

MATERIALAB CONSULTANTS LIMITED

Room 723 & 725, 7/F, Block B,
Profit Industrial Building,
1-15 Kwai Fung Crescent, Kwai Fong,
Hong Kong.

Tel : (852)-24508238
Fax : (852)-24508032
Email : mcl@fugro.com.hk

The logo for MaterialLab, featuring the word "MaterialLab" in a bold, sans-serif font. The "Material" part is in a smaller size and weight than "Lab", which is significantly larger and bolder. The text is contained within a thick, black horizontal bar that spans the width of the logo.

Environmental Monitoring & Audit Manual

April 2016

Client : SANG HING – KULY JOINT VENTURE

Contract Name : Castle Peak Road Trunk Sewer and Tuen Mun Village Sewerage (Sewage Pumping Station at Lok Chui Street near Castle Peak Villas)

Contract No. : DC/2014/01


EP No. : EP-068/2000/A

Title of Project : Sewage Pumping Stations at Tai Lam Chung Tsuen Luen On San Tsuen, Tai Lam Valley and Lok Chui Street near Castle Peak Villas under the scope of “Tuen Mun Sewerage – Eastern Coastal Sewerage Extension”

Report No. : 0367/15/ED/0120G

Prepared by : Wingo H. W. So

Reviewed by : Vincent C. T. Chan

Certified by : 
Colin K. L. Yung
Environmental Team Leader
MaterialLab Consultants Limited



Drainage Services Department
42/F., Revenue Tower
5 Gloucester Road
Wan Chai
Hong Kong

Attention: Ms Cathleen Chan

Your reference:

Our reference: HKDSD202/50/103504

Date: 8 April 2016

BY EMAIL & POST
(email: fcchan02@dsd.gov.hk)

Agreement No.: PM 08/2014
Services for Independent Environmental Checker for
Construction of Lok Chui Street Sewage Pumping Station
Verification of Environmental Monitoring & Audit Manual

We refer to email of 7 April 2016 attaching an Environmental Monitoring & Audit Manual for the captioned project prepared by the ET.

We have no comment and hereby verify the Manual in accordance with Clause 2.4 of the Environmental Permit no. EP-068/2000/A.

Please do not hesitate to contact the undersigned at 2618 2836 should you have any queries.

Yours faithfully
ANewR CONSULTING LIMITED

Adi Lee
Independent Environmental Checker

LYMA/LHHN/csym

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1. INTRODUCTION

1.1 Background

- 1.1.1 Contract No. DC/2014/01 – Castle Peak Road Trunk Sewer and Tuen Mun Village Sewerage (“the Project”) includes the construction of a sewage pumping station at Lok Chui Street near Castle Peak Villas as shown in **Figure 1**.
- 1.1.2 The environmental impact assessment (EIA) report (Tuen Mun Sewerage - Eastern Coastal Sewerage Extension) – EIA Report (Register No. AEIAR-034/2000) for the Project was approved by Environmental Protection Department (EPD) dated 7 June 2000. The EIA Report involves the construction of four sewage pumping stations at Tai Lam Chung Tsuen, Luen On San Tsuen, Tai Lam Valley and Lok Chui Street near Castle Peak Villas. The scope of this EM&A Manual focuses on the Sewage Pumping Station at Lok Chui Street near Castle Peak Villas in the EIA Report. The Project is designated under Schedule 2, section F3(b) and Q1 of the Environmental Impact Assessment Ordinance (EIAO).
- 1.1.3 EPD subsequently issued the Environmental Permit (EP) EP- 068/2000 on 25 July 2000 and the Variation of Environmental Permit (VEP) EP-068/2000/A on 10 April 2015.
- 1.1.4 The amended EP (EP-068/2000/A) is the current permit for the Project.
- 1.1.5 The Project proponent was the Drainage Services Department, HKSAR (DSD). AECOM Asia Co. Ltd. (AECOM) was commissioned by DSD as the Engineer”/Engineer’s Representative (ER) for the Project.
- 1.1.6 ANewR Consulting Limited (ANEWR) was appointed by DSD to undertake the role of Independent Environmental Checker (IEC).
- 1.1.7 Sang Hing – Kuly Joint Venture was awarded by DSD as the main contractor for the construction works for the Project.
- 1.1.8 MaterialLab Consultants Limited (MCL) was appointed by Sang Hing – Kuly Joint Venture to undertake the role of Environmental Team (ET) for the Project.
- 1.1.9 This EM&A Manual defines the EM&A programme and requirements for the construction and operation of the sewage pumping station at Lok Chui Street near Castle Peak Villas within Contract No. DC/2014/01, the layout of the pumping station is shown in **Figure 1**.
- 1.1.10 Pursuant to EP (EP-068/2000/A) condition 2.3, this Manual shall be submitted to the Director of Environmental Protection (the Director) for approval.

1.2 Project Description

- 1.2.1 The works mainly include the construction of a sewage pumping station at Lok Chui Street near Castle Peak Villas of size measuring about 15m x 23m x 6m(Height) with a pumping capacity of about 9,420 m³ per day.
- 1.2.2 The location of Castle Peak Villas pumping station is given in **Figure 1**.

1.3 Objective of the Manual

1.3.1 The objective of this EM&A Manual is to define the procedures of the EM&A programme for monitoring the environmental performance of the construction of a pumping station at Castle Peak Villas.

The purposes of this EM&A programme shall also include the following:

- To clarify and identify sources of pollution, impact and nuisance arising from the works;
- To confirm compliance with legal, contract specifications and EIA study recommendations;
- To provide an early warning system for impact prevention;
- To provide a database of environmental parameters against which to determine any short term or long term environmental impacts;
- To propose timely, cost-effective and viable solutions to actual or potential environmental issues;
- To monitor performance of the mitigation measures and to assess their effectiveness, whenever necessary, identify any further need for additional measures;
- To verify the EIA predicted impacts;
- To collate information and evidence for use in public, District Board and Government consultation; and
- To audit environmental performance.

1.3.2 The Hong Kong SAR Government's applicable environmental regulations for noise and air quality, water quality, waste management and heritage protection, the Hong Kong Planning Standards and Guidelines and recommendations in the EIA study have served as guidance documents in the preparation of this Manual. This EM&A Manual fulfills the requirements of the Study Agreement, Clause 6.6, and follows the approach recommended in the Environmental Protection Department's (EPD's) Generic EM&A Manual, Annex 21 of the Technical Memorandum on the EIA Process and EPD's EM&A Guidelines for Development Projects in Hong Kong and the original EM&A Manuals.

1.3.3 This Manual contains the following information:

- i Description of the project;
- ii Identification and recommendations for monitoring requirements for all phases of development, including:
 - Identification of sensitive receivers;
 - Monitoring locations;
 - Monitoring parameters and frequencies;
 - Monitoring equipment to be used;
 - Programmes for baseline monitoring and impact monitoring; and
 - Data management of monitoring results.
- iii The organization management structure, and procedures for auditing of the Project and implementation of mitigation measures that are recommended for the Project;
- iv The environmental quality performance limits for compliance auditing for each of the recommended monitoring parameters to ensure compliance with relevant environmental quality objectives, statutory or planning standards;
- v Organization and management structure, and procedures for reviewing the design submissions, monitoring results and auditing the compliance of the monitoring data with the environmental quality performance limits, contractual and regulatory requirements, and environmental policies and standards;
- vi Event and action plans for impact and compliance procedures;
- vii Complaints handling, liaison and consultation procedures;
- viii Interim notification of exceedances, reporting procedures, report formats and reporting frequency including periodical quarterly summary reports and annual reviews to cover all construction, post-Project and operational phases of the development; and
- ix Implementation schedules, summarizing all recommended mitigation measures as shown in **Appendix A**.

1.3.4 This Manual is considered to be a working document and should be reviewed periodically and revised once substantial changes have been made.

1.3.5 A flow chart of the general construction phase EM&A activities is shown in **Figure 2**.

1.4 Scope of Works

Construction Activities

1.4.1 The construction of the pumping station will require the following activities:

- Concrete breaking, where existing paved surfaces need to be broken;
- Excavation of soil material;
- Pre-drilling
- Soldier piling
- Mini-piling
- Compaction of earth and bedding material;
- Installation of pipeline;
- Backfilling of soil materials;
- Repaving;
- Constructing a small structure above ground to house the monitoring and electrical equipment; and
- Sheet piling may be required to support the excavations.

1.4.2 The equipment that will be required for the construction of the project will include hand-held or pneumatic breakers; air compressor; excavator; truck; compactor; crane; lorry; and an asphalt paver.

Construction Programme

1.4.3 The duration of the complete works will be approximately 39 months. A tentative construction programme is provided in **Figure 3**.

1.5 Environmental Monitoring and Audit Requirements

1.5.1 Based on the recommendation of the EIA Report, a Monitoring and Audit programme will be required for air, noise, water quality, waste, landscape and visual resources and heritage. Except for air and noise, most of these measures will be undertaken by supervision of the works rather than by quantitative measurements. The environmental monitoring and audit activities for this Project will be conducted in three distinct stages:

- Pre-construction (baseline);
- Construction phase impact; and
- Operational phase impact.

1.5.2 The operational phase works is relevant only to the audit of the maintenance and establishment period of the compensatory planting recommended by the EIA. The detailed EM&A requirements for each of the parameters are provided in the following sections and the approximate programme for the EM&A works included with the construction programme in **Figure 3**.

1.6 Project Organization

1.6.1 For the purpose of this EM&A Manual, the Drainage Services Department of the Hong Kong SAR Government is referred to as the “Employer” and the “Engineer”/Engineer’s Representative (ER) will be responsible for the supervision of the construction of the Project.

1.6.2 An Environmental Team Leader (ETL) is employed by the Contractor. He shall ensure the Contractor’s compliance with the project’s environmental performance requirements during construction. The responsibilities of the specialist will include field measurements, sampling, analysis of monitoring results, reporting and auditing. The ETL shall be approved by the ER and the DEP, shall be competent and shall have 7 years relevant environmental monitoring and audit experience on projects of a similar scale and nature, unless otherwise agreed with the DEP. The ETL will require suitable support staff (the Environmental Team, ET), to carrying out the EM&A programme including the noise, dust, water quality and waste management monitoring and supervision. The duties of the team are:

- Sampling, analysis and statistical evaluation of monitoring parameters with reference to the EIA study recommendations and requirements;
- Environmental site surveillance;
- Audit of compliance with environmental protection, and pollution prevention and control regulations;
- Monitor the implementation of environmental mitigation measures;
- Monitor compliance with the environmental protection clauses/specifications in the Contract;
- Review construction programme and comment as necessary;
- Review construction methodology and comment as necessary;
- Complaint investigation, evaluation and identification of corrective measures;
- Liaison with Independent Environmental Checker (IEC) on all environmental performance matters;
- Advice to the Contractor on environmental improvement, awareness, enhancement matter, etc., on site; and
- Timely submission of the EM&A report to the Employer and Director of the Environmental Protection (DEP).

1.6.3 Accordingly, a Landscape Architect with a minimum of 1-2 years on-site experience will be required on the ET to monitor and audit the landscaping installation works and landscape protection measures.

1.6.4 An Independent Environmental Checker (IEC) is employed by the Permit Holder and shall not be in any way associated with either the Contractor nor the ETL and his team. The IEC shall advise the ER on environmental issues related to the project. The role of the Checker shall be independent from the management of construction works, but the Checker shall be empowered to audit the environmental performance of construction. The IEC shall have project management experience in addition to the requirements of the ETL specified in

Section 1.6.3. The appointment of the Checker is subject to the approval of the ER. The main duty of the IEC shall include the followings:

- Review and audit all aspects of the EM&A programme;
- Validate and confirm the accuracy of monitoring results, monitoring equipment, monitoring locations, monitoring procedures and locations of sensitive receivers;
- Carry out random sample check and audit on monitoring data and sampling procedures, etc;
- Conduct random site inspection;
- Audit the EIA recommendations and requirements against the status of implementation of environmental protection measures on site;
- Review the effectiveness of environmental mitigation measures and project environmental performance;
- On a needs basis, audit the Contractor's construction methodology and agree the least impact alternative in consultation with the ET and the Contractor;
- Check complaint cases and the effectiveness of corrective measures;
- Review EM&A report submitted by the ET; and
- Feedback audit results to the ETL by signing off relevant EM&A proformas (see **Appendix B** for reference).

1.6.5 An organization chart showing the lines of communication with respect to the EM&A works is provided on **Figure 4**.

1.7 Documentation

1.7.1 All documentation is required to be filed in a traceable and systematic manner. Site documents, such as, monitoring field records, meeting minutes, correspondences etc. shall be cross-referenced by the ETL and be ready for inspection upon request. All construction and operational phase EM&A results and findings shall be documented in the construction phase EM&A reports prepared by the ETL and endorsed by IEC, prior to disseminate to the Contractor, the ER, and the DEP.

1.7.2 All documentation to the DEP shall be in paper form and/or electronic (in the format in agreement with the Director) upon request. All documents and data shall be kept for at least one year after the completion of the construction contract. All submissions (reports, data and correspondences etc.) to the DEP shall be liable to use freely for the purposes of communicating environmental data and the owner of information shall claim no copyright. Any request to treat all or part of a submission in confidence will be respected, but if no such request is made it will be assumed that the submission is not intended to be confidential.

1.8 Terminology

1.8.1 To clarify the terminology for noise and air quality impact monitoring and audit, the following definitions are used throughout this Manual.

1.8.2 Monitoring refers to the systematic collection of data through a series of repetitive measurements. The stages of monitoring are defined in this document as follows:

- (i) Baseline Monitoring refers to the measurement of noise and air quality impact parameters during a representative pre-project period for the purpose of determining the nature and ranges of natural variation and to establish, where appropriate, the nature of change.
- (ii) Impact Monitoring involves the measurement of noise and air quality impact parameters during Project construction and implementation so as to detect changes in these parameters which can be attributed to the Project.
- (iii) Compliance Monitoring unlike Baseline and Impact Monitoring is not necessarily aimed at noise and air quality impact parameters, but takes the form of periodic sampling and/or continuous measurement of noise and dust levels to ensure that regulatory requirements are observed and standards are met. There are no requirements for compliance monitoring for this Project.

1.8.3 Audit is a term that infers the verification of a practice and certification of data. The types of audit are defined below:

- (i) Compliance audit is defined as follows:
 - The process of verification that all or selected parameters measured by a noise or air quality impact monitoring programme or levels of an operation are in compliance with regulatory requirements and internal policies and standards;
 - The determination of the degree and scope of any necessary remediation in the event of exceedance of compliance.
- (ii) Post Project Audit is carried out after the implementation and commissioning of a Project and was found not to be applicable to this Project.

1.8.4 For the purpose of noise and air quality impact monitoring and audit, the Action and Limit Levels are defined as follows:

- (i) The Action Level is the level defined in which there is an indication of a deteriorating ambient level for which a typical response could be an increase in the monitoring frequency.
- (ii) The Limit Level is the level beyond the appropriate remedial pollution control ordinances, noise and air quality impact objectives or Hong Kong Planning Standards and Guidelines established by EPD for a particular project, such that the works should not proceed without appropriate remedial action, including a critical review of plant and work methods.

2. AIR QUALITY

2.1 Applicable Environmental Standards and Guidelines

Construction Phase

2.1.1 The principal statutory environment requirement to be observed during the execution of the project includes the following Ordinance and its subsidiary regulations:

- Air Pollution Control Ordinance (Cap. 311)
- Air Pollution Control (Construction Dust) Regulation
- Air Pollution Control (Open Burning) Regulation
- Air Pollution Control (Smoke) Regulation
- Air Pollution Control (Specified Processes) Regulations
- Air Pollution Control (Asbestos) (Administration) Regulation
- Air Pollution Control (Fuel Restriction) Regulation
- Air Pollution Control (Non-road Mobile Machinery) (Emission) Regulation

2.1.2 Besides the above legislation, the following non statutory requirements in Hong Kong are considered of relevance to the Project:

- PNRC 15 – Asbestos
- PNRC 17 –Control of Environmental Nuisance from Construction Sites
- PN 2/97 – Handling of Asbestos Containing Materials in Buildings
- ETWB TC(W) 19/2005 - Environmental Management on Construction Sites

2.1.3 Air quality is regulated through Annex 4 of the Technical Memorandum on EIA Process (TMEIA) which specified compliance with the Air Pollution Control Ordinance, 1983 Cap. 311. This provides, inter alia, statutory Air Quality Objectives (AQO) for each Air Control Zone in the Territory.

