

TABLE OF CONTENTS

1	INTRODUCTION	1-1
1.1	Project Background.....	1-1
1.2	Project Scope and Location.....	1-1
1.3	Construction Programme.....	1-2
1.4	Purpose of the Manual.....	1-2
1.5	Project Organisation	1-3
2	AIR QUALITY	2-1
2.1	Introduction	2-1
2.2	Construction Phase Monitoring.....	2-1
2.2.1	Air Quality Parameters.....	2-1
2.2.2	Monitoring Equipment.....	2-2
2.2.3	Laboratory Measurement / Analysis	2-3
2.2.4	Monitoring Locations.....	2-4
2.2.5	Baseline Monitoring	2-6
2.2.6	Impact Monitoring	2-6
2.2.7	Event and Action Plan	2-7
2.3	Operation Phase Monitoring	2-9
2.3.1	Hydrogen Sulphide Monitoring	2-9
2.3.2	Odour Complaint Registration	2-9
2.3.3	Event and Action Plan	2-9
2.4	Mitigation Measures.....	2-11
2.4.1	Construction Phase.....	2-11
2.4.2	Operation Phase	2-12
3	NOISE.....	3-1
3.1	Introduction	3-1
3.2	Noise Parameters	3-1
3.3	Monitoring Equipment.....	3-1
3.4	Monitoring Locations.....	3-2
3.5	Baseline Monitoring	3-3
3.6	Impact Monitoring	3-4
3.7	Event and Action Plan	3-4
3.8	Mitigation Measures.....	3-6
3.8.1	Construction Phase.....	3-6
3.8.2	Operation Phase	3-6
4	WATER QUALITY	4-1
4.1	Introduction	4-1
4.2	Purpose of Marine Water Quality Monitoring.....	4-1
4.3	Marine Water Quality Monitoring Stations	4-2
4.4	Marine Water Quality Monitoring Parameters and Schedule	4-2
4.5	Summary of Mitigation Measures and Marine Water Quality Monitoring for THEES Maintenance and Emergency Discharge.....	4-4
4.6	River Water Quality Monitoring at Kai Tak Nullah	4-4
4.7	Site Record	4-5
4.8	Monitoring Equipment	4-5
4.8.1	Dissolved Oxygen and Temperature Measuring Equipment.....	4-5
4.8.2	Turbidity Measurement Instrument.....	4-6
4.8.3	Sampler.....	4-6
4.8.4	Water Depth Detector	4-6
4.8.5	Salinity	4-6
4.8.6	pH	4-6
4.8.7	Sample Containers and Storage.....	4-6
4.8.8	Monitoring Position Equipment.....	4-7

4.8.9	Calibration of In-Situ Instruments	4-7
4.9	Laboratory Measurement / Analysis	4-7
4.10	Mitigation of Adverse Environmental Impacts	4-7
4.11	Construction Site Audits	4-8
4.11.2	Site Inspections.....	4-8
4.11.3	Compliance Audits	4-8
5	LAND CONTAMINATION	5-1
5.1	Introduction	5-1
5.2	Construction Phase.....	5-1
5.3	Operation Phase	5-1
6	HAZARD TO LIFE	6-1
6.1	Introduction	6-1
6.2	Mitigation and Good Practice Measures.....	6-1
6.2.2	Recommendations for Meeting the As Low As is Reasonably Practicable (ALARP) Requirements.....	6-1
6.2.3	Recommendations for Explosives Storage in Magazine	6-1
6.2.4	Recommendations for Explosives Transport	6-2
6.2.5	Recommendations for Explosives Use	6-2
7	ECOLOGICAL (TERRESTRIAL AND MARINE)	7-1
7.1	Introduction	7-1
7.2	Mitigation Measures.....	7-1
7.2.1	Avoidance	7-1
7.2.2	Minimisation	7-2
7.2.3	Compensation.....	7-4
7.3	Monitoring and Audit Measures	7-6
8	FISHERIES	8-1
8.1	Introduction	8-1
8.2	Mitigation Measures.....	8-1
8.3	Monitoring and Audit Measures	8-2
9	LANDSCAPE AND VISUAL IMPACT.....	9-1
9.1	Introduction	9-1
9.2	Mitigation Measures.....	9-1
9.3	Baseline Monitoring	9-1
9.4	Audit Requirement	9-1
10	CULTURAL HERITAGE.....	10-1
10.1	Introduction	10-1
11	WASTE MANAGEMENT IMPLICATION	11-1
11.1	Introduction	11-1
11.2	Mitigation Measures.....	11-1
11.2.2	Good Site Practices	11-1
11.2.3	Waste Reduction Measures.....	11-2
11.2.4	Storage, Collection and Transportation of Waste.....	11-2
11.2.5	Construction and Demolition Material.....	11-3
11.2.6	Sludge	11-4
11.2.7	Chemical Wastes	11-5
11.2.8	General Refuse.....	11-5
11.3	Audit Requirement	11-5
12	SITE ENVIRONMENTAL AUDIT	12-1
12.1	Site Inspections.....	12-1
12.2	Compliance with Legal and Contractual Requirements.....	12-2
12.3	Environmental Complaints	12-2

13	REPORTING.....	13-1
13.1	General	13-1
13.2	Electronic Reporting of EM&A Information	13-1
13.3	Baseline Monitoring Report	13-1
13.4	Monthly EM&A Reports	13-2
13.5	Quarterly EM&A Summary Reports	13-6
13.6	Final EM&A Review Reports	13-8
13.7	Data Keeping	13-9
13.8	Interim Notifications of Environmental Quality Limit Exceedances	13-9

LIST OF TABLES

Table 2.1	Proposed Air Quality Monitoring Stations
Table 2.2	Summary of Updated Locations of Air Quality Monitoring Stations
Table 2.3	Summary of Construction Dust Monitoring Programme
Table 2.4	Action and Limit Levels for Air Quality (Dust)
Table 2.5	Event and Action Plan for Air Quality (Dust)
Table 2.6	Action and Limit Levels for Air Quality (Odour)
Table 2.7	Event and Action Plan for Air Quality (Odour)
Table 3.1	Proposed Construction Noise Monitoring Stations during Construction of Relocated STSTW
Table 3.2	Proposed Construction Noise Monitoring Stations during Demolition of Existing STSTW
Table 3.3	Summary of Updated Locations of Noise Monitoring Stations
Table 3.4	Action and Limit Levels for Construction Noise
Table 3.5	Event and Action Plan for Construction Noise
Table 4.1	Proposed Marine Water Quality Monitoring Stations
Table 4.2	Mitigation Measures and Monitoring Requirement for THEES Maintenance / Emergency Discharge at Tolo Harbour
Table 4.3	Proposed Water Quality Monitoring Stations in Kai Tak Nullah
Table 7.1	Compensatory Planting Proposed under the Project
Table 7.2	Flora Species to be Considered for Compensatory Planting
Table 9.1	Event / Action Plan for Landscape and Visual during Construction Stage

LIST OF FIGURES

60334056/EM&A/1.01	Location Plan of the Project
60334056/EM&A/1.02	Project Organization
60334056/EM&A/2.01A	Location of Air Quality Monitoring Station During Construction Phase
60334056/EM&A/3.01A	Location of Construction Phase Noise Monitoring Station
60334056/EM&A/4.01	Location of Marine Water Quality Monitoring Stations
60334056/EM&A/7.01a	Location for Compensatory Planting (Sheet 1 of 3)
60334056/EM&A/7.01b	Location for Compensatory Planting (Sheet 2 of 3)
60334056/EM&A/7.01c	Location for Compensatory Planting (Sheet 3 of 3)

LIST OF APPENDICES

Appendix A	Tentative Construction Programme
Appendix B	Sample Record Sheet
Appendix C	Implementation Schedule of Recommended Mitigation Measures
Appendix D	Sample Template for the Interim Notification
Appendix E	Complain Register Form

ABBREVIATIONS

ADWF	Average Dry Weather Flow
AFCDD	Agriculture, Fisheries and Conservation Department
AL	Action Level
ALARP	As Low As is Reasonably Practicable
APHA	American Public Health Association
AQO	Air Quality Objective
ASR	Air Sensitive Receiver
BL	Baseline Level
BOD	Biochemical Oxygen Demand
C&D	Construction and Demolition
CAP	Contaminated Assessment Plan
CAR	Contamination Assessment Report
CEDD	Civil Engineering and Development Department
CNP	Construction Noise Permit
CSTW	Cavern Sewage Treatment Works
CUHK	Chinese University of Hong Kong
DC	Direct Current
DO	Dissolved Oxygen
DGPS	Differential Global Positioning System
DSD	Drainage Services Department
EIA	Environmental Impact Assessment
EIAO-TM	Technical Memorandum on Environmental Impact Assessment Process
EM&A	Environmental Monitoring and Audit
EMP	Environmental Management Plan
EPD	Environmental Protection Department
ER	Engineer's Representative
ET	Environmental Team
FCZ	Fish Culture Zone
FSP	Fine Suspended Particulates
H ₂ S	Hydrogen Sulphide
HOKLAS	The Hong Kong Laboratory Accreditation Scheme
HTML	Hyper Text Markup Language
HVS	High Volume Sample
IEC	Independent Environmental Checker
KTN	Kai Tak Nullah
LL	Limit Level
MIC	Maximum Instantaneous Charge
NCO	Noise Control Ordinance
NH ₃ -N	Ammonia Nitrogen
NO ₃ -N	Nitrate-Nitrogen
NSR	Noise Sensitive Receiver
PFA	Pulverized Fuel Ash
PFRF	Public Fill Reception Facilities
PME	Powered Mechanical Equipment
PPV	Peak Particle Velocity
ProPECC	Professional Persons Environmental Consultative Committee
PVC	Polyvinyl Chloride
QA	Quality Assurance
QC	Quality Control
QPME	Quality Powered Mechanical Equipment
RAP	Remediation Action Plan
RO	Regional Office
RR	Remediation Report
RSP	Respirable Suspended Particulates
SS	Suspended Solids

STDC	Sha Tin District Council
STEPS	Sha Tin Effluent Pumping Station
STF	Sludge Treatment Facilities
STSTW	Sha Tin Sewage Treatment Works
THEES	Tolo Harbour Effluent Export Scheme
TIN	Total Inorganic Nitrogen
TM	Technical Memorandum
TPEPS	Tai Po Effluent Pumping Station
TPSTW	Tai Po Sewage Treatment Works
TSP	Total Suspended Particulates
UIN	Unionized Ammonia
USEPA	US Environmental Protection Agency
VDC	Vehicle Detention Centre
VSR	Visually Sensitive Receiver
WMP	Waste Management Plan
WPCO	Water Pollution Control Ordinance
WSD	Water Supplies Department

1 INTRODUCTION

1.1 Project Background

- 1.1.1.1 To support social and economic development in Hong Kong, there is a pressing need to optimise the supply of land for various uses by sustainable and innovative approaches. One possible approach is rock cavern development. The Policy Agenda of the 2016 Policy Address has stated that works for the relocation of the Sha Tin Sewage Treatment Works (STSTW) is to commence as soon as possible for vacating the existing STSTW site for development purpose.
- 1.1.1.2 The Relocation of Sha Tin Sewage Treatment Works (STSTW) to Caverns (the Project) is implemented so as to release the existing site, of a size about 28 hectares, for other uses.
- 1.1.1.3 In May 2012, Drainage Services Department (DSD), the Project Proponent commenced a feasibility study on “Relocation of Sha Tin Sewage Treatment Works to Caverns” (the Feasibility Study). The findings of Feasibility Study affirmed that relocating the STSTW to caverns to be constructed at Nui Po Shan of A Kung Kok is technically feasible and financially viable.
- 1.1.1.4 In November 2013, DSD consulted the Health and Environment Committee of the Sha Tin District Council (STDC) on the findings and recommendations of the Feasibility Study and the Committee generally supported the Government to proceed with the investigation and design of the Project.
- 1.1.1.5 AECOM Asia Co Ltd. was commissioned by DSD to carry out this Assignment for the investigation, design and construction supervision under Agreement No. CE 30/2014 (DS) “Relocation of Sha Tin Sewage Treatment Works to Caverns: Caverns and Sewage Treatment Works – Investigation, Design and Construction” (the Assignment). The Project is a Designated Project under the Environmental Impact Assessment Ordinance (EIAO). An Environmental Impact Assessment (EIA) Study for the Project has been undertaken as part of the Assignment, in accordance with the EIA Study Brief (No. ESB-273/2014) and the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM).

1.2 Project Scope and Location

- 1.2.1.1 **Figure No. 60334056/EM&A/1.01** shows the location plan of the Project. The Project comprises the following components:
- (i) Construction of caverns at Nui Po Shan for housing the Sha Tin Cavern Sewage Treatment Works (CSTW);
 - (ii) Construction of a secondary sewage treatment works including sludge treatment facilities inside the caverns, with a design capacity of 340,000 m³/day at average dry weather flow (ADWF);
 - (iii) Construction of the main and secondary access tunnels and portals for access to the CSTW;
 - (iv) Construction of ancillary facilities to the caverns, including ventilation system, fire services, safety measures, communication systems, utilities, etc;
 - (v) Site formation and construction of ancillary facilities including a multi-storey administration building with laboratories, workshops, staff office, visitor facilities, etc, ventilation building, electrical substation, and other minor buildings and internal access road in the main portal located at A Kung Kok Street;

- (vi) Site formation and construction of ancillary facilities including a ventilation building, secondary electrical substation and internal access road in the secondary portal located at Mui Tsz Lam Road;
- (vii) Construction of pipelines from the CSTW for connection to the existing emergency submarine outfall of existing STSTW;
- (viii) Construction of new effluent tunnels and pipelines for the discharge of treated effluent from the relocated STSTW to Tolo Harbour Effluent Export Scheme (THEES) tunnel;
- (ix) Associated slope stabilisation and natural terrain hazard mitigation and geotechnical works;
- (x) Landscaping and architectural works;
- (xi) Construction of a ventilation adit connecting the CSTW to a ventilation shaft located in Nui Po Shan, together with a surface access of around 500m length leading from the end of A Kung Kok Shan Road;
- (xii) Construction of a temporary project specific magazine at Nui Po Shan next to the location for the Ventilation Shaft, with access from A Kung Kok Shan Road, for storage of explosives for up to a few days' use for construction of the CSTW, and decommissioning of it after the completion of blasting works;
- (xiii) Operation and maintenance of the CSTW; and
- (xiv) Decommissioning and demolition of the existing STSTW.

1.3 Construction Programme

- 1.3.1.1 The Project construction works are anticipated to commence in 2018 with completion of the Project by 2028. A tentative construction programme is provided in **Appendix A**.

1.4 Purpose of the Manual

- 1.4.1.1 The purpose of this Environmental Monitoring and Audit (EM&A) Manual is to guide the setups of an EM&A programme to ensure compliance with the EIA study recommendations, to assess the effectiveness of the recommended mitigation measures and to identify any further need for additional mitigation measures or remedial action. This Manual outlines the monitoring and audit programme for the construction and operational phases of the proposed Project. It aims to provide systematic procedures for monitoring, auditing and minimising environmental impacts associated with construction works and operational activities.
- 1.4.1.2 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. In addition, the EM&A Manual has been prepared in accordance with the requirements stipulated in Annex 21 of the EIAO-TM.
- 1.4.1.3 This Manual contains the following information:
- responsibilities of the Contractor, the Engineer or Engineer's 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 Project;

- 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; and
- 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.

Purpose of Update to the Manual

1.4.1.5 The updated EM&A Manual is to incorporate changes to the EM&A programme proposed under EP Condition 3.1 and those recommended in the baseline monitoring report deposited in 4 November 2019 under EP Condition 3.4.

1.4.1.6 This updated EM&A Manual incorporates the alternative air quality and noise monitoring locations based on the latest submission of Baseline Air Quality and Noise Monitoring Report, as well as proposed set up alternative air quality and noise monitoring locations during impact environmental monitoring. Section 2 incorporates the alternative air quality monitoring locations based on the latest submission of Baseline Air Quality and Noise Monitoring Report and proposed alternative air quality monitoring locations during impact monitoring. Based on the provisions and requirements set out in Section 2.2.2.5 and 2.2.2.6 of the EM&A Manual, a proposal of using portable direct reading dust meter in undertaking the EM&A for the Project was verified by IEC, and submitted to EPD, the proposal was approved by EPD on 28 May 2019. The proposal for wind data obtained from Sha Tin Hong Kong Observatory Automatic Weather Station was approved by the ER and agreed by the IEC on April 2019. Section 3 incorporates the alternative noise monitoring locations based on the latest submission of Baseline Air Quality and Noise Monitoring Report and proposed alternative noise monitoring locations during impact monitoring.

1.5 Project Organisation

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 No. 60334056/EM&A/1.02**.

The Contractor

1.5.1.2 The Contractor shall report to the Engineer. 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 Engineer;
- accompany joint site inspection undertaken by the ET; and
- adhere to the procedures for carrying out complaint investigation.

Environmental Team (ET)

1.5.1.3 The 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 the Environmental Protection Department (EPD). The ET shall be led and managed by the ET leader. The ET leader shall possess at least 10 years experience in EM&A and/or environmental management.

1.5.1.4 The duties and responsibilities of the ET are:

- monitor various environmental parameters as required in this 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 the EPD; and

- adhere to the procedures for carrying out complaint investigation in accordance with Section 13 of this Manual.

Engineer or Engineer's Representative (ER)

1.5.1.5 The Engineer 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 Engineer with respect to EM&A may include:

- supervise the Contractor's activities and ensure that the requirements in the EM&A Manual are fully complied with;
- inform the Contractor when action is required to reduce impacts in accordance with the Event and Action Plans;
- participate in joint site inspection undertaken by the ET; and
- adhere to the procedures for carrying out complaint investigation.
- The Engineer may delegate some of his power to the ER, who is his representative on site, in order to meet the site supervision needs.

Independent Environmental Checker (IEC)

1.5.1.6 The IEC shall be an independent party from the Contractor and the ET and possess at least 10 years' experience in EM&A and/or environmental management.

1.5.1.7 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;
- check the mitigation measures that have been recommended in the EIA and this Manual, and ensure they are properly implemented in a timely manner, when necessary; and
- adhere to the procedures for carrying out complaint investigation.

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

2 AIR QUALITY

2.1 Introduction

2.1.1.1 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 and operation phase of the Project are presented. Dust monitoring is proposed to be conducted during construction phase; while odour monitoring in terms of hydrogen sulphide (H₂S) is recommended to be conducted at the deodorizing units in the first three years upon commissioning of CSTW to determine whether it can meet the odour removal performance requirement. In addition to the H₂S monitoring, Odour Complaint Registration System is also introduced in the EM&A Programme. The system is meaningful to ascertain whether the Air Sensitive Receivers (ASRs) experience odour nuisance as a result of emissions from CSTW.

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;
- to comply with Action and Limit (A/L) Levels for air quality as defined in this Manual; and;
- to set up an odour complaint registration system to handle odour complaints due to CSTW.

2.2 Construction Phase Monitoring

2.2.1 Air Quality Parameters

2.2.1.1 The major construction activities of the Project would likely be demolition of existing structures, drill & blasts for caverns and access tunnels by excavation and rock crushing, construction of temporary haul road/access road/explosive compound structures which would generate insignificant amount of small size particulates, hence, no significant Respirable Suspended Particulates (RSP) or Fine Suspended Particulates (FSP) impacts would be anticipated. Monitoring of 24-hour RSP and 24-hour FSP levels are not proposed. Therefore, only 1-hour Total Suspended Particulates (TSP) is recommended to be monitored and audited at the proposed monitoring locations.

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

- 1-hour TSP limit of 500 µg m⁻³

2.2.1.3 This level is not to be exceeded at ASRs.

2.2.1.4 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.

2.2.1.5 1-hour TSP levels should be measured to indicate the impacts of construction dust on air quality. The TSP levels should be measured by following the standard method as set out

in High Volume Sampling Method for Total Suspended Particulates, Part 50 Chapter 1 Appendix B, Title 40 of the Code of Federal Regulations of the US Environmental Protection Agency (USEPA) (hereinafter referred to as "High Volume Sampler (HVS) method"). Upon approval of EPD and IEC, an alternative sampling method of using direct reading methods which are capable of producing comparable results as that by the high volume sampling method can be used to indicate short event impacts.

- 2.2.1.6 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 details. A sample data record sheet is shown in **Appendix B**.

2.2.2 Monitoring Equipment

- 2.2.2.1 HVS in compliance with the following specifications shall be used for carrying out the 1-hour TSP monitoring:

- 0.6 - 1.7 m³ per minute (20 - 60 standard cubic feet per minute) adjustable flow range;
- equipped with a timing / control device with ± 5 minutes accuracy for 24 hours operation;
- installed with elapsed-time meter with ± 2 minutes accuracy for 24 hours operation;
- capable of providing a minimum exposed area of 406 cm² ;
- flow control accuracy: $\pm 2.5\%$ deviation over 24-hour sampling period;
- equipped with a shelter to protect the filter and sampler;
- incorporated with an electronic mass flow rate controller or other equivalent devices;
- equipped with a flow recorder for continuous monitoring;
- provided with a peaked roof inlet;
- incorporated with a manometer;
- able to hold and seal the filter paper to the sampler housing at horizontal position;
- easy to change the filter; and
- capable of operating continuously for 24-hour period.

- 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, in accordance with requirements stated in the manufacturers operating manual. All the equipment, calibration kit, filter papers, etc, shall be clearly labelled. If direct reading dust meters is proposed to be used, the ET Leader should submit sufficient information to the IEC to prove that the instrument is capable of achieving a comparable result as that the HVS may be used for the 1-hour sampling. The instrument should also be calibrated regularly.

- 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 B**.
- 2.2.2.5 If the ET Leader 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:
- The wind sensors shall be installed on masts at an elevated level 10m above ground so that they are clear of obstructions or turbulence caused by the buildings;
 - The wind data shall be captured by a data logger. The data recorded in the data logger shall be downloaded periodically for analysis at least once a month;
 - The wind data monitoring equipment shall be re-calibrated at least once every six months; and
 - 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.

Proposed Use of Portable Direct Reading Dust Meter and Existing Wind Data from Sha Tin Hong Kong Observatory Automatic Weather Station

- 2.2.2.8 Based on the provisions and requirements set out in Section 2.2.2.5 and 2.2.2.6 above, a proposal of using portable direct reading dust meter in undertaking the EM&A for the Project was verified by IEC, and submitted to EPD, the proposal was approved by EPD on 28 May 2019. The proposal for wind data obtained from Sha Tin Hong Kong Observatory Automatic Weather Station was approved by the ER and agreed by the IEC on April 2019.

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 the Hong Kong Laboratory Accreditation Scheme (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 verified by the IEC and approved by the ER. 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 The dust monitoring locations will be determined when the engineering details for the dust modelling is available. The selected monitoring locations are the worst potentially affected air sensitive receivers located in the vicinity of construction sites of the Project. The proposed air quality monitoring locations are listed in **Table 2.1** below and shown in **Figure No. 60334056/EM&A/2.01A**.

Table 2.1 Proposed Air Quality Monitoring Stations

Monitoring Station ID	EIA ID	Location
Construction Phase		
AM1	ASR8	Ah Kung Kok Fishermen Village
AM2	ASR6	Block H, Kam Tai Court
AM3	ASR4	Ma On Shan Tsung Tsin Secondary School
AM4	ASR2	Wellborn Kindergarten
AM5	ASR12	The Neighbourhood Advice-Action Council Harmony Manor
AM6	ASR21	Seaview Villa

2.2.4.2 The status and locations of the air quality sensitive receivers may change after issuing this Manual. In such case, the ET shall propose updated monitoring locations and seek approval from ER and IEC and agreement from EPD on the proposal.

2.2.4.3 When alternative monitoring locations are proposed, the following criteria, as far as practicable, shall be followed:

- i. at the site boundary or such locations close to the major dust emission source;
- ii. close to the air sensitive receivers as defined in the EIAO-TM;
- iii. proper position/sitting and orientation of the monitoring equipment; and
- iv. take into account the prevailing meteorological conditions.

2.2.4.4 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. 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

Updated Monitoring Locations

- 2.2.4.5 A change of the monitoring location in baseline AM3 - Ma On Shan Tsung Tsin Secondary School was identified necessary as access was not granted for setting up the onsite monitoring station. The new monitoring location AM3(A) - Kowloon City Baptist Church Hay Nien Primary School for baseline air quality monitoring station was proposed based on the criteria as stated in section 2.2.4.2 and 2.2.4.3 above. The location of the alternative monitoring station AM3(A) - Kowloon City Baptist Church Hay Nien Primary School is shown in **Figure No. 60334056/EM&A/2.01A**. The location for the originally proposed monitoring location AM3 is also shown in the same drawing for easy reference. Table 2.2 summarised the updated locations of the air quality monitoring stations. The proposed station AM3(A) is situated in close proximity to Ma On Shan Tsung Tsin Secondary School and it is also considered to be a representative location for monitoring the construction phase air quality impact from the project.
- 2.2.4.6 A change of the monitoring location in subsequent impact monitoring for AM3(A) - Kowloon City Baptist Church Hay Nien Primary School was identified necessary as access was not granted for setting up the onsite monitoring station. The new monitoring location AM3(B) – ground level of outside A Kung Kok Street Garden for impact air quality monitoring station was proposed based on the criteria as stated in section 2.2.4.2 and 2.2.4.3 above. The location of the alternative monitoring station AM3(B) - Ground Level of Outside A Kung Kok Street Garden is shown in **Figure No. 60334056/EM&A/2.01A**. The location for the originally proposed monitoring location AM3 is also shown in the same drawing for easy reference. Table 2.2 summarised the updated locations of the air quality monitoring stations. The proposed station AM3(B) is situated in close proximity to AM3 Ma On Shan Tsung Tsin Secondary School and AM3(A) Kowloon City Baptist Church Hay Nien Primary School and it is also considered to be a representative location for monitoring the construction phase air quality impact from the project.

Table 2.2 Summary of Updated Locations of Air Quality Monitoring Stations

Monitoring Station ID	EIA ID	Location
Construction Phase		
AM1	ASR8	Ah Kung Kok Fishermen Village
AM2	ASR6	Block H, Kam Tai Court

Monitoring Station ID	EIA ID	Location
AM3(A) - Baseline	ASR3	Kowloon City Baptist Church Hay Nien Primary School
AM3(B) - Impact	-	Outside A Kung Kok Street Garden
AM4	ASR2	Wellborn Kindergarten
AM5	ASR12	The Neighbourhood Advice-Action Council Harmony Manor
AM6	ASR21	Seaview Villa

2.2.5 Baseline Monitoring

- 2.2.5.1 Baseline monitoring shall be carried out to determine the ambient 1-hour TSP levels at the monitoring locations prior to the commencement of the Project. 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 (ALs) with the Limit levels (LLs) 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 TSP baseline monitoring should be carried out at all of the designated monitoring locations for at least 14 consecutive days prior to the commissioning of the construction works. 1-hour TSP sampling shall be done at least three times per day at each monitoring station when the highest dust impacts are expected. During the baseline monitoring, there should not be any construction or dust generating activities in the vicinity of the monitoring stations. General meteorological conditions (wind speed, direction and precipitation) and notes regarding any significant adjacent dust producing sources should also be recorded throughout the baseline monitoring period. A summary of baseline monitoring is presented in **Table 2.2**.
- 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 If the ET Leader 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 (BLs). 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 1-hour TSP monitoring, the sampling frequency of at least three times in every six-days should be undertaken when the highest dust impact occurs. In case of non-compliance with the air criteria, more frequent monitoring, as specified in the Action Plan in the following section, should be conducted. This additional monitoring should be continued until the excessive dust emission or the deterioration in the air quality is rectified. The impact monitoring programme is summarised in **Table 2.3**.

- 2.2.6.2 The monthly schedule of the compliance and impact monitoring programme should be drawn up by the ET one month prior to the commencement of the scheduled construction period. 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.

Table 2.3 Summary of Construction Dust Monitoring Programme

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

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 TSP. **Table 2.4** 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 2.5** shall be carried out.

