management.

1.5.3.2 The duties and responsibilities of the ET are:

- monitor various environmental parameters as required in this Updated EM&A Manual;
- analyse the environmental monitoring and audit data and review the success of EM&A programme to cost-effectively confirm the adequacy of mitigation measures implemented and the validity of the EIA predictions and to identify any adverse environmental impacts arising;
- carry out regular site inspection to investigate and audit the Contractors' site practice, equipment and work methodologies with respect to pollution control and environmental mitigation, and effect proactive action to pre-empt problems; carry out ad hoc site inspections if significant environmental problems are identified;
- audit and prepare monitoring and 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;
- advice to the Contractor on environmental improvement, awareness, enhancement matters, etc. on site;
- timely submission of the EM&A report to the Project Proponent and EPD; and
- adhere to the procedures for carrying out complaint investigation.

1.5.4 Project Manager/Supervisor/Engineers' Representative (PM/S/ER)

1.5.4.1 The PM/S/ER is responsible for overseeing the construction works and for ensuring that the works undertaken by the Contractor in accordance with the specification and contractual requirements. The duties and responsibilities of the PM/S/ER with respect to EM&A may include:

- supervise the Contractor's activities and ensure that the requirements in the Updated 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;
- participate in joint site inspection undertaken by the ET; and
- adhere to the procedures for carrying out complaint investigation.

1.5.5 Independent Environmental Checker

1.5.5.1 The Independent Environmental Checker (IEC) shall advise the PM/S/ER on environmental issues related to the Project. The IEC shall possess at least 7 years experience in EM&A and/or environmental management.

1.5.5.2 The duties and responsibilities of the IEC are:

- review the EM&A works performed by the ET (at least at monthly intervals);
- carry out random sample check and audit the monitoring activities and results (at least at monthly intervals);
- conduct random site inspection;
- review the EM&A reports submitted by the ET;
- review the effectiveness of environmental mitigation measures and project environmental performance;
- review the proposal on mitigation measures submitted by the Contractor in accordance with the Event and Action Plans; and
- adhere to the procedures for carrying out complaint investigation.

1.5.5.3 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.

1.6 Contents of the Manual

1.6.1.1 Following this introductory section, this Updated EM&A Manual contains the following subsequent sections:-

Section 2 - Air Quality

Section 3 - Noise

Section 4 - Ecology

Section 5 - Water Quality

Section 6 - Waste Management

Section 7 - Landscape and Visual

Section 8 - Site Environmental Audit

Section 9 - Reporting

Section 10 - Implementation Schedule and Recommended Mitigation Measures

1.6.1.2 No land contamination or potential cultural heritage issue were identified in the EIA Report for the Project, thus, no environmental monitoring and audit is required.

2. AIR QUALITY

2.1 Introduction

2.1.1.1 In accordance with the EM&A Manual of the NENT NDA EIA study and the Environmental Monitoring and Audit Manual prepared under Agreement No. 40/2012 (DS) in the Investigation Stage of the Project, dust monitoring during construction phase was recommended and it is considered still valid for the Project. In this Section, the requirements, methodology, equipment, monitoring locations, criteria and protocols for the monitoring and audit of air quality impact during the construction phase of the Project are presented.

2.1.1.2 The objectives of the air quality monitoring shall be:

- to identify the extent of construction dust impact on sensitive receivers;
- to determine the effectiveness of mitigation measures to control fugitive dust emission from activities during the construction phase;
- to audit the compliance of the Contractor with regard to dust control, contract conditions and the relevant dust impact criteria;
- to recommend further mitigation measures if found to be necessary; and
- to comply with Action and Limit (A/L) Levels for air quality as defined in this Manual.

2.2 Construction Dust Monitoring

2.2.1 Monitoring Parameters

2.2.1.1 The criteria against which ambient air quality monitoring to be assessed are:

- The Hong Kong Air Quality Objectives (AQOs) for total suspended particulates (TSP), 24-hour TSP levels of 260 $\mu g\ m^{-3}$; and
- Technical Memorandum on Environmental Impact Assessment Process (TM-EIAO) for 1-hour TSP limit of 500 $\mu g\ m^{-3}$.

2.2.1.2 These levels are not to be exceeded at ASRs.

2.2.1.3 Monitoring and audit of the TSP levels shall be carried out by the ET to ensure that any deteriorating air quality could be readily detected and timely action shall be undertaken to rectify such situation.

2.2.1.4 One-hour and 24-hour TSP levels shall be measured to indicate the impacts of construction dust on air quality. The 24-hour 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 ER, 1-hour TSP levels can be measured by direct reading methods which are capable of producing comparable results as that measured by the high volume sampling method, to indicate short event impacts.

2.2.1.5 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, other local atmospheric factors affecting or affected by site conditions and work progress of the concerned site etc. shall be recorded in detail. A sample data record sheet is shown in **Appendix A**.

2.2.2 Monitoring Equipment

2.2.2.1 High volume sampler (HVS) in compliance with the following specifications shall be used for carrying out the 1-hour and 24-hour monitoring:

- 0.6 - 1.7 m^3 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 cm^2;
- flow control accuracy: ± 2.5% deviation over 24-hour sampling period;
- equipped with a shelter to protect the filter and sampler;
- incorporated with an electronic mass flow rate controller or other equivalent devices;
- equipped with a flow recorder for continuous monitoring;
- provided with a peaked roof inlet;
- incorporated with a manometer;
- able to hold and seal the filter paper to the sampler housing at horizontal position;
- easy to change the filter; and
- capable of operating continuously for 24-hour period.

2.2.2.2 The ET shall be responsible for the provision of the monitoring equipment. He shall ensure that sufficient number of HVSs with appropriate calibration kit is available for carrying out the baseline, regular impacts 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.

2.2.2.3 Initial calibration of the dust monitoring equipment shall be conducted upon installation and prior to commissioning at bi-monthly intervals. The transfer standard shall be traceable to the internationally recognised primary standard and be calibrated annually. The calibration data shall be properly documented for future reference by the concerned parties such as the IEC. All the data shall be converted into standard temperature and pressure condition.

2.2.2.4 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 on the data sheet as shown in **Appendix A**.

2.2.2.5 If the ET proposes to use a direct reading dust meter to measure 1-hour TSP levels, he shall submit sufficient information to the IEC to prove that the instrument is capable of achieving a comparable result as that of the HVS before it may be used for the 1-hour sampling. The instrument shall also be calibrated regularly, and the 1-hour sampling shall be determined periodically by HVS to check the validity and accuracy of the results measured by direct reading method.

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

(i) The wind sensors shall be installed 10m above ground so that they are clear of obstructions or turbulence caused by the buildings;

(ii) The wind data shall be captured by a data logger. The data shall be downloaded for analysis at least once a month;

(iii) The wind data monitoring equipment shall be re-calibrated at least once every six months; and

(iv) Wind direction should be divided into 16 sectors of 22.5 degrees each.

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

2.2.3 Laboratory Measurement / Analysis

2.2.3.1 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, and equipment calibration and maintenance. The laboratory shall be HOKLAS accredited or other internationally accredited laboratory.

2.2.3.2 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 IEC. Measurement performed by the laboratory shall be demonstrated to the satisfaction of the ER and the IEC.

2.2.3.3 The IEC shall conduct regular audit of the measurement performed by the laboratory so as to ensure the accuracy of measurement results. The ET shall provide the ER with one copy of the Title 40 of the Code of Federal Regulations, Chapter 1 (Part 50), Appendix B for his/her reference.

2.2.3.4 Filter paper of size 8"x10" shall be labelled before sampling. It shall be a clean filter paper with no pinholes, and shall be conditioned in a humidity-controlled chamber for over 24-hour and be pre-weighed before use for the sampling.

2.2.3.5 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 a readout down to 0.1mg. The balance shall be regularly calibrated against a traceable standard.

2.2.3.6 All the collected samples shall be kept in a good condition for 6 months before disposal.

2.2.4 Monitoring Locations

2.2.4.1 According to the EM&A Manual of NENT NDA EIA Study and the Environmental Monitoring and Audit Manual prepared under Agreement No. 40/2012(DS) in the Investigation Stage of the Project, Fu Tei Au was proposed to be monitored during construction phase of the Project. Having reviewed the specific site condition of the Project, the ASR nearest to the proposed site is found to be Wai Loi Tsuen, Sheung Shui Heung. Therefore, an additional air quality monitoring station at Wai Loi Tsuen is recommended to be included for construction phase dust monitoring.

Alternative Location

2.2.4.2 During the previous work stage “Provision of Electrical and Mechanical Facilities for Shek Wu Hui Sewage Treatment Works – Further Expansion Phase 1A - Advance Works and Ng Chow South Road Sewage Pumping Station” (Contract No. DE/2014/01), the monitoring at Wai Loi Tsuen was disrupted due to electrical problems, a proposal for an alternative 24 hours air quality monitoring station, designated as AM1a, was submitted and approved by EPD in September 2018. AM1a was proposed as a more suitable location for a setup of HVS to monitor 24-hour TSP concentration due to a more stable power supply at the new monitoring location.

2.2.4.3 According to the updated EM&A manual under DSD Contract No. DC/2013/09 – "Advance Works for Shek Wu Hui Sewage Treatment Works – Further Expansion Phase 1A and Sewerage Works at Ping Che Road", location for setup of HVS proposed was not granted at AM2. Alternative location at the site boundary was proposed which is located in close proximity to the project site. It is closer to project site compared with the original ASR Fu Tei Au. Moreover, stable power provision would be provided by the power supply from the site.

2.2.4.4 The alternative monitoring locations are positioned at the site boundary and are further justified by analysis of meteorological data from Hong Kong Observatory. The major prevailing wind directions are East and South-east, as the air sensitive receivers are the residential houses at Wai Loi Tsuen and Fu Tei Au as shown in **Figure 2**, the receivers are not under the major downwind location, therefore the location at the site boundary is chosen as alternative locations. The downwind direction is the west of the Site, as no sensitive receivers located to the west of the Site are identified, no monitoring location is proposed on the western side.

2.2.4.5 The dust monitoring locations are shown in **Figure 2** and are listed in **Table 2.1** below.

Table 2.1 - Proposed Construction Dust Monitoring Stations

Station	Location	Measurement
AM1	Wai Loi Tsuen	1-hour TSP
AM2	Fu Tei Au	
AM1a	Site boundary of the Shek Wu Hui STW (East)	24-hour TSP
AM2a	Site boundary of the Shek Wu Hui STW (North)	

2.2.4.6 The status and locations of the air quality sensitive receivers may change after issuing this Manual. The ET shall propose alternative monitoring locations and seek approval from ER and IEC and agreement from EPD on the proposal.

2.2.4.7 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;

(iii) proper position/sitting and orientation of the monitoring equipment; and

(iv) take into account the prevailing meteorological conditions.

2.2.4.8 The ET shall agree with the IEC on the position of the HVS for 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) no two samplers shall be placed less than 2 meter apart;

(iii) the distance between the sampler and an obstacle, such as buildings, must be at least twice the height that the obstacle protrudes above the sampler;

(iv) a minimum of 2 metres of separation from walls, parapets and penthouses is required for rooftop samplers;

(v) a minimum of 2 metres of separation from any supporting structure, measured horizontally is required;

(vi) no furnace or incinerator flue is nearby;

(vii) airflow around the sampler is unrestricted;

(viii) the sampler is more than 20 metres from the dripline;

(ix) any wire fence and gate, to protect the sampler, shall not cause any obstruction during monitoring;

(x) permission must be obtained to set up the samplers and to obtain access to the monitoring stations; and

(xi) a secured supply of electricity is needed to operate the samplers.

2.2.5 Baseline Monitoring

2.2.5.1 Baseline monitoring shall be carried out to determine the ambient 1-hour and 24-hour TSP levels at the monitoring locations prior to the commencement of the Project works. During the baseline monitoring, there shall not be any construction or dust generating activities in the vicinity of the monitoring stations. The baseline monitoring will provide data for the determination of the appropriate Action levels with the Limit levels set against statutory or otherwise agreed limits.

2.2.5.2 Before commencing the baseline monitoring, the ET shall inform the IEC of the baseline monitoring programme such that the IEC can conduct on-site audit to ensure accuracy of the baseline monitoring results.

2.2.5.3 Baseline monitoring shall be carried out at all of the designated monitoring locations for at least 14 consecutive days prior to the commissioning of the construction works to obtain daily 24-hour TSP samples. 1-hour sampling shall also be done at least 3 times per day while the highest dust impact is expected.

2.2.5.4 In case the baseline monitoring cannot be carried out at the designated monitoring locations during the baseline monitoring period, the ET Leader 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 approved by the ER and agreed with IEC.

2.2.5.5 In exceptional cases, when insufficient baseline monitoring data or questionable results are obtained, the ET Leader 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 ER for approval.

2.2.5.6 Baseline checking of ambient TSP levels shall be carried out every three months at each monitoring location, when no dusty works activities are in operation. If the ET considers that significant changes in the ambient conditions have arisen, a repeat of the baseline monitoring may be carried out to update the baseline levels. The revised baseline levels, in turn, the air quality criteria, shall be agreed with the IEC and EPD.

2.2.6 Impact Monitoring

2.2.6.1 The ET shall carry out impact monitoring during construction phase of the Project. For regular impact monitoring, a sampling frequency of at least once in every six-days shall be strictly observed at all of the monitoring stations for 24-hour TSP monitoring. For 1-hour TSP monitoring, the sampling frequency of at least three times in every six days shall be undertaken when the highest dust impact occurs.

2.2.6.2 Before commencing the impact monitoring, the ET shall inform the IEC of the impact monitoring programme such that the IEC can conduct on-site audit to ensure accuracy of the impact monitoring results.

2.2.6.3 The specific time to start and stop the 24-hour TSP monitoring shall be clearly defined for each location and be strictly followed by the field operator.

2.2.6.4 In case of non-compliance with the air quality criteria, more frequent monitoring, as specified in the Action Plan in **Section 2.2.7**, shall be conducted within 24 hours after the result is obtained. This additional monitoring shall be continued until the excessive dust emission or the deterioration in air quality is rectified.

2.2.7 Event and Action Plan

2.2.7.1 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 and 24-hour TSP. **Table 2.2** shows the air quality criteria, namely Action and Limit levels to be used. Should non-compliance of the air quality criteria occur, action in accordance with the Action Plan in **Table 2.3** shall be carried out.

Table 2.2 - Action and Limit Levels for Construction Dust

Parameter	Action Level (1)	Limit Level
24-hr TSP in $\mu g/m^3$	For BL ≤ 200 $\mu g/m^3$, AL = (BL×1.3 + LL)/2 For BL > 200 $\mu g/m^3$, AL = LL	260$\mu g/m^3$
1-hr TSP in $\mu g/m^3$	For BL ≤ 384 $\mu g/m^3$, AL = (BL×1.3 + LL)/2 For BL > 384 $\mu g/m^3$, AL = LL	500$\mu g/m^3$

Note:
(1) BL = Baseline level, AL = Action level, LL = Limit level.
(2) The action and limit levels are referring to *Table 1.1, Appendix D2 - General Technical Requirements of Environmental Monitoring, The Environmental Monitoring and Audit Guidelines for Development Projects in Hong Kong, EPD.*

Table 2.3 - Event and Action Plan for Construction Dust

Event	Action			
	ET	IEC	ER	Contractor
Action level being exceeded by one sampling	1. Identify source, investigate the causes of complaint and propose remedial measures; 2. Inform IEC and ER; 3. Repeat measurement to confirm finding; 4. Increase monitoring frequency to daily.	1. Check monitoring data submitted by ET; 2. Check Contractor's working method.	1. Notify Contractor.	1. Rectify any unacceptable practice; 2. Amend working methods if appropriate.
Action level being exceeded by two or more consecutive sampling	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.	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.	1. Confirm receipt of notification of exceedance in writing; 2. Notify Contractor; 3. Ensure remedial measures properly implemented.	1. Submit proposals for remedial actions to IEC within three working days of notification; 2. Implement the agreed proposals; 3. Amend proposal if appropriate.