2.1.4 In addition to the Air Quality Objectives, the TMEIA also stipulates that a maximum hourly average level of 500 µg/m³ of Total Suspended Particulates (TSP) should not be exceeded at the boundary of any construction works or at the nearest sensitive receivers and this is the criteria relevant to this project.

2.2 Air Quality Parameters

2.2.1 Monitoring of the 1 hourly average of Total Suspended Particulates (TSP) levels only shall be carried out by the ET to ensure that construction works are not generating dust which exceeds the acceptable level. Timely action should be taken to rectify the situation if an exceedance is detected. 1-hour TSP levels shall be measured by direct reading methods.

2.2.2 All relevant data shall also be recorded by the ET. A sample data sheet is shown in **Appendix C**.

2.3 Monitoring Equipment

2.3.1 The Contractor shall be responsible for provision of an acceptable dust sampler or monitoring equipment and ensuring the instruments are properly calibrated and maintained. A hand-held wind speed and direction anemometer shall also be used.

2.4 Monitoring Locations

- 2.4.1 The air quality sensitive receivers as determined by the EIA and recommended dust monitoring locations are shown in **Figure 5**. The specific locations of the monitoring stations are to be determined by the ETL and approved by the DEP prior to monitoring. The status and locations of dust sensitive receivers may change after issue of this manual. If this happens, the ETL shall propose updated monitoring locations and seek approval from the Engineer's Representative (ER) and agreement from the Independent Environmental Checker (IEC) and EPD.
- 2.4.2 When alternative monitoring locations are proposed, the following preferred locations and factors shall be considered:
- i The site boundary or locations close to the major dust emission source;
 - ii Close to the sensitive receptors; and
 - iii The prevailing meteorological conditions.
- 2.4.3 Prior to project construction, the construction schedule shall be established and the dust monitoring schedule shall be developed by the ETL and the IEC shall be informed of the impact monitoring programme such that he can conduct on-site audit to ensure accuracy of the impact monitoring results. The environmental monitoring schedule shall be approved by the ER.

2.5 Baseline Monitoring

- 2.5.1 Prior to the commencement of construction works, the ET shall carry out 1 hour baseline dust monitoring, 3 times per day, for a period of at least 14 consecutive days at the representative sensitive receivers as listed below:
- LC6a: The Castle Bay
 - LC9: Castle Peak Villas Block C
- 2.5.2 During the baseline monitoring, there should not be any construction or dust generation activities in the vicinity of the monitoring stations.
- 2.5.3 In case the baseline monitoring cannot be carried out at the designated monitoring locations during the baseline monitoring period, the ET shall carry out the monitoring at alternative locations which can effectively represent the baseline conditions at the impact monitoring locations. The alternative baseline monitoring locations shall be approved by the Engineer's Representative and agreed with DEP.
- 2.5.4 In the event that insufficient baseline monitoring data or questionable results are obtained, the ET shall liaise with the DEP to agree on an appropriate set of data to be used as a baseline reference and submit this data to the Engineer's Representative for approval.
- 2.5.5 Ambient conditions may vary seasonally and shall be reviewed at three monthly intervals. If the ET considers that the ambient conditions have changed and a repeat of the baseline monitoring is required to be carried out for obtaining updated baseline levels, the monitoring should be at times when the Contractor's activities are not generating dust, at least in the proximity of the monitoring stations. Should a change in ambient conditions be determined, the baseline levels and, in turn, the air quality criteria, shall be revised. The revised baseline levels and air quality criteria shall be agreed with the DEP.

2.6 Impact Monitoring

2.6.1 The ET shall carry out impact monitoring during the course of the works at the pumping stations as shown in **Figure 1**. For regular impact monitoring, the sampling frequency of at least once per week shall be strictly observed at designated monitoring stations for 1-hr TSP monitoring using the direct reading method. The stations to be monitored should be selected based on their proximity to the pumping during active construction works. Other relevant data that will need to be recorded will include the prevailing weather conditions, including wind speed and direction.

2.7 Event and Action Plan for Air Quality

2.7.1 The baseline monitoring results will 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 and 1-hour TSP. **Table 2.1** shows the air quality criteria, namely Action and Limit levels to be used. Should non-compliance with the air quality criteria occur, the ET, the Engineer’s Representative and the Contractor shall undertake their specified actions in accordance with the Action Plan shown in **Table 2.2**.

Table 2.1 Action and Limit Levels for Air Quality

Parameters	Location	Action	Limit
1 Hour TSP Level in $\mu\text{g}/\text{m}^3$	LC6a LC9	For baseline level $\leq 384 \mu\text{g}/\text{m}^3$, Action level = (Baseline level*1.3+Limit level)/2; For baseline level $> 384 \mu\text{g}/\text{m}^3$, Action level = Limit level	500

2.7.2 In case of non-compliance with the air quality criteria, more frequent monitoring exercise shall be conducted within 24 hours after the result is obtained. This additional monitoring shall be continued until the excessive dust emission or the deterioration in air quality is rectified. The Event/Action Plan for air quality is given in the attached **Table 2.2**.

2.7.3 The IEC shall be empowered to audit the environmental performance of construction, all aspects of the EM&A programme, validate and confirm the accuracy of monitoring results, monitoring equipment, monitoring locations and procedures. If any exceedance occurs, the IEC shall follow the actions stated in **Table 2.2** Event and Action Plan.

2.8 Dust Mitigation Measures

2.8.1 The EIA report has recommended dust control and mitigation measures. The Contractor shall be responsible for the design and implementation of the following measures. The recommended construction dust mitigation measures are summarized in the Environmental Mitigation Implementation Schedule provided in **Appendix A** and is listed below:

- (i) The Contractor shall at his own cost and to the satisfaction of the Engineer, install effective dust suppression measures and take such other measures as may be necessary to ensure that dust measures are within acceptable levels at the site boundary and any nearby sensitive receiver.
- (ii) The Contractor shall not burn debris or other materials on the works areas.
- (iii) The Contractor shall implement dust suppression measures which shall include, but not be limited, to be following:
 - a) Stockpiles of imported material kept on site shall be contained within hoardings, dampened and/or covered during dry and windy weather.
 - b) Material stockpiled alongside trenches should be covered with tarpaulins whenever works are within village boundaries.
 - c) Water sprays shall be used during the delivery and handling of cement, sand, aggregate and the like.
 - d) No batching of concrete should be carried out on site. Concrete should be used in ready mixed form and off loaded adjacent to designated works areas.
 - e) Any vehicle used for moving cement, sand, aggregate and construction waste shall have properly fitting side and tail boards. Materials shall not be loaded to a level higher than the side and tail boards, and shall be covered by a clean tarpaulin. The tarpaulin shall be properly secured and shall extend at least 300mm over the edges of the side and tail boards.
 - f) No earth, mud, debris, dust and the like shall be deposited on public roads.

2.8.2 If the above measures are not sufficient to restore the air quality to acceptable levels upon the advice of the ET, the Contractor shall liaise with the ET on other mitigation measures and consult the IEC for their effectiveness, and then propose these measures to the Engineer's Representative for approval and implement the measures.

Table 2.2 Event / Action Plan for Air Quality

EVENT	ACTION			
	ET	IEC	ER	Contractor
Action Level				
Exceedance for one sample.	<ul style="list-style-type: none"> Identify the source. Inform the IEC and the ER. Repeat measurement to confirm finding. Increase monitoring frequency to daily. 	<ul style="list-style-type: none"> Check monitoring data submitted by the ET. Check Contractor's working method. 	<ul style="list-style-type: none"> Notify Contractor. 	<ul style="list-style-type: none"> Rectify any unacceptable practice. Amend working methods if appropriate.
Exceedance for two or more consecutive samples.	<ul style="list-style-type: none"> Identify the source. Inform the IEC and the ER. Repeat measurements to confirm findings. Increase monitoring frequency to daily. Discuss with the IEC and the Contractor on remedial actions required. If exceedance continues, arrange meeting with the IEC and the ER. If exceedance stops, cease additional monitoring. 	<ul style="list-style-type: none"> Check monitoring data submitted by the ET. Check the Contractor's working method. Discuss with the ET and the Contractor on possible remedial measures. Advise the ER on the effectiveness of the proposed remedial measures. Supervisor implementation of remedial measures. 	<ul style="list-style-type: none"> Confirm receipt of notification of failure in writing. Notify the Contractor. Ensure remedial measures properly implemented. 	<ul style="list-style-type: none"> Submit proposals for remedial actions to IEC within 3 working days of notification. Implement the agreed proposals. Amend proposal if appropriate.
Limit Level				
Exceedance for one sample.	<ul style="list-style-type: none"> Identify the source. Inform the ER and the DEP. Repeat measurement to confirm finding. Increase monitoring frequency to daily. Assess effectiveness of Contractor's remedial actions and keep the IEC, the DEP and the ER informed of the results. 	<ul style="list-style-type: none"> Check monitoring data submitted by the ET. Check Contractor's working method. Discuss with the ET and the Contractor on possible remedial measures. Advise the ER on the effectiveness of the proposed remedial measures. Supervisor implementation of remedial measures. 	<ul style="list-style-type: none"> Confirm receipt of notification of failure in writing. Notify the Contractor. Ensure remedial measures are properly implemented. 	<ul style="list-style-type: none"> Take immediate action to avoid further exceedance. Submit proposals for remedial actions to IEC within 3 working days of notification. Implement the agreed proposals. Amend proposal if appropriate.
Exceedance for two or more consecutive samples	<ul style="list-style-type: none"> Notify the IEC, the ER, the DEP and the Contractor. Identify the source. Repeat measurements to confirm findings. Increase monitoring frequency to daily. Carry out analysis of the Contractor's working procedures to determine possible mitigation to be implemented. Arrange meeting with the IEC and the ER to discuss the remedial actions to be taken. Assess effectiveness of the Contractor's remedial actions and keep the IEC, the DEP and the ER informed of the results. If exceedance stops, cease additional monitoring. 	<ul style="list-style-type: none"> Discuss amongst the ER, ET and the Contractor on the potential remedial actions. Review the Contractor's remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly. Supervise the implementation of remedial measures. 	<ul style="list-style-type: none"> Confirm receipt of notification of failure in writing. Notify the Contractor. In consultation with the IEC, agree with the Contractor on the remedial measures to be implemented. Ensure remedial measures are properly implemented. If exceedance continues, consider what activity of the work is responsible and instruct the Contractor to stop that activity of work until the exceedance is abated. 	<ul style="list-style-type: none"> Take immediate action to avoid further exceedance. Submit proposals for remedial actions to IEC within 3 working days of notification. Implement the agreed proposals. Resubmit proposals if problem still not under control. Stop the relevant activity of works as determined by the ER until the exceedance is abated.

3. NOISE

3.1 Introduction

3.1.1 Based upon the EIA report, it is recommended that EM&A procedures be carried out during the construction phase. However, operational noise monitoring is not considered to be necessary as no residual noise impacts are predicted.

3.2 Applicable Environmental Standards and Guidelines

3.2.1 The principal statutory environment requirement to be observed during the execution of the project includes the following Ordinance and its subsidiary regulations:

- Noise Control Ordinance (Cap. 400)
- Noise Control (General) Regulations
- Noise Control (Construction Work) Regulation
- Noise Control (Hand Held Percussive Breakers) Regulations
- Noise Control (Air Compressors) Regulation

3.2.2 Besides the above legislation, the following non statutory requirements in Hong Kong are considered of relevance to the Project:

- PN 1/93 – Noise from Construction Activities – Statutory
- PN 2/93 – Noise from Construction Activities – Non-statutory Controls
- ETWB TC(W) 19/2005 - Environmental Management on Construction Sites

3.3 Noise Parameters

3.3.1 The construction noise level shall be monitored by the Environmental Specialist and shall be measured in terms of the A-weighted equivalent continuous sound pressure level (Leq). Leq (30min) shall be used as the monitoring parameter for the time period between 0700-1900 hours on normal weekdays. For all other time periods, Leq (5 min) shall be employed for comparison with the NCO criteria. A sample data record sheet is shown in **Appendix C** for reference.

3.4 Monitoring Equipment

3.4.1 As referred to in the Technical Memorandum (TM) issued under the Noise Control Ordinance (NCO), sound level meters in compliance with the International Electrotechnical Commission Publications 651: 1979 (Type 1) and 804: 1985 (Type 1) specifications shall be used for carrying out the noise monitoring.

3.4.2 Immediately prior to and following each noise measurement the accuracy of the sound level meter shall be checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Measurements may be accepted as valid only if the calibration level from before and after the noise measurement agrees to within 1.0dB.

3.4.3 Noise measurements shall not be made in fog, rain, wind with a steady speed exceeding 5ms^{-1} or wind with gusts exceeding 10ms^{-1} . The wind speed shall be checked with a portable wind speed meter capable of measuring the wind speed in m/s.

3.4.4 The Contractor will be responsible for the provision of the monitoring equipment. The Contractor 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 labeled.

3.5 Monitoring Locations

3.5.1 The areas for the recommended noise monitoring stations, same as the dust monitoring locations, are shown in **Figure 5**. The specific locations of the monitoring stations are to be determined by the ET and approved by DEP prior to monitoring. If the status or locations of noise sensitive receivers change after issuing this manual, the ET shall propose the updated monitoring locations and seek approval from the Engineer's Representative and agreement from IEC and DEP of the proposal to amend the monitoring locations.

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

- (i) Monitoring at sensitive receivers close to the major site activities which are likely to have noise impacts;
- (ii) Monitoring at the noise sensitive receivers as defined in the Technical Memorandum; and
- (iii) Assurance of minimal disturbance to the occupants during monitoring.

3.5.3 The monitoring station shall normally be at a point 1m from the exterior of the sensitive receivers building facade and be at a position 1.2m above the ground. If there is problem with access to the normal monitoring position, an alternative position may be chosen and a correction to the measurements shall be made.

3.5.4 After carrying out noise measurements, noise levels shall be corrected in accordance with Section 2.10 and 2.11 of the "Technical Memorandum on Noise From Construction Works Other Than Percussive Piling". The ET shall agree with the Engineer's Representative, IEC and DEP on the monitoring position and the corrections adopted.

3.5.5 The Contractor shall establish the construction equipment list and construction schedule which shall be checked and approved by the Engineer's Representative and agreed by IEC.

3.5.6 The timing of the noise impact monitoring work shall be developed by the ET and approved of by the Engineer's Representative, IEC and DEP and shall be based on the Contractors construction schedule.

3.6 Baseline Monitoring

3.6.1 The ET shall carry out baseline noise measurements prior to the commencement of the construction work over a 24 hour period. The baseline monitoring shall be carried out daily for a period of at least two weeks and shall be taken no earlier than three weeks prior to construction works being carried out. The baseline monitoring shall be undertaken at representative sensitive receivers as listed below:

- **LC6a: The Castle Bay**

The measurement at LC6a is carried out at the fence wall outside the building of the sensitive receiver, a distance correction should be made to the measured level in order to represent the sound level at the sensitive receiver building façade (Block E6, The Castle Bay). Detail of distance correction is provided in Appendix E.

• **LC9: Castle Peak Villas Block C**

The measurement at LC9 is carried out at the building façade of the sensitive receiver, no distance correction is made.

- 3.6.2 In no circumstance should construction works be carried out within the range of the monitoring stations during the two weeks of baseline monitoring.
- 3.6.3 Before commencing the baseline monitoring, the ET Leader shall submit the monitoring schedule to the Engineer’s Representative for approval and 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.
- 3.6.4 Any non Project related construction activities in the vicinity of the stations during the baseline monitoring shall be noted and the source and location recorded.

3.7 Impact Monitoring

- 3.7.1 Noise monitoring shall be carried out at each of the designated monitoring stations closest to the areas of active construction works once every week.
- 3.7.2 During construction works, one set of measurements between 0700-1900 hours on normal weekdays shall be taken. 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 nighttime works and applicable permits under the NCO shall be obtained by the Contractor.
- 3.7.3 In case of non-compliance with the construction noise criteria, more frequent monitoring as specified in the Action Plan in **Table 3.2** shall be carried out. This additional monitoring shall be continued until the recorded noise levels are rectified or proved to be unrelated to the construction activities.