Table 2.4 Action and Limit Levels for Air Quality (Dust)

Parameter	Action Level (1)	Limit Level
TSP (1 hour average)	BL \leq 384 μgm^{-3} , AL = (BL * 1.3 + LL)/2 BL > 384 μgm^{-3} , AL = LL	500 μgm^{-3}

Note: (1) BL = Baseline level, AL = Action level, LL = Limit level.

Table 2.5 Event and Action Plan for Air Quality (Dust)

Event	Action			
	ET	IEC	ER	Contractor
Action level being exceeded by one sampling	<ol style="list-style-type: none"> 1. Identify source, investigate the causes of complaint and propose remedial measures; 2. Inform Contractor, IEC and ER; 3. Repeat measurement to confirm finding; and 4. Increase monitoring frequency to daily. 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by ET; 2. Check Contractor's working method; and 3. Review and advise the ET and ER on the effectiveness of the proposed remedial measures. 	<ol style="list-style-type: none"> 1. Notify Contractor. 	<ol style="list-style-type: none"> 1. Identify source(s), investigate the causes of exceedance and propose remedial measures; 2. Implement remedial measures; and 3. Amend working methods agreed with the ER as appropriate.
Action level being exceeded by two or more consecutive sampling	<ol style="list-style-type: none"> 1. Identify source; 2. Inform Contractor, IEC and ER; 3. Advise the Contractor and 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 Contractor, IEC and ER; and 8. If exceedance stops, cease additional monitoring. 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by ET; 2. Check Contractor's working method; 3. Discuss with ET, ER and Contractor on possible remedial measures; 4. Advise the ET and ER on the effectiveness of the proposed remedial measures; and 5. Supervise Implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of exceedance in writing; 2. Notify Contractor; 3. Ensure remedial measures properly implemented; and 4. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated. 	<ol style="list-style-type: none"> 1. Identify source and investigate the causes of exceedance; 2. Submit proposals for remedial measures to the ER with a copy to ET and IEC within three working days of notification; 3. Implement the agreed proposals; and 4. Amend proposal as appropriate.
Limit level being exceeded by one sampling	<ol style="list-style-type: none"> 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; and 5. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results. 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by ET; 2. Check Contractor's working method; 3. Discuss with ET and Contractor on possible remedial measures; 4. Advise the ER on the effectiveness of the proposed remedial measures; and 5. Supervise implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of exceedance in writing; 2. Notify Contractor; 3. Ensure remedial measures properly implemented. 	<ol style="list-style-type: none"> 1. Identify source(s) and investigate the causes of exceedance; 2. Take immediate action to avoid further exceedance; 3. Submit proposals for remedial measures to ER with a copy to ET and IEC within three working days of notification; 4. Implement the agreed proposals; and 5. Amend proposal if appropriate.
Limit level being exceeded by two or more consecutive sampling	<ol style="list-style-type: none"> 1. Notify IEC, ER, Contractor and EPD; 2. Identify source; 3. Repeat measurement to confirm findings; 4. Increase monitoring frequency to daily; 5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented; 6. Arrange meeting with IEC and ER to discuss the remedial actions to be taken; 7. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results; and 8. If exceedance stops, cease additional monitoring. 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by the ET; 2. Discuss amongst ER, ET, and Contractor on the potential remedial actions; 3. Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly; and 4. Supervise the implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of exceedance in writing; 2. In consultation with the ET and IEC, agree with the Contractor on the remedial measures to be implemented; 3. Supervise the implementation of remedial measures; and 4. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated. 	<ol style="list-style-type: none"> 1. Identify source(s) and investigate the causes of exceedance; 2. Take immediate action to avoid further exceedance; 3. Submit proposals for remedial measures to the ER with a copy to the IEC and ET within three working days of notification; 4. Implement the agreed proposals; 5. Revise and resubmit proposals if problem still not under control; and 6. Stop the relevant portion of works as determined by the ER until the exceedance is abated.

2.3 Operation Phase Monitoring

2.3.1 Hydrogen Sulphide Monitoring

2.3.1.1 The odour impact monitoring (in term of H₂S concentration) at the inlets and outlets of the deodourizing units shall be conducted by H₂S sensor quarterly in the first three years upon commissioning of CSTW to determine whether the odour removal efficiency meet the requirements as stated in the EIA Report. The first odour monitoring shall be conducted within one month, after the operation of the CSTW. Subsequent odour monitoring shall be conducted quarterly, i.e. at the 4th, 7th and 10th month for the first year. For the second and third years, the frequency of the impact monitoring could be reduced to once every 6 months subject to EPD's approval, if the monitoring results remain below the limit levels.

2.3.2 Odour Complaint Registration

2.3.2.1 In the event when an odour complaint is received at the CSTW, the operator shall liaise with the complainant and a Complaint Registration Form shall be completed. The Complaint Registration Form is to record detailed information regarding the odour complaint and hence, facilitates efficient investigation work. The registration form shall contain, but not be limited to the following information:

- Location of where the odour nuisance occurred, including whether the odour was experienced indoors or outdoors;
- Date and time of the complaint and the nuisance event;
- Description of the complaint, i.e. the type and characteristics of the odour; and an indication of the odour strength (highly offensive / offensive / slightly offensive / just continuously detectable /intermittently detectable); and
- Name and contact information of the complainant.

2.3.2.2 This information shall be obtained by the plant engineer or his representative(s) of the CSTW when the complaint is received. The Complaint Registration Form is shown in **Appendix E** for reference.

2.3.2.3 In addition, the following information shall be obtained:

- Meteorological conditions from the Hong Kong Observatory's Shatin Racecourse Weather Station (including temperature, wind speed, relative humidity) at the time of the complaint; and
- Whether any abnormal operations were being carried out at the CSTW at the time the nuisance occurred.

2.3.2.4 The Odour Complaint Register shall be kept at the CSTW.

2.3.3 Event and Action Plan

2.3.3.1 **Table 2.6** 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 2.7** shall be carried out.

Table 2.6 Action and Limit Levels for Air Quality (Odour)

Parameter	Action Level	Limit Level
H ₂ S	-	Less than the proposed odour removal efficiency as stated in the EIA Report

Parameter	Action Level	Limit Level
Odour Complaints	Any incidence of odour complaint received through the Odour Complaint Register	Two or more complaints through the Odour Complaint Register within three months

Table 2.7 Event and Action Plan for Air Quality (Odour)

EVENT	ACTION		
	CSTW Engineer-in-charge of Odour Monitoring	DSD Sewage Treatment Division 1 (ST1)	DSD Sewerage Projects Division (SP) / Electrical and Mechanical Projects Division (E&MP)
ACTION LEVEL			
Receipt of any odour complaint	1. Identify source/reason of odour complaints;	1. Carry out investigation to identify the source/reason of complaints. Investigation shall be completed within 1 week; 2. Rectify any unacceptable practice; 3. Amend working methods if required; 4. Inform DSD SP/E&MP if cause of complaint is considered to be caused by civil or E&M design problems; 5. Correspond to the complainant within 10 days to inform the cause of the nuisance and action taken; and 6. Implement amended working methods.	1. Assist ST1 to find the root cause of the complaint ; and 2. Modify or improve design as appropriate.
LIMIT LEVEL			
Exceedance of Limit level or receipt of two or more complaints in 3 months	1. Identify source / reason of non-compliance or odour complaints; 2. Repeat measurements to confirm findings; 3. Increase monitoring frequency to monthly; 4. If non-compliance stops, cease additional monitoring.	1. Carry out investigation to identify the source/reason of non-compliance or complaints. Investigation shall be completed within 1 week; 2. Rectify any unacceptable practice; 3. Amended working methods if required; 4. Notify DSD SP / E&MP; 5. Formulate remedial actions; 6. Ensure amended working methods and remedial actions properly implemented; 7. If non-compliance continues, consider what portion of the work is responsible and stop that portion of the work until the non-compliance is abated; and 8. Correspond to the complainant within 10 days to inform the cause of the nuisance and action taken.	1. Assist ST1 to find the root cause of the complaint or non-compliance; 2. Modify or improve design as appropriate; and 3. Formulate remedial actions in association with ST1.

2.4 Mitigation Measures

2.4.1 Construction Phase

2.4.1.1 Mitigation measures for dust control have been recommended in the EIA Report. The Contractor shall be responsible for the design and implementation of these measures.

2.4.1.2 Recommended mitigation measures to minimise the adverse impacts on air quality during construction phases are detailed in Section 2.4.1.3 below:

2.4.1.3 To ensure compliance with the guideline level and Air Quality Objective (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 minimise construction dust impact. A number of below dust suppression measures are proposed to be implemented.

- The rock crushing plant is in enclosed structure with dust collector. Dust collector would be installed at the exhaust of the rock crusher to achieve a dust removal efficiency of 99%. Vehicles would be required to pass through the wheel washing facilities provided at site exit.
- Watering eight times a day on active works areas, exposed areas so as to achieve a dust removal efficiency of 87.5%;
- Use of regular watering to reduce dust emissions from exposed site surfaces and unpaved roads, particularly during dry weather.
- Use of frequent watering for particularly dusty construction areas and areas close to ASRs.
- Side enclosure and covering of any aggregate or dusty material storage piles to reduce emissions. Where this is not practicable owing to frequent usage, watering shall be applied to aggregate fines.
- Open stockpiles shall be avoided or covered. Where possible, prevent placing dusty material storage piles near ASRs.
- Tarpaulin covering of all dusty vehicle loads transported to, from and between site locations.
- Establishment and use of vehicle wheel and body washing facilities at the exit points of the site.
- Provision of wind shield and dust extraction units or similar dust mitigation measures at the loading area of barging point, and use of water sprinklers at the loading area where dust generation is likely during the loading process of loose material, particularly in dry seasons/ periods.
- Provision of not less than 2.4m high hoarding from ground level along site boundary where adjoins roads, streets or other accessible to the public except for a site entrance or exit.
- Imposition of speed controls for vehicles on site haul roads.
- Where possible, routing of vehicles and positioning of construction plant should be at the maximum possible distance from ASRs.
- 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.

- Instigation of an EM&A program to monitor the construction process in order to enforce controls and modify method of work if dusty conditions arise.

2.4.2 Operation Phase

2.4.2.1 In response to the public concern on the potential odour impact during operation of the relocated STSTW, the following appropriate odour control measures would be implemented.

- (i) Adopting the advantage of caverns as natural barriers for odour control;
- (ii) Covering up of odour sources;
- (iii) Preventing odour leakage through the access tunnels by applying negative pressure inside caverns;
- (iv) Installing deodourizing units to clean up the collected foul air;
- (v) Discharging exhausted air at height to further enhance the dilution effect; and
- (vi) Enhancing the odour management of the sludge transportation.

2.4.2.2 The ventilation shaft for the relocated STSTW would be sit at a remote location on the hill. The odour emission from the ventilation shaft exhaust is to be treated by deodourizers at 80% - 97% odour removal efficiency (three deodourizers at 97% and one at 80%) before venting to the ambient. The proposed deodourization technologies include activated carbon and biotrickling filter. Subject to the detailed design, a combination of both technologies may be utilized for enhanced odour removal performance. To minimize the involvement of the handling of chemicals, chemical scrubbers are not considered.

3 NOISE

3.1 Introduction

- 3.1.1.1 Construction noise impact and operation phase fixed plant noise impact from this Project are predicted at the identified representative noise sensitive receivers (NSRs).
- 3.1.1.2 Construction noise mitigation measures would be required to reduce noise levels to the stipulated standard. A noise monitoring and audit programme should be undertaken to confirm such mitigation measures would be implemented properly.
- 3.1.1.3 For fixed noise sources, the Contractor should ensure the operation of fixed plant equipment fulfill the maximum sound power levels adopted in the EIA report, in order to ensure compliance of the operation airborne noise levels with the Technical Memorandum (TM)'s stipulated noise standard. No noise monitoring during operational phase is required.
- 3.1.1.4 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.

3.2 Noise Parameters

- 3.2.1.1 The construction noise levels should be measured in terms of the 30-minute A-weighted equivalent continuous sound pressure level ($L_{eq}(30\text{-min})$). $L_{eq}(30\text{-min})$ should be used as the monitoring parameter for the time period between 0700 and 1900 hours on normal weekdays.
- 3.2.1.2 Supplementary information for data auditing and statistical results such as L10 and L90 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.

3.3 Monitoring Equipment

- 3.3.1.1 As referred to in the 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 agree to within 1.0 dB.
- 3.3.1.2 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.
- 3.3.1.3 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.

3.4 Monitoring Locations

3.4.1.1 **Figure No. 60334056/EM&A/3.01A** show the noise monitoring locations for the construction phase. The proposed noise monitoring locations are summarised in **Table 3.1** and **Table 3.2** below.

Table 3.1 Proposed Construction Noise Monitoring Stations during Construction of Relocated STSTW

Station	NSR ID (Referenced to EIA Report)	Location
CM1	NR-C02	Wellborn Kindergarten
CM2	NR-C04	Ma On Shan Tsung Tsin Secondary School
CM3	NR-C07	S.K.H. Ma On Shan Holy Spirit Primary School
CM4	NR-C08	Ah Kung Kok Fishermen Village
CM5	NR-C10	The Neighbourhood Advice-Action Council Harmony Manor

Table 3.2 Proposed Construction Noise Monitoring Stations during Demolition of Existing STSTW

Station	NSR ID (Referenced to EIA Report)	Location
DM1	NR-D01	Seaview Villa
DM2	NR-D05	Racecourse Gardens
DM3	NR-D07	S.K.H. Ma On Shan Holy Spirit Primary School

3.4.1.2 The status and locations of noise sensitive receivers may change after issuing this Manual. If such cases exist, the ET shall propose updated monitoring locations and seek approval from the ER and IEC and agreement from EPD of the proposal.

3.4.1.3 When alternative 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.

3.4.1.4 The construction noise monitoring station shall normally be at a point 1m 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.

Updated Monitoring Locations

3.4.1.5 Based on the provisions and requirements set out in **Sections 3.4.1.2** and **3.4.1.3** above, a change of the monitoring location in baseline CM2 - Ma On Shan Tsung Tsin Secondary School was identified necessary as access was not granted for setting up the onsite monitoring station. The new monitoring location CM2(A) - Kowloon City Baptist Church Hay Nien Primary School for baseline noise monitoring station was proposed based on the

criteria as stated in section 3.4.1.2 and 3.4.1.3 above. The location of the alternative monitoring station CM2(A) - Kowloon City Baptist Church Hay Nien Primary School is shown in **Figure No. 60334056/EM&A/3.01A**. The location for the originally proposed monitoring location CM2 is also shown in the same drawing for easy reference. **Table 3.3** summarised the updated locations of the noise monitoring stations. The proposed station CM2(A) is situated in close proximity to Ma On Shan Tsung Tsin Secondary School and it is also considered to be a representative location for monitoring the construction phase noise impact from the project.

- 3.4.1.6 A change of the monitoring location in subsequent impact monitoring for CM2(A) - Kowloon City Baptist Church Hay Nien Primary School was identified necessary as access was not granted for setting up the onsite monitoring station. The new monitoring location CM2(B) – ground level of outside A Kung Kok Street Garden for impact noise monitoring station was proposed based on the criteria as stated in section 3.4.1.2 and 3.4.1.3 above. The location of the alternative monitoring station CM2(B) - Ground Level of Outside A Kung Kok Street Garden is shown in **Figure No. 60334056/EM&A/3.01A**. The location for the originally proposed monitoring location CM2 is also shown in the same drawing for easy reference. **Table 3.3** summarised the updated locations of the air quality monitoring stations. The proposed station CM2(B) is situated in close proximity to CM2 Ma On Shan Tsung Tsin Secondary School and CM2(A) Kowloon City Baptist Church Hay Nien Primary School and it is also considered to be a representative location for monitoring the construction phase noise impact from the project.

Table 3.3 Summary of Updated Locations of Noise Monitoring Stations

Station	NSR ID (Referenced to EIA Report)	Location
CM1	NR-C02	Wellborn Kindergarten
CM2	NR-C04	Ma On Shan Tsung Tsin Secondary School
CM2(A) - Baseline	NR-C03	Kowloon City Baptist Church Hay Nien Primary School
CM2(B) - Impact	-	Ground Level of Outside A Kung Kok Street Garden
CM3	NR-C07	S.K.H. Ma On Shan Holy Spirit Primary School
CM4	NR-C08	Ah Kung Kok Fishermen Village
CM5	NR-C10	The Neighbourhood Advice-Action Council Harmony Manor

3.5 Baseline Monitoring

- 3.5.1.1 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 for approval before the monitoring starts.
- 3.5.1.2 During the baseline monitoring, there shall not be any construction activities in the vicinity of the monitoring stations.
- 3.5.1.3 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.

3.6 Impact Monitoring

- 3.6.1.1 Construction 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.
- 3.6.1.2 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.
- 3.6.1.3 In case of non-compliance with the construction noise criteria, more frequent monitoring, as specified in the Action Plan in **Table 3.5** 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.

3.7 Event and Action Plan

- 3.7.1.1 The Action and Limit levels for construction noise are defined in **Table 3.4**. Should non-compliance of the criteria occur, action in accordance with the Action Plan in **Table 3.5** shall be carried out.

Table 3.4 Action and Limit Levels for Construction Noise

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

Notes:

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

Table 3.5 Event and Action Plan for Construction Noise

Event	Action			
	ET	IEC	ER	Contractor
Action Level	<ol style="list-style-type: none"> 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; and 5. Increase monitoring frequency to check mitigation effectiveness. 	<ol style="list-style-type: none"> 1. Review the analysed results submitted by the ET; 2. Review the proposed remedial measures by the Contractor and advise the ER accordingly; and 3. Supervise the implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. Require Contractor to propose remedial measures for the analysed noise problem; and 4. Ensure remedial measures are properly implemented. 	<ol style="list-style-type: none"> 1. Submit noise mitigation proposals to IEC; and 2. Implement noise mitigation proposals.
Limit Level	<ol style="list-style-type: none"> 1. Identify source; 2. Inform IEC, ER, EPD and Contractor; 3. Repeat measurements to confirm findings; 4. Increase monitoring frequency; 5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented; 6. Inform IEC, ER and EPD the causes and actions taken for the exceedances; 7. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results; and 8. If exceedance stops, cease additional monitoring. 	<ol style="list-style-type: none"> 1. Discuss amongst ER, ET, and Contractor on the potential remedial actions; 2. Review Contractors remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly; and 3. Supervise the implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. Require Contractor to propose remedial measures for the analysed noise problem; 4. Ensure remedial measures properly implemented; and 5. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated. 	<ol style="list-style-type: none"> 1. Take immediate action to avoid further exceedance; 2. Submit proposals for remedial actions to IEC within 3 working days of notification; 3. Implement the agreed proposals; 4. Resubmit proposals if problem still not under control; and 5. Stop the relevant portion of works as determined by the ER until the exceedance is abated.

3.8 Mitigation Measures

3.8.1 Construction Phase

- 3.8.1.1 To alleviate the construction noise impact on the affected NSRs, adoption of quiet Powered Mechanical Equipment (PME), adoption of movable noise barriers for particular items of plant and construction works adoption of acoustic mats for Drilling Jumbo, limitation of the number of on-time operating PME within 120m of the Neighbourhood Advice-Action Council Harmony Manor during construction of access road are proposed. It is anticipated that a movable noise barrier with a cantilevered upper portion located within 5m from any static or mobile plant can provide 5 dB(A) noise reduction for mobile plant and 10 dB(A) noise reduction for static plant. The barrier material shall have a surface mass of not less than 14 kg/m² on skid footing with 25mm thick internal sound absorptive lining to achieve the maximum screening effect. The acoustic mats should have at least 10 dB(A) in noise attenuation.
- 3.8.1.2 In addition, the good site practices listed below 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.
 - 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 utilised, wherever practicable, in screening noise from on-site construction activities.
- 3.8.1.3 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.
- 3.8.1.4 The implementation schedule for the recommended mitigation measures is presented in **Appendix C**.

3.8.2 Operation Phase

- 3.8.2.1 The maximum allowable sound power levels for the chillers at the top of excavated materials, ventilation shaft and ventilation buildings at main portal and secondary portal as presented in **Table 4.17** of the EIA Report should be achieved such that the nearest NSRs can be in compliance with the noise criteria.
- 3.8.2.2 Prior to the operational phase of the Project, a commissioning test for the ventilation buildings, the ventilation shaft, ventilation fan for chiller plant room at administration building and cooling tower at the administration building would be conducted to ensure compliance with the relevant allowable maximum sound power levels.
- 3.8.2.3 The implementation schedule for the recommended mitigation measures is presented in **Appendix C**.

4 WATER QUALITY

4.1 Introduction

- 4.1.1.1 Both the existing Tai Po Sewage Treatment Works (TPSTW) and the existing STSTW are secondary treatment plants with disinfection process. Under the normal operation of the THEES, the secondarily treated and disinfected sewage effluent from STSTW, together with the secondarily treated and disinfected effluent of TPSTW, which is pumped from the Tai Po Effluent Pumping Station (TPEPS) to the Sha Tin Effluent Pumping Station (STEPS), is pumped up to THEES portal at A Kung Kok and then flow to Kai Tak Nullah (KTN) (or called Kai Tak River after completion of reconstruction and upgrading works) by gravity for discharge into Victoria Harbour. The CSTW will maintain the current arrangement in discharging effluent to KTN through the existing THEES tunnel.
- 4.1.1.2 During the construction phase, the key water quality impact identified in the EIA study would be associated with the land-based construction. Impacts may result from the surface runoff, accidental spillage, sewage from on-site construction workers and groundwater infiltration. Mitigation measures have been recommended to control the water quality impacts from the land-based construction activities. . Marine water quality monitoring is not required for the construction of the Project. It is however recommended that regular site inspections during the construction phase should be undertaken to inspect the construction activities and works areas in order to ensure the recommended mitigation measures are properly implemented.
- 4.1.1.3 On the other hand, THEES is currently in operation. Maintenance of the THEES tunnel would be conducted when necessary under the existing practice to ensure proper functioning and integrity of the tunnel. During the inspection or maintenance of the THEES tunnel, temporary suspension of the normal THEES operation with effluent bypass into the Tolo Harbour is unavoidable to provide a safe and dry zone within the THEES tunnel for the necessary inspection / maintenance works. Hence, marine water quality monitoring is recommended for the THEES maintenance events which could occur during both construction and operational phases of this Project. Moreover, there is possibility of failure of power supply, treatment units or equipment under the Project operation, therefore marine water quality monitoring is also recommended in case of any emergency discharge events during the operational phase of this Project.
- 4.1.1.4 Under normal operation of THEES, the effluent from the CSTW and TPSTW would be transported to the Victoria Harbour for discharge into the KTN. Thus, water quality monitoring is also proposed at KTN after the commissioning of this Project to verify whether there is any adverse water quality impact at KTN as compared to that before the implementation of this Project.
- 4.1.1.5 Monitoring of the treated effluent quality from the CSTW will be governed by the Water Pollution Control Ordinance (WPCO) license to ensure that the effluent quality would comply with the design standards, which is under the ambit of regional office (RO) of EPD.
- 4.1.1.6 In this section, the requirements for the monitoring and audit of water quality impacts arising from the Project are presented.

4.2 Purpose of Marine Water Quality Monitoring

- 4.2.1.1 A marine water quality monitoring programme is recommended for the THEES tunnel maintenance during both construction and operational phases of this Project to confirm the water quality impact of the THEES maintenance discharge. Marine water quality monitoring is also recommended in case of any emergency discharge events during the operational phase of this Project. The water quality data collected from the monitoring programme will be used to determine the degree of water quality impact resulted from the THEES maintenance or emergency discharge as compared to the baseline water quality condition. The monitoring programme can be discontinued after three years of post-Project

commission monitoring if there is no significant water quality impact identified from the monitoring data.

4.3 Marine Water Quality Monitoring Stations

4.3.1.1 Under THEES maintenance or emergency discharge events, effluent would be discharged into the Tolo Harbour from the existing emergency outfalls of STSTW and TPSTW as shown in **Figure No. 60334056/EM&A/4.01**.

4.3.1.2 It is recommended to set up 13 monitoring stations within the Tolo Harbour as listed in **Table 4.1** below. 12 impact stations are set up at the WSD flushing water intakes at Sha Tin (W1) and Tai Po (W2), cooling water intake at Chinese University of Hong Kong (CUHK) Marine Science Laboratory (C1), Yim Tin Tsai Fish Culture Zone (FCZ) (F1), Yim Tin Tsai (East) FCZ (F2), Yung Shue Au FCZ and Important Nursery Area for Commercial Fisheries Resources at Three Fathoms Cove (F3), Lo Fu Wat FCZ (F4), Subzone of Yim Tin Tsai FCZ (G1), corals at Tai Po Industrial Estate (CR1), Science Park (CR15), Sha Tin Hoi North (CR16) and Sha Tin Hoi South (CR17) respectively as shown in **Figure No. 60334056/EM&A/4.01** to represent the marine water sensitive receivers, which are likely affected by the Project during the THEES maintenance or emergency discharge.

4.3.1.3 Station G1 (Subzone of Yim Tin Tsai Fish Culture Zone) is also proposed as a gradient station to assist in the identification of the source of any impact at monitoring station F1. Station CR9 is far away from the Project discharge points and would unlikely be affected by the Project and will therefore serve as a control station.

4.3.1.4 The coordinates of the proposed monitoring stations are listed in **Table 4.1**.

Table 4.1 Proposed Marine Water Quality Monitoring Stations

Station	Description	Easting	Northing
W1	WSD Seawater Intake at Sha Tin	840238	830127
W2	WSD Seawater Intake at Tai Po	837753	834606
C1	Cooling Water Intake at CUHK Marine Science Laboratory	840142	831908
F1	Yim Tin Tsai Fish Culture Zone	839387	834907
F2	Yim Tin Tsai (East) Fish Culture Zone	840885	835077
F3	Yung Shue Au Fish Culture Zone / Important Nursery Area for Commercial Fisheries Resources at Three Fathoms Cove	846778	832054
F4	Lo Fu Wat Fish Culture Zone	846364	836709
CR1	Corals at Tai Po Industrial Estate	837888	834489
CR15	Corals at Science Park	839193	832710
CR16	Corals at Sha Tin Hoi North	840310	831665
CR17	Corals at Sha Tin Hoi South	840224	830692
G1	Potential Subzone of Yim Tin Tsai Fish Culture Zone / Gradient Station	840521	833311
CR9	Gruff Head Corals (Control Station)	850995	838008

4.4 Marine Water Quality Monitoring Parameters and Schedule

Depths of Measurements

4.4.1.1 Measurements shall be taken at three water depths, namely, 1 m below water surface, mid-

depth and 1 m above sea bed, except where the water depth is less than 6 m, in which case the mid-depth station may be omitted. Shall the water depth be less than 3 m, only the mid-depth station will be monitored. The status and locations of water sensitive receivers and the marine activities may change after issuing this Manual. Necessary change in the monitoring locations shall be reviewed and approved by EPD, Agriculture, Fisheries and Conservation Department (AFCD) and Water Supplies Department (WSD) before the commencement of the monitoring.

Baseline Monitoring

- 4.4.1.2 A seven-month baseline monitoring programme covering the period from June to December (outside the algae blooming season) is proposed at a frequency of twice per month to establish the baseline water quality conditions for THEES maintenance discharge at the 13 stations prior to the commencement of the Project construction works. A one-year baseline monitoring programme covering both dry and wet seasons is proposed at a frequency of twice per month to establish the baseline water quality conditions for emergency discharge at the 13 stations before commissioning of the Project. The baseline monitoring periods for the THEES maintenance and emergency discharge may be overlapped. The proposed water quality monitoring schedule should be submitted to EPD at least 4 weeks before the first day of the monitoring month. EPD should also be notified immediately for any changes in schedule. Marine water quality parameters including pH, salinity dissolved oxygen (DO), turbidity, suspended solids (SS), 5-day biochemical oxygen demand (BOD), total inorganic nitrogen (TIN), ammonia nitrogen (NH₃-N), unionized ammonia (UIA), chlorophyll-*a* and *E. coli* levels shall be monitored. Salinity, pH, DO and turbidity shall be measured *in-situ* whereas SS, BOD, TIN, NH₃-N, UIA, chlorophyll-*a* and *E. coli* shall be determined by laboratory.
- 4.4.1.3 The purpose of the baseline monitoring is to establish ambient conditions without any discharge from the Project. The baseline monitoring programme shall be suspended in the events of any THEES maintenance or emergency discharge during the monitoring period. The baseline water quality shall be established and agreed with EPD prior to the commencement of Project works.