Event	Action			
	ET	**IEC**	**ER**	**Contractor**
Limit level being exceeded by one sampling	1. Identify source, investigate the causes of exceedance and propose remedial measures; 2. Inform Contractor, IEC, ER, and EPD; 3. Repeat measurement to confirm finding; 4. Increase monitoring frequency to daily; 5. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results.	1. Check monitoring data submitted by ET; 2. Check Contractor's working method; 3. Discuss with ET and Contractor on possible remedial measures; 4. Advise the ER on the effectiveness of the proposed remedial measures; 5. Supervise implementation of remedial measures.	1. Confirm receipt of notification of exceedance in writing; 2. Notify Contractor; 3. Ensure remedial measures properly implemented.	1. Take immediate action to avoid further exceedance; 2. Submit proposals for remedial actions to IEC within three working days of notification; 3. Implement the agreed proposals; 4. Amend proposal if appropriate.
Limit level being exceeded by two or more consecutive sampling	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.	1. Discuss amongst ER, ET, and Contractor on the potential remedial actions; 2. Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly; 3. Supervise the implementation of remedial measures.	1. Confirm receipt of notification of exceedance in writing; 2. Notify Contractor; 3. In consolidation 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.	1. Take immediate action to avoid further exceedance; 2. Submit proposals for remedial actions to 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.

2.3 Mitigation Measures

2.3.1.1 Mitigation measures for dust control have been recommended in the EIA Report and summarized in Environmental Review Report of this Study. The Contractor shall be responsible for the design and implementation of these measures.

2.3.1.2 Recommended mitigation measures to minimise the adverse impacts on air quality during construction phases are detailed in sections below.

2.3.1.3 To ensure compliance with the guideline level and AQO at the ASRs, the Air Pollution Control (Construction Dust) Regulation should be implemented and good site practices should be incorporated in the contract clauses to minimize construction dust impact. A number of below dust suppression measures are proposed to be implemented.

- Any excavated or stockpile of dusty material should be covered entirely by impervious sheeting or sprayed with water to maintain the entire surface wet and then removed or backfilled or reinstated where practicable within 24 hours of the excavation or unloading;
- Any dusty material remaining after a stockpile is removed should be wetted with water and cleared from the surface of roads;
- A stockpile of dusty material should not be extended beyond the pedestrian barriers, fencing or traffic cones;
- The load of dusty materials on a vehicle leaving a construction site should be covered entirely by impervious sheeting to ensure that the dusty materials do not leak from the vehicle;
- Where practicable, vehicle washing facilities with high pressure water jet should be provided at every discernible or designated vehicle exit point. The area where vehicle washing takes place and the road section between the washing facilities and the exit point should be paved with concrete, bituminous materials or hardcores;
- When there are open excavation and reinstatement works, hoarding of not less than 2.4m high should be provided as far as practicable along the site boundary with provision for public crossing. Good site practice shall also be adopted by the Contractor to ensure the conditions of the hoardings are properly maintained throughout the construction period.
- The portion of any road leading only to construction site that is within 30m of a vehicle entrance or exit should be kept clear of dusty materials;
- Surfaces where any pneumatic or power-driven drilling, cutting, polishing or other mechanical breaking operation takes place should be sprayed with water or a dust suppression chemical continuously;
- Any area that involves demolition activities should be sprayed with water or a dust suppression chemical immediately prior to, during and immediately after the activities so as to maintain the entire surface wet;
- Where a scaffolding is erected around the perimeter of a building under construction, effective dust screens, sheeting or netting should be provided to enclose the scaffolding from the ground floor level of the building, or a canopy should be provided from the first floor level up to the highest level of the scaffolding;
- Any skip hoist for material transport should be totally enclosed by impervious sheeting;
- Every stock of more than 20 bags of cement or dry pulverised fuel ash (PFA) should be covered entirely by impervious sheeting or placed in an area sheltered on the top and the 3 sides;

- Cement or dry PFA delivered in bulk should be stored in a closed silo fitted with an audible high level alarm which is interlocked with the material filling line and no overfilling is allowed;
- Loading, unloading, transfer, handling or storage of bulk cement or dry PFA should be carried out in a totally enclosed system or facility, and any vent or exhaust should be fitted with an effective fabric filter or equivalent air pollution control system; and
- Exposed earth should be properly treated by compaction, turfing, hydroseeding, vegetation planting or sealing with latex, vinyl, bitumen, shortcrete or other suitable surface stabiliser within six months after the last construction activity on the construction site or part of the construction site where the exposed earth lies.

3. NOISE

3.1 Introduction

3.1.1.1 In this Section, the requirements, methodology, equipment, monitoring locations, criteria and protocols for the monitoring and audit of noise impacts during the construction phase of the Project are presented.

3.1.1.2 The EM&A requirements recommended in the NENT NDAs EIA Report including noise monitoring and audit during construction phase of the Project, and the Environmental Monitoring and Audit Manual prepared under Agreement No. 40/2012(DS) in the Investigation Stage of the Project are considered valid. Noise monitoring is proposed to be conducted.

3.1.2 Construction Noise

3.1.2.1 The construction noise levels should be measured in terms of the A-weighted equivalent continuous sound pressure level Leq. Leq(30-min) should be used as the monitoring parameter for the time period between 0700 and 1900 hours on normal weekdays.

3.1.2.2 Supplementary information for data auditing and statistical results such as L_{10} and L_{90} should also be obtained for reference. Sample noise field data sheets are shown in **Appendix B** of this Manual for reference. The ET Leader may modify the data record sheet for this EM&A programme but the format of which should be agreed by the IEC.

3.1.3 Monitoring Equipment

3.1.3.1 As referred to in the Technical Memorandum (TM) issued under the Noise Control Ordinance (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 shall be accepted as valid only if the calibration level from before and after the noise measurement agrees to within 1.0 dB.

3.1.3.2 Noise measurements shall not be made in fog, rain, wind with a steady speed exceeding 5m/s or wind with gusts exceeding 10m/s. The wind speed shall be checked with a portable wind speed meter capable of measuring the wind speed in m/s.

3.1.3.3 The ET is responsible for the provision 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. The equipment installation location shall be proposed by the ET Leader and agreed with the ER and EPD in consultation with the IEC.

3.1.4 Monitoring Locations

3.1.4.1 According to the EM&A Manual of NENT NDA EIA Study and the Environmental Monitoring and Audit Manual prepared under Agreement No. 40/2012(DS) in the Investigation Stage of the Project, Fu Tei Au was proposed to be monitored during construction phase of the Project. Having reviewed the project specific site conditions, Wai Loi Tsuen and Man Kok Village were identified as another key NSR in the vicinity of the Project site. Therefore, noise monitoring stations at Wai Loi Tsuen and Man Kok Village are recommended to be monitored during construction phase. The proposed noise monitoring locations are shown in **Figure 3** and summarised in **Table 3.1** below.

Table 3.1 - Proposed Construction Noise Monitoring Stations

Station	Location
NM1	Wai Loi Tsuen
NM2	Fu Tei Au
NM3	Man Kok Village

3.1.4.2 The status and locations of noise sensitive receivers (NSRs) may change or planned NSRs closer to SWHEPP are occupied after issuing this Manual. In addition, the owners of the construction noise monitoring stations proposed in **Table 3.1** may not provide the access for setting up the monitoring stations. If such cases exist, the ET shall propose alternative monitoring locations/additional monitoring locations and seek approval from the ER and IEC and agreement from EPD of the proposal.

3.1.4.3 When alternative/new monitoring locations are proposed, the monitoring locations shall be chosen based on the following criteria:

(i) at locations close to the major site activities which are likely to have noise impacts;

(ii) close to the noise sensitive receivers; and

(iii) for monitoring locations located in the vicinity of the sensitive receivers, care shall be taken to cause minimal disturbance to the occupants during monitoring.

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

3.1.5 Baseline Monitoring

3.1.5.1 Baseline noise monitoring shall be carried out daily in all of the identified monitoring stations for at least 2 weeks prior to the commissioning of the construction works. A schedule of the baseline monitoring shall be submitted to the ER and IEC for approval before the monitoring starts.

3.1.5.2 During the baseline monitoring, there shall not be any construction activities in the vicinity of the monitoring stations.

3.1.5.3 In exceptional cases, when insufficient baseline monitoring data or questionable results are obtained, the ET leader shall liaise with EPD and in consultation with ER and the IEC to agree on an appropriate set of data to be used as a baseline reference.

3.1.6 Impact Monitoring

3.1.6.1 Noise monitoring should be carried out at the designated monitoring station when there are Project-related construction activities being undertaken within a radius of 300m from the monitoring stations. The monitoring frequency should depend on the scale of the construction activities. An initial guide on the monitoring is to obtain one set of 30-minute measurement at each station between 0700 and 1900 hours on normal weekdays at a frequency of once a week when construction activities are underway.

3.1.6.2 If construction works are extended to include works during the hours of 1900 - 0700, additional weekly impact monitoring shall be carried out during evening and night-time works. Applicable permits under NCO shall be obtained by the Contractor.

3.1.6.3 In case of non-compliance with the construction noise criteria, more frequent monitoring, as specified in the Action Plan in **Table 3.3** shall be carried out. This additional monitoring shall be continued until the recorded noise levels are rectified or proved to be irrelevant to the construction activities.

3.1.7 Event and Action Plan

3.1.7.1 The Action and Limit levels for construction noise are defined in **Table 3.2**. Should non-compliance of the criteria occur, action in accordance with the Action Plan in **Table 3.3** shall be carried out.

Table 3.2 - Action and Limit Levels for Construction Noise

Time Period[1]	Action Level	Limit Level
0700 – 1900 hours on normal weekdays	When one documented complaint is received	75 dB(A)[2]

Notes:
(1) If works are to be carried out during restricted hours, the conditions stipulated in the Construction Noise Permit (CNP) issued by the Noise Control Authority have to be followed.
(2) 70 dB(A) and 65 dB(A) for schools during normal teaching periods and school examination periods, respectively.

Table 3.3 - Event and Action Plan for Construction Noise

Event	Action			
	ET	**IEC**	**ER**	**Contractor**
Action Level	1. Notify IEC 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.	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.	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.	1. Submit noise mitigation proposals to IEC; 2. Implement noise mitigation proposals.
Limit Level	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.	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.	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.	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.

3.2 Mitigation Measures

3.2.1.1 To alleviate the construction noise impact on the affected NSRs, the following mitigation measures were proposed in the EIA Report for the Project:

- Use of movable barrier, enclosure, acoustic mat and quiet plant; and
- Wooden framed barrier with a small-cantilevered upper portion of superficial density not less than 14kg/m² on a skid footing with 25mm thick internal sound absorptive lining.

3.2.1.2 In addition, the good site practices should be adopted by all the Contractors to further ameliorate the noise impacts.

- Only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction program;
- Silencers or mufflers on construction equipment should be utilised and should be properly maintained during the construction program;
- Mobile plant, if any, should be sited as far away from NSRs as possible and practicable;
- Machines and plant (such as trucks) that may be in intermittent use should be shut down between works periods or should be throttled down to a minimum;
- Plant known to emit noise strongly in one direction should, wherever possible, be orientated so that the noise is directed away from the nearby NSRs; and
- Material stockpiles and other structures should be effectively utilised, wherever practicable, in screening noise from on-site construction activities.

3.2.1.3 If the above measures are not sufficient to restore the construction noise quality to acceptable levels upon the advice of ET Leader, the Contractor shall liaise with the ET Leader to identify further mitigation measures. They shall be proposed to ER for approval, and the contractor shall then implement these additional mitigation measures.

4. ECOLOGY

4.1 Introduction

4.1.1.1 The EIA Report has evaluated the predicted ecological impacts of the NDAs project and has concluded that ecological impacts can be avoided or reduced to a low and acceptable level with the implementation of appropriate mitigation measures. This Section describes the EM&A requirements in ecological aspect specific for the Project.

4.2 Mitigation Measures

4.2.1.1 Solid dull green noise/visual barriers of at least 2m high shall be erected and maintained between active works area and all areas of ecological importance. Recommended locations of such barriers are illustrated in figure 13.15 of the EIA Report.

4.2.1.2 Unnecessary lighting should be avoided to minimize mortality impacts on birds.

4.2.1.3 Good construction site practice to minimise dust generation should be followed on all construction sites. Measures to avoid, minimise and mitigate impacts on air quality are detailed in **Sections 2** and **10** of this Manual.

4.2.1.4 Measures to avoid, minimise and mitigate impact on water quality during construction phase shall be implemented:

- Temporary sewerage and drainage to be designed and installed to collect wastewater and prevent it from entering water bodies;
- Proper locations well away from nearby water bodies should be used for temporary storage of materials (i.e. equipment, filling materials, chemicals and fuel) and temporary stockpiles of construction debris and spoil, and these should be identified before commencement of works;
- To prevent muddy water entering nearby water bodies, work sites close to nearby water bodies should be isolated, using such items as sandbags or silt curtains with lead edge at bottom and properly supported props. Other protective measures should also be taken to ensure that no pollution or siltation occurs to the water gathering grounds of the work sites;
- Construction debris and spoil should be covered and/or properly disposed of as soon as possible to avoid these being washed into nearby water bodies;
- Proper locations for discharge outlets of temporary wastewater treatment facilities well away from sensitive receivers should be identified;
- Adequate lateral support should be erected where necessary in order to prevent soil/mud from slipping into water bodies;
- Site boundaries should be clearly marked and any works beyond the boundary strictly prohibited;
- Regular water monitoring and site audit should be carried out at adequate points along any watercourses where construction works are underway upstream within their catchments and also on the Ng Tung, Sheung Yue and Shek Sheung Rivers. If the monitoring and audit results show that pollution occurs, adequate measures including temporarily cessation of works should be considered;
- Excavation profiles should be properly designed and executed with attention to the relevant requirements for environment, health and safety;
- Where soil to be excavated is situated beneath the groundwater table, it may be necessary to lower the groundwater table by installing well points or similar means;

- Stockpiling sites should be lined with impermeable sheeting and bunded. Stockpiles should be properly covered by impermeable sheeting to reduce dust emission during dry season or contaminated run-off during rainy season. Watering should be avoided on stockpiles of contaminated soil to minimize contaminated runoff and construction materials should be properly covered and located away from nearby water bodies; and
- Supply of suitable clean backfill material after excavation, if required.
- Vehicles containing any excavated materials should be suitably covered to limit potential dust emissions or contaminated run-off, and truck bodies and tailgates should be sealed to prevent discharge during transport or during wet season;
- Speed control for the trucks carrying contaminated materials should be enforced;
- Vehicle wheel washing facilities at construction sites' exit points should be established and used, where necessary; and
- Other measures as detailed in **Sections 5** and **10** of this Manual.

4.3 Monitoring of Measures to Minimise Disturbance to Waterbirds on Ng Tung, Sheung Yue and Shek Sheung Rivers

4.3.1 Monitoring Requirements Recommended in the NENT NDAs EIA Study

4.3.1.1 According to section 14.3.2.2 of the EM&A manual prepared for the NENT NDAs EIA Study, a monitoring protocol with respect to waterbirds on Ng Tung, Sheung Yue and Shek Sheung Rivers shall be followed for the development under NDAs project, which is undertaken within 200m (the maximum distance at which it is predicted there may be some disturbance, and hence a reduction in numbers, of large waterbirds) from these rivers. The monitoring shall be conducted in pre-construction (i.e. baseline), construction and post-construction phases of the concerned development.