3.8 Event and Action Plan for Noise

- 3.8.1 The Action and Limit levels for construction noise are defined in **Table 3.1**. Should non-compliance of the criteria occur, the ET, the Engineer’s Representative and the Contractor shall undertake their specified actions in accordance with the Action Plan shown in **Table 3.2**.

Table 3.1 Action and Limit Levels for Construction Noise

Time Period	Location	Action	Limit
0700-1900 hrs on normal weekdays	LC6a LC9	When one documented complaint is received	75* dB(A)

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

3.9 Noise Mitigation Measures

- 3.9.1 The EIA report has recommended construction noise control and mitigation measures to reduce noise levels from the project construction.
- 3.9.2 As detailed in the EIA report, certain construction activities for the pumping stations construction have the potential to create adverse daytime noise impacts at some of the NSRs and therefore, mitigation measures as summarised in the Environmental Mitigation

Implementation Schedule in **Appendix A** will be required. The Contractor shall be responsible for the implementation of the measures below:

- (i) Ensure that silencers are installed on the exhaust pipes of the trucks and excavators and the noise levels can be reduced by 5dB(A);
- (ii) Mufflers should be installed on the breakers and the noise levels can be reduced by 5-7dB(A); and
- (iii) Construction of either temporary noise barriers/enclosures along the site boundary of the proposed pumping stations such that the equipment will be totally screened. The barriers or enclosures should have no opening or gaps. Attenuation of 10dB(A) can be achieved.
- (iv) In order to further reduce the noise levels during construction, a combination of mitigation measures would be appropriate and will include:
 - Ensuring that hand held breakers and portable air compressors not exceed 108 and 95 dB(A) respectively;
 - Manual breaking of concrete where concrete is sufficiently thin;
 - Use of alternative pavement removal methods/equipment such as electric breakers or the kick ripper (saw and lift) method on approval of the Engineer;
 - Use of acoustic enclosure in place of a barrier where sufficient space permits. Enclosures can give a noise attenuation of up to 20 dB(A);
 - Scheduling the numbers and operating times of equipment;
 - Restrict construction activities to the daytime period (08.00-16.00) only and exclude Sundays and public holidays;
 - Do not use powered mechanical equipment within 5m of an NSR without the permission of the Engineer;
 - Good site practice to limit noise emission at source;
 - Avoidance of simultaneous noisy activities, as far as practicable;
 - Selection of quiet plant and working methods;
 - Reduction in the numbers of noisy plant operating simultaneously in critical areas close to NSRs; and
 - The Contractor should demonstrate that the noise levels are within the acceptable criteria at residential units during construction.

3.9.3 The design of the temporary noise enclosures will be the responsibility of the Contractor who will be required to submit his design to the ER for approval before carrying out the work.

3.9.4 If the above measures are not sufficient to restore the construction noise quality to an acceptable level, upon the advice of ET, the Contractor shall consult the IEC, liaise and gain approval from the Engineer's Representative on other mitigation measures proposed to reduce noise levels to an acceptable level and carry out these measures.

Table 3.2 Event / Action Plan for Construction Noise

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

4. WATER QUALITY

4.1 Introduction

4.1.1 The proposed sewer network will serve to collect the sewage from the villages and by a series of pumping stations transfer the sewage to the principal sewer which passes along the existing Castle Peak Road. This will achieve the effect of eliminating the untreated sewage discharges to surface water courses along this part of the coast and so improve stream water quality and reduce the bacterial counts at the bathing beaches in the area which frequently fail to meet the Bathing Beach Quality Standards.

4.1.2 The most significant potential impact on water quality will be due to suspended solids runoff from excavation sites and spoil heaps and from dewatering of trenches and foundations, when water containing high concentration of suspended solids may be discharged to water courses. The EIA has recommended a series of mitigation measures which will be capable of reducing any impacts to acceptable levels. The Contractor shall be responsible for the design and implementation of the measures below. These recommended construction water quality mitigation measures are summarized in the Environmental Mitigation Implementation Schedule presented in **Appendix A** and presented below:

- (i) Channels, bunds or sand bags should be used to direct any storm water to the traps and perimeter channels should be constructed before the main works begin to prevent external run off from crossing the site;
- (ii) Silt removal structures, channels and manholes should be maintained to remove accumulated material, specifically at the onset and end of rainy periods;
- (iii) Trenches for the sewer main should be dug and backfilled in short sections to minimize the quantities of rain water which will need to be pumped from them and upslope bunding provided to prevent surface water from flowing into the trenches;
- (iv) Rainwater pumped from the trenches should be discharged to storm drains via sand/silt removal traps;
- (v) Discharges to natural water courses should only take place when the effluent can be shown to comply with the relevant specified standards;
- (vi) All plant should be in proper working order and maintained such that there is no leakage of fuel or oil. Any waste oils should be collected in designated tanks prior to disposal off site;
- (vii) All mechanical plant maintenance and refuelling areas shall be sited on paved areas. All storm water run-off from these areas should be discharged via oil separators/petrol separators and sand/silt removal traps;
- (viii) Groundwater pumped out of excavations for the construction of pump sumps should only be discharged following removal of silt by sand/silt removal traps;
- (ix) Water from drilling of rock should be discharged following removal of silt by sand/silt removal traps;
- (x) The wheels of all vehicles leaving the construction site should be washed before leaving the site to minimise the carry over of mud onto public roads. Wheel wash water should be recycled and only discharged following removal of silt by sand/silt removal trap;

- (xi) Run off from the roofs of site buildings should be conveyed in closed drains to the nearest surface water course to prevent the generation of excessive quantities of surface water run off carrying suspended solids;
- (xii) All spillages should be cleaned up immediately to prevent their downward migration into the groundwater; and
- (xiii) Sewage arising from any toilets in the construction site should be collected using a temporary storage system. Chemical toilets should be provided for the workforce on site. The facilities should be serviced and cleaned by a specialist contractor at regular intervals.

4.2 Applicable Environmental Standards and Guidelines

4.2.1 The principal statutory environment requirement to be observed during the execution of the project includes the following Ordinance and its subsidiary regulations:

- Water Pollution Control Ordinance (Cap. 358)
- Water Pollution Control (General) Regulations

4.2.2 Besides the above legislation, the following non statutory requirements in Hong Kong are considered of relevance to the Project:

- PN 1/94 – Construction Site Drainage
- ETWB TC(W) 05/2005 - Protection of natural streams/rivers from adverse impacts arising from construction works
- ETWB TC(W) 19/2005 - Environmental Management on Construction Sites

4.3 Monitoring

4.3.1 Construction phase EM&A is recommended to ensure that the mitigation measures are being implemented and are effective. Operational EM&A is not required.

4.3.2 Prior to construction, surveys shall be undertaken of the watercourses which are within the influence of construction works at least once per week for a period of two weeks. The surveys should include a description of the stream course, influencing factors, photographs of the watercourse and a map showing areas of project construction works. According to section 6 of the EIA report, no watercourse is identified within the project area at Lok Chui Street near Castle Peak Villas. Hence, survey prior to construction is not required.

4.3.3 During the construction phase, surveys shall be undertaken in areas of active construction works and other areas with stock piled materials on exposed ground surfaces at least once per week.

4.3.4 Any noticeable change to water quality should be recorded in the watercourse survey reports and should be investigated and remedial actions shall be undertaken to reduce impacts. The ET Leader shall pay particular attention to the Contractor's incorporation of mitigation measures.

4.3.5 If the above mitigation measures are not sufficient to restore the water quality to an acceptable levels upon the advice of the ET Leader, the Contractor shall liaise with the ET Leader on some other mitigation measures, propose to the IEC and ER for approval and carry out the mitigation measures.

5. WASTE MANAGEMENT

5.1 Applicable Environmental Standard and Guidelines

5.1.1 The principal statutory environment requirement to be observed during the execution of the project includes the following Ordinance and its subsidiary regulations:

- Waste Disposal Ordinance (Cap. 354)
- Waste Disposal (Chemical Waste) (General) Regulation
- Waste Disposal (Charges for Disposal of Chemical Waste) Regulation
- Waste Disposal (Designated Waste Disposal Facility) Regulation
- Waste Disposal (Charges for Disposal of Construction Waste) Regulation
- Public Health and Municipal Services Ordinance (Cap.132)
- Land (Miscellaneous Provisions) Ordinance (Cap. 28)
- Dumping at Sea Ordinance (Cap. 466)

5.1.2 Besides the above legislation, the following non statutory requirements in Hong Kong are considered of relevance to the Project:

- PNR 21 – Tropical Hardwood Timber
- PNR 24 – Metal Refuse Chutes at Construction Sites
- WBTC No. 10/1992 – Provision of Refuse Containment Booms in Reclamation Contracts Involving Public Dumping
- WBTC 32/92 – The Use of Tropical Hard Wood on Construction Site
- WBTC 02/1993 - Public Dumps
- WBTC 02/1993B - Public Filling Facilities
- WBTC 16/1996 - Wet Soil in Public Dumps
- WBTC 04/1998 - Use of Public Fill in Reclamation and Earth Filling Projects
- WBTC 12/2000 - Fill Management
- WBTC No.19/2001 – Metallic Site Hoardings and Signboards
- WBTC No. 6/2002, (superseded by DEVB No.8/2010) – Enhanced Specification for Site Cleanliness and Tidiness
- WBTC No. 11/2002 – Control of Site Crushers
- WBTC No. 12/2002 – Specifications Facilitating the Use of Recycled Aggregates
- ETWB TC(Works) No. 33/2002 – Management of Construction and Demolition Material Including Rock
- ETWB TC(W) 34/2002 - Management of Dredged/Excavated Sediment
- ETWB TC(W) 22/2003, 22/2003A - Additional Measures to Improve Site Cleanliness and Control Mosquito Breeding on Construction Sites
- ETWB TC(W) 31/2004 (superseded by DEVB TC(W) 6/2010) - Trip Ticket System for Disposal of Construction & Demolition Materials
- ETWB TC(W) 19/2005 - Environmental Management on Construction Sites

5.1.3 According to the Annex 7 of the TMEIA which states that all relevant requirements of the Waste Disposal Ordinance should be complied with. The Waste Disposal Ordinance prohibits the unauthorized disposal of wastes, with waste defined as any substance or article which is abandoned. Construction waste is not directly defined in the Ordinance but is considered to fall within the category of "trade waste". Wastes can only be disposed of at a licensed site under this Ordinance.

5.1.4 In addition, construction wastes which are wholly inert may be taken to public dumps. The Government Lands Ordinance requires that dumping licences are obtained by individuals or

companies who deliver suitable construction wastes to public dumps. Under the license conditions public dumps will accept only inert building debris, soil, rock and broken concrete.

5.1.5 Under the Waste Disposal (Chemical Waste) (General) Regulation under the Waste Disposal Ordinance (Cap 354), 'chemical waste' includes any scrap material and unwanted substances specified under Schedule 1 of the Waste Disposal Regulations. These are noted as posing serious environmental, health, and safety hazards if not stored and disposed of appropriately. Chemical wastes are often produced primarily as a result of construction equipment maintenance activities, and include liquids such as waste oils and cleaning solvents. The Contractor must register as a chemical waste producer with the DEP and arrange for a licensed collector to collect and dispose of the waste.

5.1.6 Also, reference should be made to the Water Pollution Control Ordinance for the control of sewage and any waste water from the site.

5.2 Mitigation Measures

5.2.1 Based on the mitigation measures recommended in the EIA Report, the following measures, as summarized in the Environmental Mitigation Implementation Schedule in **Appendix A**, shall be undertaken when handling waste material during construction phase:

- The Contractor shall identify a coordinator for the management of waste. The coordinator shall prepare a Waste Management Plan which specifies procedures such as a ticketing system, to facilitate tracking of loads and to ensure that illegal disposal of wastes does not occur, and protocols for the maintenance of records of the quantities of wastes generated, recycled and disposed. The Waste Management Plan shall be prepared with reference to Environment, Transport and Works Bureau Technical Circular (Works) ETWB TCW No. 19/2005 for the Environmental Management on Construction Sites and issued to the DEP and CED to confirm the availability for C&D and public fill waste;
- Stockpiled material should avoid vegetated areas and be covered by tarpaulins to prevent windblown dust and/or surface run-off. Storage of material on site should be kept to a minimum to avoid nuisance to local residents;
- Surplus material generated from the installation of the sewer alignment and pumping stations should be sorted on site into construction and demolition (C&D) waste and the public fill fraction. The C&D waste should be disposed of at a licenced landfill and the material suitable for public fill delivered to a public filling area or reclamation site;
- The contractor should provide a temporary storage area for general refuse during the construction phase which should be enclosed to avoid refuse being windblown and affected by rain. General refuse should be stored on site for a minimum period and disposed of at a licensed facility;
- Excavated material in trucks shall be covered by tarpaulins to reduce the potential for spillage; and
- Any screenings and grit that are removed during maintenance shall be disposed of at a landfill site. The material shall be suitably contained and covered.

5.3 EM&A Requirements

5.3.1 EM&A is recommended during the construction phase only and limited to supervision and audit of the Contractors.

5.3.2 The aims of the waste audit are:

- To ensure the waste arising from the works are handled, stored, collected, transferred and disposed of in an environmentally acceptable manner; and
- To encourage the reuse and recycling of material.

5.3.3 The Contractor is responsible for waste control within the construction site, removal of the waste material produced from the site and to implement any mitigation measures to minimize waste or ameliorate any impacts resulting from the waste from the site. The waste material may include any sewage, waste water or effluent containing sand, cement, silt or any other suspended or dissolved material to flow from the Site onto any adjoining land, storm sewer, sanitary sewer, or any waste matter or refuse to be deposited anywhere within the Site or onto any adjoining land.

5.3.4 The Contractor shall also pay attention to the environmental standard and guidelines as mentioned in Section 5.1 and carry out appropriate waste management work. The relevant license/permit, such as the effluent discharge license, the chemical waste producer registration, etc. shall be obtained. The Contractor shall refer to the relevant booklets issued by the DEP when applying for the license/permit.

5.3.5 During the site inspections and the document review procedures as mentioned in Chapter 8 of this Manual, the Environmental Team (ET) shall pay special attention to the issues relating to waste management and check whether the Contractor has followed the relevant contract specifications and the procedures specified under the laws of Hong Kong. In addition to the site inspections, the ET shall review the documentation procedures prepared by the Waste Coordinator once a week to ensure proper records are being maintained and procedures undertaken in accordance with the Waste Management Plan.

6. CULTURAL HERITAGE

6.1 Applicable Environmental Standards and Guidelines

Environmental Impact Assessment Ordinance

- 6.1.1 Criteria for the assessment of cultural heritage are presented in Annex 10 & 19 of the TMEIA.

Antiquities and Monuments Ordinance

- 6.1.2 Under the Antiquities and Monuments Ordinance (Cap 53), the Authority (Secretary for Development) may, after consultation with the Board (Antiquities Advisory Board) and with the approval of the Chief Executive, by notice in the Gazette, declare any place, building, site or structure, which the Authority considers to be of public interest by reason of its historical, archaeological or palaeontological significance, to be a monument, historical building or archaeological or palaeontological site or structure. Once declared to be a site of public interest, no person shall excavate, carry on building or other works, plant or fell trees or deposit earth or refuse on or in a proposed monument or monument; or demolish, remove, obstruct, deface or interfere with a proposed monument or monument, except in accordance with a permit granted by the Authority.

- 6.1.3 The Antiquities and Monuments Office (AMO) of the Leisure and Cultural Services Department, provides secretarial and executive support to the Board in conserving places of historical and archaeological interest, is the executive arm of the Antiquities Authority. The AMO is headed by its Executive Secretary and comprises professional staff organized into five sections dealing with archaeology, historical buildings, education and publicity, technical and advisory, planning and management respectively. There is also a separate section to provide secretariat and administrative support to both the Board and the Office.

Cultural Heritage

- 6.1.4 The AMO provide Guidelines for Cultural Heritage Impact Assessment (CHIA) which stress that preservation in totality must be taken as the first priority. Projects undertaken are not to cause excessive impact on archaeologically and historically important sites unless there are adequate protection or mitigation measures or a satisfactory rescue plan is proposed.

- 6.1.5 The AMO considers all buildings and structures in the following categories to be historical and deserving of consideration for preservation:

- All pre-1950 buildings and structures; and
- Selected post-1950 buildings and structures of high architectural and historical significance and interest.