Impact Monitoring

- 4.4.1.4 Water quality parameters including pH, salinity, DO, turbidity, SS, BOD, TIN, NH₃-N, UIA, chlorophyll-*a* and *E.coli* shall be measured under the impact monitoring programme. Salinity, pH, DO and turbidity shall be measured *in-situ* whereas SS, BOD, TIN, NH₃-N, UIA, chlorophyll-*a* and *E. coli* shall be determined by laboratory.
- 4.4.1.5 During the construction and operational phases of this Project, marine water quality at all the 13 designated stations should be monitored at a frequency of 3 times per week throughout the THEES maintenance period until the baseline water quality is restored or at least 1 months after termination of the THEES maintenance discharge (whichever is longer). During the operational phase of this Project, marine water quality at all the 13 designated stations should also be monitored daily throughout any emergency discharge period until the baseline water quality is restored or at least 2 weeks after termination of the discharge (whichever is longer). During each monitoring event, water samples shall be collected at both mid-flood and mid-ebb tides and the intervals between 2 monitoring events should not be less than 36 hours.
- 4.4.1.6 The monitoring programme for THEES maintenance and emergency discharge during the construction and commissioning phases of the Project as discussed above shall continue in the first 3 years after commissioning of this Project. After 3 years of post-Project commissioning period, a review shall be conducted by DSD to determine whether such monitoring shall be continued. The review results shall be submitted to EPD, AFCD, WSD and other relevant parties. Any amendment on the monitoring programme shall be agreed by EPD, AFCD and WSD.

4.5 Summary of Mitigation Measures and Marine Water Quality Monitoring for THEES Maintenance and Emergency Discharge

- 4.5.1.1 It is recommended that the THEES maintenance event shall be scheduled outside the period from January to May (the algae blooming season). It is also recommended that relevant government departments including EPD, WSD, AFCD and stakeholders for mariculture and fisheries shall be informed of the THEES maintenance or emergency discharge events. The DSD / Plant operators shall maintain good communications with various concerned parties. A list of address, email address, phone and fax number of key persons in various departments responsible for action shall be made available to the Plant operators. A summary of the mitigation measures and monitoring requirements for the THEES maintenance or emergency discharge is provided in **Table 4.2**.

Table 4.2 Mitigation Measures and Monitoring Requirement for THEES Maintenance / Emergency Discharge at Tolo Harbour

Event	Mitigation Measures and Monitoring Requirement
THEES Maintenance Discharge during construction and operation of this Project	<ol style="list-style-type: none"> 1. Schedule the THEES maintenance event outside algae blooming season (January – May). 2. Inform EPD, WSD, AFCD and stakeholders for mariculture and fisheries of the THEES maintenance event before any discharge. 3. Conduct marine water quality impact monitoring at a frequency of 3 times per week as proposed in Section 4.4.1.5 until the baseline water quality is restored or at least 1 months after termination of the THEES maintenance discharge (whichever is longer). 4. If considered necessary, install silt curtains / silt screens at WI and W2 during the discharge until the baseline water quality levels are restored. 5. The monitoring data collected in Item 3 above shall be compared with the baseline data collected under normal THEES operation to identify the degree of impact caused by the maintenance discharge.
Emergency Discharge during operation of this Project	<ol style="list-style-type: none"> 1. Investigate the reason of failure and determine possible remedial measures and identify the need of emergency discharge. 2. Inform EPD, WSD, AFCD and stakeholders for mariculture and fisheries of the emergency discharge. 3. Ensure remedial measures are implemented. 4. Assess the effectiveness of the implemented remedial measures and identify alternative measures if necessary. 5. Discuss with EPD, AFCD and WSD for the required remedial actions if necessary and ensure all necessary remedial actions are properly implemented. 6. Conduct marine water quality impact monitoring daily as proposed in Section 4.4.1.5 until the baseline water quality is restored or at least 2 weeks after termination of the emergency discharge (whichever is longer). 7. The monitoring data collected in Item 6 above shall be compared with the baseline data collected under normal Project operation to identify the degree of impact caused by the emergency discharge.

4.6 River Water Quality Monitoring at Kai Tak Nullah

Monitoring Stations

- 4.6.1.1 Water quality monitoring shall be conducted at six EPD's routine river water quality monitoring stations, namely KN1, KN2, KN3, KN4, KN5 and KN7 respectively, located along KTN. The coordinates of the proposed monitoring stations are listed in **Table 4.3**.

Table 4.3 Proposed Water Quality Monitoring Stations in Kai Tak Nullah

Station	Easting	Northing
KN1	838780	820432
KN2	838704	820919
KN3	838620	821008
KN4	838421	821200
KN5	838268	821342
KN7	838388	822256

Depths of Measurements

- 4.6.1.2 Measurements shall be taken at three water depths, namely, 1 m below water surface, mid-depth and 1 m above sea bed, except where the water depth is less than 6 m, in which case the mid-depth station may be omitted. Shall the water depth be less than 3 m, only the mid-depth station will be monitored. The status and locations of water sensitive receivers and the marine activities may change after issuing this Manual. Necessary change in the monitoring locations shall be reviewed and approved by EPD and WSD before the commencement of the monitoring.

Monitoring Programme

- 4.6.1.3 A three-month impact monitoring programme is proposed at a frequency of once per month after commissioning of this Project. Marine water quality parameters including pH, salinity, DO, turbidity, SS, BOD, NH₃-N, nitrate-nitrogen (NO₃-N) and *E. coli* levels shall be monitored. Salinity, pH, DO and turbidity shall be measured *in-situ* whereas SS, BOD, TIN, NH₃-N, NO₃-N, and *E. coli* shall be determined by laboratory. The water quality data collected from this monitoring programme should be compared with the EPD's long term river water quality at the same stations to verify if there is any significant water quality change as compared to that before the implementation of this Project. Daily effluent monitoring for the same parameters shall also be conducted at both TPSTW and CSTW during the water quality monitoring programme to provide necessary data to assist in identification of the potential impact. In case adverse impact on KTN is identified from this Project with reference to the effluent and water quality monitoring results, the operating conditions of the treatment and THEES system should be investigated. In case adverse impact on KTN is identified from this Project with reference to the effluent and water quality monitoring results, the operating conditions of the treatment and THEES system should be investigated, and DSD should extend the water quality monitoring programme for at least three months or as agreed by the Director of Environmental Protection.

4.7 Site Record

- 4.7.1.1 Other relevant data shall also be recorded, including monitoring location / position, time, water depth, pH value, salinity, temperature, tidal stages, weather conditions and any special phenomena or work underway nearby. A sample data record sheet is shown in **Appendix B.3** for reference.

4.8 Monitoring Equipment

4.8.1 Dissolved Oxygen and Temperature Measuring Equipment

- 4.8.1.1 The instrument shall be a portable and weatherproof DO measuring instrument complete with cable and sensor, and use a direct current (DC) power source. The equipment shall be capable of measuring:

- a DO level in the range of 0 - 20 mg L⁻¹ and 0 - 200% saturation; and

- a temperature of 0 - 45 degree Celsius.

4.8.1.2 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. For example, YSI model 59 meter, YSI 5739 probe, YSI 5795A submersible stirrer with reel and cable or an approved similar instrument.

4.8.1.3 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.

4.8.2 Turbidity Measurement Instrument

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

4.8.3 Sampler

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

4.8.4 Water Depth Detector

4.8.4.1 A portable, battery-operated echo sounder shall be used for the determination of water depth at each designated monitoring station. This unit can either be hand held or affixed to the bottom of the work boat, if the same vessel is to be used throughout the monitoring programme.

4.8.5 Salinity

4.8.5.1 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.

4.8.6 pH

4.8.6.1 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.

4.8.7 Sample Containers and Storage

4.8.7.1 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 analysed as soon as possible after collection. Sufficient volume of samples shall be collected to achieve the required detection limit.

4.8.8 Monitoring Position Equipment

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

4.8.9 Calibration of *In-Situ* Instruments

- 4.8.9.1 All *in-situ* monitoring instruments shall be checked, calibrated and certified by a laboratory accredited under HOKLAS or any other international accreditation scheme before use and subsequently re-calibrated at three monthly intervals throughout all stages of the water quality monitoring programme. Responses of sensors and electrodes shall be checked with certified standard solutions before each use. Wet bulb calibration for a DO meter shall be carried out before measurement at each monitoring location.
- 4.8.9.2 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.

4.9 Laboratory Measurement / Analysis

- 4.9.1.1 Analysis of SS, BOD, TIN⁽¹⁾, NH₃-N, NO₃-N, UIA⁽²⁾, chlorophyll-*a* and *E. coli* levels shall be carried out in a HOKLAS or other international accredited laboratory. Sufficient water samples shall be collected at the monitoring stations for carrying out the necessary laboratory analysis. The analysis shall commence within 24 hours after collection of the water samples. The analyses shall follow the standard methods described in APHA Standard Methods for the Examination of Water and Wastewater, 19th edition or other approved methods. Detailed testing methods, pre-treatment procedures, instrument use, Quality Assurance (QA) /Quality Control (QC) details (such as blank, spike recovery, number of duplicate samples per batch, etc.), detection limits and accuracy shall be submitted to EPD for approval prior to the commencement of monitoring programme. EPD may also request the laboratory to carry out analysis of known standards provided by EPD for quality assurance. Additional duplicate samples may be required by EPD for inter laboratory calibration. Remaining samples after analysis shall be kept by the laboratory for 3 months in case repeat analysis is required. If in-house or non-standard methods are proposed, details of the method verification may also be required to submit to EPD. In any circumstance, the sample testing shall have comprehensive quality assurance and quality control programmes. The laboratory shall prepare to demonstrate the programmes to EPD or his representatives when requested.

4.10 Mitigation of Adverse Environmental Impacts

- 4.10.1.1 Mitigation measures for water quality control during the construction phase have been recommended in the EIA Report. The Contractor should be responsible for the design and implementation of these measures.
- 4.10.1.2 Recommended mitigation measures to minimise the adverse impacts on water quality during the construction activities are listed in the implementation schedule given in **Appendix C**.

(1) Total Inorganic Nitrogen (TIN) = Ammonia Nitrogen (N H₃-N) + Nitrate-N (NO₃-N) + Nitrite Nitrogen (NO₂-N)
(2) The level of Unionized Ammonia (UIA) shall be calculated from the Ammonia Nitrogen (N H₃-N) level, salinity, pH and temperature using the method proposed by Bower, C. E. and Bidwell, J. P. (1978).

4.11 Construction Site Audits

4.11.1.1 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. Site audits shall include site inspections and compliance audits.

4.11.2 Site Inspections

4.11.2.1 Site inspections shall be carried out by the ET and shall be based on the mitigation measures for water pollution control recommended in Section 4.10. In the event that the recommended mitigation measures are not fully or properly implemented, deficiency shall 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.

4.11.3 Compliance Audits

4.11.3.1 Monitoring of the treated effluent quality from the Works Areas is required during the construction phase of the Project. The monitoring shall be carried out at the pre-determined discharge point. Compliance audits are to be undertaken to ensure that a valid discharge licence has been issued by EPD prior to the discharge of effluent from the Project site. The monitoring frequency and parameters specified in the discharge licence shall be fully considered during the monitoring. All monitoring requirements shall be approved by EPD. The audit results reflect whether the effluent quality is in compliance with the discharge licence requirements. In case of non-compliance, suitable actions shall be undertaken to:

- Notify the site management for the non-compliance;
- Identify the sources of pollution;
- Check the implementation status of the recommended mitigation measures;
- Investigate the operating conditions of the on-site treatment systems;
- Implement corrective and remedial actions to improve the effluent quality;
- Increase monitoring frequency until the effluent quality is in compliance with the discharge licence requirements; and
- Record the non-compliance and propose preventive measures.

5 LAND CONTAMINATION

5.1 Introduction

- 5.1.1.1 Further site walkover and/or detailed land contamination assessment will be required for sites that are inaccessible/ currently in operation/ yet to be constructed (i.e. existing STSTW, Sha Tin Vehicle Detention Centre (VDC), David Camp and proposed Ah Kung Kok Shan Road surface magazine site). The site walkover, detailed land contamination assessment and if necessary, remediation works should be carried out after decommissioning of the sites but prior to the re-development. Supplementary Contaminated Assessment Plan(s) (CAP(s)), Contamination Assessment Report(s) (CAR(s)) and if necessary, Remediation Action Plan(s) (RAP(s)) and Remediation Report(s) (RR(s)) should be submitted to EPD for agreement.

5.2 Construction Phase

- 5.2.1.1 Remediation works, if necessary, would be carried out during construction phase but prior to commencement of any construction works. Mitigation measures as recommended in the EIA Report, **Appendix C** of this Manual and future RAP(s) should be implemented during the remediation works. EM&A should be carried out in the form of regular site inspection to ensure the recommended mitigation measures are properly implemented and findings of the audit should be reported in the EM&A reports.

5.3 Operation Phase

- 5.3.1.1 As any contaminated soil / groundwater would be identified and properly treated prior to the re-development, land contamination during the operation phase is not expected. As such, environmental monitoring and audit during operation phase for land contamination is considered not necessary.

6 HAZARD TO LIFE

6.1 Introduction

- 6.1.1.1 Blasting activities regarding the storage, transport and use of explosives should be supervised and audited by the competent site staff to ensure strict compliance with the blasting permit conditions.

6.2 Mitigation and Good Practice Measures

- 6.2.1.1 The recommended mitigation measures as outlined in the Implementation Schedule included in **Appendix C** of this EM&A Manual should be implemented to meet the Technical Memorandum on EIAO-TM requirements. Those recommended mitigation measures are also summarised as below.

6.2.2 Recommendations for Meeting the As Low As is Reasonably Practicable (ALARP) Requirements

- 6.2.2.1 The following recommendations are justified to be implemented to meet the EIAO-TM requirements:

- The truck should be designed to minimise the amount of combustible in the cabin. The fuel carried in the fuel tank should also be minimised to reduce the duration of any fire;
- The accident involvement frequency of the explosives delivery truck should be minimised through implementation of several administrative measures, such as providing training programme to the driver, regular “tool box” briefing session, implementing a defensive driving attitude, selecting driver with good safety record, and providing regular medical checks for the driver;
- Avoidance of returning unused explosives to the magazine, only the required quantity of explosives for a particular blast should be transported;
- Maintain a minimum headway of 10 minutes between two consecutive truck convoys whenever practicable; and
- The fire involvement frequency should be minimised by carrying better types of fire extinguishers and with bigger capacity onboard of the explosives delivery truck. Emergency plans and trainings could also be provided to make sure that the fire extinguishers are used adequately.

6.2.3 Recommendations for Explosives Storage in Magazine

- 6.2.3.1 The magazine should be designed, built, operated and maintained in accordance with Mines Division of the Civil Engineering and Development Department (CEDD) guidelines and appropriate industry best practice. In addition, the following recommendations should be implemented:

- The security plan should address different alert security level to reduce opportunity for arson or deliberate initiation of explosives;
- Emergency plan should be developed to address uncontrolled fire in magazine area, and drill of the emergency plan should be regularly carried out;
- Suitable work control system should be set-up, such as an operational manual including Permit-to-Work system, to ensure that work activities undertaken during operation of the magazine are properly controlled;

- Good house-keeping within the magazine to ensure no combustible materials are accumulated;
- Good house-keeping outside the magazine stores to ensure no combustible materials are accumulated;
- Regular checking of the magazine store to ensure no water seepage through the roof, walls or floor;
- A speed limit within the magazine site should be enforced to reduce the risk of vehicle impact; and
- Traffic Management should be implemented within the magazine site to ensure that no more than 1 vehicle will be loaded at any time.

6.2.4 Recommendations for Explosives Transport

6.2.4.1 The following recommendations should be implemented:

- Emergency plan should be developed to address uncontrolled fire during transport. Case of fire near an explosive delivery truck in jammed traffic should be included in the plan. Activation of fuel and battery isolation switches on vehicle when fire breaks out should also be included in the emergency plan to reduce likelihood of prolonged fire leading to explosion;
- Working guideline should be developed to define procedure for explosives transport during adverse weather such as thunderstorm;
- Detonators should be transported separately from other Class 1 explosives. Separation of vehicles should also be maintained through the trip;
- Develop procedure to ensure the availability of parking space on site for the explosives delivery truck. Delivery should not be commenced if parking space on site is not secured;
- Hot work or other activities should be banned in the vicinity of the explosives offloading or charging activities;
- Lining should be provided within the transportation box on the vehicle;
- Fire screen should be used between cabin and the load on the vehicle;
- Ensure packaging of detonators remains intact until handed over at blasting site;
- Ensure that cartridged emulsion packages are not damaged before every trip;
- Use experienced driver with good safety record; and
- If small quantities of explosives is required to be disposed, it should be made in a controlled and safe manner by a Registered Shotfirer.

6.2.5 Recommendations for Explosives Use

6.2.5.1 The following recommendations should be implemented for the safe use of explosives:

- Blast Charge Weight should be within Maximum Instantaneous Charge (MIC) as specified for the given blast face;

- Temporary mitigation measures such as blast doors or heavy duty blast curtains should be installed at the portals or shafts and at suitable locations underground to prevent flyrock and control the air overpressure.
- Multiple faces blasting will be carried out for the construction of cavern in this project. Good communication and control will need to be adopted in ensuring that the works are carried out safely.
- It is not intended to carry out complete evacuation of the construction areas and secure refuge areas should be identified to workers in the areas.
- A Chief Shotfirer and a Blasting Engineer shall be employed in addition to the normal blasting personnel to ensure that the works are safe and coordinated between blasting areas.
- Shotfirer to be provided with a lightning detector, and appropriate control measures should be in place;
- Speed limit for the diesel vehicle truck and bulk emulsion truck in the access tunnels and caverns should be imposed. The truck may be escorted while underground to ensure route is clear from hazards and obstructions; and
- Hot work should be suspended during passage of the diesel vehicle truck and bulk emulsion truck in the access tunnels and caverns.
- A boulder survey should be undertaken based on the likely Peak Particle Velocity (PPV) values that would result from the blasting process. Those boulders subject to the vibration higher than the allowable limit should be strengthened, removed, or constructed with boulder fence, prior to the commencement of blasting.

7 ECOLOGICAL (TERRESTRIAL AND MARINE)

7.1 Introduction

- 7.1.1.1 As stated in the EIA, no adverse residual ecological impacts are expected from the Project upon the proper implementation of mitigation measures. Nonetheless, EM&A is needed and the requirements are described below.

7.2 Mitigation Measures

7.2.1 Avoidance

Ecologically Friendly Designs

- 7.2.1.1 The proposed access road to the ventilation shaft and temporary magazine site would cross some natural stream sections (at stream S2b) within Nui Po Shan. Construction of access roads and other temporary works will be carefully designed (e.g. elevated road for crossing streams) to avoid habitat loss and fragmentation. Design of the access road alignment would follow the topography level of the existing steep natural terrain as far as practicable to avoid potential extensive excavation works of hilly terrain and minimise slope cutting and vegetation removal. Moreover, the proposed location of the ventilation shaft at Feasibility Study stage has been relocated such that the access road alignment can be shortened.

- 7.2.1.2 The design Option 1B has been adopted in this Project. Under this Option, connection pipes to existing emergency outfall of STSTW would be constructed by trenchless method underneath Shing Mun River. There would be no disturbance to marine or riverbed sediments under the Project. This Option is also anticipated to have the least water quality impact from emergency outfall. Impacts to marine habitats would therefore be avoided and minimised. In addition, THEES connection works required for this Project will be arranged to be undertaken within the regular THEES maintenance windows. Therefore, additional water quality impact and marine ecological impact from changes of water quality have been avoided. Furthermore, the THEES maintenance discharge would avoid the blooming season of algae (i.e. January to May) to minimise the potential water quality impacts. It is recommended that any THEES maintenance period should be shortened as far as possible.

Protection of Species of Conservation Importance

- 7.2.1.3 Some species of conservation importance were recorded within the footprint of the proposed work areas. While no major adverse impact are expected on avifauna species with high mobility, direct impact to plant species of conservation importance recorded in the vicinity of the construction sites would be avoided as far as practicable during construction phase (e.g. *Cibotium barometz* within main portal area; *Canthium dicoccum* on the southern edge of the secondary portal area; *Peristylus tentaculatus* at the proposed access road). A Detailed Vegetation Survey would be conducted within the proposed works areas to identify any potentially affected plant species of conservation importance. These identified species should be labelled and fenced off on site prior to the commencement of works for better protection according to the Protection and Transplantation Plan.
- 7.2.1.4 A freshwater crab species *Cryptopotamon anacoluthon* recorded from a natural stream section (S2b) on Nui Po Shan would be potentially impacted by the construction of access road. The proposed avoidance measure by provision of elevated road would protect the freshwater crab and their habitats from direct impact.

7.2.2 Minimisation

General Minimisation Measures

7.2.2.1 To minimise habitat loss to the nearby habitats and associated wildlife, the following mitigation measures should also be implemented:-

- confining the works within the site boundary;
- controlling access of site staff to avoid damage to the vegetation in surrounding areas; and
- placement of equipment or stockpile in the existing disturbed / urbanised land within the site boundary of the Project to minimise disturbance to vegetated areas;

Reinstatement and Enhancement of Temporarily Affected Habitats

7.2.2.2 Minor ecological impacts may arise from the temporary loss of woodland, plantation, and shrubland habitats (about 2.48 ha) during construction phase. In general, replanting would be implemented upon the completion of construction works to reinstate the temporarily affected areas to condition similar to original status. For the magazine site, given the availability of a relatively flat and ample area after decommissioning, reinstatement / enhancement in form of native tree and shrub planting would be provided, where practicable. With the implementation of mitigation measure, no adverse ecological impact is anticipated from the temporary habitat loss.

Protection of Vegetation (including Flora Species of Conservation Importance)

7.2.2.3 Small area of shrubland may be affected due to installation of boulder fences and check dams proposed under the natural terrain hazard study. The location of the installation should be carefully selected and adjusted on-site to avoid/minimise tree felling as well as the damage to root system of the existing plants. Plant species of conservation importance have been identified within the footprint of construction (i.e. *Cibotium barometz* at plantation within main portal; *Canthium dicoccum* at woodland within secondary portal; and *Peristylus tentaculatus* within the footprint of the access road). A Detailed Vegetation Survey shall be conducted by a qualified botanist / ecologist with at least 10 years relevant experience to identify plant species of conservation importance in the immediate vicinity of the proposed works areas. The potentially affected individuals shall be preserved, or in the case of unavoidable loss, transplanted according to the Protection and Transplantation Plan.

Controlling Site Runoff

7.2.2.4 Stream S2 and other streams within the assessment area would be subjected to minor indirect impact due to surface runoff resulting from construction works. Fauna species of conservation importance (i.e. amphibian Lesser Spiny Frog, Hong Kong Cascade Frog, and freshwater crab *Cryptopotamon anacoluton*) were recorded within S2, which would be subjected to such indirect impacts. Surface runoff may also indirectly impact the breeding behaviour of Lesser Spiny Frog and Hong Kong Cascade Frog in S2. Appropriate mitigation measures should be implemented to control runoff from the construction site, as well as adopting guidelines and good site practices for handling and disposal of construction discharges in order to minimise the potential indirect impact on the streams. Other precautionary measures will also be implemented in accordance with *ETWB TCW No. 5/2005 Protection of natural streams/rivers from adverse impacts arising from construction works* to minimise indirect impacts to the streams, such as isolating the work site by placing sandbags and silt curtains, covering up construction materials, debris and spoil to avoid being washed into the stream, and properly collecting and treating construction effluent and sewage.

Reducing Glare / Lighting

- 7.2.2.5 The overall reduction of glare during both construction and operation phases should also be considered. A balance between lighting for safety, and avoiding excessive lighting can be achieved through the use of directional lighting to avoid light spill into sensitive areas, and control/timing of lighting periods of some facilities, particularly at the secondary portal which lies approximately 200 m northwest of Ma On Shan Country Park. During the decommissioning and demolition of the existing STSTW, the direction and lighting periods should also be controlled during ardeid breeding season (March to August), hence minimising the potential indirect impact on Penfold Park Egret and the ardeids flying over the STSTW.

Minimising Disturbance Impacts

- 7.2.2.6 Good site practice should be implemented to further minimise impacts from disturbance such as noise, air quality and water quality issues. The measures include:
- the use of quiet plant and EPD's Quality Powered Mechanical Equipment (QPME) and the availability of British Standards 5228 has been considered;
 - the use of movable noise barrier;
 - the use of temporary noise screening structures or purpose-built temporary noise barriers;
 - install site hoarding as temporary noise barrier where construction works are undertaken;
 - only well-maintained plant should be operated on site and plant should be serviced regularly during the construction programme;
 - mitigation measures stipulated in the Professional Persons Environmental Consultative Committee (ProPECC) PN 1/94 "Construction Site Drainage" should be complied to minimise water quality impact; and
 - installation of stand-by pump, emergency power supply and telemetry system to avoid sewage overflow and surcharge to sewerage system due to power/equipment failure .

Control of Groundwater Infiltration

- 7.2.2.7 Appropriate measures during the construction of the cavern construction should be implemented to minimise the groundwater infiltration. The water control strategies include:
- Probing Ahead: As a normal practice, the Contractor will undertake rigorous probing of the ground ahead of excavation works to identify zones of significant water inflow. The probe drilling results will be evaluated to determine specific grouting requirements in line with the tunnel / cavern advance. In such zones of significant water inflow that could occur as a result of discrete, permeable features, the intent would be to reduce overall inflow by means of cut-off grouting executed ahead of the tunnel / cavern advance.
 - Pre-grouting: Where water inflow quantities are excessive, pre-grouting will be required to reduce the water inflow into the tunnel / cavern. The pre-grouting will be achieved via a systematic and carefully specified protocol of grouting.
 - In principle, the grout pre-treatment would be designed on the basis of probe hole drilling ahead of the tunnel / cavern face.

- The installation of waterproof lining would also be adopted after the formation of the tunnels and caverns.

7.2.2.8 In the event of excessive infiltration being observed as a result of the tunnelling or excavation works even after incorporation of the water control strategies, post-grouting should be applied as far as practicable as described below:

- Post-grouting: Groundwater drawdown would be most likely due to inflows of water into the tunnel / cavern that have not been sufficiently controlled by the pre-grouting measures. Where this occurs post grouting will be undertaken before the lining is cast. Such a contingency should be allowed for reduction in permeability of the tunnel / cavern surround (by grouting) to limit inflow to acceptable levels.

7.2.2.9 The groundwater control measures stated above are proven technologies and have been extensively applied in other past projects. These measures or other similar methods, as approved by the Engineer to suit the works condition shall be applied to minimise the groundwater infiltration.

7.2.2.10 In case seepage of groundwater occurs, groundwater should be pumped out from works areas and discharged to the stormwater drainage system via silt trap. Uncontaminated groundwater from dewatering process should also be discharged to the stormwater drainage system via silt removal facilities.

Marine Water Quality Control Measures

7.2.2.11 Mitigation measures recommended in the water quality impact assessment for controlling water quality impact will also serve to protect marine ecological resources from indirect impacts and ensure no unacceptable impact on marine ecological resources. For more detailed mitigation measures regarding water quality refer to Section 5 of the EIA Report.

7.2.2.12 Relevant government departments including EPD, WSD and AFCD as well as key stakeholders for mariculture and fisheries in Tolo Harbour should be informed of the THEES maintenance / emergency discharge event prior to any discharge.

7.2.3 Compensation

Compensatory Planting for Unavoidable Woodland Loss

7.2.3.1 Permanent loss of woodland (about 0.65 ha) would arise from the construction works, which would include removal of woodland on Nui Po Shan. Minor to moderate ecological impacts is anticipated from the loss. To compensate for the ecological impact resulting from unavoidable loss of woodland, habitat compensation would be provided in a “no net loss” and “like for like” basis, or by providing a compensation area with equivalent or higher ecological function.