4.3.2 Review of Monitoring Requirements for the Project

4.3.2.1 The Project is located within 200m from the concerned river channels. Nevertheless, the waterbirds monitoring requirements are reviewed based on the project specific information and site conditions.

4.3.2.2 Further expansion of Shek Wu Hui Effluent Polishing Plant will involve outdoor civil works (**Section 1.2.2.1** refers) that are expected to have disturbance impacts on waterbirds inhabiting the nearby river channels. Therefore, it is recommended that the waterbirds monitoring mentioned in **Section 4.3.1** of the Manual shall be conducted for the implementation of the works in the Project.

4.3.2.3 The monitoring protocol detailed in **Table 4.1** should be followed. A transect should be undertaken along the concerned sections of Ng Tung, Sheung Yue and Shek Sheung Rivers adjacent to where construction activities are proposed. As the sensitive receivers (large waterbirds) are easily visible, the transect route needs only follow one bank of the rivers. The transect route should remain the same during the different phases (i.e. pre-construction (baseline), construction and post-construction) in order to ensure that data are comparable. An environmental monitoring plan for pre-construction (baseline) was formulated one year before the commencement of construction phase. Environmental monitoring plan for construction shall be formulated before the commencement of construction phase.

Table 4.1 - Monitoring of Measures to Minimise Disturbance to Waterbirds on Ng Tung, Sheung Yue and Shek Sheung Rivers (for Works of the Project)

Phase	Methodology
Pre-construction (Baseline)	Weekly transect at both high and low tides to identify and enumerate all bird species utilising the river channels for 12 months prior to the commencement of Main Works Stage 1.
Construction	Weekly transect at both high and low tides to identify and enumerate all bird species utilising the river channels and identify any sources of actual or potential disturbance to birds due to construction activities throughout the construction period.
Post-construction	Weekly transects at both high and low tides to identify and enumerate all bird species utilizing the river channels and identify any sources of actual or potential disturbance to birds due to operational activities for 12 months following the completion of the construction period

4.3.2.4 The monitoring shall be conducted by the ET and supervised by a qualified ecologist who will be a member of the ET.

4.3.2.5 Measures to respond to decrease in numbers of large waterbirds using the river channels and the action and limit levels to trigger the measures are summarised in **Table 4.2**. In the approved EM&A Manual of the NENT NDA EIA Study, the numbers of waterbird species refer to the combined numbers using the channels and Long Valley Nature Park (LVNP). The works boundary of this project is 160m away from the edge of the Long Valley Nature Park and majority of the works will be located outside 200m. As no significant disturbance on the LVNP is anticipated, ecological monitoring for LVNP is excluded. Therefore, analysis of the variation of waterbird species and abundance will be based on the baseline data collected from Ng Tung, Sheung Yue and Shek Sheung Rivers. The analytical method on action and limit levels will be proposed in a separate report "Baseline Monitoring Report (Ecology)".

Table 4.2 - Action and Limit Levels and Responses to Evidence of Disturbance to Waterbirds using Ng Tung, Sheung Yue and Shek Sheung Rivers

Action Level	Response	Limit Level	Response
Construction Phase			
Decline in numbers of all waterbird species relative to numbers during Baseline Monitoring such that the Action Level response is triggered.	Investigate cause and if cause identified as related to the Project instigate remedial action to remove or reduce source of disturbance.	Decline in numbers of all waterbird species relative to numbers during Baseline Monitoring such that the Limit Level response is triggered.	Investigate cause and if caused identified as related to the Project instigate remedial action.
Decline in numbers of any one waterbird species occurring in significant numbers* during Baseline Monitoring such that the Action Level response is triggered.	Investigate cause and if cause identified as related to the Project instigate remedial action to remove or reduce source of disturbance.	Decline in numbers of any one waterbird species occurring in significant numbers* during Baseline Monitoring such that the Limit Level response is triggered.	Investigate cause and if caused identified as related to the Project instigate remedial action.

Note: * Whether numbers are significant will depend on species and season and should be determined following collection and evaluation of Baseline survey data.

5. WATER QUALITY

5.1 Introduction

5.1.1.1 The implementation of good construction works practice and adequate mitigation measures are important to prevent water pollution in the construction phase and therefore regular site audit of all the land-based construction activities is recommended. The general construction phase mitigation measures as proposed in the NENT NDA EIA Report would be implemented for the Project. Mitigation measures to prevent and minimize the impact due to the emergency discharge from the SWHEPP are also proposed and presented in this section.

5.2 Mitigation Measures

5.2.1.1 Mitigation measures for water quality are summarised below. With the implementation of the appropriate mitigation measures, the potential to cause adverse water quality impact would be minimised.

5.2.2 Construction Phase

Construction Site Runoff

5.2.2.1 Practices and measures provided in the Practice Note for Professional Persons on Construction Site Drainage, (PROPECC PN1/94) should be followed where applicable.

Sewage from Workforce

5.2.2.2 Portable chemical toilets and sewage holding tanks should be provided for handling the construction sewage generated by the workforce. A licensed Contractor should be employed to provide appropriate and adequate portable toilets and be responsible for appropriate disposal and maintenance.

5.2.2.3 Notices should be posted at conspicuous locations to remind the workers not to discharge any sewage or wastewater into the nearby environment during the construction phase of the Project. Regular environmental audit on construction site should be conducted in order to provide an effective control of any malpractices and achieve continual improvement of environmental performance on site. It is anticipated that sewage generation during the construction phase of the Project would not cause water quality impact after undertaking all required measures.

5.3 Water Quality Monitoring

5.3.1 General

5.3.1.1 During the construction phase, the key water quality impact would be associated with the land-based construction. Regular site inspections should be undertaken during the construction phase to inspect the construction activities and work areas to ensure that the recommended mitigations measures are properly implemented.

5.3.1.2 With reference to **Section 4.2.1.4**, water quality monitoring should be carried out for watercourses in which the proposed outfall will be constructed.

5.3.2 Monitoring Parameters

5.3.2.1 The parameters that have been selected for measurement *in-situ* and in the laboratory are those that were either determined in the EIA to have the greatest potential to be affected by the construction works or are a standard check on water quality conditions. Parameters to be measured are summarized in **Table 5.1**.

Table 5.1 - Parameters Measured in the Marine Water Quality Monitoring

Parameters	Unit	Abbre	Remarks	
			Baseline	Construction
***In-situ* Measurements**				
Dissolved Oxygen	mg/L	DO	✓	✓
Salinity	-	-	✓	✓
Temperature	℃	-	✓	✓
pH	-	-	✓	✓
Turbidity	NTU	-	✓	✓
Laboratory Measurements				
Suspended Solids	mg/L	SS	✓	✓

5.3.2.2 In addition to the water quality parameters as shown in **Table 5.1**, other relevant data shall also be recorded, including monitoring location / position, time, water depth, pH value, salinity, temperature, weather conditions and any special phenomena or work activities undertaken around the monitoring and works area that may influence the monitoring results.

5.3.3 Monitoring Equipment

Dissolved Oxygen and Temperature Measuring Equipment

5.3.3.1 The instrument shall be a portable and weatherproof DO measuring instrument complete with cable and sensor, and use a DC power source. The equipment shall be capable of measuring:

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

5.3.3.2 It shall have a membrane electrode with automatic temperature compensation complete with a cable. Sufficient stocks of spare electrodes and cables shall be available for replacement where necessary.

5.3.3.3 Shall salinity compensation not be built-in to the DO equipment, *in-situ* salinity shall be measured to calibrate the DO equipment prior to each DO measurement.

Salinity

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

pH

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

Turbidity Measurement Instrument

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

Sampler

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

Water Depth Detector

5.3.3.8 A portable, battery-operated echo sounder would be used for the determination of water depth at each designated monitoring station. If echo sounder is not applicable due to low water depth, various sized stainless steel rules would be used to determine the water depth.

Sample Containers and Storage

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

Calibration of In-Situ Instruments

5.3.3.10 All *in-situ* monitoring instruments shall be checked, calibrated and certified by a laboratory accredited under HOKLAS or any other international accreditation scheme before use and subsequently re-calibrated at three monthly intervals throughout the water quality monitoring programme. Responses of sensors and electrodes shall be checked with certified standard solutions before each use. Wet bulb calibration for a DO meter shall be carried out before measurement at each monitoring location.

5.3.3.11 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, etc.

Laboratory Measurement / Analysis

5.3.3.12 Analysis of suspended solids (SS) level should be carried out in a HOKLAS or other international accredited laboratory. Sufficient water samples should be collected at the monitoring stations for carrying out the laboratory determinations. The determination work should 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.

5.3.4 Monitoring Locations

5.3.4.1 Water quality monitoring is proposed in Ng Tung River adjacent to the Project area during the construction phase to monitor any sub-standard water discharge into the nearby water bodies.

5.3.4.2 It is recommended to establish control and impact monitoring stations to monitor water quality impact during construction phase. The impact monitoring station has been selected at locations in vicinity to the construction site that may potentially be affected during the construction phase. Water quality at this location shall be monitored during the construction. The control station has been selected such that they are located within the same water body as the impact monitoring station but are located outside the area of influence of the works. Data collected from the control station enables a comparison of the water quality at the potentially impacted site with the ambient water quality.

5.3.4.3 The proposed water quality monitoring stations are shown in **Table 5.2**. **Figure 5** indicates the approximate locations of the water quality monitoring stations.

Table 5.2 - Proposed Water Quality Monitoring Stations under Construction Phase

Station	Description
M1	Impact Station, downstream of the proposed outfall
C1	Control Station, upstream of the proposed outfall

5.3.4.4 The status and locations of water quality monitoring stations may change after issuing this Manual. Any change to the monitoring stations shall be justified by the ET Leader, agreed by the ER, verified by the IEC before seeking approval from EPD prior to its implementation.

5.3.4.5 The status and availability of monitoring locations may change after issuing this Manual. If such cases exist, the appointed ET Leader may propose alternative monitoring locations taking into consideration of the latest status, availability and/or accessibility of the various possible monitoring locations. Any change to the monitoring stations shall be justified by the ET Leader, agreed by the ER, verified by the IEC before seeking approval from EPD prior to the implementation of sampling programme.

- impact station shall be located close to and preferably at the boundary of the site activities, which are likely to have water quality impacts;
- control station shall be selected at a location to allow a comparison of the water quality at the potentially impacted site with the ambient water quality. The control station shall be selected such that it is located within the same body of water as the impact monitoring station but is located outside the area of influence of the works.

5.3.4.6 Duplicate *in-situ* measurements and sample collected from each independent sampling event are required for all parameters to ensure a statistically interpretable dataset.

5.3.5 Details of Water Quality Monitoring

Baseline Monitoring

5.3.5.1 Baseline conditions of water quality should be established by the ET and agreed with IEC and EPD. The purposes of the baseline monitoring are to establish ambient conditions prior to the commencement of the works, to demonstrate the suitability of the proposed control and impact monitoring stations, and for establishment of the action and limit levels.

5.3.5.2 The baseline conditions should be established by measuring the water quality parameters as specified in **Table 5.1** at the proposed monitoring stations as shown in **Figure 5** (also **Table 5.2**), 3 days a week, for a period of 4 weeks prior to the commencement of construction works. The interval between two sets of monitoring shall not be less than 36 hours, and the baseline monitoring schedule shall be submitted to EPD and IEC at least one week prior to the commencement of the baseline monitoring. The ET Leader shall seek approval from the ER, IEC and EPD on the alternative proposal prior to its implementation.

5.3.5.3 There shall not be any major construction activities in the vicinity of the stations during the baseline monitoring. The ET shall be responsible for undertaking the baseline monitoring and submitting the results within 10 working days from the completion of the baseline monitoring work.

Impact Monitoring

5.3.5.4 During the course of the construction works at the outfall at Ng Tung River, impact monitoring shall be undertaken three days per week, with sampling/measurement at the monitoring stations as shown in **Figure 5** (also **Table 5.2**). The ET should carry out spot check to ensure that the Contractor has undertaken all recommended control measures to prevent direct contact of pollutants with rainwater or runoff, and measures to abate contaminants in the stormwater runoff. Parameters to be monitored include pH, salinity, temperature, turbidity, DO (in mg/L and % of saturation) and SS (see **Table 5.1**). The interval between two sets of monitoring shall not be less than 36 hours except where there are exceedances of Action and/or Limit levels, in which case the monitoring frequency shall be increased.

5.3.5.5 Requirements as stated in **Section 5.3.4.5** shall be followed. Any change to the EM&A requirements or programme shall be justified by the ET Leader, agreed by the ER, verified by the IEC before seeking approval from EPD prior to its implementation.

5.3.5.6 Upon completion of all construction activities, a post project monitoring exercise on water quality shall be carried out for one month in the same manner as the baseline monitoring. The results of the monitoring shall be presented in the Final EM&A Summary Report.

5.3.5.7 Proposed water quality monitoring schedule shall be submitted to ER, IEC and EPD at least 1 week before the first day of the monitoring month. The ER, IEC and EPD shall also be notified immediately for any changes in schedule.

5.3.6 Event and Action Plan

5.3.6.1 Construction phase water quality monitoring will be evaluated against Action and Limit Levels. The proposed Action and Limit Levels for water quality is presented in **Table 5.3.** Action and Limit levels are used to determine whether operational modifications are necessary to mitigate impacts to water quality. In the event that the levels are exceeded, appropriate actions in Event and Action Plan (**Table 5.6**) should be undertaken and a review of works will be carried out by the Contractor(s).

5.3.6.2 Any noticeable change to water quality will be recorded in the monitoring reports and will be investigated and remedial actions will be undertaken to reduce impacts. Particular attention will be paid to the Contractor(s)'s implementation of the recommended mitigation measures.

Table 5.3 - Action and Limit Levels for Water Quality Monitoring

Parameters	Action	Limit
DO in mg/L (depth-averaged [a])	5%-ile of baseline data	4 mg/L or 1%-ile of baseline data
SS in mg/L (depth-averaged [a]) [c]	95%-ile of baseline data or 120% of upstream control station's SS recorded on the same day	99%-ile of baseline data or 130% of upstream control station's SS recorded on the same day
Turbidity in NTU (depth-averaged [a]) [c]	95%-ile of baseline data or 120% of upstream control station's turbidity recorded on the same day	99%-ile of baseline data or 130% of upstream control station's turbidity recorded on the same day

Notes:
a. "Depth-averaged" is calculated by taking the arithmetic means of reading of all three depths
b. For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limits.
c. For SS and turbidity, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.