- 6.1.6 Once identified as having the potential for conservation, buildings are entered into the record. They are then graded by AMO to show their relative value. Evaluation is based on the following criteria:

- Outstanding architectural merits - especially features emphasizing certain period, technological and artistic merits;

- Special historical interest - accommodating important civic or social function, for example, ancestral halls, religious buildings, post offices, city halls, courts of law, railways station, etc;
- Associations - with important events or well-known persons; and
- Group value - especially in historic villages.

6.1.7 Sites of archaeological interest are identified and recorded by the AMO as they are revealed through systematic survey, casual finding and/or the EIA process. All such sites are considered to be of cultural heritage value and their preservation in totality is taken as the primary aim of the EIA process. The CHIA stipulates that if such preservation on sites of archaeological interest is not feasible, a programme of mitigation measures must be designed and submitted to the AMO for approval. The mitigation measures must be clearly listed and the party responsible for implementation and timing of the measures must also be included. Examples of mitigation measures include rescue excavation and archaeological watching brief. The search for and excavation of antiquities requires a license from the Antiquities Authority.

6.2 Mitigation Measures

6.2.1 According to section 9 of the EIA report, no adverse impact on cultural heritage is identified within the project area at Lok Chui Street near Castle Peak Villas, therefore, no adverse impact on heritage is anticipated. Hence, further investigation or mitigation measure is not required

7. LANDSCAPE AND VISUAL

7.1 Introduction

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

7.2 Mitigation Measures

7.2.1 The landscape and visual impacts assessment of the EIA recommended a series on mitigation measures to ameliorate the landscape and visual impacts of the project. These measures include:

- Pumping stations design to complement architecture of village properties;
- Plant compound boundary with trees and shrubs;
- Boundary wall/railing features to resemble the adjacent building types;
- Low key design of pipe bridge in scale with surroundings and adjacent footbridge;
- Minimise impacts on existing trees, tree root-balls and scrub in all areas;
- Stockpile topsoil and regrass upon completion, including marsh verge;
- Reinstate footpath and roads upon completion;
- Avoid woodland at expense of smaller number of roadside trees, along Tai Lam Chung Road; and
- Store any good excavated topsoil on site and reuse in screen planting and hydroseeding.

7.2.2 To help integrate the proposed pumping station into this environment as seen from the villas, roadside and beach, the impact mitigation measures proposed in construction and operation phases as stated in the Approved EIA Report as stated in Section 7.2.1 above will be further enhanced as listed in **Table 7.1** and **Table 7.2**:

Table 7.1 Construction Phase Mitigation Measures

ID No.	Landscape and Visual Mitigation Measures	Funding and Implementation Agency	Maintenance / Management Agency
CM1	Protection of existing vegetation Existing vegetation shall be preserved as much as possible. Detailed tree preservation and transplanting proposals shall be submitted to relevant government departments for approval in accordance with DEVB TCW No. 7/2015 - Tree Preservation. Temporary protective fence will be erected to protect the existing vegetation to be preserved.	DSD	DSD
CM2	Control of Night-time Lighting Glare	DSD	DSD

	Night-time lighting glare shall be properly managed and control during construction so as to minimize any adverse visual impact on adjacent VSRs.		
CM3	Management of Facilities on Work Sites Management of facilities on work sites which give control on the height and disposition/arrangement of all facilities on the works site to minimize visual impact to adjacent VSRs.	DSD	DSD
CM4	Reinstatement of Temporary Works Areas All hard and soft landscape areas disturbed temporarily during construction shall be reinstated on like-to-like basis.	DSD	DSD
CM5	Decorative Screen Hoarding Erection of decorative screen hoarding compatible with the surrounding setting to minimize any potential adverse impact during construction.	DSD	DSD

Table 7.2 Operation Phase Mitigation Measures

ID No.	Landscape and Visual Mitigation Measures	Funding and Implementation Agency	Maintenance / Management Agency
OM1	Compensatory planting for loss of existing trees Compensatory planting shall be provided within the permanent works boundary where possible. Detailed compensatory planting proposal will be prepared in accordance with DEVB TCW No. 7/2015 - Tree Preservation.	DSD	DSD / LandsD
OM2	Aesthetically pleasing design of Structures Aesthetically pleasing design as regard to the form, material and finishes shall be incorporated to Pumping Station and associated retaining structures so as to blend in the structures to the adjacent landscape and visual context.	DSD	DSD
OM3	Provision of Green Roof Green Roof shall be proposed to the LCSSPS to enhance the landscape quality of the structures and mitigate any potential visual impact on adjacent VSRs.	DSD	DSD
OM4	Screen Planting Tree and Shrub Planting shall be provided to screen the LCSSPS along Lok Chui Street.	DSD	DSD
OM5	Vertical Greening Climbers will be proposed at the boundary fence at the east, south and west elevations of the LCSSPS.	DSD	DSD

7.3 Baseline Monitoring

7.3.1 Baseline monitoring for the landscape and visual resources will comprise a vegetation survey of the entire selected route undertaken on an 'area' basis. Representative vegetation types will be identified along with typical species composition. An assessment of landscape character will be made against which future change can be monitored.

7.3.2 The landscape resources and elements of particular concern are to be noted. The landscape and visual baseline will be determined with reference to the landscape resources map, landscape character areas map and the visually sensitive receivers map included in the EIA Report.

7.3.3 The locations of baseline landscape resources with overlay of the latest engineering design are mapped in **Figure 6** (drawing no. 60022471/C3/VEP/9002). Photo views illustrating the landscape resources of the study area are illustrated in **Figure 6** (drawing no. 60022471/C3/VEP/9003). The baseline landscape resources are listed as follows:

LR7.1 Woodland near Lok To Street - There is dense woodland mixed with shrub land on the hill side near Lok To Street and it is considered to have high landscape amenity value and sensitivity.

LR7.2 Woodland near Castle Peak Villas - There is woodland mixed with shrub land. Predominant species consist of *Alocasia macrorrhiza*, *Macaranga tanarius*, *Cassia siamea*, *Bombax malabaricum*, *Hibiscus tiliaceus* etc. They are mature trees and have medium landscape amenity value and sensitivity.

LR7.5 Seaside from Barbecue Garden to Marine Police Base - It provides beautiful sea views and has high landscape amenity value and sensitivity.

LR7.6 Trees and Grasses on Man-made Slopes - There is landscape plantation on the man-made slope along Lok Chui Street. Predominate species consist of *Casuarina equisetifolia*, *Celtis sinensis* and *Macaranga tanarius*. They are mature to semi-mature trees. It has medium landscape amenity value and sensitivity.

LR7.7 Scrubland - There is a natural colonization of wild plant species on an uncultivated land. Predominant species include *Alocasia macrorrhiza* and *Wedelia chinensis*. They are common landscape resources with low landscape amenity value. Their sensitivity is low.

7.3.4 Several landscape character areas (LCAs) have been identified within the study boundary. They are described below and indicated in **Figure 7** (drawing no. 60022471/C3/VEP/9004) with overlay of the latest engineering design. Photo views showing the LCAs are illustrated in **Figure 7** (drawing no. 60022471/C3/VEP/9005).

The following LCAs are defined as Residential Area within this study area:

LCA7.1 The Castle Bay

Its sensitivity/quality is considered medium.

The following LCAs are defined as Village Type Area within this study area:

LCA7.4 & 7.5 Siu Lam San Tsuen

Its sensitivity/quality is considered medium.

The following LCAs are defined as Open Space within this study area:

LCA7.6 Siu Lam Barbecue Beach

Its sensitivity/quality is considered high.

The following LCAs are defined as Bay Area within this study area:

LCA7.11 Seaside from Siu Lam Flea Market to Marine Police Base

Its sensitivity/quality is considered high.

7.3.5 A number of key Visually Sensitive receivers (VSRs) have been identified. The VSRs are mapped in **Figure 8** (drawing no. 60022471/C3/VEP/9006) with overlay of the latest engineering design. The baseline conditions of key VSRs are summarized in **Figure 8** (drawing no. 60022471/C3/VEP/9007).

Residences and institution around the Pumping Station site will become the key VSRs within this study area. Other VSRs comprise the road traffic near the Pumping Station site which would be subject to ransitory views. VSRs identified in this study area include:

Castle Peak Villas (R7.2)

The Castle Bay (R7.3)

Lok Chui Street (T7.2)

- 7.3.6 A one-off baseline review shall be undertaken at the commencement of the construction contracts in order to check the status of the landscape resources and the visually sensitive receivers within, and immediately adjacent to, the construction works sites and works areas, to determine whether any change has occurred to the status of the landscape resources and visually sensitive receivers since the EIA, to determine whether such change warrants a change in the design of the landscape and visual mitigation measures, and, to recommend any necessary changes to the design of the landscape and visual mitigation measures.

7.4 Construction and Operational Phase Audit

7.4.1 A competent landscape architect should be employed by the Contactor for the implementation of landscape construction works and subsequent maintenance operations during the 12 month establishment period. The establishment works will be undertaken throughout the Contractor’s one year maintenance period which will be within the first operational year of the project.

7.4.2 All measures undertaken by both the Contractor and the Landscape Contractor during the construction phase and first year of the operational phase shall be audited by a Landscape Architect, as a member of the ET, on a regular basis to ensure compliance with the intended aims of the measures. Site inspections should be undertaken at least once every two weeks throughout the construction period and once every two months during the operational phase. The broad scope of the audit is detailed below. Operational phase auditing will be restricted to the 12 months establishment works of the landscaping proposals, with DSD or another maintenance party as agreed to take up the maintenance and monitoring after this period, and thus only the items below concerning this period are relevant to the operational phase.

- The extent of the agreed works areas should be regularly checked during the construction phase. Any trespass by the Contractor outside the limit of the works, including any damage to existing trees and woodland shall be noted;
- The progress of the engineering works should be regularly reviewed on site to identify the earliest practical opportunities for the landscape works to be undertaken;
- The tree and shrub planting operation;
- All existing trees and vegetation within the study area which are not directly affected by the works are retained and protected;
- The methods of protecting existing vegetation proposed by the Contractor are acceptable and enforced;
- All landscaping works are carried out in accordance with the specifications;
- The planting of trees and shrubs are carried out properly and within the respective season of species;
- The species and mix of the new trees and shrubs to be planted are suitable; and
- The newly planted trees and grassed areas are maintained throughout the establishment period, particularly in respect of the following:
 - Regular watering, weeding and fertilising of all tree and shrub planting and areas of grass reinstatement;
 - Regular grass cutting for reinstated areas;
 - Firming up of trees after periods of strong winds;
 - Regular checks for and eradication of pests, fungal infection etc;
 - Pruning of dead or broken branches; and
 - Prompt replacement of dead plants and regrassing of failed areas of grass.

In addition to the above items, CM1-5 and OM 1- 5 listed in Table 7.1 and 7.2 respectively shall also be audited

7.4.3 The detail of Landscape and Visual Impact audit program for construction and operational phase are listed in **Table 7.3**.

Table 7.3 Landscape and Visual Monitoring during Construction and Operational Phase

Stage	Tasks	Frequency	Methodology	Responsible parties
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Stage	Tasks	Frequency	Methodology	Responsible parties
Construction	Monitoring of the contractor's operations during the construction period	At least once every two weeks throughout the construction period	Site Audit	ET
Operation	Monitoring of the planting works during the 12 month Establishment period after completion of the construction works	At least once every two months during the operational phase	Site Audit	ET

7.5 Event and Action Plan for Landscape and Visual Impact

7.5.1 Should non-compliance of the landscape and visual impacts occur, the ET, IEC, the Engineer's Representative and the Contractor shall undertake their specified actions in accordance with the Action Plan shown in **Table 7.4**.

Table 7.4 Event / Action Plan for Landscape and Visual Impact

EVENT ACTION LEVEL	ACTION			
	ET	IEC	ER	Contractor
Design Check	<ul style="list-style-type: none"> Check final design conforms to the requirements of EP and prepare report. 	<ul style="list-style-type: none"> Check report. Recommend remedial design if necessary 	<ul style="list-style-type: none"> Undertake remedial design if necessary 	
Nonconformity on one occasion	<ul style="list-style-type: none"> Identify Source Inform IEC and ER Discuss remedial actions with IEC, ER and Contractor Monitor remedial actions until rectification has been completed 	<ul style="list-style-type: none"> Check report Check Contractor's working method Discuss with ET and Contractor on possible remedial measures Advise ER on effectiveness of proposed remedial measures. Check implementation of remedial measures 	<ul style="list-style-type: none"> Notify Contractor Ensure remedial measures are properly implemented 	<ul style="list-style-type: none"> Amend working methods Rectify damage and undertake any necessary replacement
Repeated Nonconformity	<ul style="list-style-type: none"> Identify Source Inform IEC and ER Increase monitoring frequency Discuss remedial actions with IEC, ER and Contractor Monitor remedial actions until rectification has been completed If nonconformity stops, cease additional monitoring 	<ul style="list-style-type: none"> Check monitoring report Check Contractor's working method Discuss with ET and Contractor on possible remedial measures Advise ER on effectiveness of proposed remedial measures Supervise implementation of remedial measures 	<ul style="list-style-type: none"> Notify Contractor Ensure remedial measures are properly implemented 	<ul style="list-style-type: none"> Amend working methods Rectify damage and undertake any necessary replacement

8. SITE ENVIRONMENTAL AUDIT

8.1 Site Inspections

- 8.1.1 Site inspections shall be undertaken routinely to inspect the construction activities in order to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented.
- 8.1.2 The ET is responsible for carrying out site inspections, deficiency and remedial action reporting. He shall, in consultation with the IEC, prepare a procedure for the site inspection, deficiency and remedial action reporting requirements; and submit to the Contractor for agreement and to the ER for approval, within 21 days of commencement to the construction contract.
- 8.1.3 With reference to the original EM&A Manual (AEIAR-034/2000), regular site inspection was proposed to be carried out at least three times per week. However, in view of the small project area (a sewage pumping station at Lok Chui Street near Castle Peak Villas) in the contract, and the nature of construction works which would unlikely cause adverse environmental impact under mitigated measures, the site inspection is proposed to be carried out at a frequency of once per week. Such site inspection frequency is also adopted in similar projects:
- AEIAR-122/2008 – Tuen Mun Area 54 Sewage Pumping Station
 - AEIAR-072/2003 - Upgrading and expansion of San Wai Sewage Treatment Works and expansion of Ha Tsuen Sewage Pumping Station
- 8.1.4 The areas of inspection shall not be limited to the site area and should also include the environmental conditions outside the site which are likely to be affected, directly or indirectly, by the site activities.
- 8.1.5 The ET shall make reference to the following information while conducting the inspection:
- i The EIA recommendations on environmental protection and pollution control mitigation measures as stated in the EIA report;
 - ii Work progress and programme;
 - iii Individual works methodology proposals;
 - iv The contract specifications on environmental protection;
 - v The relevant environmental protection and pollution control laws;
 - vi Previous site inspection results; and
 - vii Environmental monitoring data.

8.1.6 The Contractor shall update the ET with all relevant information on the construction works prior to carrying out the site inspections. The site inspection results and associated recommendations on improvements to the environmental protection and pollution control works shall be submitted, in a site inspection proforma (an example shown in **Appendix B**) by the ET to the IEC, the ER and the Contractor within 24 hours for reference and for taking immediate action. The Contractor shall follow the procedures and time-frame as stipulated in the environmental site inspection.

8.1.7 Ad hoc site inspections shall also be carried out by the ET and/or IEC if significant environmental problems are identified. Inspections may also be required subsequent to receipt of an environmental complaint (an example of the complaint log is provided in **Appendix B**) or as part of the investigation work as specified in the Action Plan for environmental monitoring and audit.

8.2 Compliance with Legal and Contractual Requirements

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

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

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

8.2.4 The Contractor shall regularly copy relevant documents to the ET so that the checking work can be carried out. The document shall include at minimum the updated Work Progress Reports, the updated Works Programme, the application letters for different license/permits under the environmental protection laws and all valid licence/permit. The site diaries shall also be available for the ET's inspection upon request.

8.2.5 After reviewing the document, the ET shall advise the IEC, the ER and the Contractor of any non-compliance with the contractual and legislative requirements on environmental protection and pollution control for them to take follow-up actions. The ET shall also advise the IEC, the Contractor and the ER on the current status on license/permit applications and any environmental protection and pollution control preparation works that may not be suitable for the works programme or may result in potential violation of environmental protection and pollution control requirements.

8.2.6 Upon receipt of the advice, the Contractor shall undertake immediate action to remedy the situation. The ER and ET shall follow up to ensure that appropriate action has been taken by the Contractor in order that the environmental protection and pollution control requirements are fulfilled.