7.2.3.2 Compensatory planting with a total area of about 0.9 ha would be provided at the main and secondary portal areas, and along the access road (refer to **Table 7.1** and **Figure Nos. 60334056/EM&A/7.01a – 7.01c**). Native species are preferred for the purpose of compensatory planting, where list of species can be made reference to the native trees occurring in the existing similar habitat (refer to **Table 7.2**). At maturity, the compensatory planting areas would create a habitat with different layers (e.g. canopy, middle layer and understorey), which promotes habitat complexity and in turn enhancing the ecological value. Proposed areas for compensatory planting occur in close proximity to existing woodland habitats. As compared with fragmented planting at other urban areas, compensatory planting at the proposed area would be preferable to enhance connectivity and ecological linkage.

Table 7.1 Compensatory Planting Proposed under the Project

Locations	Area (ha)
Main Portal	0.54
Secondary Portal	0.28
Near Access Road	0.1
Total (ha)	0.92

Table 7.2 Flora Species to be Considered for Compensatory Planting

Flora Species	Growth Form
<i>Acronychia pedunculata</i>	Tree
<i>Alangium chinense</i>	Tree or shrub
<i>Aquilaria sinensis</i>	Tree
<i>Bischofia javanica</i>	Tree
<i>Bridelia tomentosa</i>	Shrub or small tree
<i>Canthium dicoccum</i>	Tree or shrub
<i>Celtis sinensis</i>	Tree
<i>Cinnamomum camphora</i>	Tree
<i>Cleistocalyx nervosum</i>	Tree
<i>Daphniphyllum calycinum</i>	Tree
<i>Elaeocarpus chinensis</i>	Tree or small tree
<i>Ficus microcarpa</i>	Tree
<i>Garcinia oblongifolia</i>	Tree
<i>Litsea glutinosa</i>	Tree
<i>Machilus pauhoi</i>	Tree
<i>Mallotus paniculatus</i>	Tree or shrub
<i>Phyllanthus emblica</i>	Tree or shrub
<i>Schefflera heptaphylla</i>	Tree
<i>Schima superba</i>	Tree
<i>Sterculia lanceolata</i>	Semi-deciduous tree
<i>Viburnum odoratissimum</i>	Shrub or small tree

- 7.2.3.3 Compensatory planting would be provided sequentially after completion of works at each works area. As such, based on the current tentative construction programme, compensatory planting would first be implemented along access road in early 2024, while compensatory planting at main portal and secondary portal would be implemented in 2027.
- 7.2.3.4 To facilitate successful planting, a detailed Woodland Compensation Plan should be prepared by local ecologists with at least 10 years relevant experience to form the basis to guide the implementation of the proposed compensatory planting. The Woodland Compensation Plan should include implementation details, management requirement, as well as monitoring requirements (e.g. frequency and parameters) of the compensatory planting area. Approval of the Plan should be obtained from EPD at least three months before the commencement of compensatory woodland planting. Upon the completion of planting, monitoring of the woodland compensation areas should be implemented, with maintenance works (e.g. irrigation, weeding, pruning, control of pests and diseases, replacement planting, repair of damage, etc.) conducted as necessary.
- 7.2.3.5 With the implementation of the proposed compensatory planting, ecological impact arising from the permanent loss of woodland habitat would be compensated.

Enhancement Measures to Promote Ecological Value

- 7.2.3.6 Other greening opportunities would be explored in the Project, including green roofs and buffer planting to be implemented at building structures. Further details of such greening opportunities are described in Section 10 of the EIA Report.

7.3 Monitoring and Audit Measures*Terrestrial Ecology*

- 7.3.1.1 Recommended mitigation measures described above (e.g. avoidance of stream and riparian habitats; control of site runoff, reduction in glare / lighting) should be monitored and audited monthly by local ecologist(s) with at least 10 years relevant experience throughout the construction phase to ensure proper implementation.
- 7.3.1.2 All flora species of conservation importance (e.g. *Cibotium barometz*, *Canthium dicoccum*, and *Peristylus tentaculatus*) should be protected as far as practicable. As a mitigation measure, all the unavoidably affected individuals should be preserved on site, or transplanted to nearby suitable habitat(s) prior to the commencement of site clearance as a last resort. A Detailed Vegetation Survey should be conducted by a suitably qualified botanist / ecologist to identify and record the affected individuals prior to the commencement of any site clearance works. A Protection and Transplantation Proposal including the subsequent monitoring visit for the affected individuals should be prepared and conducted by a suitably qualified local ecologist / horticulturist with at least 10 years relevant experience. The Proposal should be submitted for approval from EPD at least one month before works commencement.
- 7.3.1.3 Compensatory planting would be provided within the works area, including the main portal, secondary portal and along access road to compensate for the affected woodland habitat. A detailed Woodland Compensation Plan should be prepared by local ecologist / botanist with at least 10 years relevant experience to form the basis of the proposed compensatory planting. The Woodland Compensation Plan should include implementation details, management requirement, as well as monitoring requirements (e.g. frequency and parameters) of the compensatory planting area. Upon completion of compensatory planting, monitoring by local ecologist / botanist with at least 10 years relevant experience is recommended. The monitoring frequency should be monthly within the first year after planting. Parameters, such as health condition and survival rate of the plant, presence of weedy plant, should be monitored. Maintenance works (e.g. irrigation, weeding, pruning, control of pests and disease, replacement planting, repair of damage, etc.) should also be conducted as necessary. The Woodland Compensation Plan should be submitted for approval from EPD at least three months before commencement of compensatory woodland planting.
- 7.3.1.4 It is anticipated that the construction of rock caverns would not have adverse impacts on groundwater in Nui Po Shan. Nonetheless, precautionary measures should be taken in cavern design and construction to minimize the potential impacts from the change in groundwater level. Surface water level or groundwater level near the caverns will be closely monitored during the construction and operation stage.

Marine Ecology

- 7.3.1.5 As described in Section 5 of EIA Report, monitoring of water quality parameters would be required to ensure the effectiveness of the mitigation measures.
- 7.3.1.6 The potential water quality impact from the land-based construction works can be controlled by the recommended mitigation measures. Regular site inspections should be undertaken during the construction phase to inspect the construction activities and works areas in order to ensure the recommended mitigation measures are properly

implemented. Details of the EM&A programme are presented in Section 4 of this manual.

- 7.3.1.7 During normal plant / THEES operation, monitoring of the treated effluent quality from the CSTW should be carried out in accordance with WPCO license to ensure that the effluent quality would comply with the design standards, which is under the ambit of RO of EPD.
- 7.3.1.8 Marine water quality monitoring is recommended in Tolo Harbour for THEES maintenance during both construction and operational phases of this Project. Marine water quality parameters such as SS, BOD, *E.coli*, chlorophyll-a, TIN, UIA and NH₃-N should be monitored. A seven-month baseline monitoring programme covering the period from June to December (outside the algae blooming season) is proposed at a frequency of twice per month to establish the baseline water quality conditions at selected monitoring points. In case of THEES maintenance during the construction and operational phases of this Project, marine water quality in Tolo Harbour should be monitored at a frequency of 3 times per week throughout the maintenance period until the baseline water quality is restored or at least 1 month after termination of the effluent bypass (whichever is longer).
- 7.3.1.9 The monitoring programme for THEES maintenance during the construction and operational phase of this Project as discussed above shall continue in the first 3 years after commissioning of this Project. After 3 years of post-Project commission period, a review shall be conducted by DSD to determine whether such monitoring shall be continued. The review results shall be submitted to EPD, AFCD, WSD and other relevant parties. Any amendment on the monitoring programme shall be agreed by EPD, AFCD and WSD. Details of the monitoring programme and an event and action plan for the THEES maintenance are provided in Section 4 of this Manual.
- 7.3.1.10 Marine water quality monitoring is also recommended in Tolo Harbour for emergency discharge during operational phase of this Project. Marine water quality parameters such as SS, BOD, *E.coli*, chlorophyll-a, TIN, UIA and NH₃-N should be monitored. A one-year baseline monitoring programme covering both dry and wet seasons is proposed at a frequency of twice per month to establish the baseline water quality conditions at selected monitoring points. In case of emergency discharge during the operational phase of this Project, marine water quality in Tolo Harbour should be monitored daily throughout the maintenance period until the baseline water quality is restored or at least 2 weeks after termination of the discharge (whichever is longer).
- 7.3.1.11 The monitoring programme for emergency discharge during the operational phase of this Project as discussed above shall continue in the first 3 years after commissioning of this Project. After 3 years of post-Project commission period, a review shall be conducted by DSD to determine whether such monitoring shall be continued. The review results shall be submitted to EPD, AFCD, WSD and other relevant parties. Any amendment on the monitoring programme shall be agreed by EPD, AFCD and WSD. Details of the monitoring programme and an event and action plan for the emergency discharge are provided in Section 4 of this Manual.

8 FISHERIES

8.1 Introduction

- 8.1.1.1 The Project will only involve land-based construction works. There will be no disturbance to marine or riverbed sediments. Under the Project design, any Project effluent bypass to the Tolo Harbour will be discharged separately through the existing emergency outfall of the TPSTW and STSTW. Construction of the connection pipes to existing emergency outfall of STSTW by trenchless method underneath Shing Mun River was proposed. The construction method would not cause disturbance to the marine sediment. With the adoption of trenchless method, no loss of fishing ground is anticipated.
- 8.1.1.2 During the construction phase, THEES connection works required for this Project will be arranged to be undertaken within the regular THEES maintenance windows. As such, no additional water quality impact, and hence, no additional fisheries impact from changes of water quality will be induced by the proposed THEES connection works. Indirect fisheries impacts due to deterioration of water quality are expected during operation phase. Changes in water quality (e.g. SS, DO, TIN, chlorophyll-a) at Yim Tin Tsai FCZ, Lo Fu Wat FCZ and the important nursery area for commercial fisheries resources at Three Fathoms Cove are expected during operation phase (i.e. discharge of effluent to Tolo Harbour during the maintenance of THEES tunnel; and emergency discharge of primarily treated sewage from the relocated STSTW). However, no significant changes in water quality parameters are predicted. No unacceptable water quality impacts are expected. With the implementation of mitigation measures for water quality, no unacceptable fisheries impacts are expected.
- 8.1.1.3 As mentioned in the EIA report, no monitoring program specific for fisheries is required. However, monitoring of water quality parameters would be required to ensure the effectiveness of the mitigation measures (refer to Section 5 of the EIA Report).

8.2 Mitigation Measures

Avoidance

- 8.2.1.1 Potential impacts on fisheries resources and fishing operations arising from the Project have been avoided and minimised by selecting Option 1B (construction of the connection pipes to existing emergency outfall of STSTW by trenchless method underneath Shing Mun River) of emergency outfall with the least water quality impact. In addition, the temporary effluent bypass event would be arranged within the regular THEES maintenance windows. Therefore, additional water quality impact and fisheries impact from changes of water quality have been avoided. Furthermore, the THEES maintenance discharge would avoid the blooming season of algae (i.e. January to May) to minimise the potential water quality impacts. It is recommended that any any THEES maintenance period should be shortened as far as possible.

Minimisation

- 8.2.1.2 Mitigation measures recommended in the water quality impact assessment for controlling water quality impact will also serve to protect fisheries from indirect impacts and ensure no unacceptable impact on fisheries resources and operations. For more detailed mitigation measures regarding water quality refer to Sections 5.72 and 5.13.2 of the EIA Report.
- 8.2.1.3 Relevant government departments including EPD, WSD and AFCD as well as key stakeholders for mariculture and fisheries in Tolo Harbour should be informed prior to the THEES maintenance / emergency discharge events.

8.3 Monitoring and Audit Measures

- 8.3.1.1 No unacceptable residual fisheries impact is expected from the Project. No monitoring program specific for fisheries is required. However, monitoring of water quality parameters would be required to ensure the effectiveness of the mitigation measures (refer to Section 4 of this Manual).
- 8.3.1.2 The potential water quality impact from the land-based construction works can be controlled by the recommended mitigation measures. Regular site inspections should be undertaken during the construction phase to inspect the construction activities and works areas in order to ensure the recommended mitigation measures are properly implemented. Details of the EM&A programme are presented in Section 4 of this Manual.
- 8.3.1.3 During normal plant / THEES operation, monitoring of the treated effluent quality from the CSTW should be carried out in accordance with the WPCO license to ensure that the effluent quality would comply with the design standards, which is under the ambit of RO of EPD.
- 8.3.1.4 Marine water quality monitoring is recommended in Tolo Harbour for THEES maintenance during both construction and operational phases of this Project. Marine water quality parameters such as SS, BOD, *E.coli*, chlorophyll-a, TIN, UIA and NH₃-N should be monitored. A seven-month baseline monitoring programme covering the period from June to December (outside the algae blooming season) is proposed at a frequency of twice per month to establish the baseline water quality conditions at selected monitoring points. In case of THEES maintenance during the construction and operational phases of this Project, marine water quality in Tolo Harbour should be monitored at a frequency of 3 times per week throughout the maintenance period until the baseline water quality is restored or at least 1 month after termination of the effluent bypass (whichever is longer).
- 8.3.1.5 The monitoring programme for THEES maintenance during the construction and operational phase of this Project as discussed above shall continue in the first 3 years after commissioning of this Project. After 3 years of post-Project commission period, a review shall be conducted by DSD to determine whether such monitoring shall be continued. The review results shall be submitted to EPD, AFCD, WSD and other relevant parties. Any amendment on the monitoring programme shall be agreed by EPD, AFCD and WSD. Details of the monitoring programme and an event and action plan for the THEES maintenance are provided in Section 4 of this Manual.
- 8.3.1.6 Marine water quality monitoring is also recommended in Tolo Harbour for emergency discharge during operational phase of this Project. Marine water quality parameters such as SS, BOD, *E.coli*, chlorophyll-a, TIN, UIA and NH₃-N should be monitored. A one-year baseline monitoring programme covering both dry and wet seasons is proposed at a frequency of twice per month to establish the baseline water quality conditions at selected monitoring points. In case of emergency discharge during the operational phase of this Project, marine water quality in Tolo Harbour should be monitored daily throughout the maintenance period until the baseline water quality is restored or at least 2 weeks after termination of the discharge (whichever is longer).
- 8.3.1.7 The monitoring programme for emergency discharge during the operational phase of this Project as discussed above shall continue in the first 3 years after commissioning of this Project. After 3 years of post-Project commission period, a review shall be conducted by DSD to determine whether such monitoring shall be continued. The review results shall be submitted to EPD, AFCD, WSD and other relevant parties. Any amendment on the monitoring programme shall be agreed by EPD, AFCD and WSD. Details of the monitoring programme and an event and action plan for the emergency discharge are provided in Section 4 of this Manual.

9 LANDSCAPE AND VISUAL IMPACT

9.1 Introduction

- 9.1.1.1 The EIA has recommended landscape and visual mitigation measures to be undertaken during both the construction and operational phases of the Project. The design, implementation and maintenance of landscape mitigation measures should be checked to ensure that any potential conflicts between the proposed landscape measures and any other works of the Project would be resolved as early as practicable without affecting the implementation of the mitigation measures.

9.2 Mitigation Measures

- 9.2.1.1 The proposed mitigation measures of landscape and visual impacts are summarised in **Appendix C**. The landscape and visual mitigation measures proposed should be incorporated in the detailed landscape and engineering design. The construction phase mitigation measures should be adopted from the commencement of construction and should be in place throughout the entire construction period. Mitigation measures for the operational phase should be adopted during the detailed design and be built as part of the construction works so that they are in place on commissioning of the Project.
- 9.2.1.2 Any potential conflicts among the proposed mitigation measures, the Project works, and operational requirements should also be identified and resolved at early stage. Any changes to the mitigation measures should be incorporated in the detailed design.

9.3 Baseline Monitoring

- 9.3.1.1 Baseline monitoring to check, record and report the status of the Landscape Resources and Character Areas within the construction works sites and works areas and the Visually Sensitive Receivers (VSRs) within the visual envelope shall be conducted prior to commencement of any construction works making reference to the Landscape Resources, Landscape Character Area and VSRs maps included in the EIA Report.
- 9.3.1.2 Any significant changes to the status of Landscape Resources, Character Areas and VSRs since the EIA shall be identified. The recommended landscape and visual mitigation measures shall be reviewed if such change warrants a change in the design of the landscape and visual mitigation measures.
- 9.3.1.3 A baseline monitoring report including photographic record of the site at the time of the Contractor's possession of the site shall be prepared by the Contractor and approved by the ER. The approved baseline monitoring report including photographic record shall be submitted to the Project Proponent, ET, IEC and EPD for record.

9.4 Audit Requirement

- 9.4.1.1 Site audits should be undertaken during the construction phase of the Project to check that the proposed landscape and visual mitigation measures are properly implemented and maintained as per their intended objectives. Site inspections should be undertaken by the ET at least once every two weeks during the construction period.
- 9.4.1.2 In the event of non-compliance, the responsibilities of the relevant parties are detailed in the Event/Action plan provided in **Table 9.1**.

Table 9.1 Event / Action Plan for Landscape and Visual during Construction Stage

Action Level	ET	IEC	ER	Contractor
Non-conformity on one occasion	<ol style="list-style-type: none"> 1. Inform the Contractor, the IEC and the ER; 2. Discuss remedial actions with the IEC, the ER and the Contractor; and 3. Monitor the remedial actions until rectification has been completed. 	<ol style="list-style-type: none"> 1. Check the inspection report; 2. Check the Contractor's working method; 3. Discuss with the ET, ER and the Contractor on possible remedial measures; and 4. Advise the ER on effectiveness of proposed remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of non-conformity in writing; 2. Review and agree on the remedial measures proposed by the Contractor; and 3. Supervise implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Identify Source and investigate the non-conformity; 2. Implement remedial measures; 3. Amend working methods agreed with the ER as appropriate; and 4. Rectify damage and undertake any necessary replacement.
Repeated Non-conformity	<ol style="list-style-type: none"> 1. Identify source; 2. Inform the Contractor, the IEC and the ER; 3. Increase inspection frequency; 4. Discuss remedial actions with the IEC, the ER and the Contractor; 5. Monitor remedial actions until rectification has been completed; and 6. If non-conformity stops, cease additional monitoring. 	<ol style="list-style-type: none"> 1. Check inspection report; 2. Check the Contractor's working method; 3. Discuss with the ET and the Contractor on possible remedial measures; and 4. Advise the ER on effectiveness of proposed remedial measures. 	<ol style="list-style-type: none"> 1. Notify the Contractor; 2. In consultation with the ET and IEC, agree with the Contractor on the remedial measures to be implemented; and 3. Supervise implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Identify Source and investigate the non-conformity; 2. Implement remedial measures; 3. Amend working methods agreed with the ER as appropriate; and 4. Rectify damage and undertake any necessary replacement. Stop relevant portion of works as determined by the ER until the non-conformity is abated.

Note:

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

10 CULTURAL HERITAGE

10.1 Introduction

- 10.1.1.1 No terrestrial and marine archaeological potential is identified within the study area, and therefore it is considered that there is no impact on archaeology and mitigation measure is not required.
- 10.1.1.2 Two built heritage resources in Tai Shui Hang (both are Grade 3 historic buildings) as well as the Pak Kong-Mui Tsz Lam Trackway (Site of Archaeological Interest) are identified outside the 50m study area from the site boundary of Project. Thus, no potential direct or indirect impact to these cultural heritage resources is anticipated. Hence no mitigation measures are required.

11 WASTE MANAGEMENT IMPLICATION

11.1 Introduction

- 11.1.1.1 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.
- 11.1.1.2 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. A waste management plan (WMP) should be prepared in accordance with ETWB TCW No. 19/2005 and submitted to the Engineer for approval. The monitoring and auditing requirements of the WMP as detailed in ETWB TCW No. 19/2005 should be followed with regard to the management of C&D material.
- 11.1.1.3 Large quantities of wastes are not expected from the operation of the Project and no adverse environmental impacts would arise with the implementation of good waste management practices. Therefore, an audit programme for the operational phase will not be required.

11.2 Mitigation Measures

- 11.2.1.1 Recommended mitigation measures for waste management are summarised below, whereas the implementation schedule is detailed in **Appendix C**. With the appropriate handling, storage and removal of waste arisings during the construction works as defined below, the potential to cause adverse environmental impacts would be minimised. During the site inspections, the ET shall pay special attention to the issues relating to waste management and check whether the Contractor has implemented the recommended good site practices and other mitigation measures.

11.2.2 Good Site Practices

- 11.2.2.1 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 person, such as a site manager, to be responsible for good site practices, arrangements for collection and effective disposal to an appropriate facility, of all wastes generated at the site;
 - Training of site personnel in proper waste management and chemical handling procedures;
 - Provision of sufficient waste reception/ disposal points, of a suitable vermin-proof design that minimises windblown litter;
 - Arrangement for regular collection of waste for transport off-site and final 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;
- A recording system for the amount of wastes generated, recycled and disposed (including the disposal sites) should be proposed; and
- A WMP should be prepared and should be submitted to the Engineer for approval. One may make reference to ETWB TCW No. 19/2005 for details.

11.2.3 Waste Reduction Measures

11.2.3.1 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 construction related waste in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal;
- Provide separate labelled bins to segregate recyclable waste such as aluminium cans from other general refuse generated by the work force, and to encourage collection by individual collectors;
- Any unused chemicals or those with remaining functional capacity shall be recycled;
- Maximising the use of reusable steel formwork to reduce the amount of C&D material;
- Prior to disposal of C&D waste, it is recommended that wood, steel and other metals shall be separated for re-use and / or recycling to minimise the quantity of waste to be disposed of to landfill;
- On-site crushing and sorting facilities are being considered to reduce the rock size to fulfill the size requirements from relevant waste collection / transfer / disposal facilities;
- Adopt proper storage and site practices to minimise the potential for damage to, or contamination of, construction materials;
- Plan the delivery and stock of construction materials carefully to minimise the amount of waste generated;
- Adopt pre-cast construction method instead of cast-in-situ method for construction of concrete structures as much as possible; and
- Minimise over ordering of concrete, mortars and cement grout by doing careful check before ordering.

11.2.3.2 In addition to the above measures, specific mitigation measures are recommended below for the identified waste arising to minimise environmental impacts during handling, transportation and disposal of these wastes.

11.2.4 Storage, Collection and Transportation of Waste

11.2.4.1 Storage of materials on site may induce adverse environmental impacts if not properly managed, recommendations to minimise the impacts include:

- Waste, such as soil, should be handled and stored well to ensure secure containment, thus minimising the potential of pollution;

- Maintain and clean storage areas routinely;
- 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.

11.2.4.2 Licensed waste haulers should be employed for the collection and transportation of waste generated. The following measures should be enforced to minimise the potential adverse impacts:

- Remove waste in timely manner;
- Waste collectors should only collect wastes prescribed by their permits;
- Impacts during transportation, such as dust and odour, should be mitigated by the use of covered trucks or in enclosed containers;
- Obtain relevant waste disposal permits from the appropriate authorities, in accordance with the Waste Disposal Ordinance (Cap. 354), Waste Disposal (Charges for Disposal of Construction Waste) Regulation (Cap. 345) and the Land (Miscellaneous Provisions) Ordinance (Cap. 28);
- Waste should be disposed of at licensed waste disposal facilities; and
- Maintain records of quantities of waste generated, recycled and disposed.

11.2.4.3 Land transport will be used for transportation of excavated and stockpile materials. It is anticipated that there is no adverse impact from the waste during transportation with the implementation of appropriated measures (e.g. using water-tight containers and covered trucks).

11.2.4.4 In order to monitor the disposal of C&D materials at Public Fill Reception Facilities (PFRF) and landfills and to control fly-tipping, a trip-ticket system should be established in accordance with DEVB TC(W) No. 6/2010. A recording system for the amount of waste generated, recycled and disposed, including the disposal sites, should also be set up. Warning signs should be put up and close-circuited television should be installed at the vehicular accesses to remind the designated disposal sites and prevent fly-tipping.

11.2.4.5 In addition to the above general measures, other specific mitigation measures on handling the C&D materials and materials generated from site formation and demolition work are recommended below, which should form the basis of the WMP to be prepared by the Contractor in construction phase.

11.2.5 Construction and Demolition Material

11.2.5.1 In order to minimise the impact resulting from collection and transportation of C&D materials for off-site disposal, the excavated material arising from site formation and foundation works should be reused on-site as backfilling material and for landscaping works as far as practicable. Other mitigation requirements are listed below:

- A WMP, which becomes part of the Environmental Management Plan (EMP), should be prepared in accordance with ETWB TCW No.19/2005;
- A recording system for the amount of wastes generated, recycled and disposed (including the disposal sites) should be adopted for easy tracking; and

- In order to monitor the disposal of C&D materials at public filling facilities and landfills and to control fly-tipping, a trip-ticket system should be adopted (refer to DEVB TCW No. 6/2010).

11.2.5.2 It is recommended that specific areas should be provided by the Contractor for sorting and to provide temporary storage areas (if required) for the sorted materials.

11.2.5.3 The Contractor should prepare and implement an EMP in accordance with ETWB TCW No.19/2005, which describes the arrangements for avoidance, reuse, recovery, recycling, storage, collection, treatment and disposal of different categories of waste to be generated from construction activities. Such a management plan should incorporate site specific factors, such as the designation of areas for segregation and temporary storage of reusable and recyclable materials. The EMP should be submitted to the Engineer for approval. The Contractor should implement waste management practices in the EMP throughout the construction stage of the Project. The EMP should be reviewed regularly and updated by the Contractor, preferably on a monthly basis.

11.2.5.4 All surplus C&D materials arising from or in connection with construction works should become the property of the Contractor when it is removed unless otherwise stated. The Contractor would be responsible for devising a system to work for on-site sorting of C&D materials and promptly removing all sorted and process materials arising from the construction activities to minimise temporary stockpiling on-site. The system should be included in the EMP identifying the source of generation, estimated quantity, arrangement for on-site sorting, collection, temporary storage areas and frequency of collection by recycling Contractors or frequency of removal off-site.

11.2.6 Sludge

11.2.6.1 Through relocation of the STSTW to caverns, the odour issue is expected to be largely reduced. Nevertheless, the practices of good housekeeping for the relocated STSTW listed below should be followed to further ameliorate any odour impact from handling, collection, transportation and disposal of sludge:

- Screens should be cleaned regularly to remove any accumulated organic debris;
- Grit and screening transfer systems should be flushed regularly with water to remove organic debris and grit;
- Grit and screened materials should be transferred to closed containers;
- Scum and grease collection wells and troughs should be emptied and flushed regularly to prevent putrefaction of accumulated organics;
- Skim and remove floating solids and grease from primary clarifiers regularly;
- Frequent sludge withdrawal from tanks is necessary to prevent the production of gases ;
- Sludge should be transported to the Sludge Treatment Facilities (STF) by water-tight containers to avoid H₂S/odour emission and ingress of water into the containers which would lower the sludge dryness during transportation;
- Sludge cake should be transferred to closed containers; and
- Sludge containers should be flushed with water regularly; and
- Sludge trucks and containers should be washed thoroughly before leaving the STSTW to avoid any odour nuisance during transportation.

- 11.2.6.2 In addition, all wastewater generated from the sludge dewatering process and all contaminated water from the cleaning operations recommended for odour control will be diverted to the relocated STSTW for proper treatment.

11.2.7 Chemical Wastes

- 11.2.7.1 If chemical wastes are produced at the construction site or during operation, the Contractor during construction or the operator during operation will be required to register with the EPD as a Chemical Waste Producer and to follow the guidelines stated in the *Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes*. Good quality containers compatible with the chemical wastes should be used, and incompatible chemicals should be stored separately. Appropriate labels should be securely attached on each chemical waste container indicating the corresponding chemical characteristics of the chemical waste, such as explosive, flammable, oxidising, irritant, toxic, harmful, corrosive, etc. The Contractor shall use a licensed collector to transport and dispose of the chemical wastes, to either the Chemical Waste Treatment Centre at Tsing Yi, or other licensed facility, in accordance with the Waste Disposal (Chemical Waste) (General) Regulation.

11.2.8 General Refuse

- 11.2.8.1 Recycling of waste paper, aluminium cans and plastic bottles should be encouraged, it is recommended to place clearly labelled recycling bins at designated locations which could be accessed conveniently. Other general refuse should be separated from chemical and industrial waste by providing separated bins for storage to maximise the recyclable volume.
- 11.2.8.2 A reputable licensed waste collector should be employed to remove general refuse on a daily basis to minimise odour, pest and litter impacts.