Table 5.4 - Event and Action Plan for Water Quality Monitoring

Event	Action			
	ET	IEC	ER	Contractor
Action level being exceeded by one sampling day	○ Repeat *in situ* measurement on the next day of exceedance to confirm findings; ○ Check monitoring data, plant, equipment and Contractor(s)'s working methods; ○ Identify source(s) of impact and record in notification of exceedance; ○ Inform IEC, Contractor(s) and ER	○ Check monitoring data submitted by ET and Contractor(s)'s working methods; ○ Inform EPD.	○ Confirm receipt of notification of exceedance in writing	○ Confirm receipt of notification of exceedance in writing; ○ Check plant and equipment and rectify unacceptable practice
Action level being exceeded by two or more consecutive sampling days	○ Repeat *in situ* measurement on the next day of exceedance to confirm findings; ○ Check monitoring data, plant, equipment and Contractor(s)'s working methods; ○ Identify source(s) of impact and record in notification of exceedance; ○ Inform IEC, Contractor(s) and ER; ○ Discuss with IEC and Contractor(s) on additional mitigation measures and ensure that they are implemented.	○ Check monitoring data submitted by ET and Contractor(s)'s working methods; ○ Inform EPD; ○ Discuss with ET and Contractor(s) on additional mitigation measures and advise ER accordingly; ○ Assess the effectiveness of the implemented mitigation measures.	○ Confirm receipt of notification of exceedance in writing; ○ Discuss with the IEC on the proposed additional mitigation measures and agree on the mitigation measures to be implemented. ○ Ensure additional mitigation measures are properly implemented.	○ Confirm receipt of notification of exceedance in writing; ○ Check plant and equipment and rectify unacceptable practice; ○ Consider changes of working methods; ○ Discuss with ET and IEC on additional mitigation measures and propose them to ER within 3 working days; ○ Implement the agreed mitigation measures.
Limit level being exceeded by one sampling day	○ Repeat *in situ* measurement on the next day of exceedance to confirm findings; ○ Check monitoring data, plant, equipment and Contractor(s)'s working methods; ○ Identify source(s) of impact and record in notification of exceedance; ○ Inform IEC, Contractor(s) and ER; ○ Discuss with IEC and Contractor(s) on additional mitigation measures and ensure that they are implemented.	○ Check monitoring data submitted by ET and Contractor(s)'s working methods; ○ Inform EPD; ○ Discuss with ET and Contractor(s) on additional mitigation measures and advise ER accordingly; ○ Assess the effectiveness of the implemented mitigation measures.	○ Confirm receipt of notification of exceedance in writing; ○ Discuss with the IEC on the proposed additional mitigation measures and agree on the mitigation measures to be implemented. ○ Ensure additional mitigation measures are properly implemented. ○ Request Contractor(s) to critically review the working methods.	○ Confirm receipt of notification of exceedance in writing; ○ Check plant and equipment and rectify unacceptable practice; ○ Critically review the need to change working methods; ○ Discuss with ET and IEC on additional mitigation measures and propose them to ER within 3 working days; ○ Implement the agreed mitigation measures.
Limit level being exceeded by two or more consecutive sampling days	○ Repeat *in situ* measurement on the next day of exceedance to confirm findings; ○ Check monitoring data, plant, equipment and Contractor(s)'s working methods; ○ Identify source(s) of impact and record in notification of exceedance; ○ Inform IEC, Contractor(s) and ER; ○ Discuss with IEC and Contractor(s) on additional mitigation measures and ensure that they are implemented.	○ Check monitoring data submitted by ET and Contractor(s)'s working methods; ○ Inform EPD; ○ Discuss with ET and Contractor(s) on additional mitigation measures and advise ER accordingly; ○ Assess the effectiveness of the implemented mitigation measures.	○ Confirm receipt of notification of exceedance in writing; ○ Discuss with the IEC on the proposed additional mitigation measures and agree on the mitigation measures to be implemented. ○ Ensure additional mitigation measures are properly implemented. ○ Request Contractor(s) to critically review the working methods.	○ Confirm receipt of notification of exceedance in writing; ○ Check plant and equipment and rectify unacceptable practice; ○ Critically review the need to change working methods; ○ Discuss with ET and IEC on additional mitigation measures and propose them to ER within 3 working days; ○ Implement the agreed mitigation measures.

5.3.7 Construction Site Audits

5.3.7.1 Implementation of regular site audits is to ensure that the recommended mitigation measures are to be properly undertaken during construction phase of the Project. It can also provide an effective control of any malpractices and therefore achieve continual improvement of environmental performance on site.

5.3.7.2 Site inspections should be carried out by the ET and should be based on the good construction works practice for water pollution control. In the event that the recommended mitigation measures are not fully or properly implemented, deficiency should be recorded and reported to the site management. Suitable actions are to be carried out to

- investigate the problems and the causes;
- issue action notes to the Contractor which is responsible for the works;
- implement remedial and corrective actions immediately;
- re-inspect the site conditions upon completion of the remedial and corrective actions; and
- record the event and discuss with the Contractor for preventive actions.

6. WASTE MANAGEMENT

6.1 Introduction

6.1.1.1 Waste management would be the contractor's responsibility to ensure that all wastes produced during the construction works for the Project are handled, stored and disposed of in accordance with good waste management practices, EPD's regulations and requirements.

6.1.1.2 Waste materials generated during construction activities, such as construction and demolition (C&D) materials and general refuse, are recommended to be audited at regular intervals (at least quarterly) to ensure that proper storage, transportation and disposal practices are being implemented. This monitoring of waste management practices would ensure that these solid wastes generated during construction are not disposed into the nearby coastal waters. The Contractor would be responsible for the implementation of any mitigation measures to minimise waste or redress problems arising from the waste materials. An environmental management plan (EMP) should be prepared and submitted to the Supervisor for approval. The monitoring and auditing requirements of the EMP should be followed with regard to the management of C&D material.

6.2 Mitigation Measures

6.2.1 General

6.2.1.1 Mitigation measures for waste management are summarised below. With the appropriate handling, storage and removal of waste arising during the construction works as defined below, the potential to cause adverse environmental impacts would be minimised.

6.2.2 Good Site Practices

6.2.2.1 Adverse impacts related to waste management are not expected to arise, provided that good site practices are strictly followed. Recommendations for good site practices during the construction activities include:

- Nomination of an approved personnel, such as a site manager, to be responsible for the implementation of good site practices, arrangements for collection and effective disposal to an appropriate facility, of all wastes generated at the site;
- Training of site personnel in site cleanliness, appropriate waste management procedures and concepts of waste reduction, reuse and recycling;
- Provision of sufficient waste disposal points and regular collection for disposal;
- Appropriate measures to minimise windblown litter and dust during transportation of waste by either covering trucks or by transporting wastes in enclosed containers;
- Regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors;
- An EMP should be prepared by the contractor and submitted to the Supervisor for approval.

6.2.3 Waste Reduction Measures

6.2.3.1 Good management and control can prevent the generation of a significant amount of waste. Waste reduction is best achieved at the planning and design stage, as well as by ensuring the implementation of good site practices. Recommendations to achieve waste reduction include:

- Segregate and store different types of waste in different containers, skip or stockpiles to enhance reuse or recycling of materials and their proper disposal;
- Proper storage and site practices to minimize the potential for damage and contamination of construction materials;
- Plan and stock construction materials carefully to minimize amount of waste generated and avoid unnecessary generation of waste;
- Sort out demolition debris and excavated materials from demolition works to recover reusable/recyclable portions (i.e. soil, broken concrete, metal etc.);
- Provide training to workers on the importance of appropriate waste management procedures, including waste reduction, reuse and recycling.

6.2.4 Storage, Collection and Transportation of Waste

6.2.4.1 In addition to the above measures, specific mitigation measures are recommended below for any temporary storage or stockpiling of waste. The mitigation measures on handling and storing these wastes should be implemented to minimize the impacts:

- Waste such as soil should be handled and stored well to ensure secure containment;
- Stockpiling area should be provided with covers and water spraying system to prevent materials from wind-blown or being washed away; and
- Different locations should be designated to stockpile each material to enhance reuse.

6.2.4.2 The collection and transportation of waste from works area to respective disposal sites may also induce adverse environmental impacts if not properly managed. The following recommendation should be implemented to minimize the impacts:

- Remove waste in timely manner;
- Employ the trucks with cover or enclosed containers for waste transportation;
- Obtain relevant waste disposal permits from the appropriate authorities; and
- Disposal of waste should be done at licensed waste disposal facilities.

6.2.5 Handling of Excavated and C&D Materials, Chemical Waste and Materials Generated during Construction Phase

6.2.5.1 In addition to the above measures, other specific mitigation measures on handling the excavated and C&D materials, chemical waste and materials generated during construction phase are recommended in the following subsections.

C&D Materials from Site Formation

6.2.5.2 Wherever practicable, C&D materials should be segregated from other wastes to avoid contamination and ensure acceptability at public filling areas or reclamation sites. The following mitigation measures should be implemented in handling the excavated C&D materials:

- Maintain temporary stockpiles and reuse excavated fill material for backfilling;
- Carry out on-site sorting;
- Make provisions in the Contract documents to allow and promote the use of recycled aggregates where appropriate;
- Adopt "selective demolition" technique to demolish the existing structure and facilities with a view to recovering broken concrete effectively for recycling purpose, where possible; and
- Implement a trip-ticket system for each works contract to ensure that the disposal of C&D materials are properly documented and verified.

C&D Materials from Buildings Demolition and New Building Construction

6.2.5.3 The following mitigation measures should be implemented in handling the C&D materials from building demolition and new building construction:

- The Contractor should recycle as much as possible of the C&D materials on-site. Public fill and C&D waste should be segregated and stored in different containers or skips to enhance reuse or recycling of materials and their proper disposal. For example, concrete and masonry can be crushed and used as fill, and steel reinforcing bar can be used by scrap steel mills. Different areas of the work sites should be designated for such segregation and storage.
- The use of wooden hoardings shall not be allowed. An alternative material, such as metal, aluminium or alloy etc, could be used.
- Government has developed a charging policy for the disposal of waste to landfill at present. It will provide additional incentive to reduce the volume of generated waste and ensure proper segregation to allow reuse of the inert material on site when implemented.
- In order to minimize the impacts of the demolition works, the generated wastes must be cleared as quickly as possible after demolition. Therefore, the demolition and clearance works should be undertaken simultaneously. To facilitate proper segregation of inert and non-inert C&D material arising from demolition works, selective demolition method should be adopted.

Chemical Waste

6.2.5.4 If chemical wastes are produced at the construction site, the Contractors should register with EPD as chemical waste producers. Chemical wastes should be stored in appropriate containers and collected by a licensed chemical waste contractor. Chemical wastes (e.g. spent lubricant oil) should be recycled at an appropriate facility as far as possible, while the chemical waste that cannot be recycled should be disposed of at either the Chemical Waste Treatment Centre, or another licensed facility, in accordance with the Waste Disposal (Chemical Waste) (General) Regulation.

General Refuse

6.2.5.5 General refuse should be stored in enclosed bins separately from construction and chemical wastes. Recycling bins should also be placed to encourage recycling. Preferably enclosed and covered areas should be provided for general refuse collection and routine cleaning for these areas should also be implemented to keep areas clean. A reputable waste collector should be employed to remove general refuse on a daily basis. It is expected that such arrangements would minimize potential environmental impacts.

7. LANDSCAPE AND VISUAL

7.1 Introduction

7.1.1.1 The EIA has recommended landscape and visual mitigation measures to be undertaken during the construction phase of the NDAs project. The design, implementation and maintenance of landscape and visual mitigation measures will be checked to ensure that any potential conflicts between the proposed landscape and visual mitigation measures and any other works of the Project will be resolved as early as practical without affecting the implementation of the mitigation measures.

7.2 Audit Requirement

7.2.1 General

7.2.1.1 Site audits will 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.

7.2.1.2 Site inspections will be undertaken by the ET at least once every two weeks during the construction period, preferably by a Registered Landscape Architect (RLA) employed by the Contractor. Particularly audits will be carried out during site clearance when proposed tree felling and transplantation may occur. For all soft landscaping work, including measures for trees such as transplantation and compensatory planting, the 12-months establishment period should commence upon completion of the soft landscape works and also as agreed by the relevant long term maintenance parties.

7.2.2 Event and Action Plan

7.2.2.1 The audit of the compensatory planting will also extend during the one year maintenance period, to ensure the establishment of the compensatory planting. In the event of non-compliance, the responsibilities of the relevant parties are detailed in the Event/Action plan provided in **Table 7.1**.

Table 7.1 - Event and Action Plan for Landscape and Visual during Construction Phase

Event	Action			
	ET	IEC	ER	Contractor
Non-conformity on one occasion	1. Inform the Contractor, IEC and ER; 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 effectiveness of proposed 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. Supervise implementation of remedial measures.	1. Identify source and investigate the non-conformity; 2. Implement remedial measures; 3. Amend working methods agreed with ER as appropriate; 4. Rectify damage and undertake any necessary replacement.
Repeated Non-conformity	1. Identify source; 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.	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.	1. Notify the Contractor; 2. In consultation with the ET and IEC, agree with the Contractor on the remedial measures to be implemented; 3. Supervise implementation of remedial measures.	1. Identify source and investigate the non-conformity; 2. Implement remedial measures; 3. Amend working methods agreed with ER as appropriate; 4. Rectify damage and undertake any necessary replacement. Stop relevant portion of works as determined by ER until the non-conformity is abated.

Note:
ET - Environmental Team
IEC - Independent Environmental Checker
ER – Engineers' Representative

7.3 Mitigation Measures

7.3.1 Good Site Practices

7.3.1.1 For areas unavoidably disturbed by the Project on a short term basis e.g. works areas, the general principle to try and restore these to their former state to suit future land use, should be adhered to. With regard to topsoil, where identified, it should be stripped, treated appropriately, and where suitable and practical stored for re-use in the construction of the soft landscape works such as roadside amenity strips, and open space sites.

7.3.2 Landscape and Visual Mitigation Measures

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

- MM1 - Minimum Topographical Change
- MM2 - Detailed Design (Visual)
- MM4 - Tree Protection & Preservation
- MM5 - Tree Transplantation
- MM6 Slope Landscaping
- MM7 - Compensatory Planting
- MM9 - Vertical Greening
- MM10 - Green Roof
- MM11 - Screen Planting
- MM16 - Screen Hoarding
- MM17 - Light Control

7.3.2.2 Details of measures for landscape and visual impacts are presented in **Section 10**.

7.3.2.3 The long term maintenance and management responsibilities for the proposed landscape mitigation measures have been agreed with DSD and are presented in **Table 7.2**.

Table 7.2 – Long Term Maintenance and Management Responsibilities for Proposed Landscape Mitigation Measures

Proposed Landscape Mitigation Measures	Management Agent	Maintenance Agent
Soft Landscape [incl. planting / establishing the green areas (trees / shrubs) and green surfaces]	Sewage Treatment 1 Division of DSD	Sewage Treatment 1 Division of DSD
Hard Landscape [incl. planters, paving blocks, seats and tables]	Sewage Treatment 1 Division of DSD	Hong Kong & Islands (Building and Civil Management) Division of DSD

8. SITE ENVIRONMENTAL AUDIT

8.1 Site Inspections

8.1.1.1 Site inspection provides a direct means to trigger and enforce specified environmental protection and pollution control measures. These shall be undertaken regularly and routinely to inspect construction activities in order to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented. The site inspection is one of the most effective tools to enforce the environmental protection requirements at the works area.

8.1.1.2 The ET Leader shall be responsible for formulating the environmental site inspection as well as the deficiency and remedial action reporting system, and for carrying out the site inspection works. He shall submit a proposal for site inspection and deficiency and remedial action reporting procedures to the Contractor for agreement, and to the ER for approval. The ET's proposal for rectification would be made known to the IEC.

8.1.1.3 Regular site inspections shall be carried out at least once per week. 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 situation outside the works area which is likely to be affected, directly or indirectly, by the site activities. The ET shall make reference to the following information in conducting the inspection:

- the EIA and EM&A recommendations on environmental protection and pollution control mitigation measures;
- ongoing results of the EM&A program;
- works progress and programme;
- individual works methodology proposals (which shall include proposal on associated pollution control measures);
- contract specifications on environmental protection and pollution prevention control;
- relevant environmental protection and pollution control laws;
- previous site inspection results undertaken by the ET and others.

8.1.1.4 The Contractor shall keep the ER and ET Leader updated with all relevant information on the construction contract necessary for him to carry out the site inspections. Inspection results and associated recommendations for improvements to the environmental protection and pollution control works shall be submitted to the ER, the IEC and the Contractor within 24 hours for reference and for taking immediate remedial action. The Contractor shall follow the procedures and time-frame stipulated in the environmental site inspection, and the deficiency and remedial action reporting system formulated by the ET Leader, to report on any remedial measures subsequent to the site inspections.