8.3 Environmental Complaints

8.3.1 Complaints shall be referred to the ET for carrying out complaint investigation procedures.

8.3.2 The ET shall undertake the following procedures upon receipt of the complaints:

- i Log complaint and date of receipt into the complaint database and inform the IEC immediately;
- ii Investigate the complaint and discuss with the Contractor to determine its validity and to assess whether the source of the problem is due to works activities;
- iii If a complaint is considered valid by the ER or the DEP and due to the works, the ET shall identify mitigation measures in consultation with the IEC;
- iv If mitigation measures are required, the ET shall advise the Contractor accordingly;
- v Review the Contractor's response on the identified mitigation measures and the updated situation;
- vi If the complaint is transferred from the DEP, an interim report shall be submitted to the DEP on the status of the complaint investigation and follow-up action within the time frame assigned by DEP;
- vii Undertake additional monitoring and audit to verify the situation if necessary and ensure that any valid reason for complaint does not recur;
- viii Report the investigation results and the subsequent actions on the source of the complaint for responding to complainant. If the source of complaint is the DEP, the results should be reported within the time frame assigned by the DEP; and
- ix Record the complaint, investigation, the subsequent actions and the results in the monthly EM&A reports.

8.3.3 During the complaint investigation work, the Contractor and ER shall cooperate with the ET in providing all the necessary information and assistance for completion of the investigation. If mitigation measures are identified in the investigation by the ET, in consultation with the IEC, the Contractor shall promptly carry out the mitigation measures. The ET and ER shall approve of the proposed mitigation measures and check that the measures have been carried out by the Contractor.

8.3.4 The ET shall prepare a flow chart of the complaint response procedures that addresses, complaint receiving channels, responsible parties/contacts for information, the investigation process, procedures for the implementation of mitigation/remedial action, guidelines for communication and public relation with the complainant etc.

8.4 Choice of Construction Method

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

9. REPORTING

9.1 General

9.1.1 The following reporting requirements are based upon a paper documented approach. However, the same information can be provided in an electronic medium upon agreeing the format with the ER and the DEP. The reports are required to be prepared by the ET. All reports shall be approved in writing by DEP.

9.2 Baseline Monitoring Report

9.2.1 The ET shall prepare and submit a Baseline Environmental Monitoring Report within 10 working days of completion of baseline monitoring. Copies of the Baseline Environmental Monitoring Report shall be submitted to each of the four parties: the Contractor, the IEC, the ER and the DEP. The ET shall liaise with the relevant parties on the exact number of copies required.

9.2.2 The baseline monitoring report shall include at least the following:

- i Up to half a page executive summary;
- ii 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 diskette copies) together with the following information:
 - Monitoring methodology;
 - Name of laboratory and 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;
 - Other factors which might affect the results;
- vii Determination of the Action and Limit Levels for each monitoring parameter and statistical analysis of the baseline data;
- viii Revisions for inclusion in the EM&A Manual; and
- ix Comments and conclusions.

9.3 EM&A Reports

9.3.1 The results and findings of all EM&A work during the construction and operational phases required in this Manual shall be recorded in the EM&A Reports prepared by the ET and endorsed by the IEC. The EM&A Reports during the construction phase shall be prepared and submitted within 10 working days of the end of each reporting month, with the first report due one month and 10 days after construction commences. Operational phase

EM&A reports shall be completed bi-monthly and submitted 10 days after the bi-monthly landscape audit.

9.3.2 A maximum of 4 copies of each EM&A Report shall be submitted to each of the four parties: the Contractor, the IEC, the ER and the DEP. Before submission of the first EM&A Report, the ET shall liaise with the parties on the exact number of copies and format of the reports in both hard copy and electronic medium.

9.3.3 The ET shall review the monitoring programme every 6 months or on as needed basis in order to cater for any changes in the surrounding environment and nature of works in progress and shall document all observation in the monthly report.

9.4 First EM&A Report

9.4.1 The first EM&A report shall include at least the following:

i 1-2 pages executive summary, comprising:

- Breaches of AL levels;
- Complaint log;
- Notifications of any summons and successful prosecutions;
- Reporting changes; and
- Future key issues.

ii Basic project information including a synopsis of the Project organisation (including key personnel, contact names and telephone numbers), a drawing of the project area showing the environmentally sensitive receivers and the locations of monitoring and control stations, programme, management structure and the work undertaken during the month.

iii Environmental status, including:

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

iv A brief summary of EM&A requirements including:

- All monitoring parameters;
- Environmental quality performance limits (Action and Limit levels);
- Event-Action Plans;
- Environmental mitigation measures, as recommended in the Project EIA study final report; and
- Environmental requirements in contract documents.

- v Advice on the implementation status of environmental protection and pollution control/mitigation measures as recommended in the Project EIA study report and summarized 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 equipment used and calibration details;
 - Parameters monitored;
 - Monitoring locations (and depth); and
 - Monitoring date, time, frequency, and duration.
- vii Graphical plots of trends of monitored parameters at the representative monitoring stations annotated against the following:
 - 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
 - QA/QC results and detection limits.
- viii A summary of noncompliance (exceedances) of the environmental quality performance limits (Action and Limit levels).
- ix A review of the reasons for and the implications of noncompliance including a review of pollution sources and working procedures.
- x A description of the actions taken in the event of noncompliance and deficiency reporting and any follow-up procedures related to earlier noncompliance.
- xi A summary record of all complaints received (written or verbal) for each media, including locations and nature of complaints, liaison and consultation undertaken, actions and follow-up procedures taken and summary of complaints.
- xii A summary of notifications of summons, successful prosecutions for breaches of environmental protection/pollution control legislation and actions to rectify such breaches.
- xiii An account of the future key issues as assessed from the works programme and work method statements.
- xiv Advice on the solid and liquid waste management status.
- xv Submission of implementation status proforma, proactive environmental protection proforma, regulatory compliance proforma, site inspection proforma, data recovery schedule and complaint log summarizing the EM&A of the period.

9.5 Subsequent EM&A Reports

9.5.1 The subsequent EM&A reports shall include the following:

- i Title page.
- ii Executive summary (1-2 pages), comprising:

- Breaches of all Action and Limit levels;
 - Complaint log;
 - Notifications of any summons and successful prosecutions;
 - Reporting changes; and
 - Future key issues.
- iii Contents page.
- iv Environmental status, comprising:
- Drawing showing the Project area, any environmental sensitive receivers and the locations of the monitoring and control stations;
 - Summary of non-compliance with the environmental quality performance limits; and
 - Summary of complaints.
- v Environmental issues and actions, including:
- Review issues carried forward and any follow-up procedures related to earlier non-compliance (complaints and deficiencies);
 - Description of the actions taken in the event of noncompliance and deficiency reporting;
 - Recommendations (should be specific and target the appropriate party for action); and
 - Implementation status of the mitigatory measures and the corresponding effectiveness of the measures.
- vi Future key issues.
- vii Appendix, comprising:
- Action and limit levels;
 - Graphical plots of trends of monitored parameters at key stations over the past four reporting periods for representative monitoring stations annotated against the following: major activities being carried out on site during the period; weather conditions during the period; and any other factors which might affect the monitoring results;
 - Monitoring schedule for the present and next reporting period;
 - Cumulative complaints statistics; and
 - Details of complaints, outstanding issues and deficiencies.

9.6 Quarterly EM&A Summary Reports

9.6.1 The ET shall submit Quarterly EM&A Summary Reports, during the construction phase only, which should be around 5 pages (including about 3 of text and tables and 2 of figures) and shall contain at minimum the following information:

- i Up to half a page executive summary.
- ii Basic project information including a synopsis of the Project organisation, programme, contacts of key management, and a synopsis of work undertaken during the quarter.
- iii A brief summary of EM&A requirements including:
 - Monitoring parameters;
 - Environmental quality performance limits (Action and Limit levels); and
 - Environmental mitigation measures, as recommended in the Project EIA study final report.

- iv Advice on the implementation status of environmental protection and pollution control/mitigation measures as recommended in the Project EIA study report and summarized 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 4 months (the last month of the previous quarter and the present quarter) for representative monitoring stations annotated against:
 - The major activities being carried out on site during the period;
 - Weather conditions during the period; and
 - Any other factors which might affect the monitoring results.
- vii Advice on the solid and liquid waste management status.
- viii A summary of noncompliance (exceedances) of the environmental quality performance limits (Action and Limit levels).
- ix A brief review of the reasons for and the implications of non-compliance including 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 summary record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken.
- xii Comments (e.g. effectiveness and efficiency of the mitigation measures), recommendations (e.g. any improvement in the EM&A programme) and conclusions for the quarter.
- xiii Proponents' contacts and any hotline telephone number for the public to make enquiries.

9.7 Annual/Final EM&A Review Reports

9.7.1 The termination of EM&A programme shall be determined on the following basis:

- i Completion of construction activities and insignificant environmental impacts of the remaining outstanding construction works;
- ii Trends analysis to demonstrate the narrow down of monitoring exceedances due to construction activities and the return of ambient environmental conditions in comparison with baseline data; and
- iii No environmental complaint and prosecution involved.

9.7.2 The annual/final EM&A report should contain at least the following information:

- i Executive Summary (1-2 pages).;
- ii Drawings showing the project area any environmental sensitive receivers and the locations of the monitoring and control stations.
- iii Basic project information including a synopsis of the project organization, contacts for key management staff and a synopsis of work undertaken during the course of the project or past twelve months.
- iv A brief summary of EM&A requirements including:
 - Environmental mitigation measures as recommended in the project EIA study final report;
 - Environmental impact hypotheses tested;
 - Environmental quality performance limits (Action and Limit Levels);
 - All monitoring parameters; and
 - Event-Action Plans.
- v A summary of the implementation status of environmental protection and pollution control/mitigation measures as recommended in the project EIA study report and summarized in the updated implementation schedule.
- vi Graphical plots and the statistical analysis of the trends of monitored parameters over the course of the projects including the post-project monitoring (or the past twelve months for annual reports) for all 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 A summary of noncompliance (exceedances) of the environmental quality performance limits (Action and Limit levels).
- viii A review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures as appropriate.
- ix A description of the actions taken in the event of non-compliance.
- x A summary record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken.
- xi A summary record of notifications of summonses 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.
- xii A review of the validity of EIA predictions and identification of shortcomings in the EIA recommendations.
- xiii A review of the effectiveness and efficiency of the mitigation measures.
- xiv A review of the success of the EM&A programme to identify any deterioration and to initiate prompt effective mitigatory action when necessary cost effectively.

9.8 Data Keeping

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

monitoring data shall also be recorded on disk the soft copy shall be available upon request. All the documents and data shall be kept for at least one year after completion of the construction contract.

9.9 Interim Notifications of Environmental Quality Limit Exceedances

- 9.9.1 With reference to Event/Action Plans, when the environmental quality limits are exceeded, the ET shall immediately notify the Contractor, the ER and the DEP, as appropriate. The notification shall be followed up with advice to each party on the results of the investigation, proposed action and success of the action taken, with any necessary follow-up proposals. A sample template for the interim notifications is shown in **Appendix D**.

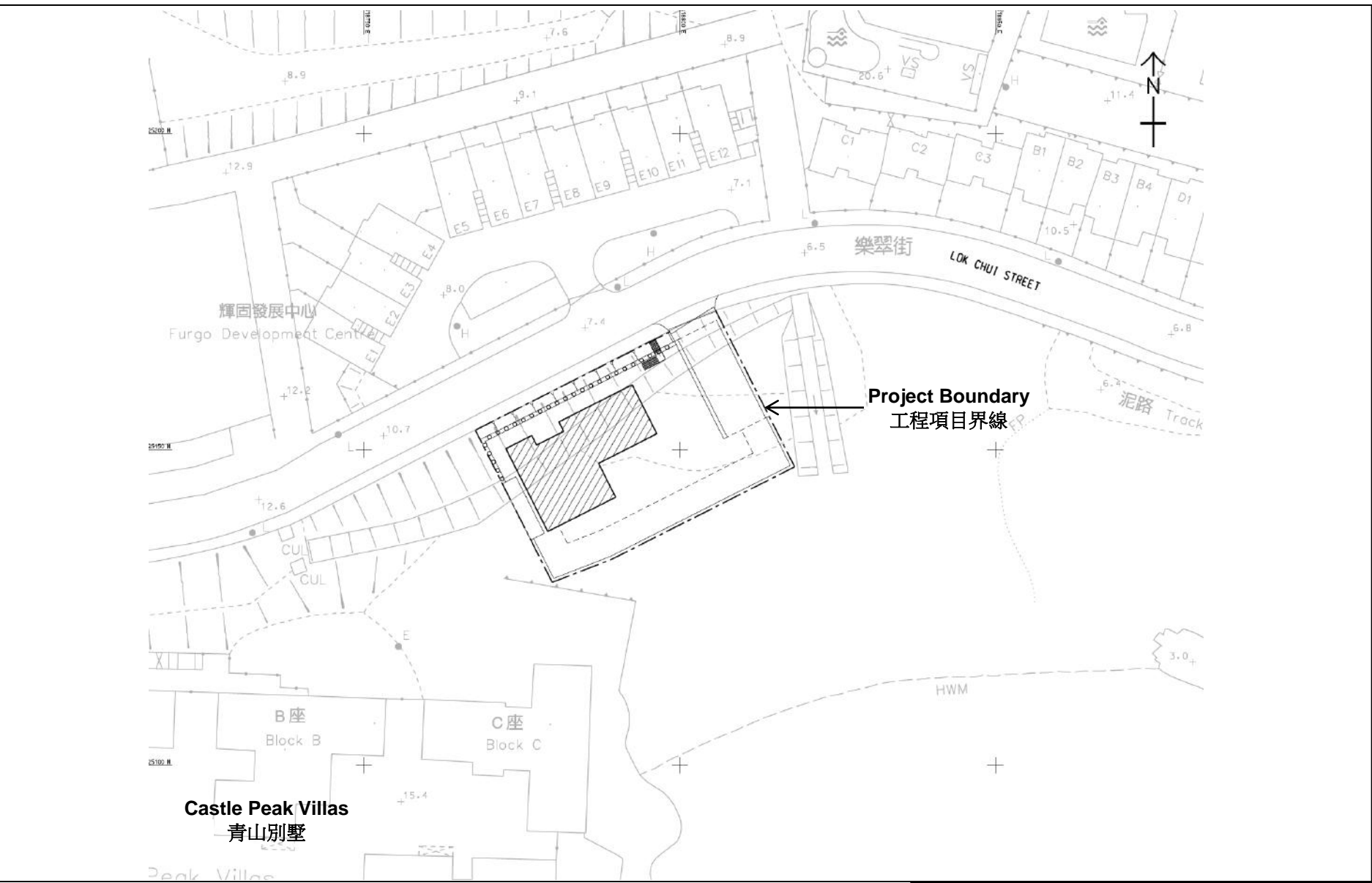
MATERIALAB CONSULTANTS LIMITED

Room 723 & 725, 7/F, Block B,
Profit Industrial Building,
1-15 Kwai Fung Crescent, Kwai Fong,
Hong Kong..

Tel : (852)-24508238
Fax : (852)-24508032
Email : mcl@fugro.com.hk

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FIGURE 1 PROJECT GENERAL LAYOUT



Location of the Proposed Sewage Pumping Station at Lok Chui Street near Castle Peak Villas
 位於樂翠街近青山別墅的擬建污水泵水站

Figure 1

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Profit Industrial Building,
1-15 Kwai Fung Crescent, Kwai Fong,
Hong Kong..