11.3 Audit Requirement

- 11.3.1.1 Regular audits and site inspections should be carried out during construction phases by the ER, ET and Contractor to ensure that the recommended good site practices and the recommended mitigation measures in **Appendix C** are properly implemented by the Contractor. The audits should concern all aspects of on-site waste management practices including waste generation, storage, recycling, transport and disposal. Apart from site inspection, documents including licences, permits, disposal and recycling records should be reviewed and audited for compliance with the legislation and contract requirements.
- 11.3.1.2 The requirements of the environmental audit programme are set out in Section 13 of this Manual. The audit programme will verify the implementation status and evaluate the effectiveness of the mitigation measures.

12 SITE ENVIRONMENTAL AUDIT

12.1 Site Inspections

- 12.1.1.1 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.
- 12.1.1.2 The ET Leader shall be responsible for formulating the environmental site inspection, 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.
- 12.1.1.3 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; and
 - previous site inspection results undertaken by the ET and others.
- 12.1.1.4 The Contractor shall keep the 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 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.
- 12.1.1.5 The ET 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 Action Plan for EM&A.

12.2 Compliance with Legal and Contractual Requirements

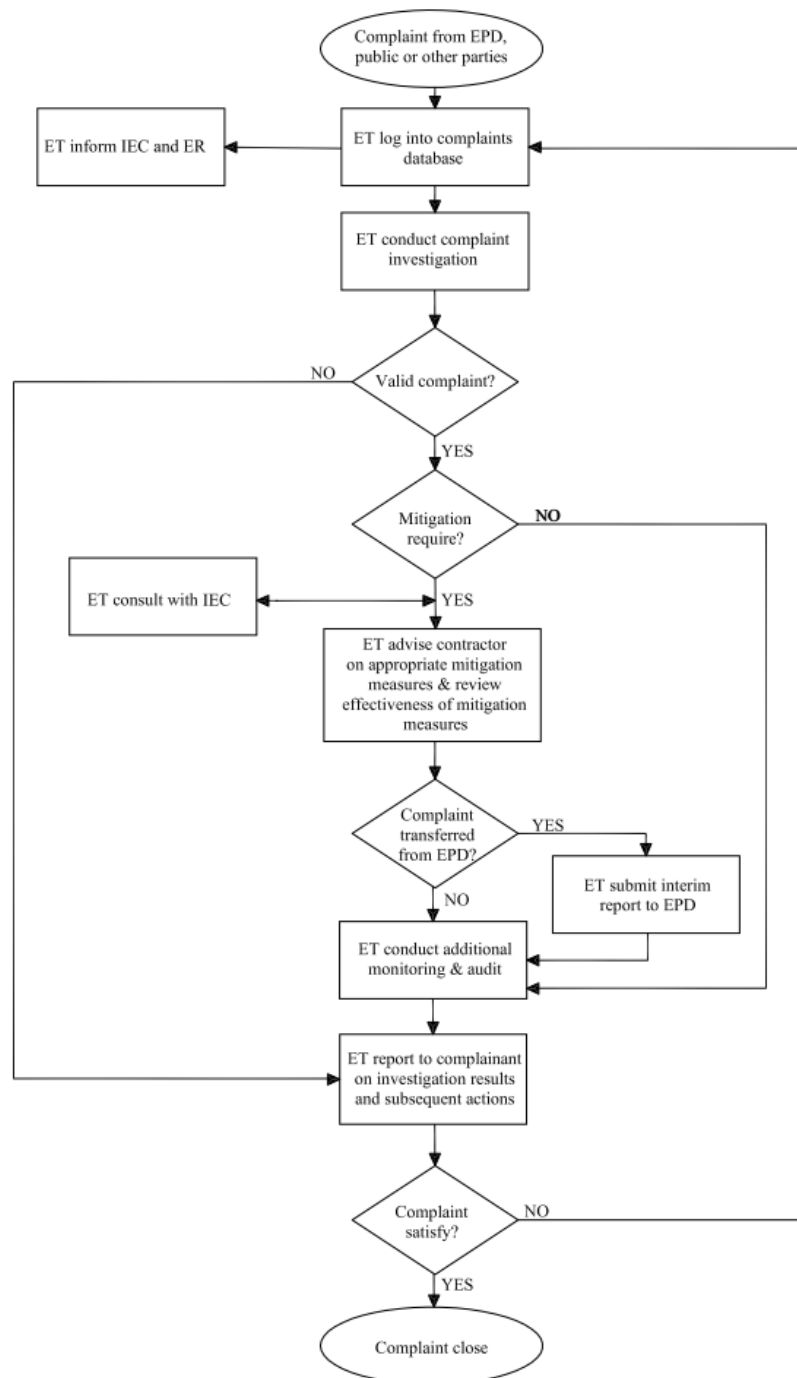
- 12.2.1.1 There are contractual environmental protection and pollution control requirements as well as environmental protection and pollution control laws in Hong Kong with which construction activities must comply.
- 12.2.1.2 In order that the works are in compliance with the contractual requirements, 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. The implementation schedule of mitigation measures is summarised in **Appendix C**.
- 12.2.1.3 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.
- 12.2.1.4 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.
- 12.2.1.5 After reviewing the documentation, the ET Leader shall advise 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 accordingly.
- 12.2.1.6 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.

12.3 Environmental Complaints

- 12.3.1.1 Complaints shall be referred to the ET Leader for action. The ET Leader shall undertake the following procedures upon receipt of any 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 the EPD, submit interim report to the EPD on status of the complaint investigation and follow-up action within the time frame assigned by the 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); and
- ix. record the complaint, investigation, the subsequent actions and the results in the monthly EM&A reports.

A flow chart of the complaint response procedure is shown below:



13 REPORTING

13.1 General

- 13.1.1.1 Reports can be provided in an electronic medium upon agreeing the format with the ER and EPD. This would enable a transition from a paper / historic and reactive approach to an electronic / real time proactive approach. All the monitoring data (baseline and impact) shall also be submitted in electronic format. The formats for air quality, noise, water quality and landfill gas monitoring data to be submitted are shown in **Appendix B**.
- 13.1.1.2 Types of reports that the ET Leader shall submit include baseline monitoring report, monthly EM&A report, quarterly EM&A summary report and final EM&A review report. 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.

13.2 Electronic Reporting of EM&A Information

- 13.2.1.1 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.

13.3 Baseline Monitoring Report

- 13.3.1.1 Baseline Environmental Monitoring Report(s) shall be prepared within 10 working days of completion of the baseline monitoring and then certified by the ET Leader. Copies of the Baseline Environmental Monitoring Report shall be submitted to the Contractor, the IEC, the ER and the 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 the EPD prior to submission.
- 13.3.1.2 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
 - QA / 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 (A/L 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.

13.4 Monthly EM&A Reports

- 13.4.1.1 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 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.
- 13.4.1.2 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.

First Monthly EM&A Report

- 13.4.1.3 The first monthly EM&A report shall include at least but not be limited to the following:
- i. executive summary (1-2 pages):
- breaches of AL 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 dredging/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 (AL 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
- QA / 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 (AL levels);
 - record of all complaints received (written or verbal) for each media, including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
 - record of all 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.

Subsequent monthly EM&A Reports

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

- i. executive summary (1 - 2 pages):
 - breaches of AL 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, as recommended in the Final EIA report, 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;
 - o the major activities being carried out on site during the period;
 - o weather conditions that may affect the results; and
 - o any other factors which might affect the monitoring results.
 - any other factors which might affect the monitoring results; and
 - QA / 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 (AL levels);
 - record of all complaints received (written or verbal) for each media, including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;

- record of all 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 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.
- vii. appendix
- AL levels;
 - graphical plots of trends of monitored parameters at key stations over the past four reporting periods for representative monitoring stations annotated against the following:
 - o major activities being carried out on site during the period;
 - o weather conditions during the period; and
 - o 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

13.5 Quarterly EM&A Summary Reports

- 13.5.1.1 A quarterly EM&A summary report of around five pages shall be produced by the ET Leader 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. Each quarterly EM&A report shall be submitted to the following parties: the IEC, the ER and EPD.

- i. executive summary (1 - 2 pages);
- 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 (AL levels); and
 - environmental mitigation measures, as recommended in the Final EIA report.
- iv. 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;
- 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 (AL 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.

13.6 Final EM&A Review Reports

- 13.6.1.1 The EM&A program shall be terminated upon completion of those construction activities that have the potential to result in a significant environmental impact.
- 13.6.1.2 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 Engineer and the Project proponent followed by final approval from the Director of Environmental Protection.
- 13.6.1.3 The final EM&A report should be prepared by the ET Leader and contain at least the following information. The Final EM&A Review report shall be submitted to the following parties: the IEC, the ER and EPD.
- i. executive summary (1 - 2 pages);
 - 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 (AL levels); and
 - environmental mitigation measures, as recommended in the Final EIA report.
 - iv. 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 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, including the post-project monitoring 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 (AL 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. present the water quality monitoring data as obtained in the three-month impact monitoring programme at KTN after commissioning of this Project, elaborate comparison of these data with the EPD's long term river water quality at the same stations to verify if there is any significant water quality change, summarize the result of the impact monitoring programme, and provide clear-cut advice on whether adverse impact on Kai Tak Nullah is identified;
- xvii. 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
- xviii. a conclusion to state the return of ambient and / or the predicted scenario as per EIA findings.

13.7 Data Keeping

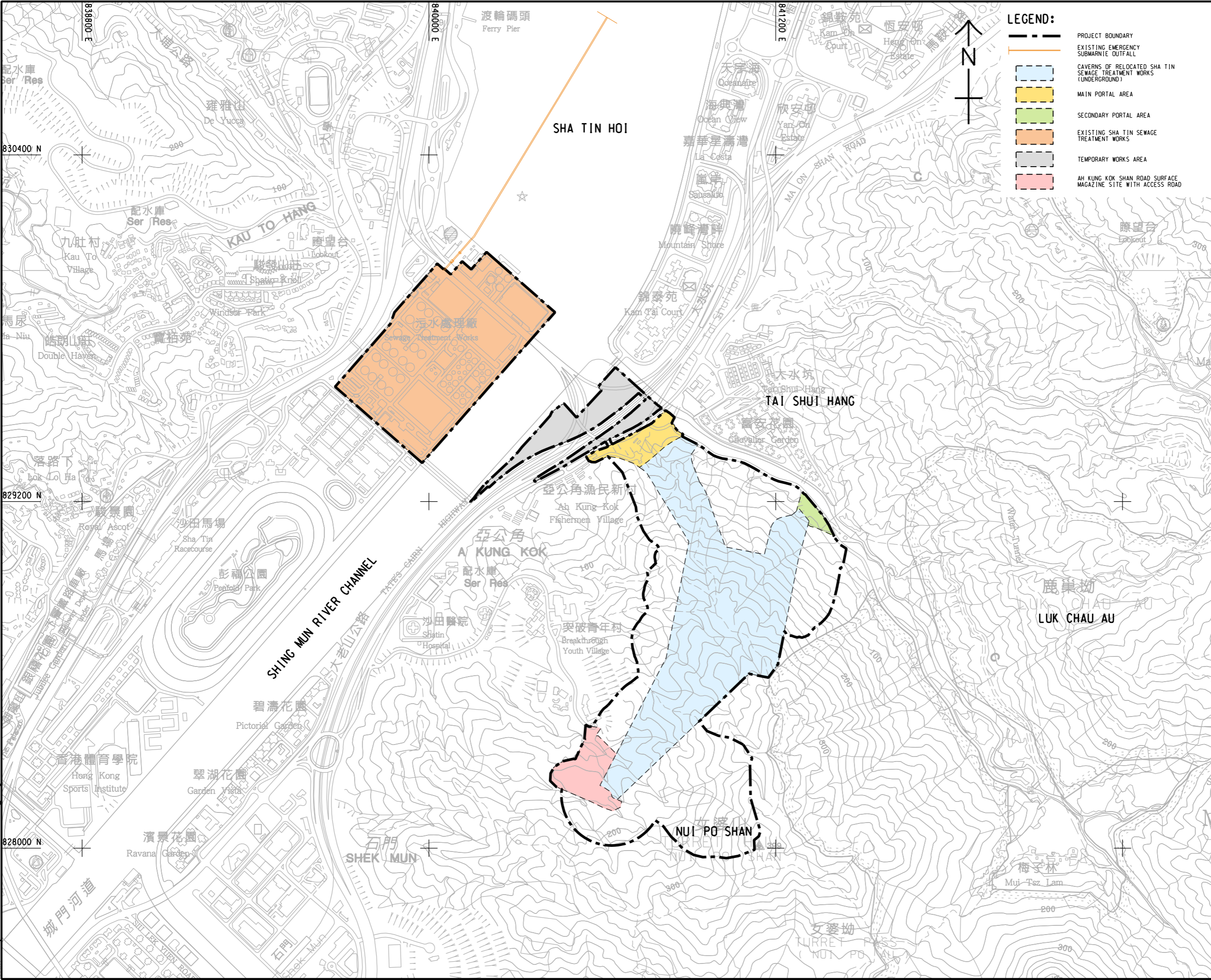
- 13.7.1.1 No site-based documents (such as monitoring field records, laboratory analysis records, site inspection forms, etc.) are required to be included in the monthly EM&A reports. However, any such document shall be well kept by the ET Leader and be ready for inspection upon request. All relevant 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 the EPD. All documents and data shall be kept for at least one year following completion of the construction contract.

13.8 Interim Notifications of Environmental Quality Limit Exceedances

- 13.8.1.1 With reference to the Event and Action Plan, when the environmental quality performance limits are exceeded, the ET Leader shall immediately notify the IEC and EPD, as appropriate. The notification shall be followed up with advice to IEC and EPD on the results of the investigation, proposed actions and success of the actions taken, with any necessary follow-up proposals. A sample template for the interim notifications is presented in **Appendix D**.

Figures

ISO A1 594mm x 841mm
Approved:
Checked:
Designer:
Project Management Initials:
Pld File by: PENGW 2016/02/24
PATH P:\p\6334056\3\DRAWING\REPORT\EM&A\EM&A_711.dgn



LEGEND:

- PROJECT BOUNDARY
- EXISTING EMERGENCY SUBMARINE OUTFALL
- CAVERNS OF RELOCATED SHA TIN SEWAGE TREATMENT WORKS (UNDERGROUND)
- MAIN PORTAL AREA
- SECONDARY PORTAL AREA
- EXISTING SHA TIN SEWAGE TREATMENT WORKS
- TEMPORARY WORKS AREA
- AH KUNG KOK SHAN ROAD SURFACE MAGAZINE SITE WITH ACCESS ROAD

AECOM

PROJECT
項目

RELOCATION OF SHA TIN SEWAGE TREATMENT WORKS TO CAVERNS: CAVERNS AND SEWAGE TREATMENT WORKS - INVESTIGATION, DESIGN AND CONSTRUCTION

CLIENT
業主

渠務署
Drainage Services Department

CONSULTANT
工程顧問公司

AECOM Asia Company Ltd.
www.aecom.com

SUB-CONSULTANTS
分判工程顧問公司

ISSUE/REVISION
發行

NO.	DATE	DESCRIPTION	CHK.

STATUS
階段

SCALE
比例

DIMENSION UNIT
尺寸單位

A3 1: 12000 METRES

KEY PLAN A3 1: 500000

PROJECT NO.
項目編號

CONTRACT NO.
合約編號

60334056 CE 30/2014 (DS)

SHEET TITLE
圖紙名稱

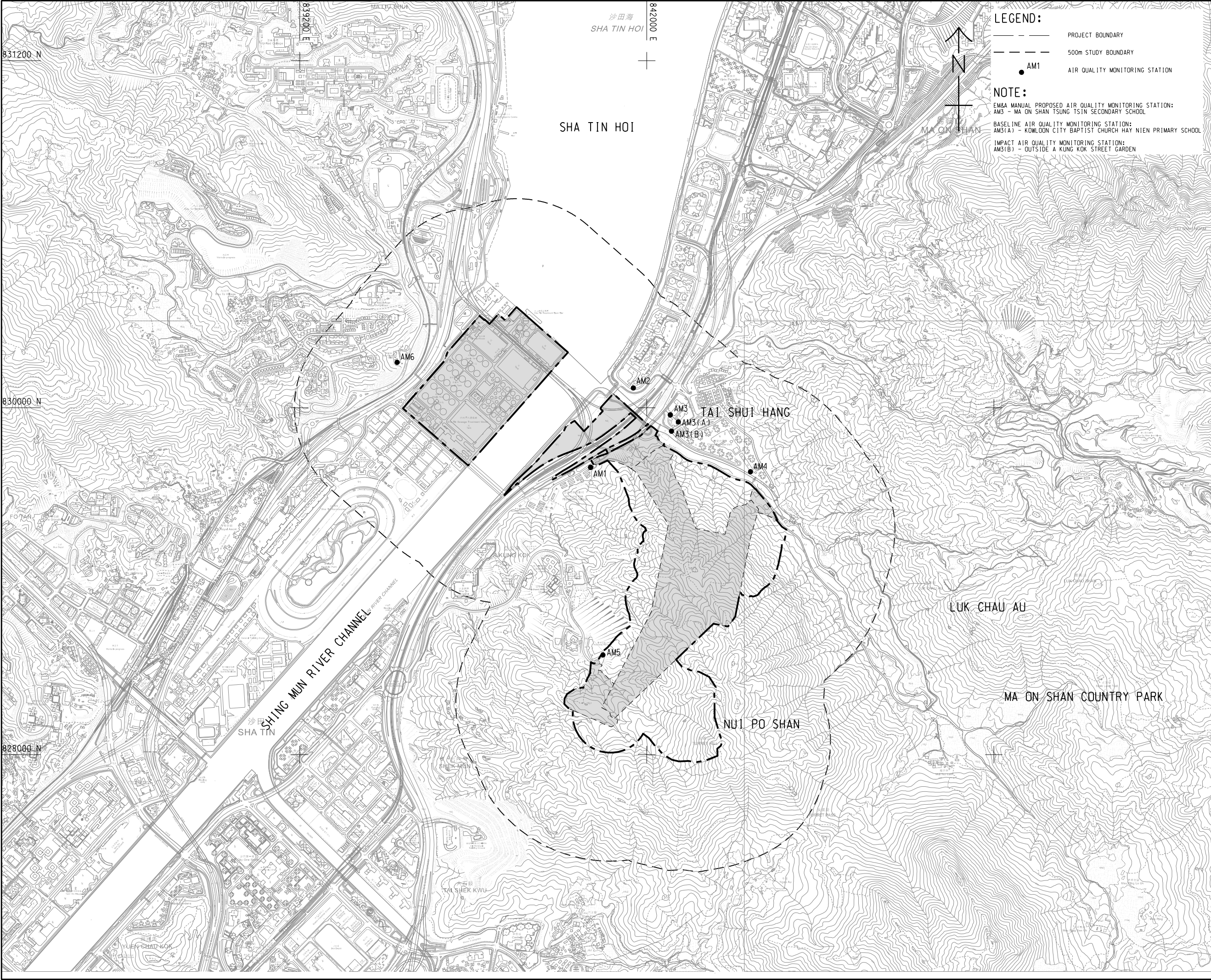
LOCATION PLAN OF THE PROJECT

SHEET NUMBER
圖紙編號

60334056/EM&A/1.01

This drawing has been prepared for the use of AECOM's client. It may not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent. Do not scale this document. All measurements must be obtained from the related dimensions.

This drawing was prepared for the use of AECOM's client. It may not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent. All measurements must be obtained from the stated dimensions.



PROJECT

RELOCATION OF SHA TIN
SEWAGE TREATMENT
WORKS TO CAVERNS:
CAVERNS AND SEWAGE
TREATMENT WORKS -
INVESTIGATION, DESIGN
AND CONSTRUCTION

CLIENT



CONSULTANT

AECOM Asia Company Ltd.
www.aecom.com

SUB-CONSULTANTS

ISSUE/REVISION

A	17/11/20	GENERAL REVISION	WY
I/R	DATE	DESCRIPTION	CHK.

STATUS

SCALE

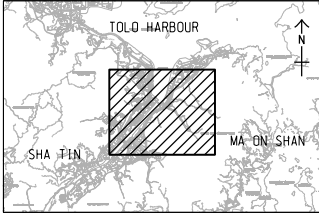
A3 1: 16000

DIMENSION UNIT

METRES

KEY PLAN

A3 1: 400000



PROJECT NO.

60334056

CONTRACT NO.

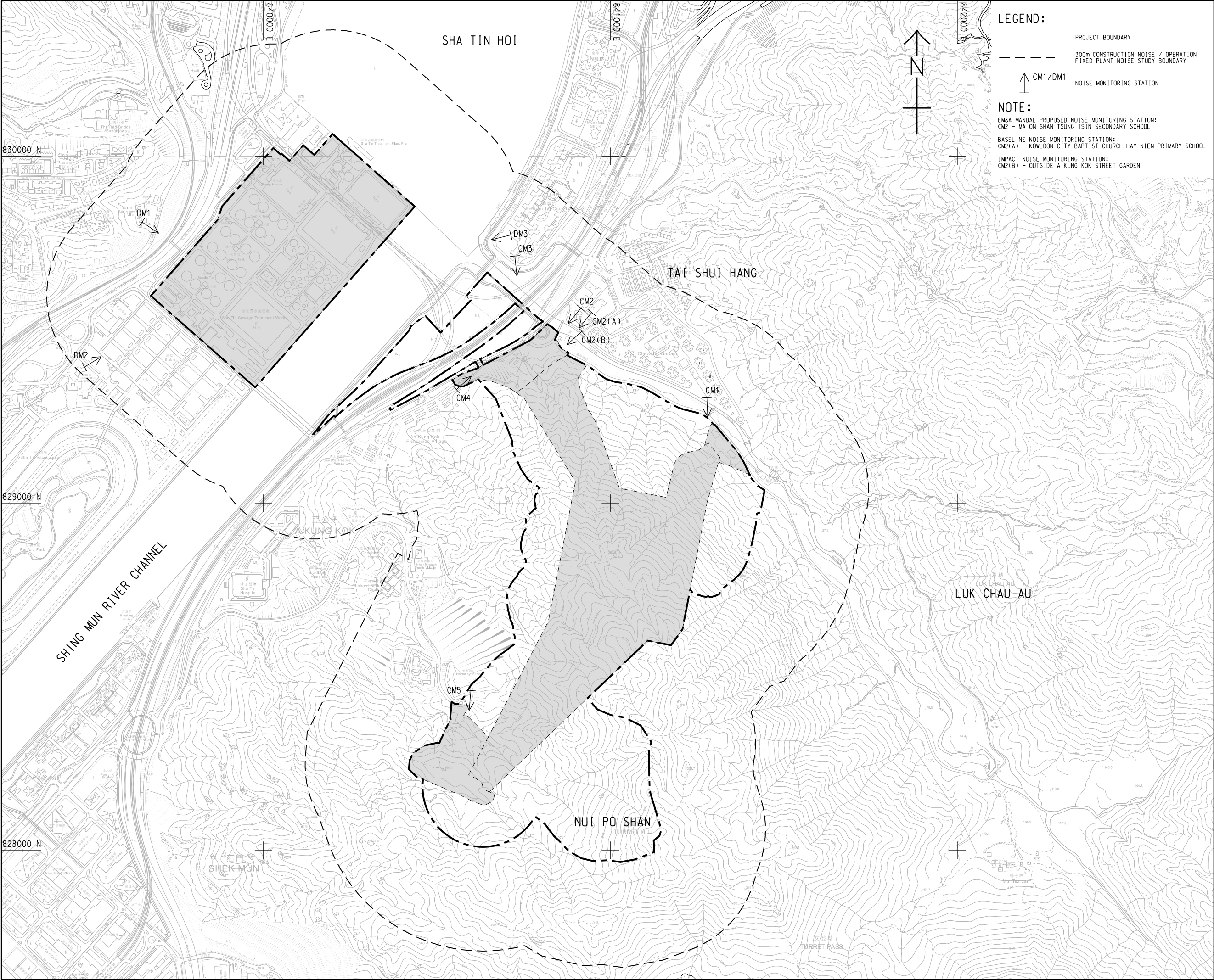
CE 30/2014 (DS)

SHEET TITLE

LOCATION OF AIR QUALITY
MONITORING STATION DURING
CONSTRUCTION PHASE

SHEET NUMBER

60334056/EM&A/2.01A



LEGEND:
--- PROJECT BOUNDARY
--- 300m CONSTRUCTION NOISE / OPERATION
FIXED PLANT NOISE STUDY BOUNDARY
↑ CM1/DM1 NOISE MONITORING STATION

NOTE:
EM&A MANUAL PROPOSED NOISE MONITORING STATION:
CM2 - MA ON SHAN TSUNG TSIN SECONDARY SCHOOL
BASELINE NOISE MONITORING STATION:
CM2(A) - KOWLOON CITY BAPTIST CHURCH HAY NIEN PRIMARY SCHOOL
IMPACT NOISE MONITORING STATION:
CM2(B) - OUTSIDE A KUNG KOK STREET GARDEN

AECOM
PROJECT
RELOCATION OF SHA TIN
SEWAGE TREATMENT
WORKS TO CAVERNS:
CAVERNS AND SEWAGE
TREATMENT WORKS -
INVESTIGATION, DESIGN
AND CONSTRUCTION

CLIENT
渠務署
Drainage Services Department

CONSULTANT
AECOM Asia Company Ltd.
www.aecom.com

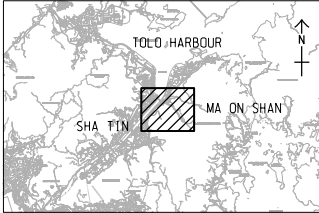
SUB-CONSULTANTS
分判工程顧問公司

ISSUE/REVISION			
修訂			
A	17/11/20	GENERAL REVISION	WY
I/R	DATE	DESCRIPTION	CHK.
(修訂)	(日期)	(修改描述)	(校核)

STATUS
階段

SCALE
比例
A3 1 : 10000
DIMENSION UNIT
尺寸單位
METRES

KEY PLAN
索引圖
A3 1 : 500000

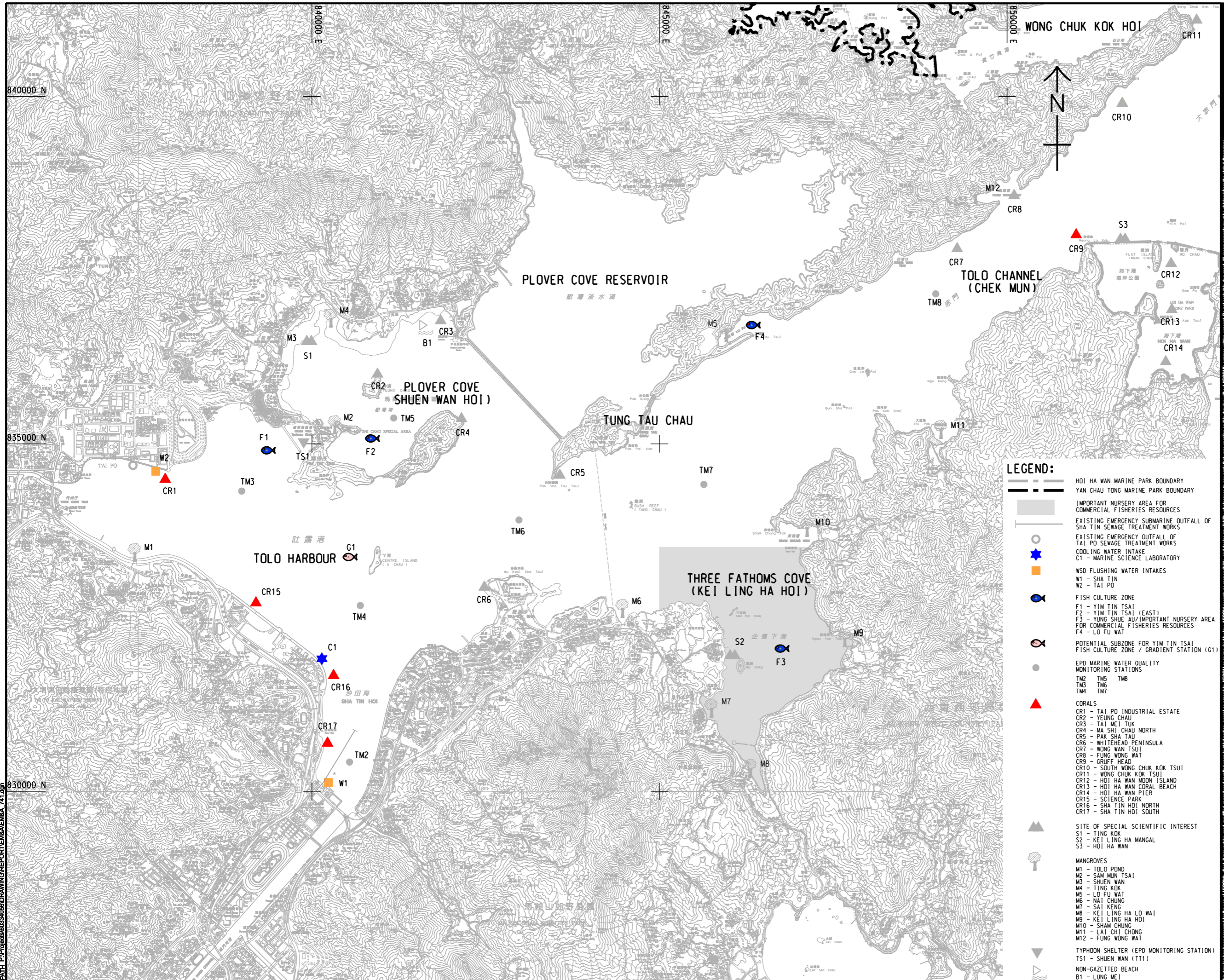


PROJECT NO.
項目編號
60334056
CONTRACT NO.
合約編號
CE 30/2014 (DS)