8.1.1.5 The ER, ET and the Contractor shall also carry out ad hoc site inspections if significant environmental problems are identified. Inspections may also be required subsequent to receipt of an environmental complaint, or as part of the investigation work, as specified in the Event and Action Plan for EM&A programme.

8.2 Compliance with Legal and Contractual Requirements

8.2.1.1 There are contractual environmental protection and pollution control requirements as well as environmental protection and pollution control laws in Hong Kong with which construction activities must comply.

8.2.1.2 In order that the works are in compliance with the contractual requirements, all works method statements submitted by the Contractor to the ER for approval shall be sent to the ET Leader for vetting to see whether sufficient environmental protection and pollution control measures have been included.

8.2.1.3 The ET Leader shall also review the progress and programme of the works to check that relevant environmental laws have not been violated, and that any foreseeable potential for violating laws can be prevented.

8.2.1.4 The Contractor shall regularly copy relevant documents to the ET Leader so that works checking could be carried out effectively. The document shall at least include the updated Works Progress Reports, updated Works Programme, any application letters for different licence/permits under the environmental protection laws, and copies of all valid licences/permits. The site diary shall also be available for the ET Leader's inspection upon his request.

8.2.1.5 After reviewing the documentation, the ET Leader shall advise the ER and the Contractor of any non-compliance with contractual and legislative requirements on environmental protection and pollution control for them to take follow-up actions. If the ET Leader's review concludes that the current status on licence / permit application and any environmental protection and pollution control preparation works may result in potential violation of environmental protection and pollution control requirements, he shall also advise the Contractor and the ER accordingly.

8.2.1.6 Upon receipt of the advice, the Contractor shall undertake immediate action to remedy the situation. The ER shall follow up to ensure that appropriate action has been taken in order to satisfy contractual and legal requirements.

8.3 Environmental Complaints

8.3.1.1 Complaints received during the construction phase shall be referred to the ET Leader for action. The ET Leader shall undertake the following procedures upon receipt of any environmental complaint:

(i) log complaint and date of receipt onto the complaint database and inform the IEC immediately;

(ii) investigate the complaint to determine its validity, and assess whether the source of the problem is due to works activities;

(iii) identify mitigation measures in consultation with the IEC if a complaint is valid and due to works;

(iv) advise the Contractor if mitigation measures are required;

(v) review the Contractor's response to identified mitigation measures, and the updated situation;

(vi) if the complaint is transferred from EPD, submit interim report to EPD on status of the complaint investigation and follow-up action within the time frame assigned by EPD;

(vii) undertake additional monitoring and audit to verify the situation if necessary, and review that circumstances leading to the complaint do not recur;

(viii) report investigation results and subsequent actions to complainant (if the source of complaint is identified through EPD, the results should be reported within the timeframe assigned by EPD);

(ix) record the complaint, investigation, the subsequent actions and the results in the monthly EM&A reports.

9. REPORTING

9.1 General

9.1.1.1 Reports can be provided in an electronic medium upon agreeing the format with the ER, DSD 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 in electronic format and the formats shall be agreed with the ER, DSD and EPD.

9.1.1.2 Types of reports that the ET Leader shall prepare and submit for construction phase impacts include baseline monitoring report; monthly EM&A report, quarterly EM&A summary report and final EM&A review report for construction phase. In accordance with Annex 21 of the EIAO-TM, a copy of the monthly, quarterly summary and final review EM&A reports shall be made available to the Director of Environmental Protection.

9.2 Electronic Reporting of EM&A Information

9.2.1.1 To facilitate public inspection of the baseline monitoring report and various EM&A reports via the EIAO Internet website and at the EIAO register office, electronic copies of these reports shall be prepared in Hyper Text Markup Language (HTML) (version 4.0 or later) and in Portable Document Format (PDF Adobe 11 Pro version or later), unless otherwise agreed by EPD and shall be submitted at the same time as the hardcopies. For the HTML version, a content page capable of providing hyperlink to each section and sub-section of these reports shall be included at the beginning of the document. Hyperlinks to all figures, drawings and tables in these reports shall be provided in the main text from where the respective references are made. All graphics in these reports shall be in interlaced GIF format unless otherwise agreed by EPD. The content of the electronic copies of these reports must be the same as the hard copies. The summary of the monitoring data taken shall be included in the various EM&A Reports to allow for public inspection via the EIAO Internet website.

9.3 Baseline Monitoring Report

9.3.1.1 The ET Leader shall prepare and submit a Baseline Environmental Monitoring Report within 10 working days of completion of the baseline monitoring. Copies of the Baseline Environmental Monitoring Report shall be submitted to the Contractor, the IEC, the ER, DSD and EPD. The ET Leader shall liaise with the relevant parties on the exact number of copies they require. The report format and baseline monitoring data format shall be agreed with ER, DSD and EPD prior to submission.

9.3.1.2 The baseline monitoring report shall include, but not be limited to 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) an updated construction programme with milestones of environmental protection/mitigation activities annotated;

(v) monitoring results (in both hard and soft copies) together with the following information:

- monitoring methodology;
- name of laboratory and types of equipment used and calibration details;
- parameters monitored;
- monitoring locations (and depth);
- monitoring date, time, frequency and duration; and
- quality assurance (QA) / quality control (QC) results and detection limits.

(vi) details on 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 results.

(vii) determination of the Action and Limit Levels (AL levels) for each monitoring parameter and statistical analysis of the baseline data, the analysis shall conclude if there is any significant difference between control and impact stations for the parameters monitored;

(viii) revisions for inclusion in the EM&A Manual; and

(ix) comments, recommendations and conclusions.

9.4 Monthly EM&A Reports

9.4.1 General

9.4.1.1 The results and findings of all EM&A work required in the Manual shall be recorded in the monthly EM&A reports prepared by the ET Leader. The EM&A report shall be prepared and submitted within 10 working days at the end of each reporting month, with the first report due the month after construction commences. Each monthly EM&A report shall be submitted to the following parties: the Contractor, the IEC, the ER, DSD and EPD. Before submission of the first EM&A report, the ET Leader shall liaise with the parties on the required number of copies and format of the monthly reports in both hard copy and electronic medium.

9.4.1.2 The ET leader 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.

9.4.2 First Monthly EM&A Report

9.4.2.1 The first monthly EM&A report shall include at least but not be limited to the following:

(i) executive summary (1-2 pages) [refer to "Template of Executive Summary in an EM&A Report" as shown in Appendix D]:

- 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 organisation including key personnel contact names and telephone numbers;
- construction programme with fine tuning of construction activities showing the inter-relationship with environmental protection/mitigation measures for the month;
- management structure, and
- works undertaken during the month.

(iii) environmental status:

- works undertaken during the month with illustrations (such as location of works, daily filling rates, percentage of fines in the fill materials used, 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 Final EIA 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 Final EIA report, summarised in the updated implementation schedule.

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

- monitoring methodology;
- name of laboratory and types of equipment used and calibration details;
- parameters monitored;
- monitoring locations (and depth);
- monitoring date, time, frequency, and duration;
- weather conditions during the period;
- graphical plots of the monitored parameters in the month annotated against:
  - the major activities being carried out on site during the period;
  - weather conditions that may affect the results; and
  - any other factors which might affect the monitoring results;
- any other factors which might affect the monitoring results; and
- quality assurance (QA) / quality control (QC) results and detection limits.

(vii) report on non-compliance, complaints, 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 legislations, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;
- review of the reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures; and
- description of the actions taken in the event of 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;
- a forecast of the works programme, impact predictions and monitoring schedule for the next three months;
- compare and contrast the EM&A data with the EIA predictions and annotate with explanation for any discrepancies; and
- comments (for examples, effectiveness and efficiency of the mitigation measures), recommendations (for example, any improvement in the EM&A programme) and conclusions.

9.4.3 Subsequent Monthly EM&A Reports

9.4.3.1 Subsequent monthly EM&A reports shall include the following:

(i) executive summary (1 - 2 pages) [refer to "Template of Executive Summary in an EM&A Report" as shown in Appendix D]:

- breaches of Action and Limit levels;
- complaints log;
- notifications of any summons and successful prosecutions;
- reporting changes; and
- future key issues.

(ii) environmental status:

- construction programme with fine tuning of construction activities showing the inter-relationship with environmental protection / mitigation measures for the month;
- works undertaken during the month with illustrations including key personnel contact names and telephone numbers; and
- drawing showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations.

(iii) implementation status:

- advice on the implementation status of environmental protection and pollution control / mitigation measures related to further expanded SWHEPP works, as recommended in the Final NENT NDAs EIA report and Environmental Review Report under Agreement No. CE 40/2012 (DS), summarised in the updated implementation schedule.

(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 (and depth);
- monitoring date, time, frequency, and duration;
- weather conditions during the period;
- graphical plots of the monitored parameters in the month annotated against;
  - the major activities being carried out on site during the period;
  - weather conditions that may affect the results; and
  - any other factors which might affect the monitoring results.
- any other factors which might affect the monitoring results; and
- quality assurance (QA) / quality control (QC) results and detection limits.

(v) report 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 legislations, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;
- review of the reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures; and
- description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance.

(vi) 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;
- a forecast of the works programme, impact predictions and monitoring schedule for the next three months;
- compare and contrast the EM&A data with the Final NENT NDAs EIA predictions (relating to further expanded SWHEPP works) and annotate with explanation for any discrepancies; and
- comments (for examples, effectiveness and efficiency of the mitigation measures), recommendations (for example, any improvement in the EM&A programme) and conclusions.

(vii) appendix

- Action and Limit levels;
- graphical plots of trends of monitored parameters at key stations over the past four reporting periods for representative monitoring stations annotated against the following:

  -major activities being carried out on site during the period;

  -weather conditions during the period; and

  -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;
- outstanding issues and deficiencies

9.5 Quarterly EM&A Summary Reports

9.5.1.1 A quarterly EM&A summary report of around five pages shall be produced and shall contain at least the following information. Apart from these, the first quarterly summary report should also confirm that the monitoring work is proving effective and that it is generating data with the necessary statistical power to categorically identify or confirm the absence of impact attributable to the works.

(i) executive summary (1 - 2 pages) [refer to "Template of Executive Summary in an EM&A Report" as shown in Appendix D];

(ii) basic project information including a synopsis of the project organisation, programme, contacts of key management, and a synopsis of works undertaken during the quarter;

(iii) a brief summary of EM&A requirements including:

- monitoring parameters;
- environmental quality performance limits (Action and Limit levels); and
- environmental mitigation measures related to further expanded SWHSTW works, as recommended in the Final NENT NDAs EIA report and Environmental Review Report under Agreement No. CE40/2012 (DS);

(iv) advice on the implementation status of environmental protection and pollution control/mitigation measures related to further expanded SWHSTW, as recommended in the Final NENT NDAs EIA report and Environmental Review Report under Agreement No. CE40/2012 (DS), summarised in the updated implementation schedule;

(v) drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;

(vi) graphical plots of the trends of monitored parameters over the past four months (the last month of the previous quarter and the present quarter) for representative monitoring stations annotated against:

- the major activities being carried out on site during the period;
- weather conditions during the period; and
- any other factors which might affect the monitoring results.

(vii) advice on the solid and liquid waste management status;

(viii) a summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);

(ix) a brief review of the reasons for and the implications of non-compliance, including a review of pollution sources and working procedures;

(x) a summary description of the actions taken in the event of non-compliance and any follow-up procedures related to earlier non-compliance;

(xi) a summarised record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken;

(xii) a summary record of notifications of summons and successful prosecutions for breaches of the current environmental protection / pollution control legislations, locations and nature of the breaches, investigation, follow-up actions taken and results;

(xiii) comments (for examples, a review of the effectiveness and efficiency of the mitigation measures and the performance of the environmental management system, that is, of the overall EM&A programme); recommendations (for example, any improvement in the EM&A programme) and conclusions for the quarter; and

(xiv) proponents' contacts and any hotline telephone number for the public to make enquiries.

9.6 Final EM&A Review Reports

9.6.1.1 The EM&A program shall be terminated upon completion of those construction activities that have the potential to result in a significant environmental impact.

9.6.1.2 Although a number of works contracts will be carried out for the SWHEPP Project, it is considered that construction will last for years until the completion of further expansion to treatment capacity of 190,000 m^3/d (i.e. Main Works Stage 3) and therefore monitoring works (construction phase) will continue. ET and IEC can be changed to suit contract execution under Main Works Stage 1. If no actual construction works are carried out more than 6 months, no Monitoring Reports would be submitted to EPD starting from the seventh month (since no actual construction) until further construction works proceed.

9.6.1.3 Prior to the proposed termination, it may be advisable to consult relevant local communities (such as village representatives/communities and/or District Boards). The proposed termination should only be implemented after the proposal has been endorsed by the IEC, the Supervisor, the Project Manager and DSD followed by final approval from the Director of Environmental Protection.

9.6.1.4 The final EM&A report should contain at least the following information:

(i) executive summary (1 - 2 pages) [refer to "Template of Executive Summary in an EM&A Report" as shown in Appendix D];

(ii) basic project information including a synopsis of the project organisation, contacts of key management, and a synopsis of work undertaken during the course of the project or past twelve months;

(iii) a brief summary of EM&A requirements including:

- monitoring parameters;
- environmental quality performance limits (Action and Limit levels); and
- environmental mitigation measures related to further expanded SWHSTW works, as recommended in the Final NENT NDAs EIA report and Environmental Review Report under Agreement No. CE40/2012 (DS).

(iv) advice on the implementation status of environmental protection and pollution control / mitigation measures related to further expanded SWHSTW works, as recommended in the Final NENT NDAs EIA report and Environmental Review Report under Agreement No. CE40/2012 (DS), summarised in the updated implementation status proformas;

(v) drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;

(vi) graphical plots of the trends of monitored parameters over the course of the project for all monitoring stations annotated against:

- the major activities being carried out on site during the period;
- weather conditions during the period;
- any other factors which might affect the monitoring results; and
- the return of ambient environmental conditions in comparison with baseline data.

(vii) compare and contrast the EM&A data with the EIA predictions and annotate with explanation for any discrepancies;

(viii) provide clear-cut decisions on the environmental acceptability of the project with reference to the specific impact hypothesis;

(ix) advice on the solid and liquid waste management status;

(x) a summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);

(xi) a brief review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures;

(xii) a summary description of the actions taken in the event of non-compliance and any follow-up procedures related to earlier non-compliance;

(xiii) a summary record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken;

(xiv) review monitoring methodology adopted and with the benefit of hindsight, comment on its effectiveness (including cost effectiveness);

(xv) a summary record of notifications of summons and successful prosecutions for breaches of the current environmental protection/pollution control legislations, locations and nature of breaches, investigation, follow-up actions taken and results;

(xvi) review the practicality and effectiveness of the EIA process and EM&A programme (for examples, a review of the effectiveness and efficiency of the mitigation measures and the performance of the environmental management system, that is, of the overall EM&A programme), recommendations (for example, any improvement in the EM&A programme); and

(xvii) a conclusion to state the return of ambient and / or the predicted scenario as per EIA findings.

9.7 Data Keeping

9.7.1.1 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 Leader 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 electronic format, 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.

9.8 Interim Notifications of Environmental Quality Limit Exceedances

9.8.1.1 With reference to the Event and Action Plan, when the environmental quality performance limits are exceeded, the ET Leader shall immediately notify the IEC, ER, DSD and EPD, as appropriate. The notification shall be followed up with advice to IEC, ER, DSD 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 notifications is presented in **Appendix C**.