Tel : (852)-24508238
Fax : (852)-24508032
Email : mcl@fugro.com.hk

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FIGURE 2

FLOWCHART OF GENERAL CONSTRUCTION PHASE EM&A ACTIVITIES

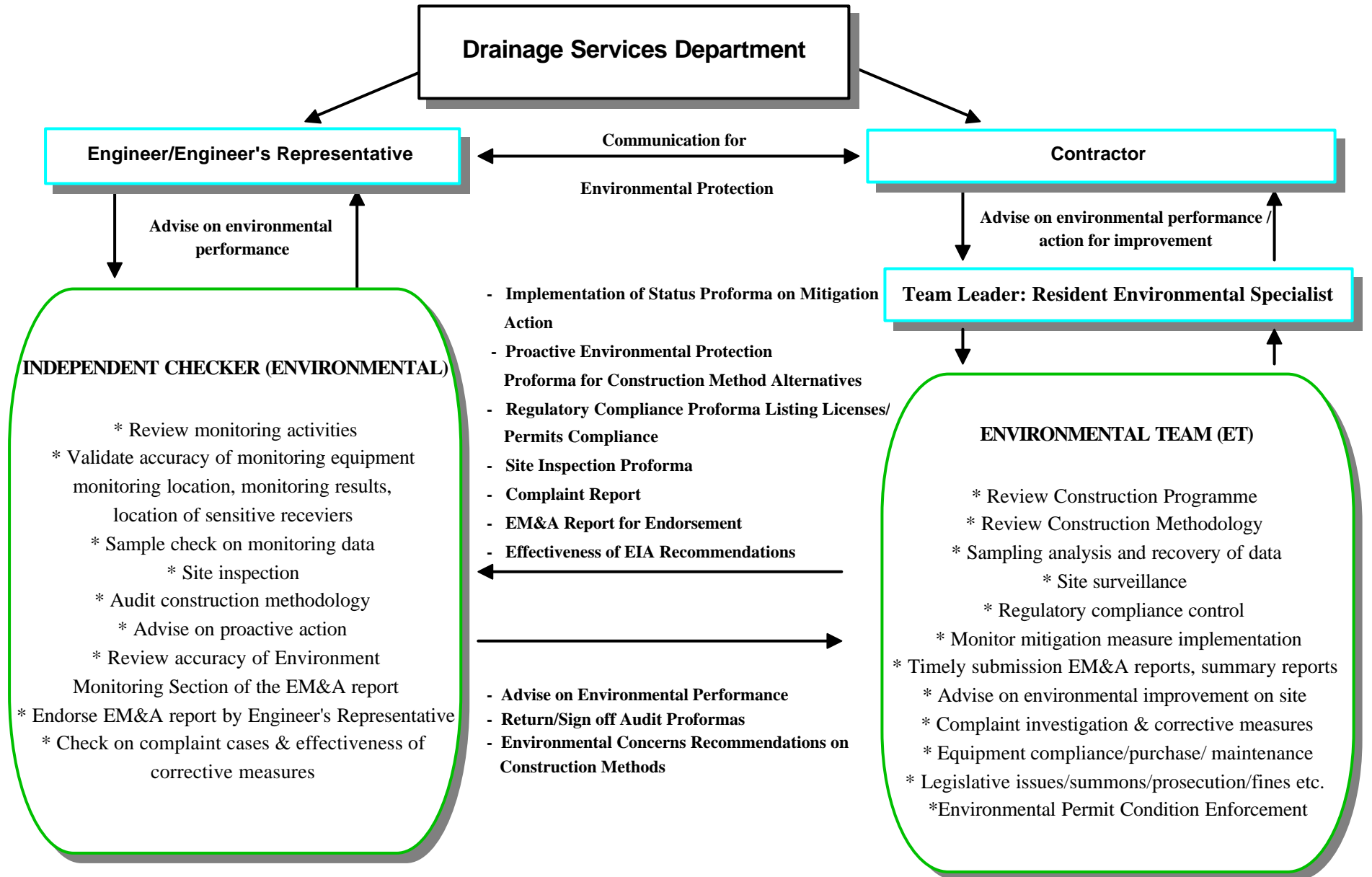


Figure 2 Construction Phase Environmental Monitoring & Audit Procedure

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Room 723 & 725, 7/F, Block B,
Profit Industrial Building,
1-15 Kwai Fung Crescent, Kwai Fong,
Hong Kong..

Tel : (852)-24508238
Fax : (852)-24508032
Email : mcl@fugro.com.hk

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FIGURE 3

TENTATIVE CONSTRUCTION PROGRAMME

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Profit Industrial Building,
1-15 Kwai Fung Crescent, Kwai Fong,
Hong Kong..

Tel : (852)-24508238
Fax : (852)-24508032
Email : mcl@fugro.com.hk

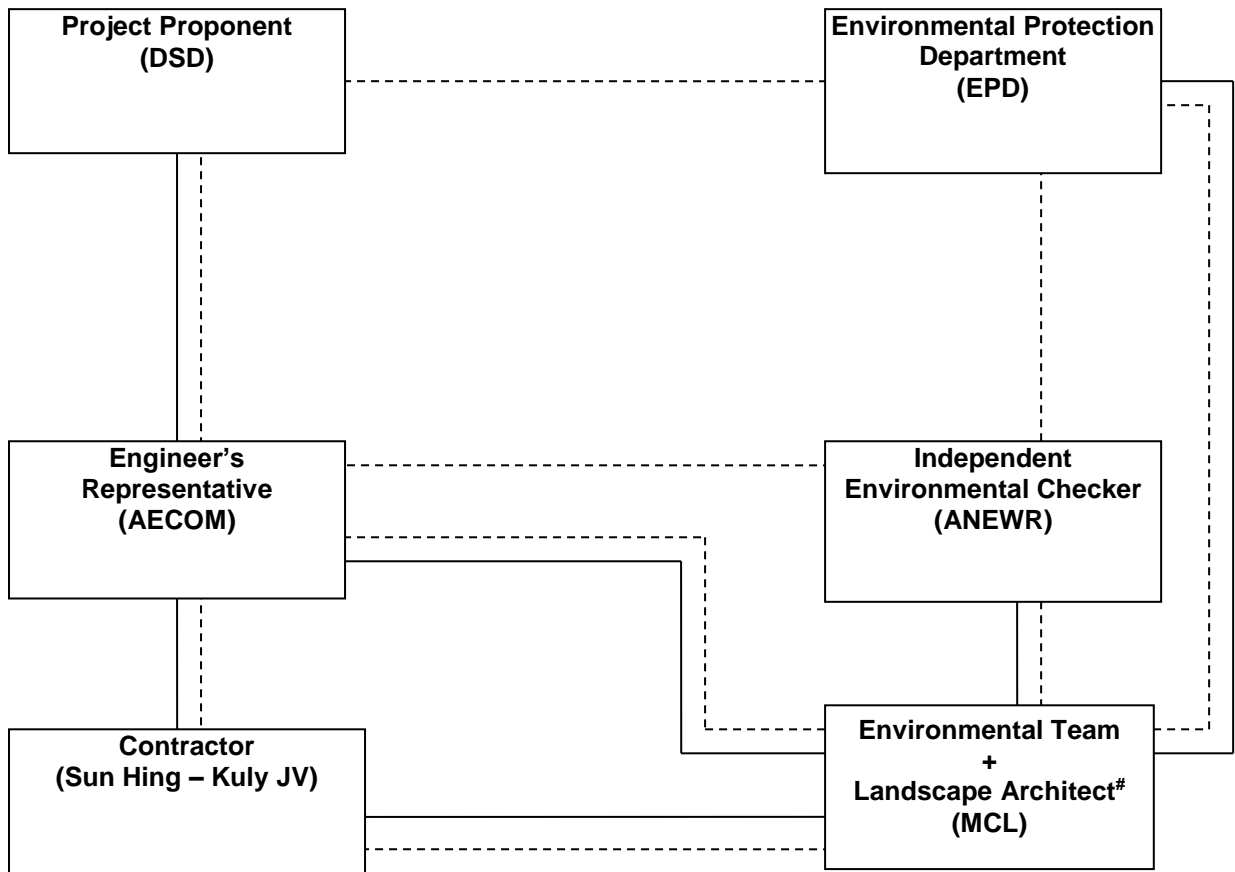
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FIGURE 4 ORGANIZATION CHART

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Room 723 & 725, 7/F, Block B,
Profit Industrial Building,
1-15 Kwai Fung Crescent, Kwai Fong,
Hong Kong..

Tel : (852)-24508238
Fax : (852)-24508032
Email : mcl@fugro.com.hk



Remark:

The Landscape Architect with a minimum of 1-2years on site experience as a member of the ET to monitor and audit the landscaping installation works and landscape protection measures.

Legend:

— Line of Reporting
- - - Line of Communication

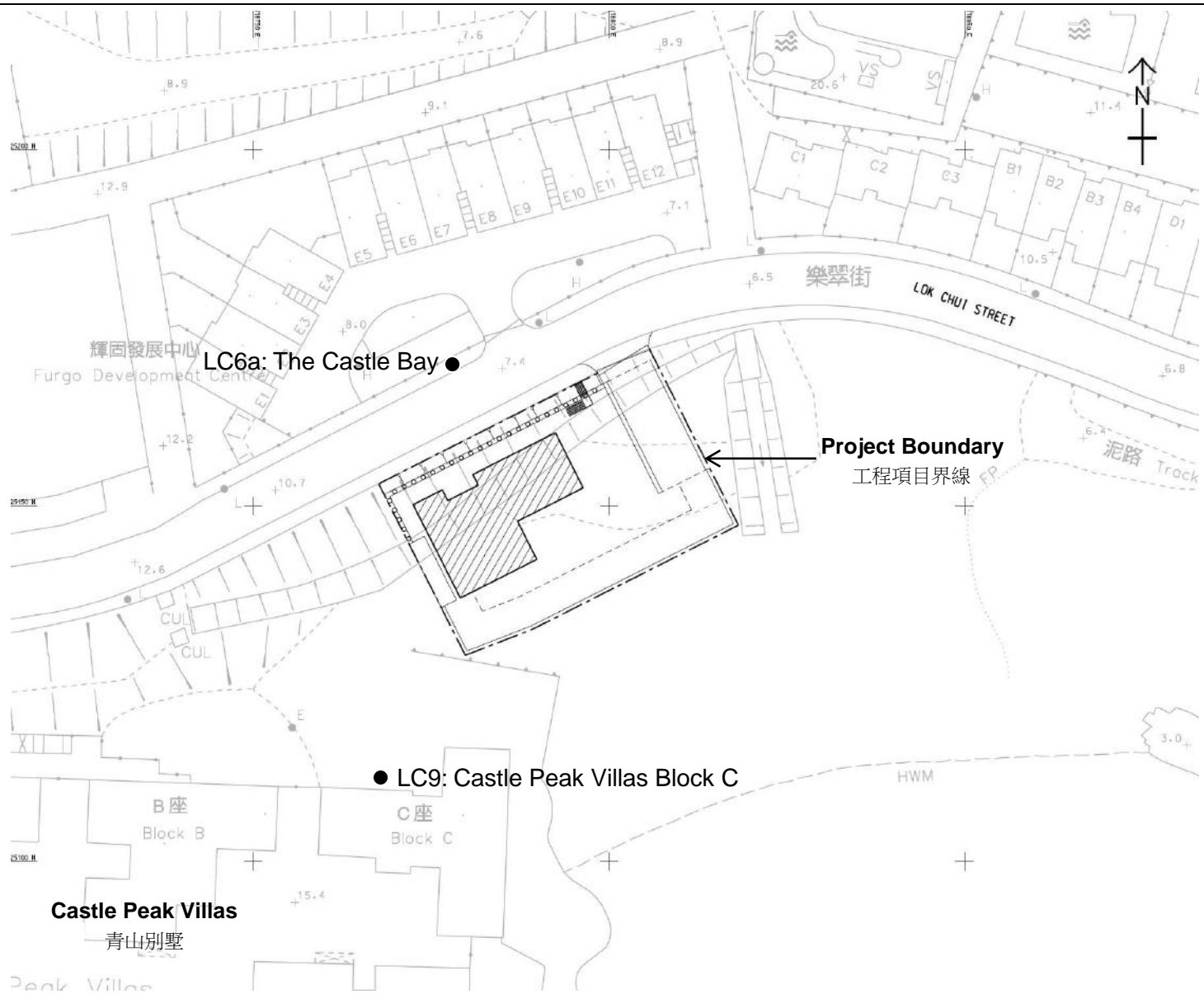
MATERIALAB CONSULTANTS LIMITED

Room 723 & 725, 7/F, Block B,
Profit Industrial Building,
1-15 Kwai Fung Crescent, Kwai Fong,
Hong Kong.

Tel : (852)-24508238
Fax : (852)-24508032
Email : mcl@fugro.com.hk

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FIGURE 5 PROPOSED AIR AND NOISE MONITORING LOCATIONS



Proposed Air and Noise Monitoring Location

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Room 723 & 725, 7/F, Block B,
Profit Industrial Building,
1-15 Kwai Fung Crescent, Kwai Fong,
Hong Kong.

Tel : (852)-24508238
Fax : (852)-24508032
Email : mcl@fugro.com.hk

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LC6a: The Castle Bay






LC9: Castle Peak Villas Block C



Note:

1) LC6a: The air and noise monitoring station is set at a point 1m from the exterior of the sensitive receiver fence wall, and set at a position 1.2m above ground. Façade measurement will be carried out for noise monitoring.

2) LC9: The air monitoring station is set at the top of parapet wall of sensitive receivers building and the noise monitoring station is set at a point 1m from the exterior of the sensitive receivers building façade and set at a position 5m above the ground.

Legend:  Proposed Air Monitoring Location
 Proposed Noise Monitoring Location
 1m from the exterior building façade

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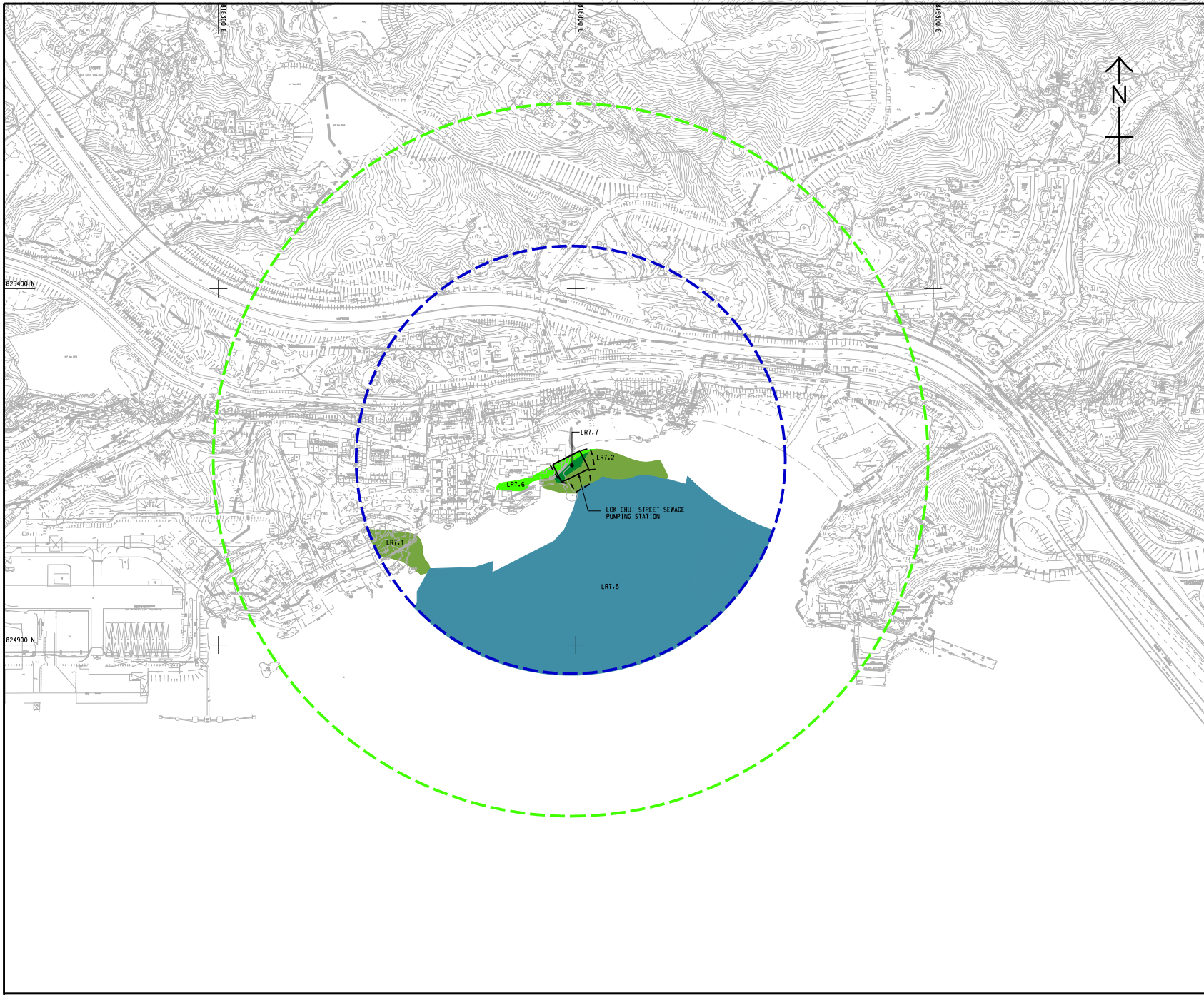
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Profit Industrial Building,
1-15 Kwai Fung Crescent, Kwai Fong,
Hong Kong..