SHEET TITLE
圖紙名稱
LOCATION OF CONSTRUCTION
PHASE TRAFFIC NOISE
MONITORING STATION

SHEET NUMBER
圖紙編號
60334056/EM&A/3.01A

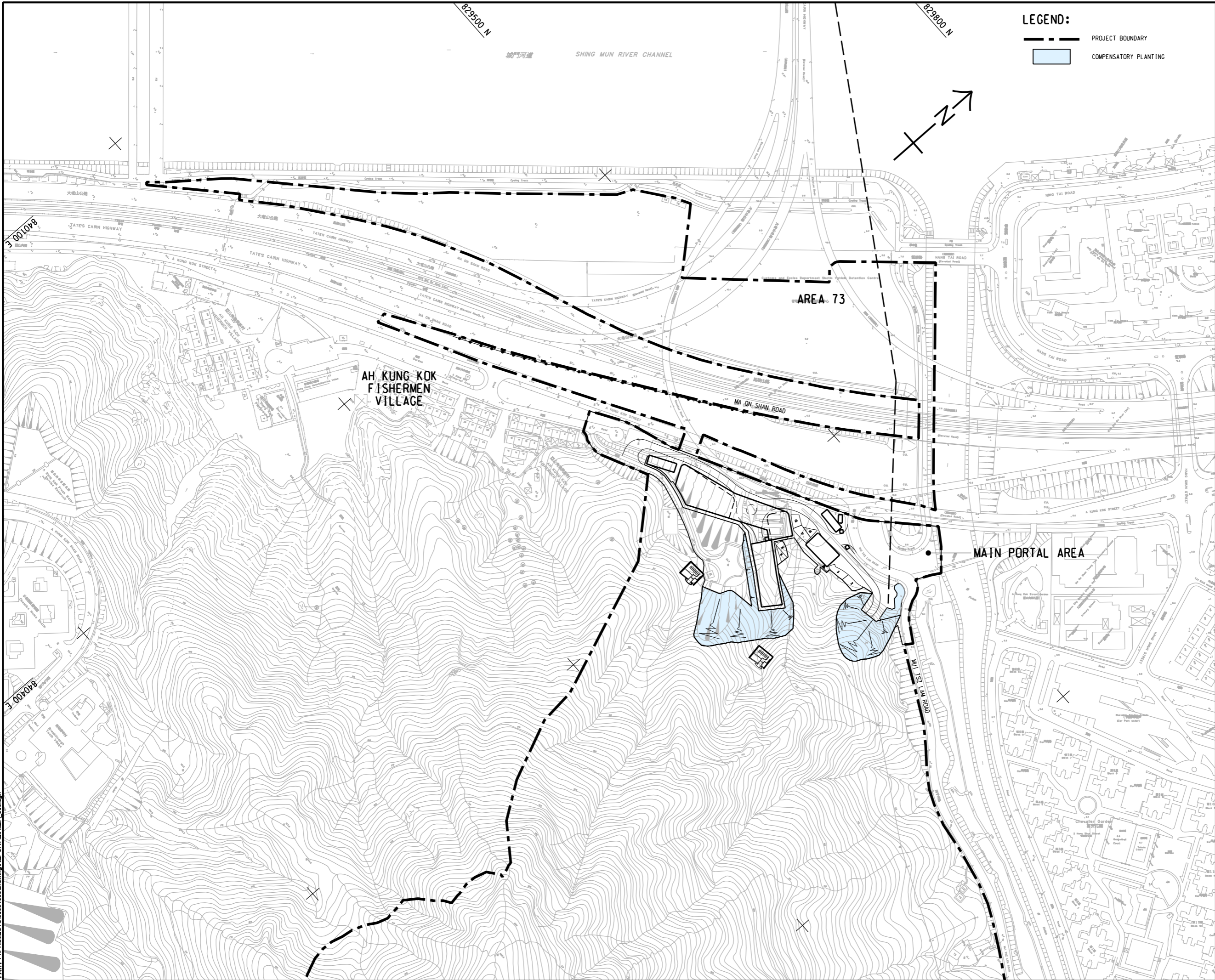
This drawing has been prepared for the use of AECOM's client. It may not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent. All measurements must be obtained from the stated dimensions.



This document is not to be used, modified, reproduced or relied upon by any party, except as agreed by ACCUM or as required by law. ACCUM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without ACCUM's express written consent. All measurements must be obtained from the same dimension.

Pld File by: PENGW 2016/05/19
PATH P:\PROJECTS\60334056\Drawing\REPORT\EA\EA_008.dgn

ISO A1 594mm x 841mm
Approved:
Checked:
Designer:
Project Management Initials:



LEGEND:

PROJECT BOUNDARY

■

COMPENSATORY PLANTING

AECOM

PROJECT
項目
RELOCATION OF SHA TIN
SEWAGE TREATMENT
WORKS TO CAVERNS:
CAVERNS AND SEWAGE
TREATMENT WORKS -
INVESTIGATION, DESIGN
AND CONSTRUCTION

CLIENT
業主
渠務署
Drainage Services Department

CONSULTANT
工程顧問公司
AECOM Asia Company Ltd.
www.aecom.com

SUB-CONSULTANTS
分判工程顧問公司

ISSUE/REVISION
修訂

I/R 修訂	DATE 日期	DESCRIPTION 內容摘要	CHK. 校核

STATUS
階段

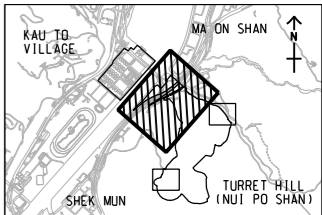
SCALE
比例

DIMENSION UNIT
尺寸單位

A3 1 : 3000

METRES

KEY PLAN A3 1 : 100000



PROJECT NO.
項目編號
60334056

CONTRACT NO.
合約編號
CE 30/2014 (DS)

SHEET TITLE
圖紙名稱

LOCATION FOR
COMPENSATORY PLANTING

SHEET NUMBER
圖紙編號

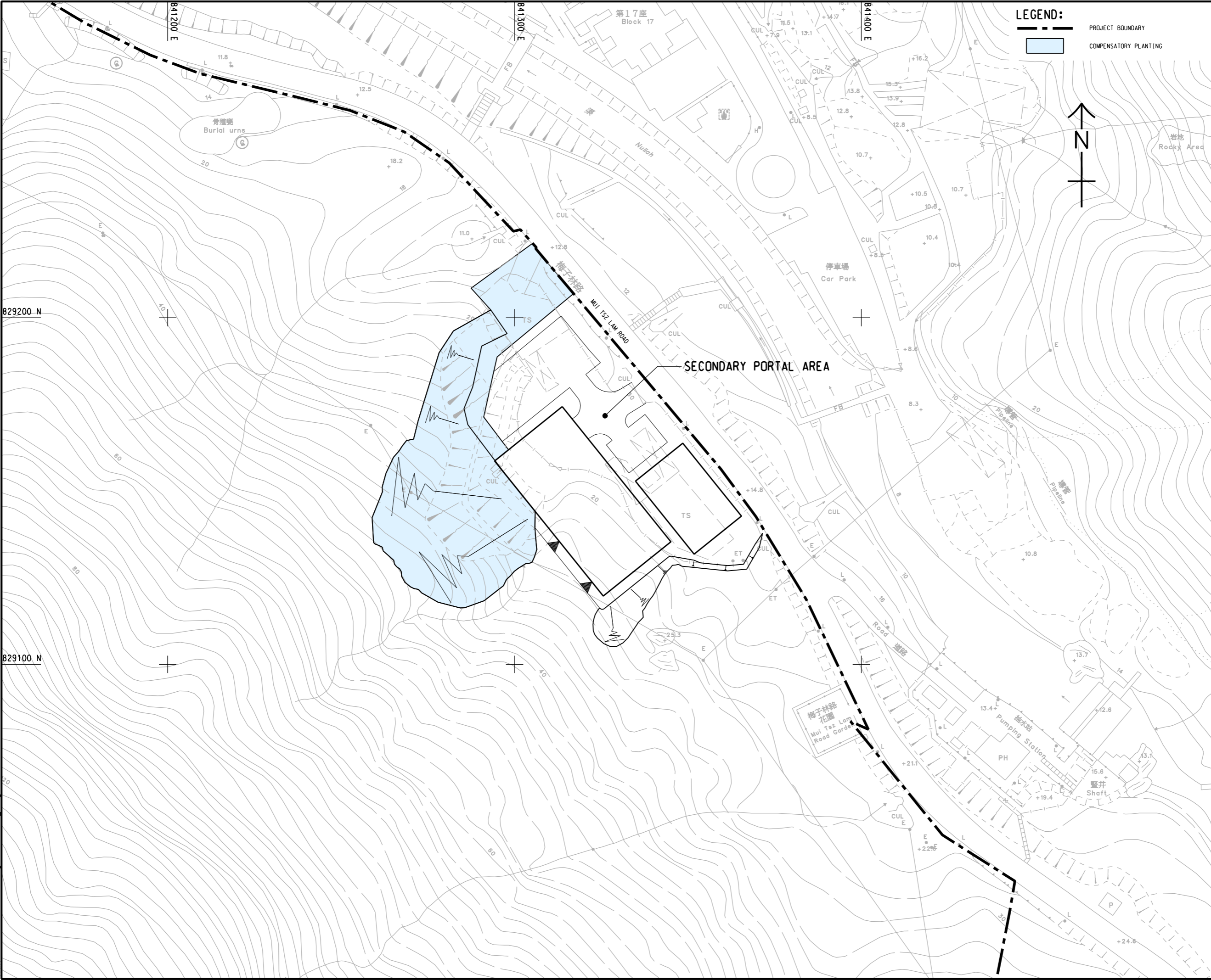
60334056/EM&A/7.01a

SHEET 1 OF 3

This drawing has been prepared for the use of AECOM's client. It may not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party for loss or damage of any kind arising from the use of this drawing without AECOM's express written consent. Do not scale this document. All measurements must be obtained from the stated dimensions.

Pld File by: PENGW 2016/05/19
PATH P:\PROJECTS\60334056\Drawing\REPORT\EA\EA_009.dgn

ISO A1 594mm x 841mm
Approved:
Checked:
Designer:
Project Management Initials:



LEGEND:

PROJECT BOUNDARY

COMPENSATORY PLANTING

AECOM

PROJECT
項目

RELOCATION OF SHA TIN SEWAGE TREATMENT WORKS TO CAVERNS: CAVERNS AND SEWAGE TREATMENT WORKS - INVESTIGATION, DESIGN AND CONSTRUCTION

CLIENT
業主

渠務署

Drainage Services Department

CONSULTANT
顧問公司

AECOM Asia Company Ltd.
www.aecom.com

SUB-CONSULTANTS
分判工程顧問公司

ISSUE/REVISION			
修訂			
I/R	DATE	DESCRIPTION	CHK.
修訂	日期	內容摘要	校核

STATUS
備註

SCALE
比例

DIMENSION UNIT
尺寸單位

A3 1 : 1000METRES

KEY PLAN A3 1 : 1000000
索引圖

PROJECT NO.
項目編號

60334056

CONTRACT NO.
合約編號

CE 30/2014 (DS)

SHEET TITLE
圖紙名稱

LOCATION FOR COMPENSATORY PLANTING

SHEET NUMBER
圖紙編號

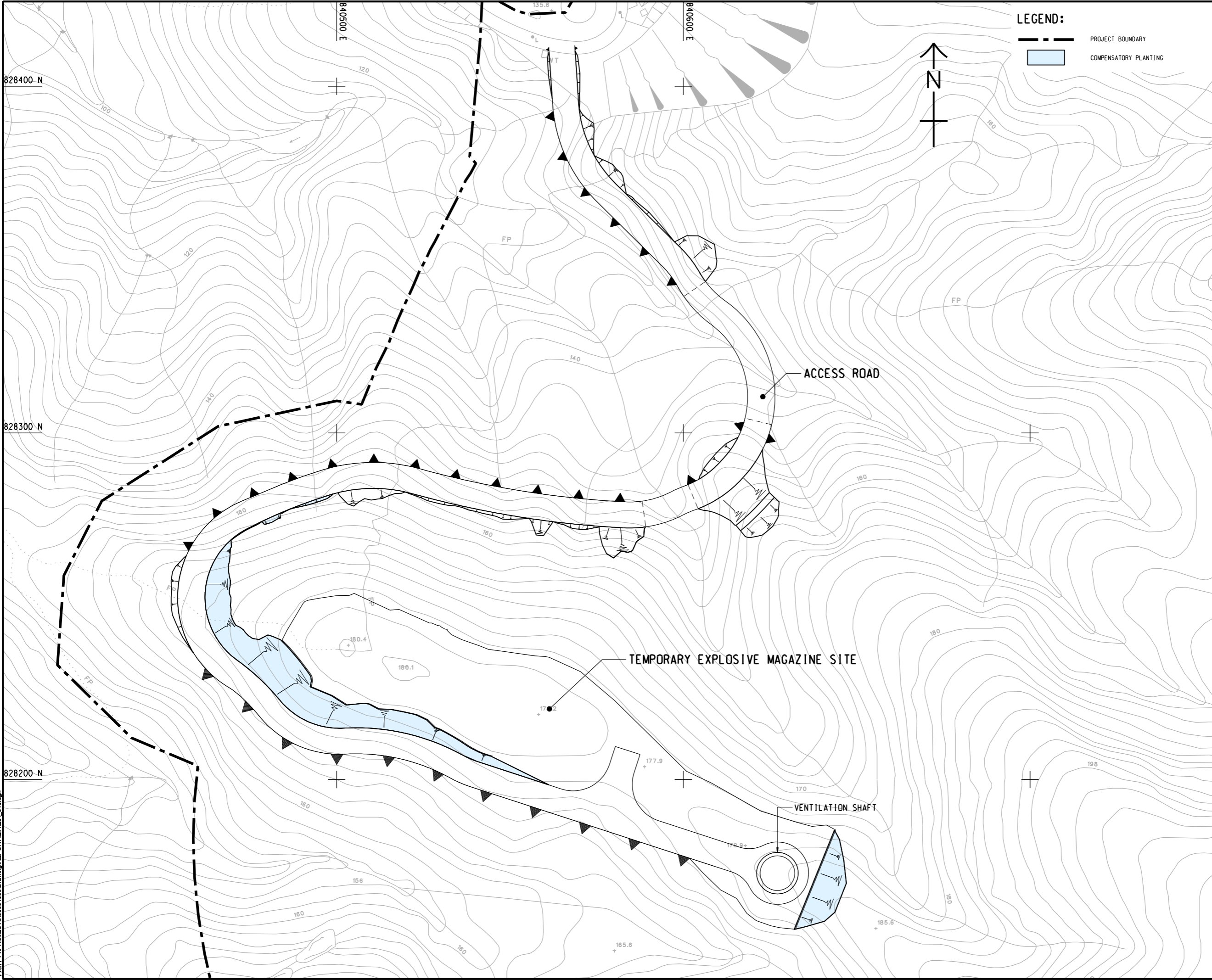
60334056/EM&A/7.01b

SHEET 2 OF 3

This drawing has been prepared for the use of AECOM's client. It may not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent. Do not scale this document. All measurements must be obtained from the related dimensions.

Pld File by: PENGW 2016/05/19
PATH P:\PROJECTS\60334056\Drawing\REPORT\EA\EA_810.dgn

ISO A1 594mm x 841mm
Approved:
Checked:
Designer:
Project Management Initials:



LEGEND:

- PROJECT BOUNDARY
- COMPENSATORY PLANTING

AECOM

PROJECT

RELOCATION OF SHA TIN
SEWAGE TREATMENT
WORKS TO CAVERNS:
CAVERNS AND SEWAGE
TREATMENT WORKS -
INVESTIGATION, DESIGN
AND CONSTRUCTION

CLIENT

渠務署
Drainage Services Department

CONSULTANT

AECOM Asia Company Ltd.
www.aecom.com

SUB-CONSULTANTS

分判工程顧問公司

ISSUE/REVISION

I/R	DATE	DESCRIPTION	CHK.
01	16/05/16	Issue for tender	
02	16/05/16	Issue for tender	
03	16/05/16	Issue for tender	
04	16/05/16	Issue for tender	
05	16/05/16	Issue for tender	

STATUS

預備

SCALE

比例

A3 1: 1000

DIMENSION UNIT

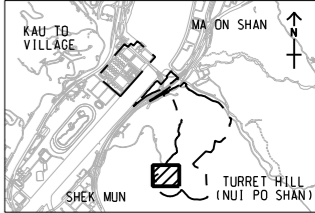
尺寸單位

METRES

KEY PLAN

索引圖

A3 1: 100000



PROJECT NO.

項目編號

60334056

CONTRACT NO.

合約編號

CE 30/2014 (DS)

SHEET TITLE

圖紙名稱

LOCATION FOR
COMPENSATORY PLANTING

SHEET NUMBER

圖紙編號

60334056/EM&A/7.01c






SHEET 3 OF 3

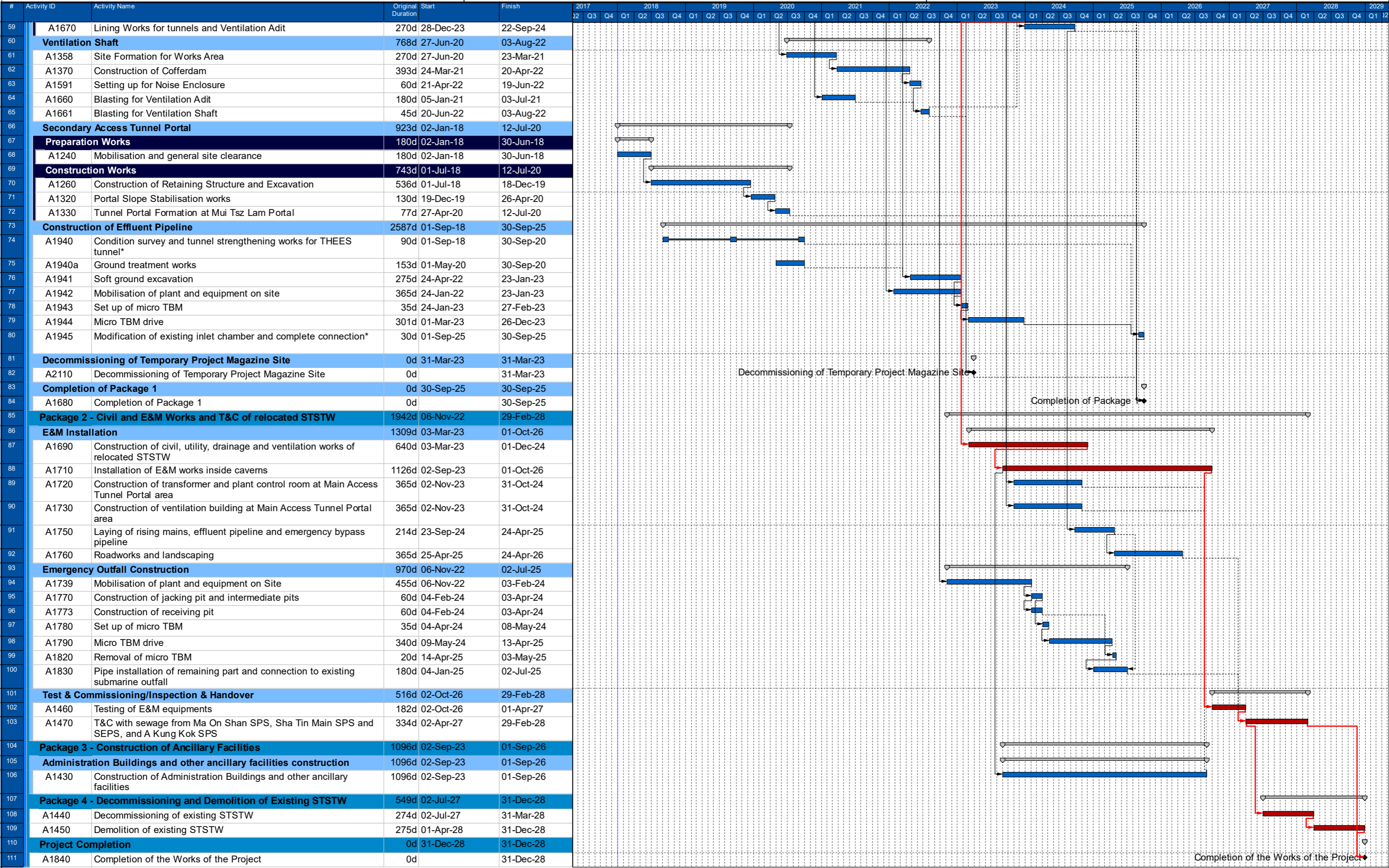
This drawing has been prepared for the use of AECOM's client. It may not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent. Do not scale this document. All measurements must be obtained from the related dimensions.

Appendix A

Tentative Construction Programme

#	Activity ID	Activity Name	Original Duration	Start	Finish
1	RELOCATION OF SHA TIN SEWAGE TREATMENT WORKS TO (
2	Package 1 - Construction of Tunnels and Caverns for relocated STSTW				
3	Blasting Submission				
4	A1000	Obtain of Blasting Permit for excavation of Tunnels and Caverns	538d	02-Jan-18	23-Jun-19
5	Access Road for Magazine at A Kung Kok Road				
6	Construction of Access Road				
7	M1010	Mobilisation and site clearance	180d	02-Jan-18	30-Jun-18
8	M1020	Formation of Temporary Haul Road	243d	01-Jul-18	28-Feb-19
9	M1040	Permanent Slope Work, Retaining Structure, Elevated sections, Slope Stabilisation Work and Soil Backfilling	485d	29-Oct-18	25-Feb-20
10	M1080	Permanent Access Road & Other Road Furniture	365d	28-Mar-19	26-Mar-20
11	M1090	Remaining Works	180d	29-Sep-19	26-Mar-20
12	Construction of Explosive Compound Structure				
13	M1100	Site Formation & Construction of Explosive Compound Structure	150d	01-Mar-19	28-Jul-19
14	M1110	E&M Installation for Explosive Compound Structure	92d	29-Jul-19	28-Oct-19
15	Inspection & Approval				
16	M1120	Inspection and Approval by Government Authorities	152d	27-Jan-20	26-Jun-20
17	Main Access Tunnel				
18	Natural Terrain Hazard Mitigation Works				
19	A1549	Mobilisation and site clearance	180d	02-Jan-18	30-Jun-18
20	A1550	Natural Terrain Hazard Mitigation Works in Main Access Tunnel Portal and Secondary Access Tunnel Portal	275d	01-Jul-18	01-Apr-19
21	A1580	Boulder Fall Fence Construction	275d	01-Jul-18	01-Apr-19
22	Pilot Construction Adit				
23	A1010	Construction of Pilot Construction Adit	467d	02-Apr-18	12-Jul-19
24	Main Access Tunnel Portal (East)				
25	Preparation Works				
26	A1080	Mobilisation and general site clearance	180d	02-Jan-18	30-Jun-18
27	A1090	Diversion of existing utilities	180d	02-Apr-18	28-Sep-18
28	Site Formation Works at Portal Areas				
29	A2100	Site Formation works at Portal Areas	242d	02-Apr-18	29-Nov-18
30	Site Formation Works of Portal (East)				
31	A1100	Excavation and slope cutting	180d	29-Sep-18	27-Mar-19
32	A1110	Portal Slope Stabilisation Works	200d	18-Dec-18	05-Jul-19
33	A1120	Soft ground excavation (East)	235d	06-Jul-19	25-Feb-20
34	Excavation of Main Access Tunnel (East)				
35	A1540	Excavation of Main Access Tunnel (East)	370d	13-Jul-19	16-Jul-20
36	Main Access Tunnel Portal (West)				
37	Preparation Works				
38	A1130	Mobilisation, general site clearance and levelling	150d	02-Jan-18	31-May-18
39	A1140	Diversion of existing utilities	180d	02-Apr-18	28-Sep-18
40	A1150	Demolition of existing facility	180d	02-Apr-18	28-Sep-18
41	Site Formation Works of Portal (West)				
42	A1160	Retaining Structure and Excavation	535d	29-Sep-18	16-Mar-20
43	A1200	Excavation and slope cutting	350d	17-Mar-20	01-Mar-21
44	A1210	Portal Slope Stabilisation works	200d	16-Apr-20	01-Nov-20
45	A1220	Soft ground excavation (West)	77d	02-Mar-21	17-May-21
46	Excavation of Main Access Tunnel (West)				
47	A1620	Blasting for Main Access Tunnel (West)	30d	27-Jun-20	26-Jul-20
48	Main Access Tunnel				
49	Excavation Works				
50	A1520	Blasting for Main Access Tunnel outside Cavern	214d	27-Jul-19	25-Feb-20
51	Cavern Construction				
52	Cavern Excavation (Drill & Blast)				
53	A1630	Blasting for Main Access Tunnel inside Cavern	254d	26-Feb-20	05-Nov-20
54	A1850	Construction of Caverns and Driveway	742d	27-Jun-20	08-Jul-22
55	A1910	Blasting of Secondary Access Tunnel outside Caverns	172d	09-Jul-22	27-Dec-22
56	A1930	Remaining excavation in side caverns	180d	09-Jul-22	04-Jan-23
57	Construction of Cavern Lining				
58	A1650	Lining Works for Caverns	417d	06-Nov-22	27-Dec-23

 Normal Work  Critical Work  Milestone  Summary	* The exact periods of the construction activities to be determined and confirmed by background water monitoring.	<p align="center"> AGREEMENT NO. CE30/2014(DS) RELOCATION OF SHA TIN SEWAGE TREATMENT WORKS TO CAVERNS:CAVERNS AND SEWAGE TREATMENT WORKS - INVESTIGATION, DESIGN AND CONSTRUCTION </p> <p align="center">TENTATIVE CONSTRUCTION PROGRAMME</p>	<table border="1"> <thead> <tr> <th>Date</th> <th>Revision</th> <th>Checked</th> <th>Approved</th> </tr> </thead> <tbody> <tr> <td>24-Sep-15</td> <td>Rev.1</td> <td>RL</td> <td></td> </tr> <tr> <td>09-Dec-15</td> <td>Rev.2</td> <td>RL</td> <td></td> </tr> <tr> <td>24-Feb-16</td> <td>Rev.3</td> <td>RL</td> <td></td> </tr> <tr> <td>22-Mar-16</td> <td>Rev.4</td> <td>RL</td> <td></td> </tr> <tr> <td>25-Apr-16</td> <td>Rev.5</td> <td>RL</td> <td></td> </tr> </tbody> </table>	Date	Revision	Checked	Approved	24-Sep-15	Rev.1	RL		09-Dec-15	Rev.2	RL		24-Feb-16	Rev.3	RL		22-Mar-16	Rev.4	RL		25-Apr-16	Rev.5	RL		
Date	Revision	Checked	Approved																									
24-Sep-15	Rev.1	RL																										
09-Dec-15	Rev.2	RL																										
24-Feb-16	Rev.3	RL																										
22-Mar-16	Rev.4	RL																										
25-Apr-16	Rev.5	RL																										



Normal Work

Critical Work

Milestone

Summary

* The exact periods of the construction activities to be determined and confirmed by background water monitoring.