10. IMPLEMENTATION SCHEDULE AND RECOMMENDED MITIGATION MEASURES

EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
Air Quality Impact						
S2.4.1.3	Dust suppression measures stipulated in the Air Pollution Control (Construction Dust) Regulation and good site practices: • Any excavated or stockpile of dusty material should be covered entirely by impervious sheeting or sprayed with water to maintain the entire surface wet and then removed or backfilled or reinstated where practicable within 24 hours of the excavation or unloading; • Any dusty material remaining after a stockpile is removed should be wetted with water and cleared from the surface of roads; • A stockpile of dusty material should not be extended beyond the pedestrian barriers, fencing or traffic cones; • The load of dusty materials on a vehicle leaving a construction site should be covered entirely by impervious sheeting to ensure that the dusty materials do not leak from the vehicle; • Where practicable, vehicle washing facilities with high pressure water jet should be provided at every discernible or designated vehicle exit point. The area where vehicle washing takes place and the road section between the washing facilities and the exit point should be paved with concrete, bituminous materials or hardcores;	To minimize the dust impact	Contractor	Work Sites	Construction phase of Main Works Stage 1, Stage 2 and Stage 3	Air Pollution Control Ordinance (APCO) and Air Pollution Control (Construction Dust) Regulation

EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
	• When there are open excavation and reinstatement works, hoarding of not less than 2.4m high should be provided as far as practicable along the site boundary with provision for public crossing. Good site practice shall also be adopted by the Contractor to ensure the conditions of the hoardings are properly maintained throughout the construction period. • The portion of any road leading only to construction site that is within 30m of a vehicle entrance or exit should be kept clear of dusty materials; • Surfaces where any pneumatic or power-driven drilling, cutting, polishing or other mechanical breaking operation takes place should be sprayed with water or a dust suppression chemical continuously; • Any area that involves demolition activities should be sprayed with water or a dust suppression chemical immediately prior to, during and immediately after the activities so as to maintain the entire surface wet; • Where a scaffolding is erected around the perimeter of a building under construction, effective dust screens, sheeting or netting should be provided to enclose the scaffolding from the ground floor level of the building, or a canopy should be provided from the first floor level up to the highest level of the scaffolding; • Any skip hoist for material transport should be totally enclosed by impervious sheeting;					

EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
	• Every stock of more than 20 bags of cement or dry pulverised fuel ash (PFA) should be covered entirely by impervious sheeting or placed in an area sheltered on the top and the 3 sides; • Cement or dry PFA delivered in bulk should be stored in a closed silo fitted with an audible high level alarm which is interlocked with the material filling line and no overfilling is allowed; • Loading, unloading, transfer, handling or storage of bulk cement or dry PFA should be carried out in a totally enclosed system or facility, and any vent or exhaust should be fitted with an effective fabric filter or equivalent air pollution control system; and • Exposed earth should be properly treated by compaction, turfing, hydroseeding, vegetation planting or sealing with latex, vinyl, bitumen, shortcrete or other suitable surface stabiliser within six months after the last construction activity on the construction site or part of the construction site where the exposed earth lies					

EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
Noise Impact						
S3.4.1.1	Use of movable barrier, enclosure, acoustic mat and quiet plant. Use of wooden frames barrier with a small-cantilevered upper portion of superficial density not less than 14kg/m² on a skid footing with 25mm thick internal sound absorptive lining.	To minimize construction noise impact arising from the Project at the affected noise sensitive receivers (NSRs)	Contractor	Work Sites	Construction phase of Main Works Stage 1, Stage 2 and Stage 3	EIAO-TM, Noise Control Ordinance (NCO)
S3.4.1.2	Good Site Practice: • Only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction program. • Silencers or mufflers on construction equipment should be utilized and should be properly maintained during the construction program. • Mobile plant, if any, should be sited as far away from NSRs as possible. • Machines and plant (such as trucks) that may be in intermittent use should be shut down between works periods or should be throttled down to a minimum. • Plant known to emit noise strongly in one direction should, wherever possible, be orientated so that the noise is directed away from the nearby NSRs. • Material stockpiles and other structures should be effectively utilized, wherever practicable, in screening noise from on-site construction activities.	To minimize construction noise impact arising from the Project at the affected NSRs	Contractor	Work Sites	Construction phase of Main Works Stage 1, Stage 2 and Stage 3	EIAO-TM, NCO

EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
Ecological Impact						
S4.2.1.1	Solid dull green noise/visual barriers of at least 2m high shall be erected and maintained between active works area and all areas of ecological importance.	Minimize noise and human disturbances during construction phase.	Contractor	Work Sites	Construction phase of Main Works Stage 1, Stage 2 and Stage 3	EIAO-TM
S4.2.1.2	Avoid unnecessary lighting.	Minimize mortality impacts on birds.	Design / Contractor/ Plant Operator	Work Sites	Construction and operation phase of Main Works Stage 1, Stage 2 and Stage 3	EIAO-TM
S4.2.1.3	Good construction site practice to minimise dust generation should be followed on all construction sites. Measures to avoid, minimise and mitigate impacts on air quality are detailed in this schedule	Minimize dust generation from construction sites.	Contractor	Work Sites	Construction phase of Main Works Stage 1, Stage 2 and Stage 3	EIAO-TM
S4.2.1.4	The following measures to avoid, minimise and mitigate impact on water quality during construction phase shall be implemented • Temporary sewerage and drainage to be designed and installed to collect wastewater and prevent it from entering water bodies; • Proper locations well away from nearby water bodies should be used for temporary storage of materials (i.e. equipment, filling materials, chemicals and fuel) and temporary stockpiles of construction debris and spoil, and these should be identified before commencement of works;	Avoid, minimise and mitigate impact on water quality	Contractor	Work Sites	Construction phase of Main Works Stage 1, Stage 2 and Stage 3	EIAO-TM

EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
	• To prevent muddy water entering nearby water bodies, work sites close to nearby water bodies should be isolated, using such items as sandbags or silt curtains with lead edge at bottom and properly supported props. Other protective measures should also be taken to ensure that no pollution or siltation occurs to the water gathering grounds of the work sites; • Construction debris and spoil should be covered and/or properly disposed of as soon as possible to avoid these being washed into nearby water bodies; • Proper locations for discharge outlets of temporary wastewater treatment facilities well away from sensitive receivers should be identified; • Adequate lateral support should be erected where necessary in order to prevent soil/mud from slipping into water bodies; • Site boundaries should be clearly marked and any works beyond the boundary strictly prohibited; • Regular water monitoring and site audit should be carried out at adequate points along any watercourses where construction works are underway upstream within their catchments and also on the Ng Tung, Sheung Yue and Shek Sheung Rivers. If the monitoring and audit results show that pollution occurs, adequate measures including temporarily cessation of works should be considered;					

EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
	• Excavation profiles should be properly designed and executed with attention to the relevant requirements for environment, health and safety; • Where soil to be excavated is situated beneath the groundwater table, it may be necessary to lower the groundwater table by installing well points or similar means; • Stockpiling sites should be lined with impermeable sheeting and bunded. Stockpiles should be properly covered by impermeable sheeting to reduce dust emission during dry season or contaminated run-off during rainy season. Watering should be avoided on stockpiles of contaminated soil to minimize contaminated runoff and construction materials should be properly covered and located away from nearby water bodies; and • Supply of suitable clean backfill material after excavation, if required. • Vehicles containing any excavated materials should be suitably covered to limit potential dust emissions or contaminated run-off, and truck bodies and tailgates should be sealed to prevent discharge during transport or during wet season; • Speed control for the trucks carrying contaminated materials should be enforced; • Vehicle wheel washing facilities at construction sites' exit points should be established and used, where necessary; and • Other measures as detailed in this schedule.					

EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
Water Quality Impact						
S5.2.2.1	Construction Site Runoff Practices and measures provided in the Practice Note for Professional Persons on Construction Site Drainage, (PROPECC PN1/94) should be followed where applicable.	Control construction runoff	Contractors	Work Sites	Construction phase of Main Works Stage 1, Stage 2 and Stage 3	EIAO-TM, WPCO, EIAO
S5.2.2.2 – S5.2.2.3	Sewage from Workforce • Portable chemical toilets and sewage holding tanks should be provided for handling the construction sewage generated by the workforce. A licensed Contractor should be employed to provide appropriate and adequate portable toilets and be responsible for appropriate disposal and maintenance. • Notices should be posted at conspicuous locations to remind the workers not to discharge any sewage or wastewater into the nearby environment during the construction phase of the Project. Regular environmental audit on construction site should be conducted in order to provide an effective control of any malpractices and achieve continual improvement of environmental performance on site. It is anticipated that sewage generation during the construction phase of the Project would not cause water quality impact after undertaking all required measures	Handling of site sewage	Contractors	Work Sites	Construction phase of Main Works Stage 1, Stage 2 and Stage 3	EIAO-TM, WPCO, EIAO

EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
Waste Management						
S6.2.2.1	Good Site Practices and Waste Reduction Measures • Nomination of an approved person, such as a site manager, to be responsible for the implementation of good site practices, arrangements for collection and effective disposal to an appropriate facility, of all wastes generated at the site; • Training of site personnel in site cleanliness, appropriate waste management procedures and concepts of waste reduction, reuse and recycling; • Provision of sufficient waste disposal points and regular collection for disposal; • Appropriate measures to minimise windblown litter and dust during transportation of waste by either covering trucks or by transporting wastes in enclosed containers; • Regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors; • An Environmental Management Plan (EMP) should be prepared by the contractor and submitted to the Supervisor for approval.	Minimize waste generation during construction	Contractor	Work Sites	Construction phase of Main Works Stage 1, Stage 2 and Stage 3	Waste Disposal Ordinance (WDO)

EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
S6.2.3.1	Waste Reduction Measures • Segregate and store different types of waste in different containers, skip or stockpiles to enhance reuse or recycling of materials and their proper disposal; • Proper storage and site practices to minimize the potential for damage and contamination of construction materials; • Plan and stock construction materials carefully to minimize amount of waste generated and avoid unnecessary generation of waste; • Sort out demolition debris and excavated materials from demolition works to recover reusable/recyclable portions (i.e. soil, broken concrete, metal etc.); and • Provide training to workers on the importance of appropriate waste management procedures, including waste reduction, reuse and recycling.	Reduce waste generation	Contractor	Work Sites	Prior to the commencement of construction of Main Works Stage 1, Stage 2 and Stage 3	WDO
S6.2.4.1	Storage, Collection and Transportation of Waste Should any temporary storage or stockpiling of waste is required, recommendations to minimize the impacts include: • Waste, such as soil, should be handled and stored well to ensure secure containment, thus minimizing the potential of pollution; • Stockpiling area should be provided with covers and water spraying system to prevent materials from wind-blown or being washed away; and • Different locations should be designated to stockpile each material to enhance reuse.	Minimize waste impacts arising from waste storage	Contractor	Work Sites	Construction phase of Main Works Stage 1, Stage 2 and Stage 3	WDO

EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
S6.2.4.2	Storage, Collection and Transportation of Waste (con't) • Remove waste in timely manner; • Employ the trucks with cover or enclosed containers for waste transportation; • Obtain relevant waste disposal permits from the appropriate authorities; and • Disposal of waste should be done at licensed waste disposal facilities.	Minimize waste impacts arising from waste storage	Contractor	Work Sites	Construction phase of Main Works Stage 1, Stage 2 and Stage 3	WDO
S6.2.5.2	C&D Materials from Site Formation • Maintain temporary stockpiles and reuse excavated fill material for backfilling; • Carry out on-site sorting; • Make provisions in the Contract documents to allow and promote the use of recycled aggregates where appropriate; • Adopt "selective demolition" technique to demolish the existing structure and facilities with a view to recovering broken concrete effectively for recycling purpose, where possible; and • Implement a trip-ticket system for each works contract to ensure that the disposal of C&D materials are properly documented and verified.	Minimize waste impacts from excavated and C&D materials	Contractor	Work Sites	Construction phase of Main Works Stage 1, Stage 2 and Stage 3	Land (Miscellaneous Provisions) Ordinance, WDO, ETWB TCW No. 19/2005

EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
S6.2.5.3	C&D Material from Buildings Demolition and New Building Construction • The Contractor should recycle as much as possible of the C&DM on-site. Public fill and C&DM waste should be segregated and stored in different containers or skips to enhance reuse or recycling of materials and their proper disposal. For example, concrete and masonry can be crushed and used as fill, and steel reinforcing bar can be used by scrap steel mills. Different areas of the work sites should be designated for such segregation and storage. • The use of wooden hoardings shall not be allowed. An alternative material, such as metal, aluminium or alloy etc, could be used. • Government has developed a charging policy for the disposal of waste to landfill at present. It will provide additional incentive to reduce the volume of generated waste and ensure proper segregation to allow reuse of the inert material on site when implemented. • In order to minimize the impacts of the demolition works, the generated wastes must be cleared as quickly as possible after demolition. Therefore, the demolition and clearance works should be undertaken simultaneously. To facilitate proper segregation of inert and non-inert C&D material arising from demolition works, selective demolition method should be adopted.	Minimize waste impacts from building demolition and new building construction	Contractor	Work Sites	Construction phase of Main Works Stage 1, Stage 2 and Stage 3	Land (Miscellaneous Provisions) Ordinance, WDO, ETWB TCW No. 19/2005

EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
S6.2.5.4	Chemical Waste • If chemical wastes are produced at the construction site, the Contractors should register with EPD as chemical waste producers. • Chemical wastes should be stored in appropriate containers and collected by a licensed chemical waste contractor. Chemical wastes (e.g. spent lubricant oil) should be recycled at an appropriate facility as far as possible, while the chemical waste that cannot be recycled should be disposed of at either the Chemical Waste Treatment Centre, or another licensed facility, in accordance with the Waste Disposal (Chemical Waste) (General) Regulation.	Control the chemical waste and ensure proper storage, handling and disposal	Contractor	Work Sites	Construction phase of Main Works Stage 1, Stage 2 and Stage 3	Waste Disposal (Chemical Waste General) Regulation, Code of Practice on the Packaging, Labelling and Storage of Chemical Waste
S6.2.5.5	General Refuse • General refuse should be stored in enclosed bins separately from construction and chemical wastes. • Recycling bins should also be placed to encourage recycling. • Preferably enclosed and covered areas should be provided for general refuse collection and routine cleaning for these areas should also be implemented to keep areas clean. • A reputable waste collector should be employed to remove general refuse on a daily basis.	Minimize production of the general refuse and avoid odour, pest and litter impacts	Contractor	Work Sites	Construction phase of Main Works Stage 1, Stage 2 and Stage 3	Waste Disposal (Chemical Waste General) Regulation

EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
Landscape and Visual						
S7.3.1.1	Good Site Practices Measures • For areas unavoidably disturbed by the Project on a short term basis e.g. works areas, the general principle to try and restore these to their former state to suit future land use, should be adhered to. • With regard to topsoil, where identified, it should be stripped, treated appropriately, and where suitable and practical stored for re-use in the construction of the soft landscape works such as roadside amenity strips, and open space sites.	Minimize the impact to the landscape and visual	Contractor	Work Sites	Prior to construction and construction phase	

EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
S7.3.2.1	MM4 - Tree Protection & Preservation • Existing trees to be retained within the Project Site should be carefully protected during construction. In particular Old and Valuable Trees (OVTs) will be preserved according to ETWB TC (Works) No. 29/2004. Detailed Tree Protection Specification shall be provided in the Contract Specification. Under this specification, the Contractor shall be required to submit, for approval, a detailed working method statement for the protection of trees prior to undertaking any works adjacent to all retained trees, including trees in Contractor's works areas. A detailed tree survey will be carried out for the Tree Removal Application (TRA) process which will be carried out at the later detailed design stage of the Project. The detailed tree survey will propose which trees should be retained, transplanted or felled and will include details of tree protection measures for those trees to be retained.	Protect and Preserve Trees	Designer / Contractor	Work Sites	Prior to construction and construction phase	ETWB TCW No. 29/2004 and DEVB TC(W) No.7/2015