Tel : (852)-24508238
Fax : (852)-24508032
Email : mcl@fugro.com.hk

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FIGURE 6

DRAWING NO. (60022471/C3/VEP/9002, 60022471/C3/VEP/9003)



- LEGEND:**
- - - - 300 STUDY BOUNDARY
 - - - - 500 STUDY BOUNDARY
 - - - - EXTENT OF PERMANENT WORK
 - - - - EXTENT OF TEMPORARY WORKS AREA
 - WOODLAND/SHRUBLAND/GRASSLAND
 - SEA
 - TREES AND SHRUBS PLANTING ON MAN-MADE SLOPE
 - SCRUBLAND

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NO.	DESCRIPTION	DATE	BY	CHECKED	DATE

DRAINAGE SERVICES DEPARTMENT,
THE GOVERNMENT OF THE HONG KONG
SPECIAL ADMINISTRATIVE REGION
 AGREEMENT No. CE 38/2006 (DS)
TUEN MUN SEWERAGE - INVESTIGATION,
DESIGN AND CONSTRUCTION
LANDSCAPE RESOURCES -
LOK CHUI STREET PUMPING
STATION

AECOM

DRGNO. 圖區編號	60022471/C3/VEP/9002
DESIGNED BY 設計	SWK
CONTRACT NO. 合約編號	LVP
SCALE 比例尺	A1 : 1 : 2500
DATE 日期	

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LR 7.1



LR 7.2



LR 7.5



LR 7.6



LR 7.7

NO. NO.	DESCRIPTION 描述	DATE 日期	SCALE 比例
-	VEP	SWK TLST MAR. 15	
D DRAINAGE SERVICES DEPARTMENT, THE GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION AGREEMENT No. CE 38/2006 (DS) TUEN MUN SEWERAGE - INVESTIGATION, DESIGN AND CONSTRUCTION PHOTOS OF LANDSCAPE RESOURCES AECOM			
DRAWING NO. 圖紙編號		60022471/C3/VEP/9003	
DESIGNED BY 設計	SWK	CONTRACT NO. 合約編號	DATE APPROVED 日期
DRAWN BY 繪圖	LVP	STATUS 狀態	
SCALE 比例	N.T.S.		
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MATERIALAB CONSULTANTS LIMITED

Room 723 & 725, 7/F, Block B,
Profit Industrial Building,
1-15 Kwai Fung Crescent, Kwai Fong,
Hong Kong..

Tel : (852)-24508238
Fax : (852)-24508032
Email : mcl@fugro.com.hk

The logo for MaterialLab, featuring the word "MaterialLab" in a bold, sans-serif font. The text is centered between two thick, horizontal black bars.

FIGURE 7

DRAWING NO. (60022471/C3/VEP/9004, 60022471/C3/VEP/9005)



LEGEND:

- 300 STUDY BOUNDARY
- 500 STUDY BOUNDARY
- EXTENT OF PERMANENT WORK
- EXTENT OF TEMPORARY WORKS AREA
- SEA
- OPEN SPACE
- RESIDENTIAL
- VILLAGE
- TRANSPORTATION CORRIDOR

NO.	DESCRIPTION	D.T.	P.L.	DATE	SIGN.
DRAINAGE SERVICES DEPARTMENT THE GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION					
AGREEMENT No. CE 38/2006 (DS) TUEN MUN SEWERAGE - INVESTIGATION, DESIGN AND CONSTRUCTION					
LANDSCAPE CHARACTER AREA - LOK CHUI STREET PUMPING STATION					
AECOM					
DRGNO.	60022471/C3/VEP/9004				
DESIGNED BY	SWK	CONTRACT NO.	P. D.T. APPROVED		
DRAWN BY	LVP	STATUS	D.S.E.		
SCALE	A1 : 1 : 2500				
DRAWING UNIT	METRES				
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LCA 7.4



LCA 7.5



LCA 7.6



LCA 7.11

NO.	DESCRIPTION	DATE	BY
-	VEP	SWK	TLST/MAR. 15

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THE GOVERNMENT OF THE HONG KONG
SPECIAL ADMINISTRATIVE REGION

AGREEMENT No. CE 38/2006 (DS)
TUEN MUN SEWERAGE - INVESTIGATION,
DESIGN AND CONSTRUCTION

PHOTOS OF LANDSCAPE
CHARACTER AREA

AECOM

DRAWING NO. 60022471/C3/VEP/9005
圖紙編號

DESIGNED BY SWK	CONTRACT NO.	DATE APPROVED
DRAWN BY LVP	STATUS	
CHECKED BY N.T.S.		
SCALE METRES		

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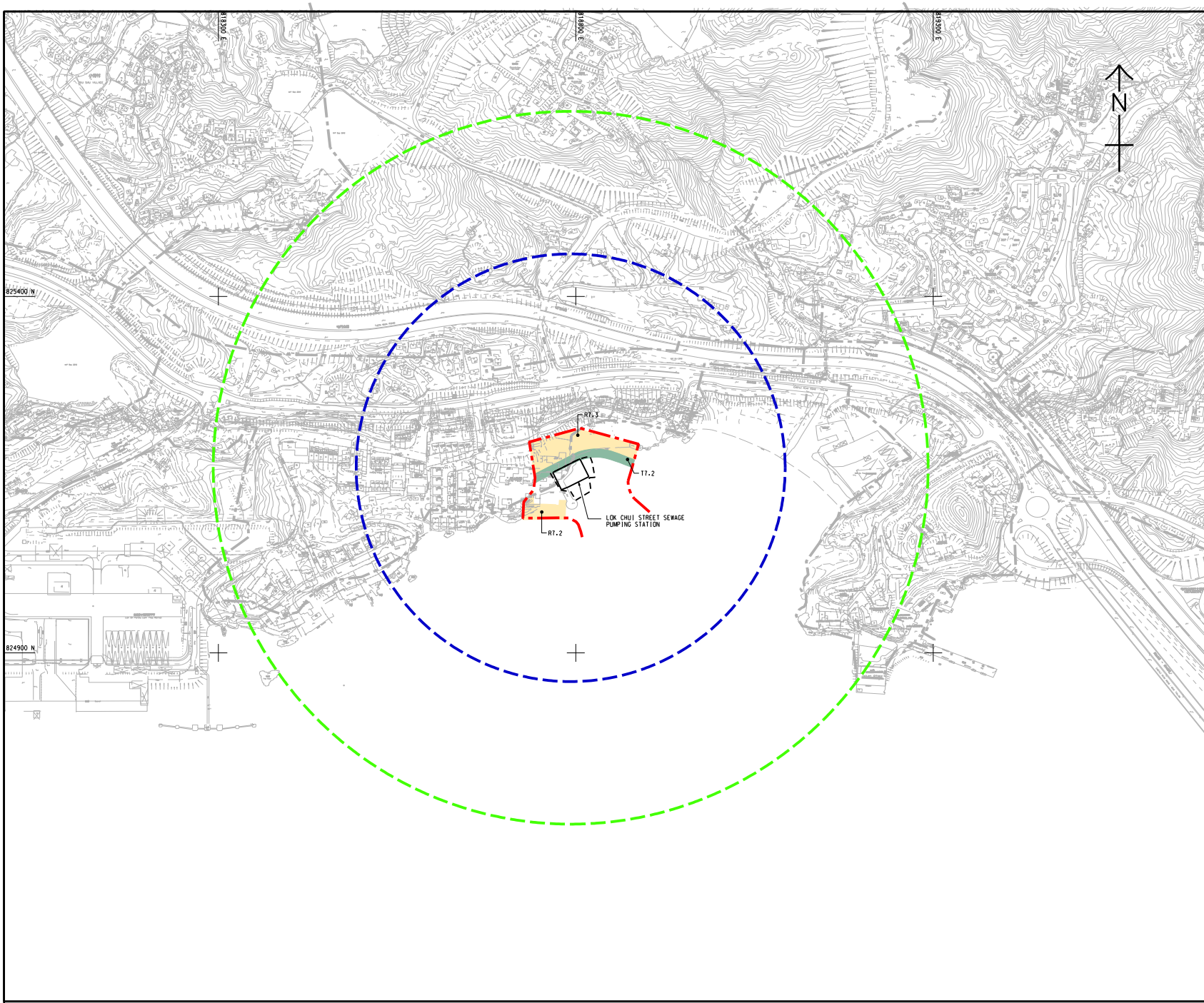
Room 723 & 725, 7/F, Block B,
Profit Industrial Building,
1-15 Kwai Fung Crescent, Kwai Fong,
Hong Kong..

Tel : (852)-24508238
Fax : (852)-24508032
Email : mcl@fugro.com.hk

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FIGURE 8

DRAWING NO. (60022471/C3/VEP/9006, 60022471/C3/VEP/9007)



- LEGEND:**
- 300 STUDY BOUNDARY
 - 500 STUDY BOUNDARY
 - ZONE OF VISUAL INFLUENCES
 - EXTENT OF PERMANENT WORK
 - EXTENT OF TEMPORARY WORKS AREA
 - RESIDENTIAL VSRS
 - TRAVELLING VSRS

NO.	DESCRIPTION	DATE	BY	CHECKED	SCALE

DRAINAGE SERVICES DEPARTMENT,
THE GOVERNMENT OF THE HONG KONG
SPECIAL ADMINISTRATIVE REGION

AGREEMENT No. CE 38/2006 (DS)
 TUEN MUN SEWERAGE - INVESTIGATION,
 DESIGN AND CONSTRUCTION

KEY VSRS & ZONE OF VISUAL
INFLUENCES - CASTLE PEAK
VILLAS PUMPING STATION



DRAWING NO. 60022471/C3/VEP/9006

DESIGNED BY SWK	CONTRACT NO. LVP	P. BY / APPROVED SWK
DRAWN BY LVP	STATUS REV	SCALE A1 : 1 : 2500
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VSR - R7.2



VSR - R7.3



VSR - T7.2

NO.	DESCRIPTION	DATE	BY
-	VEP	SWK	TLST/MAR. 15

D DRAINAGE SERVICES DEPARTMENT,
THE GOVERNMENT OF THE HONG KONG
SPECIAL ADMINISTRATIVE REGION

AGREEMENT No. CE 38/2006 (DS)
TUEN MUN SEWERAGE - INVESTIGATION,
DESIGN AND CONSTRUCTION

PHOTOS OF KEY VSRS

AECOM

DRAWING NO. 60022471/C3/VEP/9007
圖紙編號

DESIGNED BY 設計人	SWK	CONTRACT NO. 合約編號	DATE 日期
DRAWN BY 繪圖人	LVP	STATUS 狀態	APPROVED BY 核准人
SCALE 比例	N.T.S.		
VERTICAL SCALE 垂直比例	METRES	COPYRIGHT RESERVED 版權 所 有	

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Room 723 & 725, 7/F, Block B,
Profit Industrial Building,
1-15 Kwai Fung Crescent, Kwai Fong,
Hong Kong.

Tel : (852)-24508238
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APPENDIX A

ENVIRONMENTAL MITIGATION IMPLEMENTATION SCHEDULE

Contract No. DC/2014/01
Castle Peak Road Trunk Sewer and Tuen Mun Village Sewerage

ENVIRONMENTAL MITIGATION IMPLEMENTATION SCHEDULE

Air Quality

EIA Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages		
					Design	Construction	Operation
4.5	Undertake all air pollution measures to prevent dust nuisance as a result of and during construction activities.	All unpaved haul roads, bulldozed material, exposed site areas / Throughout construction period	Contractor	TMEIA		U	
4.5	No debris or other materials shall be burnt on the works areas.	All areas / Throughout construction period	Contractor	TMEIA. Avoid smoke impacts and disturbance		U	
4.5	Dust suppression measures shall be provided and to be submitted to and approved by the Engineer.	All areas / Throughout construction period	Contractor	TMEIA		U	
4.5	Stockpiles of imported material kept on site shall be contained within hoardings, dampened and/or covered during dry and windy weather.	All areas / Throughout construction period	Contractor	TMEIA Avoid dust generation		U	
4.5	Material stockpiled along side trenches should be covered with tarpaulins whenever works are within village boundaries.	All areas / Throughout construction period	Contractor	TMEIA Avoid dust generation / visual impacts		U	
4.5	Water sprays shall be used during the delivery and handling of cement, sands aggregates and the like.	All areas / Throughout construction period	Contractor	TMEIA Avoid dust generation		U	
4.5	No batching of concrete should be carried out on site. Concrete should be used in ready mixed form and off loaded adjacent to designated works areas.	All areas / Throughout construction period	Contractor	TMEIA		U	

Contract No. DC/2014/01
Castle Peak Road Trunk Sewer and Tuen Mun Village Sewerage

ENVIRONMENTAL MITIGATION IMPLEMENTATION SCHEDULE

Air Quality

EIA Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages		
					Design	Construction	Operation
4.5	Any vehicle used for moving cement, sands, aggregates and construction waste and the like shall have properly fitting side and tail boards. Materials shall not be loaded to a level higher than the side and tail boards, and shall be covered by a clean tarpaulin. The tarpaulin shall be properly secured and shall extend at least 300mm over the edges of the side and tail boards.	All areas / Throughout construction period	Contractor	TMEIA Avoid dust and spillage of material		U	
4.5	No earth, mud, debris, dust and the like shall be deposited on public roads. Details of proposals for the wheel cleaning facilities shall be agreed with the Engineer. Such wheel washing facility shall be usable prior to any earthworks excavation activity on the Site.	All areas, particularly pumping station sites / Throughout construction period	Contractor	TMEIA Avoid spread/ deposition of mud		U	
4.6.9	Pumping station vent shafts should be located away from sensitive receiver.	All pumping stations	DSD	TMEIA Avoid odour impacts	U		
4.6.18	Use a covered container to store and transport the screenings from the pump house.	All pumping stations / operational phase	DSD	TMEIA Avoid odour impacts			U
4.6.18	Undertake the collection of the screenings and transfer to the covered container within the confines of the pump house.	All pumping stations / operational phase	DSD	TMEIA Avoid odour impacts			U
11.2.8	EM&A in the form of 1 hour total suspended particulates monitoring once per week	All sensitive representative receivers / Throughout construction period	Contractor	EM&A Manual		U	

Contract No. DC/2014/01
Castle Peak Road Trunk Sewer and Tuen Mun Village Sewerage

ENVIRONMENTAL MITIGATION IMPLEMENTATION SCHEDULE

Noise

EIA Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages		
					Design	Construction	Operation
5.7.1 & 5.8.1	Ensure silencers are installed on the exhaust pipes of the trucks, excavators, compactors, concrete lorry mixer, and cranes for all activities.	All areas / Throughout construction period	Contractor	TMEIA		U	
5.7.1 & 5.8.1	Use of mufflers on the breakers for all activities.	All areas / Throughout construction period	Contractor	TMEIA		U	
5.7.1 & 5.8.1	Use of temporary noise barriers for all activities at the pumping station sites and during main sewer construction. During main sewer construction, barriers should be used to screen the activities of mobile equipment including the crane and excavator.	All pumping stations and main sewer construction locations / Throughout construction period	Contractor	TMEIA		U	
5.5.10	Use of temporary noise barriers for all activities in the villages, where there is at least a 5m clearance	Village sewer alignment / Throughout construction period	Contractor	TMEIA		U	
5.8.6 & 5.9.6	Manual breaking of concrete, where the concrete is less than 50mm thick.	Sewer alignment construction / concrete breaking activities	Contractor	TMEIA		U	
5.8.6 & 5.9.6	Use of alternative pavement removal methods/equipment (kick ripper), where the concrete is less than 100mm thick	Sewer alignment construction / concrete breaking activities	Contractor	TMEIA		U	
5.8.6 & 5.9.6	Use of acoustic enclosure in place of a barrier where there is a 6m clearance.	Sewer alignment construction / Throughout construction period	Contractor	TMEIA		U	

Contract No. DC/2014/01
Castle Peak Road Trunk Sewer and Tuen Mun Village Sewerage