AGREEMENT NO. CE30/2014(DS)

RELOCATION OF SHA TIN SEWAGE TREATMENT WORKS TO CAVERNS:CAVERNS AND SEWAGE TREATMENT WORKS - INVESTIGATION, DESIGN AND CONSTRUCTION

TENTATIVE CONSTRUCTION PROGRAMME

Date

Revision

Checked

Approved

24-Sep-15

Rev.1

RL

09-Dec-15

Rev.2

RL

24-Feb-16

Rev.3

RL

22-Mar-16

Rev.4

RL

25-Apr-16

Rev.5

RL

AECOM

Appendix B

Sample Record Sheet

APPENDIX B.1 Data Sheet for TSP Monitoring

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

	<u>Name & Designation</u>	<u>Signature</u>	<u>Date</u>
Field Operator:	_____	_____	_____
Laboratory Staff:	_____	_____	_____
Checked by:	_____	_____	_____

APPENDIX B.2 Construction Noise Monitoring Field Record Sheet

Monitoring Location		
Description of Location		
Date of Monitoring		
Measurement Start Time (hh:mm)		
Measurement Time Length (min.)		
Noise Meter Model/Identification		
Calibrator Model/Identification		
Measurement Results	L ₉₀ (dB(A))	
	L ₁₀ (dB(A))	
	L _{eq} (dB(A))	
Major Construction Noise Source(s) During Monitoring		
Other Noise Source(s) During Monitoring		
Remarks		

	<u>Name & Designation</u>	<u>Signature</u>	<u>Date</u>
Recorded by:	_____	_____	_____
Checked by:	_____	_____	_____

APPENDIX B.3 Water Quality Monitoring Data Record Sheet

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

Name & Designation

Signature

Date

Recorded by:

Checked by:

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

Appendix C

Implementation Schedule of Recommended Mitigation Measures

APPENDIX C IMPLEMENTATION SCHEDULE OF RECOMMENDED MITIGATION MEASURES

C.1 Introduction

C.1.1 This section presents the implementation schedule of mitigation measures for the Project. **Table C.1** summarises the details of the recommended mitigation measures for all works areas. For each recommended mitigation measures, both the location and timing for the measure have clearly been identified as well as the parties responsible for implementing the measure and for maintenance (where applicable).

Table C.1 Implementation Schedule of Recommended Mitigation Measures

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
	Air Quality Impact								
	Construction Phase								
Table 3.5	2.4.1	The rock crushing plant is configured as an enclosed system. Dust collector with dust removal efficiency of 99% will be provided at the exhaust of the rock crusher during rock crushing. Watering will be provided to maintain material in wet condition. Vehicles would be required to pass through the wheel washing facilities provided at site exit.	Rock Crushing Plant / Construction Phase	Contractor	√	√		√	Air Pollution Control Ordinance (APCO)
3.8.1	2.4.1	Watering eight times a day on active works areas, exposed areas and unpaved haul roads to reduce dust emission by 87.5%.	All active works areas, exposed areas and unpaved haul roads	Contractor		√		√	APCO

¹ Des = Design; C = Construction; O = Operation; Dec = Decommissioning

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
3.8.1	2.4.1	<p>Dust suppression measures stipulated in the Air Pollution Control (Construction Dust) Regulation and good site practices:</p> <ul style="list-style-type: none"> • Use of regular watering to reduce dust emissions from exposed site surfaces and unpaved roads, particularly during dry weather. • Use of frequent watering for particularly dusty construction areas and areas close to ASRs. • Side enclosure and covering of any aggregate or dusty material storage piles to reduce emissions. Where this is not practicable owing to frequent usage, watering shall be applied to aggregate fines. • Open stockpiles shall be avoided or covered. Where possible, prevent placing dusty material storage piles near ASRs. • Tarpaulin covering of all dusty vehicle loads transported to, from and between site locations. • Establishment and use of vehicle wheel and body washing facilities at the exit points of the site. • Provision of wind shield and dust extraction units or similar dust mitigation measures at the loading area of barging point, and use of water sprinklers at the loading area 	Construction Sites	Contractor		√		√	APCO and Air Pollution Control (Construction Dust) Regulation

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		<p>where dust generation is likely during the loading process of loose material, particularly in dry seasons/ periods.</p> <ul style="list-style-type: none"> • Provision of not less than 2.4m high hoarding from ground level along site boundary where adjoins a road, streets or other accessible to the public except for a site entrance or exit. • Imposition of speed controls for vehicles on site haul roads. • Where possible, routing of vehicles and positioning of construction plant should be at the maximum possible distance from ASRs. • Every stock of more than 20 bags of cement or dry PFA should be covered entirely by impervious sheeting or placed in an area sheltered on the top and the 3 sides. • Instigation of an environmental monitoring and auditing program to monitor the construction process in order to enforce controls and modify method of work if dusty conditions arise. 							

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
	Operation Phase								
3.5.2	-	Sludge tanks with totally enclosed design proven by DSD should be deployed for transporting sludge. With thorough cleaning practice and regular condition test of the sludge tanks, odour emission and leachate leakage during storage and transportation are not anticipated.	Cavern Sewage Treatment Works (CSTW) / Operation Phase	Project Proponent / Operator	√		√		-
3.6.2, 3.7.2	2.4.2	All treatment units with potential odour emission will be covered and the exhausted air will be conveyed to the deodouriser (with 80 – 97% odour removal efficiency) for treatment before discharge to the environment.	CSTW / Operation Phase	Design team / Project Proponent / Operator	√		√		-
3.7.2	2.4.2	The following appropriate odour control measures would be implemented. (i) Adopting the advantage of caverns as natural barriers for odour control; (ii) Covering up of odour sources; (iii) Preventing odour leakage through the access tunnels by applying negative pressure inside caverns; (iv) Installing deodourizing units to clean up the collected foul air; (v) Discharging exhausted air at height to further enhance the dilution effect; and (vi) Enhancing the odour management of the sludge transportation.	CSTW / Operation Phase	Design team / Project Proponent / Operator	√		√		-

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
3.10.2	2.3.1	Odour monitoring at the inlet and outlet of the deodourizing units is proposed to be conducted for first three years of the operation of CSTW, quarterly in the first year, and once every 6 months in the second and third years if monitoring results remain below the limit levels.	CSTW / Operation Phase	Project Proponent / Operator	√		√		-
3.10.2	2.3.2	An Odour Complaint Registration System is also proposed in the EM&A programme to check whether the deodorizing units can fulfill the recommended odour removal performance.	CSTW / Operation Phase	Operator			√		-
3.10.2	-	Any unexpected leakage from tanks could be observed with monitoring equipment. Monitoring equipment would be installed in the CSTW to monitor the concentration of H ₂ S, CO and CO ₂ and methane. Investigation and repair works would be carried out immediately if abrupt increase of these concentrations are reported. Emergency Plan would be established for these upset conditions.	CSTW / Operation Phase	Project Proponent / Operator	√		√		-
	Noise Impact								
	Construction Phase								
4.5.1.6	-	Re-provision of 220m length noise barrier with 10mPD on temporary access haul road to replace the existing 150m length noise barrier with 9.2mPD to 10mPD on Ma On Sha Road. The	Proposed temporary access / Construction Phase	Contractor		√			Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM), Noise Control Ordinance (NCO)

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		location of the relocated noise barrier is shown in Figure No. 60334056/EIA/4.02 and Appendix 4.07 . Once the construction work for the CSTW is completed, the temporary access roads would be demolished and the relevant section of Ma On Shan Road and associated noise barrier would be recovered as before.							
4.8.1	3.8.1	The use of quiet plant associated with the construction works is prescribed in British Standard "Code of practice for noise and vibration control on construction and open sites, BS5228" which contains the SWLs for specific quiet PME.	All Construction Work Sites	Contractor		√		√	EIAO-TM, NCO
4.8.1	3.8.1	To alleviate the construction noise impact on the affected NSRs, movable noise barrier for Air Compressor, Bar Bender and Cutter, Breaker, Chisel, Saw, Compactor, Mixers, Pump, Crane, Desander, Drilling Rig, Dump Truck, Excavator, Generator, Grab, Lorry, Paver, Poker and Roller are proposed.	All Construction Work Sites	Contractor		√		√	EIAO-TM, NCO
4.8.1	3.8.1	Provision of noise barrier/acoustic mats for Drilling Jumbo so as to have screening effecting with 10 dB(A) noise attenuation	Drilling Jumbo operate outside the portal and within 20m inside the portal	Contractor		√			EIAO-TM, NCO
4.8.1	3.8.1	To further alleviate the construction noise impact on the Neighbourhood Advice-Action Council Harmony	Construction Site for access road for	Contractor		√		√	EIAO-TM, NCO

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		Manor, it is proposed to limit the number of on-time operating PMEs within 120m of this NSR during construction of access road.	magazine at A Kung Kok Road						
4.9.1	3.8.1	<p>In addition to the above-mentioned mitigation measures, good site practices listed below shall be adopted by all the contractors to further ameliorate the noise impacts.</p> <ul style="list-style-type: none"> 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. 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. 	All Construction Work Sites	Contractor		√		√	EIAO-TM, NCO

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		<ul style="list-style-type: none"> Material stockpiles and other structures should be effectively utilised, wherever practicable, in screening noise from on-site construction activities. 							
	Operation Phase								
4.7.4	3.8.2	The maximum allowable sound power levels for the ventilation shaft, ventilation buildings at main portal and emergency portal, ventilation fan for chiller plant room and cooling tower at the administration building as presented in Table 4.16 of the EIA Report should be achieved such that the nearest affected NSRs can be in compliance with the noise criteria	Ventilation Shaft, Administration Building and Ventilation Buildings/ Operation Phase	Project Proponent	√		√		EIAO-TM, NCO
4.11.2	3.8.2	Prior to the operational phase of the Project, a commissioning test for the ventilation buildings, the ventilation shaft, ventilation fan for chiller plant room at administration building and cooling tower at the administration building would be conducted to ensure compliance with the relevant allowable maximum sound power levels.	Ventilation Shaft, Administration Building and Ventilation Buildings/ Operation Phase	Contractor			√		EIAO-TM, NCO

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
	Water Quality Impact								
	Construction Phase								
5.7.2	4.10	Water used in ground boring and drilling for site investigation or rock / soil anchoring should as far as practicable be re-circulated after sedimentation. When there is a need for final disposal, the wastewater should be discharged into storm drains via silt removal facilities.	Construction Sites / Construction Phase	Contractor		√			Water Pollution Control Ordinance (WPCO), EIAO-TM
5.7.2	4.10	All vehicles and plant should be cleaned before they leave a construction site to minimise the deposition of earth, mud, debris on roads. A wheel washing bay should be provided at every site exit if practicable and wash-water should have sand and silt settled out or removed before discharging into storm drains. The section of construction road between the wheel washing bay and the public road should be paved with backfill to reduce vehicle tracking of soil and to prevent site run-off from entering public road drains.	Construction Sites / Construction Phase	Contractor		√			Professional Persons Environmental Consultative Committee (ProPECC) Practice Note (PN) 1/94, WPCO, Waste Disposal Ordinance (WDO)
5.7.2	4.10	Good site practices should be adopted to remove rubbish and litter from construction sites so as to prevent the rubbish and litter from spreading from the site area. It is recommended to clean the construction sites on a regular basis.	Construction Sites / Construction Phase	Contractor		√			WPCO, EIAO-TM

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
5.7.2	4.10	The site practices outlined in ProPECC PN 1/94 "Construction Site Drainage" should be followed where applicable to minimise surface run-off and the chance of erosion.	Construction Sites / Construction Phase	Contractor		√			WPCO, EIAO-TM, ProPECC PN 1/94
5.7.2	4.10	There is a need to apply to EPD for a discharge licence for discharge of effluent from the construction site under the WPCO. The discharge quality must meet the requirements specified in the discharge licence. All the runoff and wastewater generated from the works areas should be treated so that it satisfies all the standards listed in the Technical Memorandum on Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters (TM-DSS). The beneficial uses of the treated effluent for other on-site activities such as dust suppression, wheel washing and general cleaning etc., can minimise water consumption and reduce the effluent discharge volume. If monitoring of the treated effluent quality from the works areas is required during the construction phase of the Project, the monitoring should be carried out in accordance with the relevant WPCO licence which is under the ambit of RO of EPD.	Construction Sites / Construction Phase	Contractor		√			WPCO, EIAO-TM, (TM-DSS)
5.7.2	4.10	Contractor must register as a chemical waste producer if chemical wastes would be produced from the	Construction Sites / Construction Phase	Contractor		√			WPCO, EIAO-TM, WDO

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		construction activities. The Waste Disposal Ordinance (Cap 354) and its subsidiary regulations in particular the Waste Disposal (Chemical Waste) (General) Regulation, should be observed and complied with for control of chemical wastes.							
5.7.2	4.10	Any service shop and maintenance facilities should be located on hard standings within a bonded area, and sumps and oil interceptors should be provided. Maintenance of vehicles and equipment involving activities with potential for leakage and spillage should only be undertaken within the areas appropriately equipped to control these discharges.	Construction Sites / Construction Phase	Contractor		√			WPCO, EIAO-TM
5.7.2	4.10	Disposal of chemical wastes should be carried out in compliance with the Waste Disposal Ordinance. The Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes published under the Waste Disposal Ordinance should be followed to avoid leakage or spillage of chemicals.	Construction Sites / Construction Phase	Contractor		√			WPCO, EIAO-TM, WDO
5.7.2	4.10	Sufficient chemical toilets should be provided in the works areas. A licensed waste collector should be deployed to clean the chemical toilets on a regular basis.	Construction Sites / Construction Phase	Contractor		√			WPCO, EIAO-TM

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
5.7.2	4.10	Notices should be posted at conspicuous locations to remind the workers not to discharge any sewage or wastewater into the surrounding environment.	Construction Sites / Construction Phase	Contractor		√			WPCO, EIAO-TM
5.7.2	4.10	The practices outlined in ETWB TC (Works) No. 5/2005 "Protection of natural streams/rivers from adverse impacts arising from construction works" should also be adopted where applicable to minimise the water quality impacts upon any natural streams or surface water systems.	Construction Sites / Construction Phase	Contractor		√			WPCO, EIAO-TM, ETWB TC (Works) No. 5/2005
5.7.2	4.10	Appropriate measures during the construction of the cavern construction should be implemented to minimise the groundwater infiltration.	Construction Sites / Construction Phase	Contractor		√			WPCO, EIAO-TM
5.7.2	4.10	No directly discharge of groundwater from contaminated areas should be adopted. Prior to any excavation works within the potentially contaminated areas at the existing STSTW site, the baseline groundwater quality in these areas should be reviewed based on the relevant SI data and any additional groundwater quality measurements to be performed with reference to <i>Guidance Note for Contaminated Land Assessment and Remediation</i> and the review results should be submitted to EPD for examination. If the review results indicated that the groundwater to be generated from the excavation	Construction Sites / Construction Phase	Contractor		√			WPCO, EIAO-TM, Guidance Note for Contaminated Land Assessment and Remediation

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		works would be contaminated, this contaminated groundwater should be either properly treated or properly recharged into the ground in compliance with the requirements of the TM-DSS. If wastewater treatment is to be deployed for treating the contaminated groundwater, the wastewater treatment unit shall deploy suitable treatment processes (e.g. oil interceptor / activated carbon) to reduce the pollution level to an acceptable standard and remove any prohibited substances (such as TPH) to an undetectable range. All treated effluent from the wastewater treatment plant shall meet the requirements as stated in TM-DSS and should be either discharged into the foul sewers or tankered away for proper disposal.							
5.7.2	4.10	If deployment of wastewater treatment is not feasible for handling the contaminated groundwater, groundwater recharging wells should be installed as appropriate for recharging the contaminated groundwater back into the ground. The recharging wells should be selected at places where the groundwater quality will not be affected by the recharge operation as indicated in section 2.3 of the TM-DSS. The baseline groundwater quality should be determined prior to the selection of the recharge wells, and submit a working plan to EPD for agreement. Pollution	Construction Sites / Construction Phase	Contractor		√			WPCO, EIAO-TM, TM-DSS

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		levels of groundwater to be recharged shall not be higher than pollutant levels of ambient groundwater at the recharge well. Groundwater monitoring wells should be installed near the recharge points to monitor the effectiveness of the recharge wells and to ensure that no likelihood of increase of groundwater level and transfer of pollutants beyond the site boundary. Prior to recharge, free products should be removed as necessary by installing the petrol interceptor. The Contractor should apply for a discharge licence under the WPCO through the Regional Office of EPD for groundwater recharge operation or discharge of treated groundwater							
5.7.2	4.10	THEES connection works should be synchronized with the THEES maintenance, for a duration not longer than 4 weeks each outside the algae blooming season (January to May) and frequency of THEES maintenance shall be no more than once per year during the construction phase of the Project.	Tolo Harbour / Construction Phase	Project Proponent / Contractor	√	√			EIAO-TM
	Construction and Operation Phases								
5.10.2	4.10	Shutdown of the THEES for maintenance should be shortened as far as possible. It is recommended that the maintenance of the THEES tunnel should be avoided during the algae blooming season (January to May).	Tolo Harbour / Construction and Operation Phase	Project Proponent		√	√		WPCO, EIAO-TM

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
5.10.2	4.10	Relevant government departments including EPD, WSD, AFCD as well as the key stakeholders for mariculture and fisheries in Tolo Harbour should be informed of the maintenance event prior to any discharge.	Tolo Harbour / Construction and Operation Phase	Project Proponent		√	√		WPCO, EIAO-TM
5.10.3	4.2-4.5	An event and action plan and a water quality monitoring programme (as presented in the EM&A Manual) should be implemented for the THEES maintenance discharge	Tolo Harbour / Construction and Operation Phase	Project Proponent		√	√		WPCO, EIAO-TM
5.10.1	4.10	Silt screen may be installed at the flushing water intakes during the THEES maintenance discharge should it appear necessary. Close communication between DSD and WSD should be maintained to minimize any impact on the flushing water intakes due to THEES maintenance discharge.	WSD flushing water intakes / Construction and Operation Phase	WSD / Project Proponent		√	√		WPCO, EIAO-TM
	Design and Operation Phases								
5.8.3	4.6	In case adverse impact on KTN is identified based on the result of the three-month monitoring programme after commissioning of the project, the operation conditions of the treatment and THEES system should be investigated, and corrective and remedial action should be implemented to improve the effluent discharge from the CSTW. Furthermore, DSD should extend the water quality monitoring	Project site / Design and Operation Phases	Project Proponent			√		WPCO, EIAO-TM

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		programme for at least three months or as agreed by the Director of Environmental Protection.							
5.11.2	4.10	Dual power supply or ring main supply from CLP Power Hong Kong Ltd. CLP should be provided for the CSTW to prevent the occurrence of power failure. In addition, standby facilities for the main treatment units and standby equipment parts / accessories should also be provided in order to minimise the chance of emergency discharge. CLP should be consulted in order to ascertain the power supply for normal plant operation within the caverns. It is recommended that government departments including EPD, WSD and AFCD as well as the key stakeholders for mariculture and fisheries in Tolo Harbour should be informed as soon as possible in case of any emergency discharge so that appropriate actions can be taken.	Project site / Design and Operation Phases	Project Proponent	√		√		WPCO, EIAO-TM
5.11.2	4.10	In case of emergency discharge, the plant operators of CSTW should carry out necessary follow-up actions according to the procedures of the current contingency plan formulated for the existing STSTW to minimise the water quality impact.	Project site / Operation Phase	Project Proponent			√		WPCO, EIAO-TM
5.11.2	4.10	WSD may also consider, should it appear necessary, to shut down the Sha Tin seawater pumping station for a short period of time in case of	Sha Tin seawater pumping station / Operation Phase	WSD / Project Proponent			√		WPCO, EIAO-TM

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		emergency discharge in order to minimize any adverse impacts.							
5.13.2	4.10	<p>Best Management Practices to reduce storm water and non-point source pollution are also proposed as follows:</p> <p><u>Design Measures</u></p> <ul style="list-style-type: none"> Exposed surface shall be avoided within the road and portal sites to minimise soil erosion. The access road and the portal areas shall be either hard paved or covered by landscaping area where appropriate. Streams near the Project site will be retained to maintain the original flow path. The drainage system will be designed to avoid flooding. Green areas / planting etc. should be introduced alongside the access road and within the portal areas, as far as possible, to minimise runoff pollution. <p><u>Devices/ Facilities to Control Pollution</u></p> <ul style="list-style-type: none"> Screening facilities such as standard gully grating and trash grille, with spacing which is capable of screening off large substances such as fallen leaves and rubbish should be provided at the inlet of drainage system. Road gullies with standard design and silt traps should be provided to 	Project site / Design and Operation Phase	Project Proponent	√		√		WPCO, ProPECC PN 5/93

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		<p>remove particles present in stormwater runoff, where appropriate.</p> <p><u>Administrative Measures</u></p> <ul style="list-style-type: none"> • Good management measures such as regular cleaning and sweeping of road surface/ open areas are suggested. The road surface/ open area cleaning should also be carried out prior to occurrence rainstorm. • Manholes, as well as stormwater gullies, ditches provided at the Project site should be regularly inspected and cleaned (e.g. monthly). Additional inspection and cleansing should be carried out before forecast heavy rainfall. 							
	Land Contamination								
6.7.1	-	<p>Further site walkover and/or detailed land contamination assessment will be required for sites that are inaccessible or currently in operation / yet to be constructed (i.e. existing STSTW, David Camp and part of existing Sha Tin VDC, and proposed A Kung Kok Shan Road surface magazine site within the Project boundary). The site walkover, detailed land contamination assessment and if necessary, remediation works should be carried out after decommissioning of the sites</p>	Existing STSTW, David Camp and VDC / Construction Phase	Project Proponent / Contractor		√		√ (for existing STS TW)	Guidance Note for Contaminated Land Assessment and Remediation, Practice Guide for Investigation and Remediation of Contaminated Land, Guidance Manual for Use of Risk-based Remediation Goals for Contaminated Land Management

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		<p>but prior to re-development and should include the following:</p> <ul style="list-style-type: none"> • Prior to the commencement of the SI works, review the CAP to confirm whether the proposed SI works (e.g. sampling locations, testing parameters etc.) are still valid and to confirm the appropriate RBRGs land use scenario for the development; • Submit supplementary CAP(s), presenting the findings of the above review for EPD endorsement. If land contamination issues were identified within David Camp or part of existing VDC / proposed A Kung Kok Shan Road surface magazine site within the Project boundary in the further site walkover, findings of the site walkover and the proposal for SI works should also be presented in the supplementary CAP(s); • Carry out SI works according to the supplementary CAP endorsed by EPD; • Submit CAR(s), detailing findings of the SI works and nature/extent of any soil/groundwater contamination, and, if contaminated identified, RAP(s), discussing the appropriate remedial methods and mitigation 							

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		<p>measures, for the identified contamination, for EPD agreement; and</p> <ul style="list-style-type: none"> Carry out soil/groundwater remediation works according to EPD agreed RAP and submit RR(s) afterwards for EPD agreement. The remediation works and agreement of RR should be completed prior to re-development. 							
6.7.2	-	<p>If contamination were identified, mitigation measures as recommended in the RAP should be followed and should include the following:</p> <ul style="list-style-type: none"> Excavation profiles must be properly designed and executed with attention to the relevant requirements for environment, health and safety; Excavation shall be carried out during dry season as far as possible to minimise contaminated runoff from contaminated soils; Supply of suitable clean backfill material (or treated soil) after excavation; Stockpiling site(s) shall be lined with impermeable sheeting and bunded. Stockpiles shall be fully covered by impermeable sheeting to reduce dust emission. If this is not practicable due to frequent 	Project Site / Construction Phase	Contractor		√		√ (for existing STS TW)	Guidance Note for Contaminated Land Assessment and Remediation, Practice Guide for Investigation and Remediation of Contaminated Land, Guidance Manual for Use of Risk-based Remediation Goals for Contaminated Land Management

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		<p>usage, regular watering shall be applied. However, watering shall be avoided on stockpiles of contaminated soil to minimise contaminated runoff.</p> <ul style="list-style-type: none"> • Vehicles containing any excavated materials shall be suitably covered to limit potential dust emissions or contaminated wastewater run-off, and truck bodies and tailgates shall be sealed to prevent any discharge during transport or during wet conditions; • Speed control for the trucks carrying contaminated materials shall be enforced; • Vehicle wheel and body washing facilities at the site's exist points shall be established and used; and • Pollution control measures for air emissions (e.g. from biopile blower and handling of cement), noise emissions (e.g. from blower or earthmoving equipment), and water discharges (e.g. runoff control from treatment facility) shall be implemented and complied with relevant regulations and guidelines. 							

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
	Hazard to Life								
	Construction Phase								
7.14.1	6.2.2	<p>The following recommendations are justified to be implemented to meet the EIAO-TM requirements:</p> <ul style="list-style-type: none">• The truck should be designed to minimise the amount of combustible in the cabin. The fuel carried in the fuel tank should also be minimised to reduce the duration of any fire;• The accident involvement frequency of the explosives delivery truck should be minimised through implementation of several administrative measures, such as providing training programme to the driver, regular “tool box” briefing session, implementing a defensive driving attitude, selecting driver with good safety record, and providing regular medical checks for the driver;• Avoidance of returning unused explosives to the magazine, only the required quantity of explosives for a particular blast should be transported;• Maintain a minimum headway of 10 minutes between two	Explosives delivery route / Construction Phase	Contractor	√	√			EIAO-TM

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		<p>consecutive truck convoys whenever practicable; and</p> <ul style="list-style-type: none"> The fire involvement frequency should be minimised by carrying better types of fire extinguishers and with bigger capacity onboard of the explosives delivery truck. Emergency plans and trainings could also be provided to make sure that the fire extinguishers are used adequately. 							
7.14.2	6.2.3	<p>The magazine should be designed, built, operated and maintained in accordance with Mines Division's guidelines and appropriate industry best practice. In addition, the following recommendations should be implemented:</p> <ul style="list-style-type: none"> The security plan should address different alert security level to reduce opportunity for arson or deliberate initiation of explosives; Emergency plan should be developed to address uncontrolled fire in magazine area, and drill of the emergency plan should be regularly carried out; Suitable work control system should be set-up, such as an operational manual including Permit-to-Work system, to ensure that work activities undertaken 	Magazine Site/ Construction Phase	Contractor	√	√			-

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		<p>during operation of the magazine are properly controlled;</p> <ul style="list-style-type: none"> • Good house-keeping within the magazine to ensure no combustible materials are accumulated; • Good house-keeping outside the magazine stores to ensure no combustible materials are accumulated; and • Regular checking of the magazine store to ensure no water seepage through the roof, walls or floor. 							
7.14.3	6.2.4	<p>The following recommendations should be implemented:</p> <ul style="list-style-type: none"> • Emergency plan should be developed to address uncontrolled fire during transport. Case of fire near an explosive delivery truck in jammed traffic should be included in the plan. Activation of fuel and battery isolation switches on vehicle when fire breaks out should also be included in the emergency plan to reduce likelihood of prolonged fire leading to explosion; • Working guideline should be developed to define procedure for explosives transport during adverse weather such as thunderstorm; 	To and from Magazine Site / Construction Phase	Contractor	√	√			-

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		<ul style="list-style-type: none"> Detonators should be transported separately from other Class 1 explosives. Separation of vehicles should also be maintained through the trip; Develop procedure to ensure the availability of parking space on site for the explosives delivery truck. Delivery should not be commenced if parking space on site is not secured; Hot work or other activities should be banned in the vicinity of the explosives offloading or charging activities; Lining should be provided within the transportation box on the vehicle; Fire screen should be used between cabin and the load on the vehicle; Ensure packaging of detonators remains intact until handed over at blasting site; Ensure that cartridged emulsion packages are not damaged before every trip; and Use experienced driver with good safety record. 							