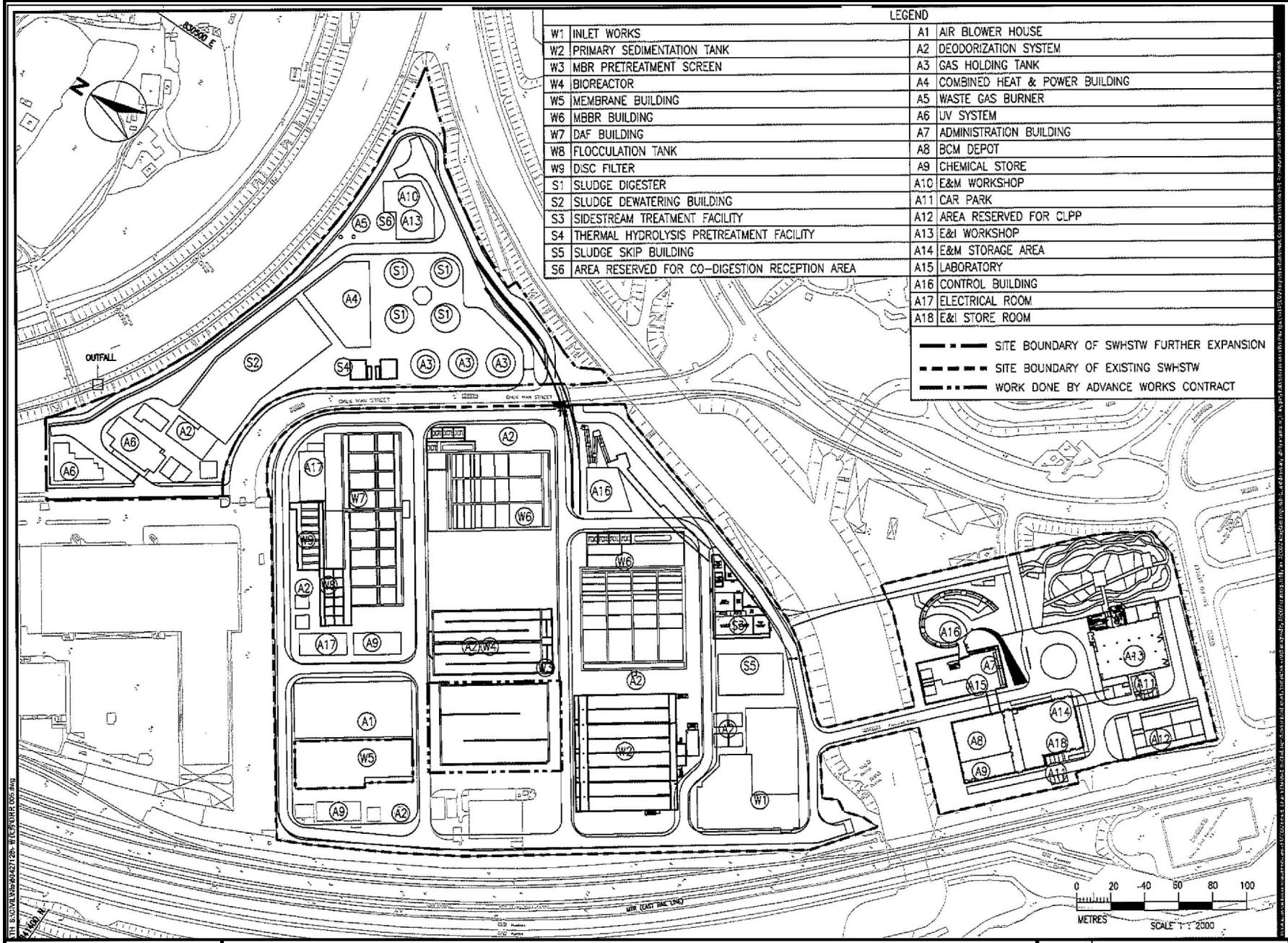
EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
S7.3.2.1	MM5 - Tree Transplantation • Trees unavoidably affected by the Project works should be transplanted where practical. Trees should be transplanted straight to their final receptor site and not held in a temporary nursery as far as possible. A detailed Tree Transplanting Specification shall be provided in the Contract Specification, where applicable. Sufficient time for necessary tree root and crown preparation periods shall be allowed in the project programme. A detailed transplanting proposal will be submitted to relevant government departments for approval in accordance with ETWBTC No. 2/2004 and DEVB TC(W) No. 7/2015 and final locations of transplanted trees should be agreed prior to commencement of the work. For trees associated with highways e.g. roadside planting along highways, that are unavoidably affected and should be transplanted, HyD HQ/GN/13 'Interim Guidelines for Tree Transplanting Works under Highways Department's Vegetation Maintenance Ambit' should be referred to.	Transplant Trees where suitable for transplantation	Designer / Contractor	Work Sites where possible. Otherwise consider offsite locations	Prior to construction, construction phase and operation phase	DEVB TC(W) No. 7/2015 and ETWB TCW No.2/2004 HyD HQ/GN/13 Interim Guidelines for Tree Transplanting Works under Highways Department's Vegetation Maintenance Ambit
S7.3.2.1	MM6 - Slope Landscaping • Site formation should be reduced as far as possible. Hydroseeding of modified slopes should be done as soon as grading works are completed to prevent erosion and subsequent loss of landscape recourses and charter. Woodland tree seedings and/or shrubs should be planted where slope gradient and site conditions allow. • In addition, landscape planting should be provided for the retaining structures associated with modified slopes where conditions allow. All slope landscaping	To avoid substantial slope cutting and fill slopes. To prevent erosion and subsequent loss of landscape resources and character. To ensure man-made slopes are as visually amenable	Designer / Contractor	Work Sites	Prior to construction, construction phase and operation phase	GEO Publication (1999) - Use of Vegetation as Surface Protection on Slope; GEO Publication No. 1/2011-Technical Guidelines on Landscape Treatment for Slopes

EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
	works should comply with GWO Publication No. 1/2011-Technical Guidelines on Landscape Treatment for Slopes.	as possible.				
S7.3.2.1	MM7 - Compensatory Planting • Compensatory tree planting for felled trees shall be provided to the satisfaction of relevant Government departments. Required numbers and locations of compensatory trees shall be determined and agreed separately with Government during the Tree Removal Application process under DEVB TC(W) No. 7/2015. • Compensatory planting is proposed at the potential open areas such as open spaces, amenity areas, open areas of the streetscapes, as well as the open areas within development lots. • Compensatory planting for shrubs should be considered in suitable locations. Native species such as *Melastoma malabathricum, Diospyros vaccinioides, Gardenia jasminoides, Ixora chinensis, Ligustrum sinense, Litsea rotundifolia, Melastoma dodecandrum, Atalantia buxifolia, Rhodomyrtus tomentosa, Rhaphiolepis indica,* and *Rhododendron simsii* are suggested.	Compensate for trees and shrubs lost due to the Project	Designer / Contractor	Work Sites where possible. Otherwise consider offsite locations	Prior to construction, construction phase and operation phase	DEVB TC(W) No. 7/2015 and ETWB TCW No. 2/2004
S7.3.2.1	MM9 - Vertical Greening • Planting of climbers to grow up vertical surfaces were appropriate.	Soften hard surfaces and facilities	Designer / Contractor	On appropriate structures	Prior to construction, construction phase and operation phase	ETWB TCW No.11/2004 – Cyber Manual for Greening

EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
S7.3.2.1	MM10 - Green Roof • Roof greening where appropriate should be established on proposed buildings as per the guidelines stated. These guidelines provide further details including information regarding structural loading, design, maintenance, etc. considerations as well as providing information on what types of plants might be suitable.	Reduce exposure to untreated concrete surfaces and particularly mitigate visual impact to visually sensitive receivers (VSRs) at high levels. Provide greening.	Designer / Contractor	On appropriate buildings	Prior to construction, construction phase and operation phase	CIBSE HK Branch, Technical Guidelines for Green Roof Systems in Hong Kong (2011); ArchSD/Urbis Study on Green Roof Application in HK (2007)
S7.3.2.1	MM11 - Screen Planting • Tall screen/buffer trees and shrubs should be planted. This measure may additionally form part of the compensatory planting.	To screen proposed structures such as roads and buildings. Improve compatibility with the surrounding environment and create a pleasant pedestrian environment	Designer / Contractor	Along roads, around suitable built structures, or around VSRs to contain their view out to the structures.	Prior to construction, construction phase and operation phase	ETWB TCW No. 10/2013 and 3/2006
S7.3.2.1	MM16 - Screen Hoarding • Screen hoarding shall be erected along areas of the construction works site boundary where the works site borders publically accessible routes and/or is close to visually sensitive receivers (VSRs). It is proposed that the screening be compatible with the surrounding environment and where possible, non-reflective, recessive colours be used. Any works areas near the ecological sensitive areas should erect 2m high dull green site boundary fence. Details can refer to the ecological impact assessment. [Chapter 13 of the EIA	To screen undesirable views of the works site.	Designer	Work Sites	Construction phase	

EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
	Report of NENT NDAs (Register No. AEIAR-175-2013)]					
S7.3.2.1	MM17 - Light Control Construction day and night time lighting should be controlled to minimize glare impact to adjacent VSRs during the Construction phase. Street and night time lighting shall also be controlled to minimize glare impact to adjacent VSRs during the operation phase.	To minimize glare impact to adjacent VSRs.	Designer / Contractor	Work Sites and/or the Plant	Construction phase and operation phase	