ENVIRONMENTAL MITIGATION IMPLEMENTATION SCHEDULE

Noise

EIA Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages		
					Design	Construction	Operation
5.8.6 & 5.9.6	Scheduling the numbers and operating times of equipment, when noise levels cannot be reduced to within the standards by other means	Sewer alignment construction / Throughout construction period	Contractor	TMEIA		U	
5.8.11	The construction activities should be carried out in the daytime period (08.00-18.00) only and shall exclude Sundays and public holidays.	All areas	Contractor	TMEIA		U	
5.8.11	Powered mechanical equipment shall not be used within 5m of an NSR without the permission of the Engineer	All areas / Throughout construction period	Contractor	TMEIA		U	
5.8.11	Carry out good site practice to limit noise emission at source.	All areas / Throughout construction period	Contractor	TMEIA		U	
5.8.11	Avoid simultaneous noisy activities.	All areas / Throughout construction period	Contractor	TMEIA		U	
11.2.8	EM&A in the form of noise monitoring.	All representative receivers / Throughout construction period	Contractor	EM&A Manual		U	

Contract No. DC/2014/01
Castle Peak Road Trunk Sewer and Tuen Mun Village Sewerage

ENVIRONMENTAL MITIGATION IMPLEMENTATION SCHEDULE

Water Quality

EIA Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages		
					Design	Construction	Operation
6.4.3	Stockpiles of excavated material should be kept to a minimum and covered during times of heavy rainfall.	All areas / throughout construction period	Contractor	WPCO, TMEIA & ProPECC PN 1/94		U	
6.4.10	Pass any trench dewatering through a portable sand/silt removal traps prior to discharge.	All areas / throughout construction period	Contractor	WPCO, TMEIA & ProPECC PN 1/94		U	
6.5.2	When works are carried out during the rainy season exposed slopes, stockpiles should be covered with tarpaulin and temporary access roads protected with a layer of gravel or crushed stone.	All areas / throughout construction period	Contractor	WPCO, TMEIA & ProPECC PN 1/94		U	
6.5.2	Surface run off should be discharged to storm drains via sand/silt removal traps.	All areas / throughout construction period	Contractor	WPCO, TMEIA & ProPECC PN 1/94		U	
6.5.2	Channels, bunds or sand bags should be used to direct any storm water to the traps and perimeter channels should be constructed before the main works begin to prevent external run off from crossing the site.	All areas / throughout construction period	Contractor	WPCO, TMEIA & ProPECC PN 1/94		U	
6.5.2	Silt removal structures, channels and manholes should be maintained to remove accumulated material, specifically at the onset and end of rainy periods.	All areas / throughout construction period	Contractor	WPCO, TMEIA & ProPECC PN 1/94		U	

Contract No. DC/2014/01
Castle Peak Road Trunk Sewer and Tuen Mun Village Sewerage

ENVIRONMENTAL MITIGATION IMPLEMENTATION SCHEDULE

Water Quality

EIA Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages		
					Design	Construction	Operation
6.5.2	Trenches for the sewer main should be dug and backfilled in short sections to minimise the quantities of rain water which will need to be pumped from them and upslope bunding provided to prevent surface water from flowing into the trenches.	All areas / throughout construction period	Contractor	WPCO, TMEIA & ProPECC PN 1/94		U	
6.5.2	Rainwater pumped from the trenches should be discharged to storm drains via sand/silt removal traps.	All areas / throughout construction period	Contractor	WPCO, TMEIA & ProPECC PN 1/94		U	
6.5.2	Discharges to natural water courses should only take place when the effluent can be shown to comply with the relevant specified standards.	All areas / throughout construction period	Contractor	WPCO, TMEIA & ProPECC PN 1/94 & Technical Memorandum on Standards for Effluent Discharged in Drainage and Sewerage Systems, Inland and Coastal Waters		U	
6.5.3	All plant should be in proper working order and maintained such that there is no leakage of fuel or oil. Any waste oils should be collected in designated tanks prior to disposal off site.	All areas / throughout construction period	Contractor	WPCO, TMEIA & ProPECC PN 1/94		U	
6.5.3	All mechanical plant maintenance and refuelling areas shall be sited on paved areas. All storm water run-off from these areas should be discharged via oil separators/petrol separators and sand/silt removal traps.	All areas / throughout construction period	Contractor	WPCO, TMEIA & ProPECC PN 1/94		U	

Contract No. DC/2014/01
Castle Peak Road Trunk Sewer and Tuen Mun Village Sewerage

ENVIRONMENTAL MITIGATION IMPLEMENTATION SCHEDULE

Water Quality

EIA Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages		
					Design	Construction	Operation
6.5.4	Groundwater pumped out of excavations for the construction of pump sumps should only be discharged following removal of silt by sand/silt removal traps.	All areas / throughout construction period	Contractor	WPCO, TMEIA & ProPECC PN 1/94		U	
6.5.5	Water from drilling of rock should be discharged following removal of silt by sand/silt removal traps.	All areas / throughout construction period	Contractor	WPCO, TMEIA & ProPECC PN 1/94		U	
6.5.6	The wheels of all vehicles leaving the construction site should be washed before leaving the site to minimise the carry over of mud onto public roads. Wheel wash water should be recycled and only discharged following removal of silt by sand/silt removal traps.	All areas particularly pumping station sites / throughout construction period	Contractor	WPCO, TMEIA & ProPECC PN 1/94		U	
6.5.7	Run off from the roofs of site buildings should be conveyed in closed drains to the nearest surface water course to prevent the generation of excessive quantities of surface water run off carrying suspended solids.	Site Office areas / throughout construction period	Contractor	WPCO, TMEIA & ProPECC PN 1/94		U	
6.5.7	All spillages should be cleaned up immediately to prevent their downward migration into the groundwater.	All areas / throughout construction period	Contractor	WPCO, TMEIA & ProPECC PN 1/94		U	
6.5.7	Sewage from toilets and any kitchens in the site facilities should be treated via a septic tank system or if this is not practicable chemical toilets should be provided and the waste from these together with 'grey water' removed from the site on a daily basis for disposal at an appropriate receiving point.	All areas / throughout construction period	Contractor	WPCO, TMEIA & ProPECC PN 1/94		U	
6.6.2	Overflow bypasses to be used in emergency situations only and no effluent should be discharged during regular maintenance.	All pumping stations / Operation	DSD	WPCO, TMEIA			U

Contract No. DC/2014/01
Castle Peak Road Trunk Sewer and Tuen Mun Village Sewerage

ENVIRONMENTAL MITIGATION IMPLEMENTATION SCHEDULE

Water Quality

EIA Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages		
					Design	Construction	Operation
6.6.3 & 6.6.4	Supply pumping stations with stand-by pumps, emergency power supplies and telemetry system.	All Pumping Stations	DSD	WPCO, TMEIA & ProPECC PN 1/94	U		
11.2.8	EM&A in the form of site supervision to ensure water quality protection measures are implemented	All areas/ Throughout construction period	Contractor	EM&A		U	

Contract No. DC/2014/01
Castle Peak Road Trunk Sewer and Tuen Mun Village Sewerage

ENVIRONMENTAL MITIGATION IMPLEMENTATION SCHEDULE

Waste Management

EIA Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages		
					Design	Construction	Operation
7.12.1	The Contractor shall identify a coordinator for the management of waste. The coordinator shall prepare a Waste Management Plan which specifies procedures such as a ticketing system, to facilitate tracking of loads and to ensure that illegal disposal of wastes does not occur, and protocols for the maintenance of records of the quantities of wastes generated, recycled and disposed. The Waste Management Plan shall be prepared with reference to Works Branch Technical Circular (WBTC) No. 5/99 for the Trip-ticket System for Disposal of Construction and Demolition Material and issued to the DEP and CED to confirm the availability for C&D and public fill waste.	Plan to be prepared prior to the start of construction, Implementation throughout construction period / All areas	Contractor	TMEIA. Works Branch Technical Circular (WBTC) No. 5/99 for the Trip-ticket System for Disposal of Construction and Demolition Material		U	
7.12.1	Stockpiled material should avoid vegetated areas where possible and covered by tarpaulins. Storage of material on site should be kept to a minimum.	All areas/ Throughout construction period	Contractor	TMEIA. Prevent windblown dust and/or surface run-off / avoid nuisance to local residents		U	
7.12.1	Surplus material should be sorted on site into C&D waste and that suitable for public fill	All areas /throughout construction period	Contractor	TMEIA. Maximise reusable material		U	
7.12.1	The contractor should provide a temporary storage area for general refuse during the construction phase which should be enclosed to avoid refuse being windblown and affected by rain. General refuse should be stored on site for a minimum period and disposed of at a licenced facility.	All areas / throughout construction period	Contractor	TMEIA		U	

Contract No. DC/2014/01
Castle Peak Road Trunk Sewer and Tuen Mun Village Sewerage

ENVIRONMENTAL MITIGATION IMPLEMENTATION SCHEDULE

Waste Management

EIA Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages		
					Design	Construction	Operation
7.12.1	Excavated material in trucks shall be covered by tarpaulins to reduce the potential for spillage.	All areas / throughout construction period	Contractor	TMEIA		U	
7.12.1	Suitable chemical waste storage areas shall be formed on the site for temporary storage pending collection. All chemical wastes shall be handled, stored, transported and disposed of in accordance with the relevant practices.	All areas / throughout construction period	Contractor	TMEIA/ Code of Practice on the Package, Labelling and Storage of Chemical Wastes and A Guide to the Chemical Waste Control Scheme		U	
7.12.1	Nightsoil arising from chemical toilets and on site chemical treatment facilities shall be transported by a licensed contractor to government Sewage Treatment Works for disposal.	All areas / throughout construction period	Contractor	TMEIA/ Sanitation and Conservancy (Regional Council) By-laws		U	
7.12.1	Any screenings and grit that are removed during maintenance shall be disposed of at a landfill site. The material shall be suitably contained and covered.	All areas / operational phase	DSD	TMEIA			U
11.2.8	EM&A in the form of supervision of waste management practices	All areas / throughout construction period	Contractor	EM&A		U	

Contract No. DC/2014/01
Castle Peak Road Trunk Sewer and Tuen Mun Village Sewerage

ENVIRONMENTAL MITIGATION IMPLEMENTATION SCHEDULE

Landscape and Visual

EIA Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages		
					Design	Construction	Operation
10.8.5, 10.9.15, 10.10.6, 10.10.11, 10.10.20, 10.11.6	Use of a suitable colour scheme to the pump station building to match the design of the adjacent properties.	All pumping stations	DSD & Contractor	Reduce visual intrusion of pumping stations	U	U	
10.8.5, 10.9.15, 10.10.11, 10.10.20, 10.11.6	Construction of boundary wall similar to the adjacent housing instead of standard chain link and barbed wire fence.	All pumping stations except Tai Lam Correctional Institution	DSD & Contractor	Screen pumping stations	U	U	
10.8.5, 10.9.15, 10.10.11, 10.10.20, 10.11.6	Planting of trees and shrubs to the boundary of the pumping station compound.	All pumping stations except Tai Lam Correctional Institution	DSD & Contractor	Screen pumping stations	U	U	
10.8.6	Minimise damage to the rootball of the tree east of the pumping station site.	East of Castle Peak Villas pumping station/ During excavation	DSD and Contractor		U	U	
11.2.8	EM&A in the form of site supervision of protection measures for trees and landscaping and compensatory planting establishment during the construction and operational phases respectively	All areas	Contractor	EM&A		U	U

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Tel : (852)-24508238
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APPENDIX B

PROFORMA FOR CONSTRUCTION PHASE EM&A PROGRAMME

SITE INSPECTION PROFORMA

Ref: _____

Date	Location	Req't Ref.*	Observation/Deficiency	Mitigation Action** (Responsible Agency)	Date*** of Confirmation

* EIA Ref/EM&A Log Ref/Design Document Ref/Environmental Protection Contract Clause
 ** Specific Environmental Mitigation Measures should be stated, such as, equipment, processes, systems, practices or technologies.
 *** The required completion date to confirm the specified Environmental Protection Action

This Proforma is an Environmental Protection Instruction for: _____ on _____

Signed by Environmental Team Leader: _____ Date: _____

Copy to Independent Checker (Environment)

PROACTIVE ENVIRONMENTAL PROTECTION PROFORMA

Ref: _____

Ref*	Proposed Construction Method**	Location/ Working Period	Anticipated Impacts	Recommended Mitigation Measures

* EIA Ref/EM&A Log Ref/Design Document Ref
 ** Details of equipment, vehicles, plants, processes, technologies for the option of construction method

Reviewed by Environmental Team Leader: _____

Date: _____

Approved by Independent Checker (Environment): _____

Date: _____

COMPLAINT LOG

Ref: _____

Log Ref	Date/Location	Complainant/ Date of Contact	Details of Complaint	Investigation/Mitigation Action	File Closed

Filed by Environmental Team Leader: _____

Date: _____

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Room 723 & 725, 7/F, Block B,
Profit Industrial Building,
1-15 Kwai Fung Crescent, Kwai Fong,
Hong Kong.

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APPENDIX C SAMPLE DATA SHEET

Drawing 2.1 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:	
Measured TSP Level (Fg/m ³):	

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

Drawing 3.1 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 Result	Leq (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 : _____	_____	_____	_____

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Profit Industrial Building,
1-15 Kwai Fung Crescent, Kwai Fong,
Hong Kong..

Tel : (852)-24508238
Fax : (852)-24508032
Email : mcl@fugro.com.hk

The logo for MaterialLab, featuring the word "MaterialLab" in a bold, sans-serif font. The "Material" part is in a smaller size and weight than the "Lab" part. The text is centered between two thick horizontal black bars.

APPENDIX D

SAMPLE TEMPLATE FOR THE INTERIM NOTIFICATIONS

Drawing 9.1 Sample Template for Interim Notifications of Environmental Quality Limits Exceedances

Incident Report on Action Level or Limit Level Non-compliance

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

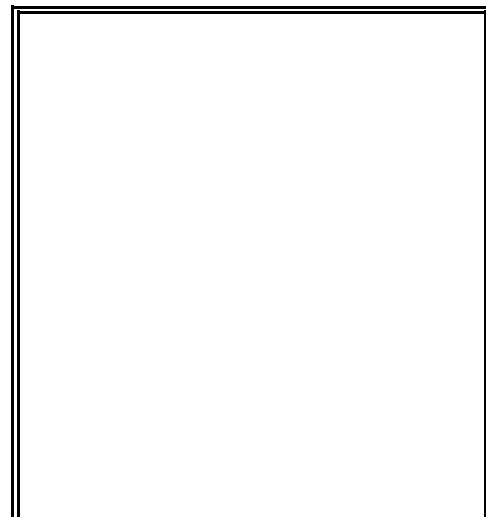
Location Plan

Prepared by : _____

Designation : _____

Signature : _____

Date : _____



MATERIALAB CONSULTANTS LIMITED

Room 723 & 725, 7/F, Block B,
Profit Industrial Building,
1-15 Kwai Fung Crescent, Kwai Fong,
Hong Kong.

Tel : (852)-24508238
Fax : (852)-24508032
Email : mcl@fugro.com.hk

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APPENDIX E

DISTANCE CORRECTION OF SOUND LEVEL

Distance Correction of Sound Level

The measurement of sound level at LC6a is carried out at the fence wall outside the building of the sensitive receiver, a correction should be made to the measured level in order to represent the actual sound level at the sensitive receiver building façade (Block E6, The Castle Bay).

The correction of sound level is calculated by the equation:

$$L2 = L1 - 20 \times \left| \text{Log} \left(\frac{r1}{r2} \right) \right|$$

Where,

L1: Sound level at location 1

L2: Sound level at location 2

r1: Distance from noise source to location 1

r2: Distance from noise source to location 2

The notional noise source of PME from the site boundary is 3.8m (determined according to Technical Memorandum on Noise from Construction Work other than Percussive Piling as the midway between approximate geographical centre and site boundary nearest to NSR).

The distance between site boundary and the measurement location is 10m.

The distance between the measurement location and the sensitive receiver building façade (Block E6, The Castle Bay) is 10m.

Therefore,

r1

= the distance between notional noise source of PME and monitoring location
= 13.8m

r2

= the distance from the notional noise source to the sensitive receiver building
= 23.8m

and

$L2$ (Sound Level at Sensitive Receiver) = $L1$ (Sound Level at Monitoring Location) – 5 dB(A)