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
7.14.4	6.2.5	<p>The following recommendations should be implemented for the safe use of explosives:</p> <ul style="list-style-type: none"> Blast Charge Weight should be within MIC as specified for the given blast face; Temporary mitigation measures such as blast doors or heavy duty blast curtains should be installed at the portals or shafts and at suitable locations underground to prevent flyrock and control the air overpressure; Multiple faces blasting will be carried out for the construction of cavern in this project. Good communication and control will need to be adopted in ensuring that the works are carried out safely; It is not intended to carry out complete evacuation of the construction areas and secure refuge areas should be identified to workers in the areas; A Chief Shotfirer and a Blasting Engineer shall be employed in addition to the normal blasting personnel to ensure that the works are safe and coordinated between blasting areas; Shotfirer to be provided with a lightning detector, and appropriate 	CSTW / Construction Phase	Contractor	√	√			-

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		<p>control measures should be in place;</p> <ul style="list-style-type: none"> Speed limit for the diesel vehicle truck and bulk emulsion truck in the access tunnel and cavern should be imposed. The truck may be escorted while underground to ensure route is clear from hazards and obstructions; and Hot work should be suspended during passage of the diesel vehicle truck and bulk emulsion truck in the access tunnel and cavern. A boulder survey should be undertaken based on the likely PPV values that would result from the blasting process. Those boulders subject to the vibration higher than the allowable limit should be strengthened, removed, or constructed with boulder fence, prior to the commencement of blasting. 							
	Operation Phase								
		Nil							

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
	Ecological Impact (Terrestrial and Marine)								
	Construction Phase								
8.8.2	7.2.1	Construction of access roads and other temporary works should be carefully designed (e.g. elevated road for crossing streams) to avoid / minimise habitat loss and fragmentation.	Project site – areas access road / Pre-Construction Phase	Design team / Project Proponent	√				-
8.8.3	7.2.2	Minimise habitat loss to nearby habitats and associated wildlife by implementing the following mitigation measures: - <ul style="list-style-type: none">• confining the works within the site boundary;• controlling access of site staff to avoid damage to the vegetation in surrounding areas; and• placement of equipment or stockpile in the existing disturbed / urbanised land within the site boundary of the Project to minimise disturbance to vegetated areas;	Project site / Construction Phase	Contractor		√			-
8.8.3	7.2.2	Reinstatement planting should be implemented upon the completion of construction works to minimise the ecological impact arising from the temporary habitat loss	Project Site (Main Portal Area / Secondary Portal Area / Access Road / Temporary Works Area) /Construction Phase	Project Proponent	√	√		√	

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
8.8.2, 8.8.3 & 8.10	7.2.2	<p>Detailed Vegetation Survey shall be conducted by a suitably qualified botanist / ecologist within the works area requiring vegetation clearance prior to commencement of works to identify plant species of conservation importance.</p> <p>The potentially affected individuals shall be tagged and fenced off for preservation, and in the case of unavoidable loss, for transplantation to nearby suitable habitat(s).</p>	Proposed works areas (Main Portal, Secondary Portal, Access Road) / Pre-Construction Phase	Project Proponent / Qualified botanist or ecologist		√			
8.8.2, 8.8.3 & 8.10	7.3.1	<p>A Protection and Transplantation Proposal including the subsequent monitoring visit for the affected plant species should be prepared and conducted by a suitably qualified local ecologist. The Proposal should be submitted for approval at least one month before works commencement.</p> <p>To review the performance of the transplantation exercise, monitoring of transplanted flora should be conducted monthly after the transplantation throughout the construction phase. The parameters to be monitored should include the health condition and survival rate of the transplanted flora and presence of weedy species. Any observations and recommendations should be reported in monthly EM&A reports</p>	Recipient Site for transplanted species / Construction Phase	Project Proponent / Qualified botanist or ecologist		√			

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
8.8.3	7.2.2	<p>Mitigation measures should be implemented to control runoff from the construction site, as well as the adopting guidelines and good site practices for handling and disposal of construction discharges in order to minimise the potential indirect impact on the streams (particularly S2) resulting from site runoff.</p> <p>Precautionary measures should also be implemented to minimise indirect impacts to the streams, such as isolating the work site by placing sandbags and silt curtains, covering up construction materials, debris and spoil to avoid being washed into the stream, and properly collecting and treating construction effluent and sewage.</p>	Access Road on Nui Po Shan / Construction Phase	Contractor		√			ETWB TCW No. 5/2005
8.8.3	7.2.2	<p>Implement good site practice to further minimise impacts from disturbance such as noise, air quality and water quality issues, such as: -</p> <ul style="list-style-type: none"> the use of quiet plant and EPD's QPME and the availability of British Standards 5228 has been considered; the use of movable noise barrier; the use of temporary noise screening structures or purpose-built temporary noise barriers; 	Project site / Construction Phase	Contractor		√			-

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		<ul style="list-style-type: none"> install site hoarding as temporary noise barrier where construction works are undertaken; only well-maintained plant should be operated on site and plant should be serviced regularly during the construction programme; Mitigation measures stipulated in the ProPECC PN 1/94 "Construction Site Drainage" should be complied to minimise water quality impact; Installation of stand-by pump, emergency power supply and telemetry system to avoid sewage overflow and surcharge to sewerage system due to power/equipment failure. 							
8.8.3	7.2.2	<p>Minimise groundwater infiltration during cavern construction with the following water control strategies:-</p> <ul style="list-style-type: none"> Probing Ahead: As a normal practice, the Contractor will undertake rigorous probing of the ground ahead of excavation works to identify zones of significant water inflow. The probe drilling results will be evaluated to determine specific grouting requirements in line with the tunnel / cavern advance. In such zones of significant water inflow that could occur as a result of discrete, permeable features, the intent 	Project site / Construction Phase	Contractor		√			-

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		<p>would be to reduce overall inflow by means of cut-off grouting executed ahead of the tunnel / cavern advance;</p> <ul style="list-style-type: none"> Pre-grouting: Where water inflow quantities are excessive, pre-grouting will be required to reduce the water inflow into the tunnel / cavern. The pre-grouting will be achieved via a systematic and carefully specified protocol of grouting; In principle, the grout pre-treatment would be designed on the basis of probe hole drilling ahead of the tunnel / cavern face; The installation of waterproof lining would also be adopted after the formation of the tunnels and caverns. 							
8.8.3	7.2.2	<p>In the event of excessive infiltration being observed as a result of the tunnelling or excavation works even after incorporation of the water control strategies, post-grouting should be applied as far as practicable as described below:</p> <ul style="list-style-type: none"> Post-grouting: Groundwater drawdown will be most likely due to inflows of water into the tunnel / cavern that have not been sufficiently controlled by the pre-grouting measures in high permeability area. Where this 	Project site / Construction Phase	Contractor		√			-

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		<p>occurs post grouting will be undertaken before the lining is installed. Whilst unlikely to be required in significant measure, such a contingency should be allowed for reduction in permeability of the tunnel / cavern surround (by grouting) to limit inflow to acceptable levels.</p> <p>The practical groundwater control measures stated above are proven technologies and have been extensively applied in other past projects. These measures or other similar methods, as approved by the Engineer to suit the works condition shall be applied to minimise the groundwater infiltration.</p>							
8.8.3	7.2.2	In case seepage of groundwater occurs, groundwater should be pumped out from works areas and discharged to the storm system via silt trap. Uncontaminated groundwater from dewatering process should also be discharged to the storm system via silt removal facilities.	Project site / Construction Phase	Contractor		√			-

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
8.8.3	7.2.2	<p>Mitigation measures recommended in the water quality impact assessment for controlling water quality impact will also serve to protect marine ecological resources from indirect impacts and ensure no unacceptable impact on marine ecological resources.</p> <p>Relevant government departments including EPD, WSD and AFCD as well as key stakeholders for mariculture and fisheries in Tolo Harbour should be informed of the THEES maintenance / emergency discharge event prior to any discharge.</p> <p>It is recommended that the temporary effluent bypass event and the THEES maintenance period should be shortened as far as possible.</p>	Tolo Harbour / Construction Phase	Contractor and Operator		√			-
	Construction and Operation Phase								
8.8.3	7.2.2	<p>Overall reduction of glare during both construction and operation phase should be considered. A balance between lighting for safety, and avoiding excessive lighting can be achieved through the use of directional lighting to avoid light spill into sensitive areas, and control/timing of lighting periods of some facilities, particularly at the secondary portal which lies approximately 200 m northwest of Ma On Shan Country Park.</p>	Project site / Construction and Operation Phase	Contractor and Operator		√	√		-

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
8.8.3	7.2.2	During the decommissioning and demolition of the existing STSTW, the direction and lighting periods should be controlled during ardeid breeding season (March to August) to minimise the potential indirect impact on Penfold Park Egretty and the ardeids flying over the existing STSTW.	Existing STSTW / Decommissioning / March to August	Contractor				√	-
8.10	7.3	It is anticipated that the construction of rock caverns would not have adverse impacts on groundwater in Nui Po Shan. Nonetheless, surface water level or groundwater level near the caverns will be closely monitored during the construction and operation stage.	Project site / Construction and Operation Phase	Contractor and Operator		√	√		-
	Compensatory Planting								
8.8.4& 8.10.1	7.2.3	Compensatory planting would be provided at main and secondary portal areas, and along the access road.	Main portal, secondary portal, and along access road	Project Proponent	√	√			DEVB TC(W) No. 7/2015
8.8.4 & 8.10.1	7.2.3	To facilitate successful planting, a detailed Woodland Compensation Plan should be prepared by local ecologists with at least 10 years relevant experience to form the basis of the proposed compensatory planting. The Woodland Compensation Plan should include implementation details, management requirement, as well as monitoring requirements (e.g. frequency and parameters) of the	Compensatory planting area (Main portal, secondary portal, and along access road) / pre-construction	Project Proponent	√	√			

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		compensatory planting area. Approval of the Plan should be obtained from EPD at least three months before the prior to commencement of compensatory woodland planting.							
8.8.4 & 8.10.1	7.2.3	Upon the completion of planting, monitoring of the woodland compensation areas should be implemented, with maintenance works (e.g. irrigation, weeding, pruning, control of pests and diseases, replacement planting, repair of damage, etc.) conducted as necessary.	Compensatory planting area (Main portal, secondary portal, and along access road) / Operation	Project Proponent / CSTW Operator			√		
	Fisheries Impact								
9.6	8.2	Potential impacts on fisheries resources and fishing operations arising from the Project have been avoided and minimised by construction of a connection pipes to the existing emergency outfall of STSTW by trenchless method underneath Shing Mun River with the least water quality impact. In addition, the temporary effluent bypass event for THEES connection work would be synchronized within regular THEES maintenance. Therefore, additional water quality impact and fisheries impact from changes of water quality have been avoided. Furthermore, the THEES maintenance discharge would avoid the blooming season of algae (i.e. January to May) to minimise the potential water quality impacts. It is	Tolo Harbour /Construction and Operation Phase	Project Proponent / Contractor	√	√			-

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		recommended that any THEES maintenance period should be shortened as far as possible.							
9.6	8.2	Mitigation measures recommended in the water quality impact assessment for controlling water quality impact will also serve to protect fisheries from indirect impacts and ensure no unacceptable impact on fisheries resources and operations. For more detailed mitigation measures regarding water quality refer to Sections 5.7.2 and 5.13.2 of the EIA Report.	Construction and Operation Phase	Contractor and Operator		√	√		-
9.6	8.2	Relevant government departments including EPD, WSD and AFCD as well as key stakeholders for mariculture and fisheries in Tolo Harbour should be informed prior to the THEES maintenance / emergency discharge events.	Tolo Harbour / Construction and Operation Phase	Project Proponent		√	√		
	Landscape and Visual Impact								
Table 10.10	-	CM1 - Preservation of Existing Vegetation	Construction Sites/ Construction Phase	Project Proponent	√	√		√	DEVB TCW No. 7/2015 and latest Guidelines on Tree Preservation during Development issued by GLTM Section of DEVB
Table 10.10	-	CM2 - Transplanting of Affected Trees	Construction Sites/ Construction Phase	Project Proponent	√	√		√	DEVB TCW No. 7/2015 and the latest Guidelines on Tree Transplanting issued by GLTM Section of DEVB

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
Table 10.10	-	CM3 - Compensatory Tree Planting	Construction Sites/ Construction Phase	Project Proponent	√	√		√	DEVB TCW No. 7/2015
Table 10.10	-	CM4 - Control of Night-time Lighting Glare	Construction Sites/ Construction Phase	Project Proponent	√	√		√	
Table 10.10	-	CM5 - Erection of Decorative Screen Hoarding	Construction Sites/ Construction Phase	Project Proponent	√	√		√	
Table 10.10	-	CM6 - Management of Construction Activities and Facilities	Construction Sites/ Construction Phase	Project Proponent	√	√		√	
Table 10.10	-	CM7 - Reinstatement of Temporarily Disturbed Landscape Areas	Construction Sites/ Construction Phase	Project Proponent	√	√		√	
Table 10.11	-	OM1 - Tree and Shrub Planting at the Temporary Project Magazine Site after Completion of Engineering Works	Temporary Project Magazine Site / Operation Phase	Project Proponent	√	√	√		
Table 10.11	-	OM2 - Aesthetically pleasing design of Aboveground Structures	Tunnel Portals, Administration Building, Ventilation Buildings, Electrical Substations and Ventilation Shaft / Operation Phase	Project Proponent	√	√	√		

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
Table 10.11	-	OM3 - Aesthetically pleasing design of Highways Structures	Access Road to Ventilation Shaft / Operation Phase	Highways Department	√	√	√		
Table 10.11	-	OM4 - Reprovision of Cycle Track	Cycle track / Operation Phase	Highways Department	√	√	√		
Table 10.11	-	OM5 - Provision of Green Roof	Administration Building and Ventilation Buildings / Operation Phase	Project Proponent	√	√	√		
Table 10.11	-	OM6 - Provision of Buffer Planting	Main and Secondary Portal Areas / Operation Phase	Project Proponent	√	√	√		
Table 10.11	-	OM7 - Hydroseeding on the disturbed ground surface after demolition works prior to future redevelopment of the existing STSTW	Existing STSTW / Operation Phase	Lands Department (LandsD) or future development agent in existing STSTW	√	√	√		
Table 10.11	-	OM8 - Woodland Mix Planting on Soil Slopes	Soil Slopes / Operation Phase	Project Proponent	√	√	√		

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
	Cultural Heritage Impact								
11.5.1.1	10.1.1	No potential direct or indirect impact to cultural heritage resource is anticipated, and therefore no mitigation measures are required.	N/A	N/A					EIAO EIAO-TM Antiquities and Monuments Ordinance Guidelines for Cultural Heritage Impact Assessment
	Wastes Management Implications								
12.6.2	11.2.2	<p>Appropriate waste handling, transportation and disposal methods for all waste arising generated during the construction works for the Project should be implemented to ensure that construction wastes do not enter the nearby streams or drainage channel.</p> <p>It is anticipated that adverse impacts would not arise on the construction site, provided that good site practices are strictly followed. Recommendations for good site practices during the construction activities include:</p> <ul style="list-style-type: none">Nomination of approved personnel, such as a site manager, to be responsible for good site practices, and making arrangements for collection of all wastes generated at the site and effective disposal to an appropriate facility.	Project Site Area / Construction Phase	Contractor		√		√	Waste Disposal Ordinance

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		<ul style="list-style-type: none"> • Training of site personnel in proper waste management and chemical waste handling procedures. • Provision of sufficient waste reception/ disposal points, of a suitable vermin-proof design that minimises windblown litter. • Arrangement for regular collection of waste for transport off-site and final 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. • A recording system for the amount of wastes generated, recycled and disposed (including the disposal sites) should be proposed. • A Waste Management Plan should be prepared and should be submitted to the Engineer for approval. One may make reference to ETWB TCW No. 19/2005 for details. <p>In order to monitor the disposal of C&D material at landfills and public filling areas, as appropriate, and to control fly tipping, a trip-ticket system should be included as one of the contractual</p>							

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		requirements to be implemented by an Environmental Team undertaking the Environmental Monitoring and Audit work. One may make reference to DEVB TCW No.6/2010 for details.							
12.6.3	11.2.3	<p>Good management and control of construction site activities / processes can minimise the generation 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:</p> <ul style="list-style-type: none"> • Segregate and store different types of construction related waste in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal. • Provide separate labelled bins to segregate recyclable waste such as aluminium cans from other general refuse generated by the work force, and to encourage collection by individual collectors. • Any unused chemicals or those with remaining functional capacity shall be recycled. • Maximising the use of reusable steel formwork to reduce the amount of C&D material. • Prior to disposal of C&D waste, it is recommended that wood, steel 	Project Site Area / Construction Phase	Contractor		√		√	Waste Disposal Ordinance

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		<p>and other metals shall be separated for re-use and / or recycling to minimise the quantity of waste to be disposed of to landfill.</p> <ul style="list-style-type: none"> On-site crushing and sorting facilities are being considered to reduce the rock size to fulfill the size requirements from relevant waste collection / transfer / disposal facilities; Adopt proper storage and site practices to minimise the potential for damage to, or contamination of, construction materials. Plan the delivery and stock of construction materials carefully to minimise the amount of surplus waste generated. Adopt pre-cast construction method instead of cast-in-situ method for construction of concrete structures as much as possible; and Minimise over ordering of concrete, mortars and cement grout by doing careful check before ordering. <p>In addition to the above measures, other specific mitigation measures are recommended below to minimise environmental impacts during handling, transportation and disposal of wastes.</p>							

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
12.6.4	11.2.4	Storage of materials on site may induce adverse environmental impacts if not properly managed, recommendations to minimise the impacts include: <ul style="list-style-type: none"> Waste, such as soil, should be handled and stored well to ensure secure containment, thus minimising the potential of pollution; Maintain and clean storage areas routinely; Stockpiling area should be provided with covers as much as practicable 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. 	Project Site Area / Construction Phase	Contractor		√		√	-
12.6.4	11.2.4	Licensed waste haulers should be employed for the collection and transportation of waste generated. The following measures should be enforced to minimise the potential adverse impacts: <ul style="list-style-type: none"> Remove waste in timely manner; Waste collectors should only collect wastes prescribed by their permits; Impacts during transportation, such as dust and odour, should be 	Project Site Area / Construction Phase	Contractor		√		√	Waste Disposal Ordinance Waste Disposal (Charges for Disposal of Construction Waste) Regulation Land (Miscellaneous Provisions) Ordinance

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		<p>mitigated by the use of covered trucks or in enclosed containers;</p> <ul style="list-style-type: none"> Obtain relevant waste disposal permits from the appropriate authorities, in accordance with the Waste Disposal Ordinance (Cap. 354), Waste Disposal (Charges for Disposal of Construction Waste) Regulation (Cap. 345) and the Land (Miscellaneous Provisions) Ordinance (Cap. 28); Waste should be disposed of at licensed waste disposal facilities; and Maintain records of quantities of waste generated, recycled and disposed. 							
12.6.4	11.2.4	<p>Land transport will be used for transportation of excavated and stockpile materials. It is expected there will be 1260 vehicles per day for transporting waste during peak construction phase. The tentative transportation routings for the disposal of various types of wastes are shown in Table 12.4. The transportation routing may be changed subject to the traffic conditions. Nevertheless, it is anticipated that there is no adverse impact from the waste during transportation with the implementation of appropriated measures (e.g. using water-tight containers and covered trucks).</p>	Transportation Route of Waste / Construction Phase	Contractor		√			-

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
12.6.4	11.2.4	In order to monitor the disposal of C&D materials at PFRFs and landfills and to control fly-tipping, a trip-ticket system should be established in accordance with DEVB TCW No. 6/2010. A recording system for the amount of waste generated, recycled and disposed, including the disposal sites, should also be set up. Warning signs should be put up to remind the designated disposal sites. Close-circuited television should be installed at the vehicular entrance and exit of the site as additional measures to prevent fly-tipping.	Project Site Area / Construction Phase	Contractor		√		√	DEVB TCW No. 6/2010
12.6.4	11.2.5	In addition to the above general measures, other specific mitigation measures on handling the C&D materials and materials generated from site formation and demolition work are recommended below, which should form the basis of the WMP to be prepared by the contractor(s) in construction phase.	Project Site Area / Construction Phase	Contractor		√		√	Technical Circular (Works) No. 19/2005 Environmental Management on Construction Site
12.6.5	11.2.5	In order to minimise the impact resulting from collection and transportation of C&D materials for off-site disposal, the excavated material arising from site formation and foundation works should be reused on-site as backfilling material and for landscaping works as far as practicable. Other mitigation requirements are listed below:	Project Site Area / Construction Phase	Contractor		√		√	Waste Disposal Ordinance ETWB TCW No.19/2005 DEVB TCW No. 6/2010

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		<ul style="list-style-type: none"> A WMP, which becomes part of the EMP, should be prepared in accordance with ETWB TCW No.19/2005; A recording system for the amount of wastes generated, recycled and disposed (including the disposal sites) should be adopted for easy tracking; and In order to monitor the disposal of C&D materials at public filling facilities and landfills and to control fly-tipping, a trip-ticket system should be adopted (refer to DEVB TCW No. 6/2010). <p>It is recommended that specific areas should be provided by the Contractors for sorting and to provide temporary storage areas (if required) for the sorted materials.</p>							
12.6.5	11.2.5	The Contactor should prepare and implement an EMP in accordance with ETWB TCW No.19/2005, which describes the arrangements for avoidance, reuse, recovery, recycling, storage, collection, treatment and disposal of different categories of waste to be generated from construction activities. Such a management plan should incorporate site specific factors, such as the designation of areas for segregation and temporary storage of reusable and recyclable materials. The EMP should	Project Site Area / Construction Phase	Contractor		√			ETWB TCW No.19/2005

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		be submitted to the Engineer for approval. The Contractor should implement waste management practices in the EMP throughout the construction stage of the Project. The EMP should be reviewed regularly and updated by the Contractor, preferably on a monthly basis.							
12.6.5	11.2.5	All surplus C&D materials arising from or in connection with construction works should become the property of the Contractor when it is removed unless otherwise stated. The Contractor would be responsible for devising a system to work for on-site sorting of C&D materials and promptly removing all sorted and process materials arising from the construction activities to minimise temporary stockpiling on-site. The system should be included in the EMP identifying the source of generation, estimated quantity, arrangement for on-site sorting, collection, temporary storage areas and frequency of collection by recycling Contractors or frequency of removal off-site.	Project Site Area / Construction Phase	Contractor		√		√	-
12.6.6	11.2.6	The practices of good housekeeping for CSTW listed below should be followed to ameliorate any odour impact from handling, collection, transportation and disposal of sludge:	Operation Phases	Operator			√		Waste Disposal Ordinance

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		<ul style="list-style-type: none"> Screens should be cleaned regularly to remove any accumulated organic debris Grit and screening transfer systems should be flushed regularly with water to remove organic debris and grit Grit and screened materials should be transferred to closed containers Scum and grease collection wells and troughs should be emptied and flushed regularly to prevent putrefaction of accumulated organics Skim and remove floating solids and grease from primary clarifiers regularly Frequent sludge withdrawal from tanks is necessary to prevent the production of gases Sludge should be transported to the STF by water-tight containers to avoid Hydrogen Sulphide (H₂S)/odour emission and ingress of water into the containers which would lower the sludge dryness during transportation Sludge cake should be transferred to closed containers Sludge containers should be flushed with water regularly 							

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		<ul style="list-style-type: none"> Sludge trucks and containers should be washed thoroughly before leaving the CSTW to avoid any odour nuisance during transportation 							
12.6.6	11.2.6	In addition, all wastewater generated from the sludge dewatering process and all contaminated water from the cleaning operations recommended for odour control will be diverted to the relocated STSTW for proper treatment.	Operation Phases	Operator			√		Waste Disposal Ordinance
12.6.7	11.2.7	If chemical wastes are produced at the construction site or during operation, the Contractor during construction or the operator during operation will be required to register with the EPD as a chemical waste producer and to follow the guidelines stated in the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes. Good quality containers compatible with the chemical wastes should be used, and incompatible chemicals should be stored separately. Appropriate labels should be securely attached on each chemical waste container indicating the corresponding chemical characteristics of the chemical waste, such as explosive, flammable, oxidising, irritant, toxic, harmful, corrosive, etc. The Contractor shall use a licensed collector to transport and dispose of the chemical wastes, to the licensed Chemical Waste Treatment Centre, or other	Construction and Operation Phases	Contractor / Operator		√	√		<p>Waste Disposal (Chemical Waste) (General) Regulation</p> <p>Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes</p>

EIA Ref.	EM&A Log Ref.	Environmental Protection Measures	Location / Duration of Measures / Timing of Completion of Measures	Implementation Agent	Implementation Stage ¹				Relevant Legislation & Guidelines
					Des	C	O	Dec	
		licensed facilities, in accordance with the Waste Disposal (Chemical Waste) (General) Regulation.							
12.6.8	11.2.8	Recycling of waste paper, aluminium cans and plastic bottles should be encouraged, it is recommended to place clearly labelled recycling bins at designated locations which could be accessed conveniently. Other general refuse should be separated from chemical and industrial waste by providing separated bins for storage to maximise the recyclable volume.	Construction and Operation Phases	Contractor / Operator		√	√		Public Health and Municipal Services Ordinance (Cap.132)
12.6.8	11.2.8	A reputable licensed waste collector should be employed to remove general refuse on a daily basis to minimise odour, pest and litter impacts.	Construction and Operation Phases	Contractor / Operator		√	√		Public Health and Municipal Services Ordinance (Cap. 132)
	Health Impact								
-	-	Not applicable.							

Appendix D

Sample Template for the Interim Notification

Appendix D 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 E

Complain Register Form

Drainage Services Department **Performance-related Complaint Register**

First date of receipt by the Department	Date of receipt by the Division	File Ref.	Format of complaint (Please tick)		Channel of complaint (see Note 1)	Brief account of the complaint	Details of actions taken			
			Verbal	Written			Complaints transferred to and on	Interim reply sent on (Note 2)	Full reply to complainant sent on	Follow-up action required (please specify)

Note 1:

CE - Chief Executive's Office
CS - Chief Secretary for Administration's Office
OB - The Ombudsman
LC - Legislative Council
A - Anonymous

PB - Policy Bureaux
DB - District Boards
ICAC - Independent Commission Against Corruption
M - Mass media
O - Other departments/organizations (please specify)

Note 2:

An interim reply should be sent to the complainant if a full reply cannot be made within 10 calendar days or before the specified deadline.
The interim reply should explain the reasons for the delay and give an indication of whom to contact if the complainant wishes to check progress.

Drainage Services Department
Return on Performance-related Complaints for the month of _____

To: ADS/GA2 (Fax: 2827 8605)

From: _____ (HQs/Branch/Division)

First date of receipt by the Department	Date of receipt by the Division	Format of complaint (Please tick)		Channel of complaint (see Note 1)	Brief account of the complaint	Details of actions taken			Status of follow-up action: C - completed I - in progress (Note 3)
		Verbal	Written			Interim reply sent on (Note 2)	Full reply to complainant sent on	Follow-up action required (please specify)	

Note 1:

CE - Chief Executive's Office
CS - Chief Secretary for Administration's Office
OB - The Ombudsman
LC - Legislative Council
A - Anonymous

PB - Policy Bureaux
DB - District Boards
ICAC - Independent Commission Against Corruption
M - Mass media
O - Other departments/organizations (please specify)

Note 2:

An interim reply should be sent to the complainant if a full reply cannot be made within 10 calendar days or before the specified deadline.
The interim reply should explain the reasons for the delay and give an indication of whom to contact if the complainant wishes to check progress.

Note 3:

All in progress complaints reported in the current period should be repeated in the following monthly returns until their follow-up actions are completed.

Signature: _____

Name: _____

Post: _____

Date: _____