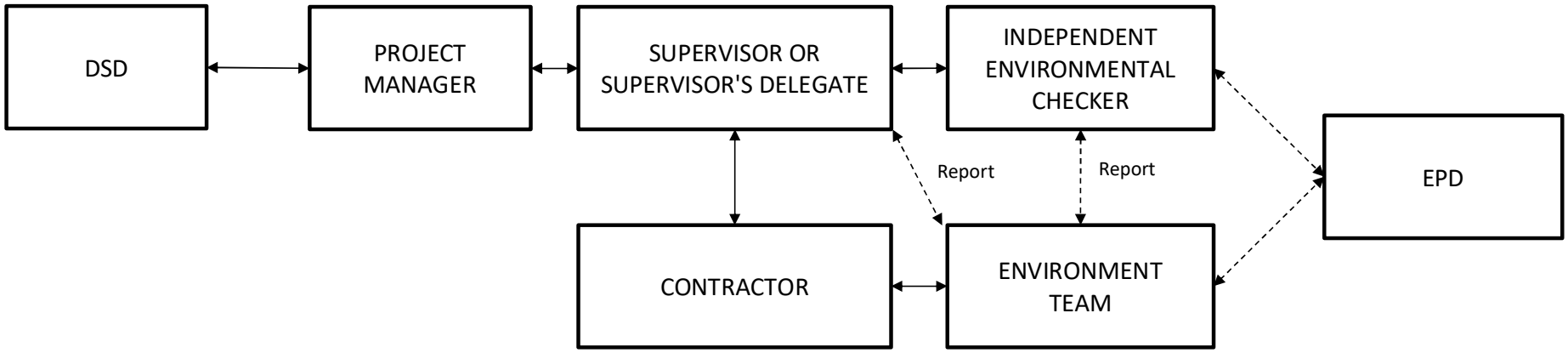
FIGURES



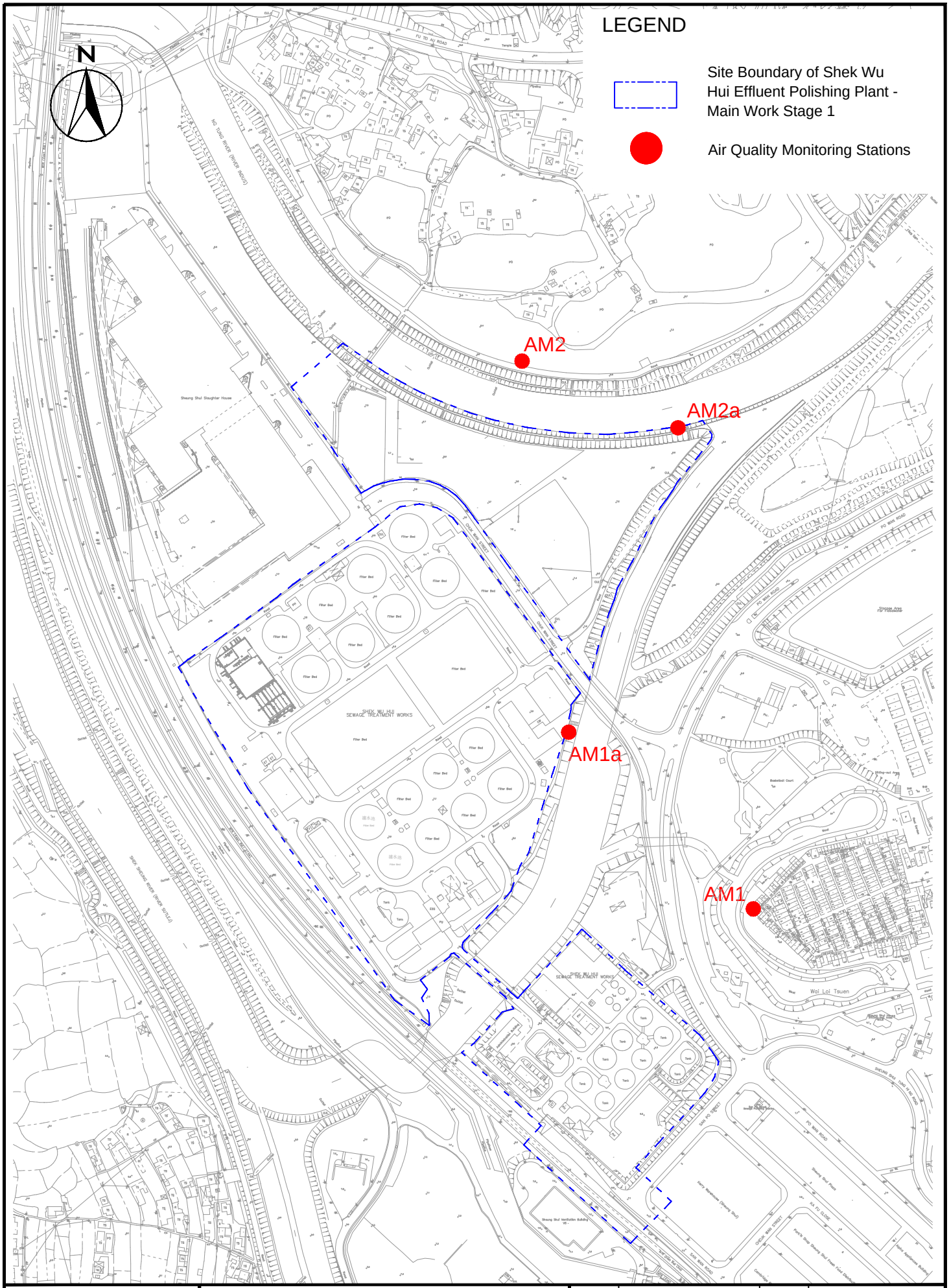
Shek Wu Hui Effluent Polishing Plant

General Site Layout Of SWHEPP

SCALE	As Shown	DATE	SEP 2019
CHECK	JM	DRAWN	SY
JOB No.		FIGURE NO. 1.1	REV -

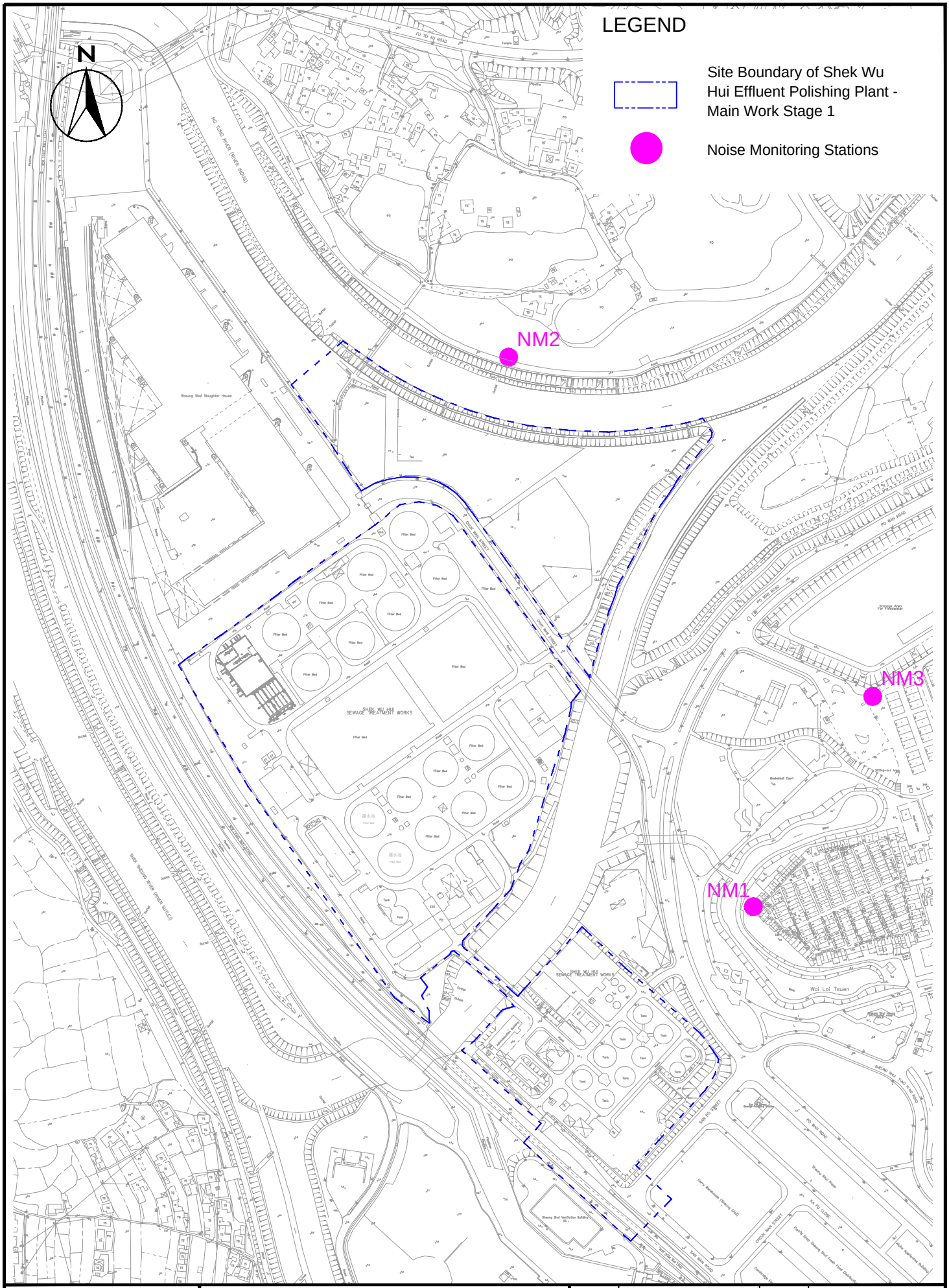


	Shek Wu Hui Effluent Polishing Plant -	**SCALE**	N.T.S.	**DATE**	Sep 2019
		CHECK	JW	**DRAWN**	SY
	Project Organisation For Environmental Monitoring and Audit	**JOB NO.**		**FIGURE NO.**	1.2

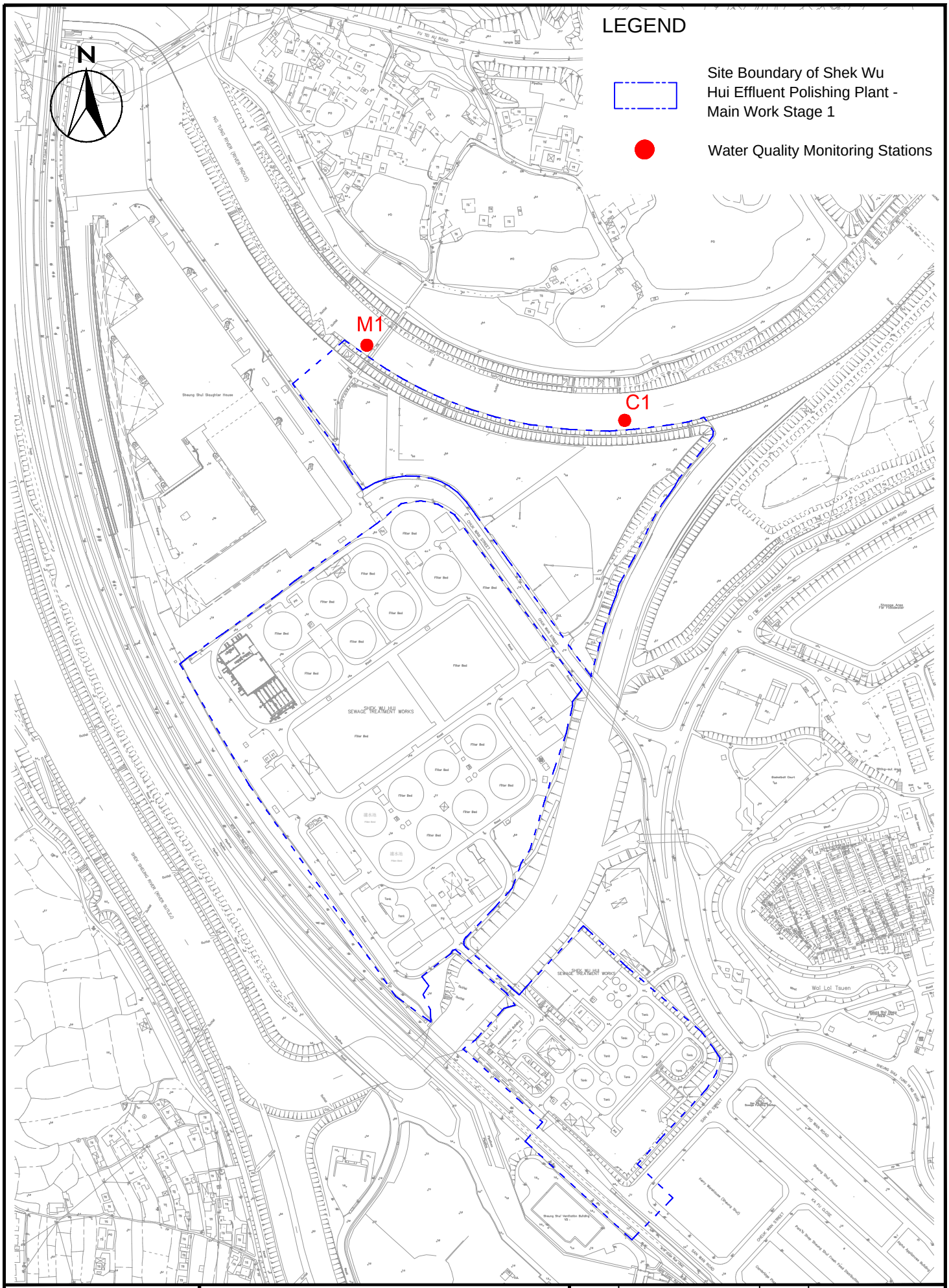


	Shek Wu Hui Effluent Polishing Plant - Location of Air Quality Monitoring Stations	SCALE	1:400@A4	DATE SEP 2019
		CHECK	JM	DRAWN SY
		JOB No.		FIGURE NO. 2 / REV -

F:/Project_drawings



	Shek Wu Hui Effluent Polishing Plant	SCALE	1:4000@A4	DATE	SEP 2019
		CHECK	JM	DRAWN	SY
	Location of Noise Monitoring Stations	JOB No.	MA19019	FIGURE NO. 3	REV -



	Shek Wu Hui Effluent Polishing Plant - Location of Water Quality Monitoring Stations	SCALE	1:400@A4	DATE OCT 2019
		CHECK	JM	DRAWN SY
		JOB No.		FIGURE NO. 5 / REV -

F:/Project_drawings

APPENDIX A
DATA SHEET FOR TSP MONITORING

Shek Wu Hui Effluent Polishing Plant

1-hr TSP Air Quality Monitoring

Field Operation Data Log Sheet

Equipment	Model	Equipment No.	Last Calibration/Due Date
Laser Dust Monitoring			/

Monitoring Location		AM1 / AM2		
Description of Location		Wai Loi Tsuen / Fu Tei Au		
Sampling Date and Time				
Weather Condition		Sunny / Fine / Cloudy / Windy / Rainy		
Measuring Parameters		TSP		
		1st hour	2nd hour	3rd hour
Display Value				
For LD-3B : - Display Value ÷ 60 mins x (K Factor:) For LD-5R & HAL-HPC301 : - Display Value x (Correlation Factor:) **Mass Concentration (μg/m^3)**				
Site Condition	Main Construction Site			
	Other Construction Site			
Remarks				

	Name	Signature	Date
Recorded By			
Checked By			

Shek Wu Hui Effluent Polishing Plant

24-hr TSP Air Quality Monitoring

Field Operation Data Log Sheet

AM1a / AM2a

Station: _____

Sampling Date & Time: From:_____(: am/pm) Collection Date: _____

Operators: _____ Weather: Sunny Cloudy Windy Rainy

Wind: Strong Mild Calm

High Volume Sampler		Model no.	TE-5170
		Blower Motor Serial no.	
		Last Calibration / Due Date	

TSP - Total Suspended Particulates Sampler			
Equipment No.		Set Point	
Slope, m		Intercept. b	

	Initial, I	Final, f
Ambient Pressure (mmHg), Pa		
Ambient Temperature (K), Ta		
Delta (in. of Water), W		
Y = [W x (Pa/760) x (298/Ta)]1/2		
Standard flow, Qstd (m^3/min) = (Y - b)*0.0283/m		
Elapsed Timer Indicator (Hours), T		
Filter Identification no.		
Weight of Filter (g)		
Weight of Particulate (g)		
Mean Standard Flow, $Qstd_{avg} = (Qstd_i + Qstd_f)/2$		
Total Time, Total Time = (Tf - Ti) x 60		
Standard Volume, Vstd (m^3) = $Qstd_{avg}$ x Total Time		
Particulate Concentration (µg/m^3)		
Observed Construction Activities — Main Construction Site		
Observed Construction Activities — Other Construction Site		

Remarks: _____

_____

Conducted by: _____ Signature: _____ Date: _____

Checked by: _____ Signature: _____ Date: _____

APPENDIX B
CONSTRUCTION NOISE MONITORING FIELD RECORD SHEET

Shek Wu Hui Effluent Polishing Plant

Noise monitoring

Field Record Sheet – 30 min

Equipment	Model	Equipment No.	Last Calibration/Due Date
Integrating Sound Level Meter			/
Sound Pressure Calibrator			/

Noise Monitoring Period (Delete the inappropriate)	Before Measurement			After Measurement		
	Noise Level (dB)	Freq. of Signal (KHz)	Display (dB)	Noise Level (dB)	Freq. of Signal (KHz)	Display (dB)
07:00 – 19:00	94.0	1		94.0	1	

Monitoring Location		NM1 / NM2 / NM3		
Description of Location		House No. 15, Wai Loi Tsuen / Fu Tei Au / Man Kok Village		
Date of Monitoring				
Weather Condition		Sunny / Cloudy / Rainy		
Measurement Start Time (hh:mm)				
Measurement Time Length (min/hr)				
Measurement Results	Parameter	Measured	Baseline	Actual Construction Noise Level
	L_{eq} dB(A)			
	L_{10} dB(A)		/	/
	L_{90} dB(A)		/	/
Major Construction Noise Source(s) During Measurement	Excavator / backhoe		Bulldozer	
	Dump truck / lorry		Roller	
	Other, pls specify:			
Other Noise Source(s) During Measurement	Road traffic noise		Air traffic noise	
	Construction noise from other sites:			
Remarks	Façade Measurement / Free Field Measurement			

Note: During daytime (0700-1900): 1 no. of Leq(30-min)

	Name	Signature	Date
Recorded By			
Checked By			

Remarks: Monitoring should be cancelled if steady wind speed exceeds 5m/s or with gusts exceeding 10m/s

APPENDIX C
SAMPLE TEMPLATE FOR THE
INTERIM NOTIIFICATION

APPENDIX F Sample Template for the Interim Notification

Incident Report on Action Level or Limit Level Non-compliance

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

	Name & Designation	Signature	Date
Prepared by:	_____	_____	_____

APPENDIX D
TEMPLATE OF EXECUTIVE SUMMARY IN AN EM&A REPORT

The typical template of Executive Summary in an EM&A report

Executive Summary

(1) Introduction

This is the [**xxth**] EM&A Report prepared by the **[ET]** for the **[Project Name]**. This report summarized the monitoring results and audits findings of the EM&A programme under the issued EP (**[EP No.: xxx/xxx]**) and in accordance with the EM&A Manual during the reporting period from **[dd/mm/yyyy]** to **[dd/mm/yyyy]**

(2) Summary of Main Works Undertaken and Key Measures Implemented

The main works undertaken during the reporting period are as follows:

- xxx
- xxx
- xxx
- xxx

OR

[Columns indicated by contract no., location or works nature]			
• xxx • xxx • xxx	• xxx • xxx • xxx	• xxx • xxx • xxx	• xxx • xxx • xxx

Implementation of the key mitigation measures during the reporting period are as follows:

- xxx
- xxx
- xxx
- xxx

OR

[Columns indicated by contract no., location or works nature]			
• xxx • xxx • xxx	• xxx • xxx • xxx	• xxx • xxx • xxx	• xxx • xxx • xxx

(3) Summary of Exceedances, Investigation and Follow-up

Exceedance of AL levels during the reporting period and the investigation results and/or follow-up actions:

- **[Monitoring item]**: **[no.]** of exceedances of **[action/limit]** level recorded at **[location(s)]**. – **[Summary of Investigation result**: e.g. to confirm (1) if all recommended mitigation measures were implemented by whom at where and to summarize the effectiveness based on the compliance audit; and (2) possible explanation of the exceedance event]. **[Summary of follow-up action(s)**: to state, if appropriate, (1) the implemented or planned follow-up actions or remedial measures; and (2) to confirm the effectiveness of the follow-up action by the time of reporting]

Breach(es) of A/L Level	Location (s)	Investigation Result	Follow-up / Remedial Actions

(4) Complaint Handling, Prosecution and Public Engagement

Event	Event Details		Follow-up / Remedial Actions	Status / Remarks
	Number	Brief Description		
Complaints Received				
Notification of Summons and Prosecutions Received				
Public Engagement Activities				

(5) Reporting Changes (if any)

There were **[no]** reporting changes during the reporting month. / **[Summary of reporting changes]**

(6) Future Key Issues

The key works or activities will be anticipated in the next reporting period are as follows:

The proposed key changes that will be anticipated in the next reporting period are as follows:

- (e.g. project design, work methodology, updates on EM&A manual, mitigation measures to be implemented, upcoming submissions or public participation event etc.)

The following EP submissions were submitted during the reporting month:

[EP submission (submitted on **[date]** and approved on **[date] / pending for approval)]**