Highways Department
Works Division

Agreement No. WD 7/2007
Upgrading of Remaining Sections of Kam Tin Road & Lam Kam Road

ENVIRONMENTAL MONITORING AND AUDIT MANUAL

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Mannings (Asia) Consultants Ltd
in association with BMT Asia Pacific Ltd

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Environmental Monitoring and Audit Manual

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Kam Tin Road and Lam Kam Road

ENVIRONMENTAL MONITORING AND AUDIT MANUAL

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1.0 INTRODUCTION

Background

1.1 On April 2008, BMT Asia Pacific Limited (BMT) in association with Mannings (Asia) Consultants Limited (Mannings) was commissioned by the Highways Department (HyD) under Agreement No. WD 7/2007 to conduct the Environmental Impact Assessment (EIA) Study for Upgrading of Remaining Sections of Kam Tin Road and Lam Kam Road (hereafter as "the Project").

1.2 The Environmental Monitoring and Audit (EM&A) Manual is to specify the recommended environmental monitoring and audit requirements, where considered necessary for the concerned environmental aspects, to ensure effective implementation of the environmental protection and pollution control measures.

1.3 This Manual provides systematic procedures for carrying out recommended monitoring and audit works for checking potential environmental impacts that may arise from the Project. Mitigation measures recommended in the EIA report for each key environmental aspect are also summarized and presented in this Manual.

Objectives of this EM&A Programme

1.4 The main objectives of this EM&A programme are:

- To provide a database of baseline environmental quality for subsequent checking during the construction phase of the works;
- To provide information at an early stage for identification of potential problem areas and formulation of additional environmental mitigation measures where necessary should any of the environmental control measures or practices fail to achieve the target standards;
- To monitor the effectiveness of the proposed mitigation measures;
- To verify the environmental impacts predicted in the EIA Study for the project;
- To determine project compliance with relevant regulatory standards, requirements and guidelines;
- To outline remedial measures to be undertaken if unexpected problems or unacceptable impacts arise; and
- To provide data against which environmental audits may be undertaken effectively.

Content of the EM&A Manual

1.5 This Manual contains the following:

- Duties of the Environmental Team and Independent Environmental Checker with respect to the EM&A requirements during the course of the Project;
- Information on project organisation;
- Requirements with respect to the construction schedule and the necessary EM&A programme to track the varying environmental impacts;
- Definition of Action and Limit Levels;
- Establishment of event and action plans;
- Requirements of reviewing pollution sources and working procedures required in the event of non-compliance of the environmental criteria; and
- Requirements of presentation of EM&A data and appropriate reporting procedures.

1.6 An Implementation Schedule (IS) of the environmental mitigation measures has been developed and presented in Appendix A.

1.7 This EM&A Manual shall be regarded as an evolving document that may need to be reviewed and updated. An updated EM&A Manual should be prepared by the Environmental Team Leader and verified by the Independent Environment Checker before submission to the Engineer's Representative and Environmental Protection Department (EPD) for agreement.

2.0 PROJECT DESCRIPTION

2.1 Based on the Project Brief, the Project is to upgrade the remaining sections of Kam Tin Road and Lam Kam Road to a standard width single two-lane carriageway, with the associated improvement of pedestrian facilities and public transport laybys. The remaining sections are located at Kam Tin Road section between Kam Tin Bypass and Lam Kam Road; and Lam Kam Road section between Kam Tin Road and Kadoorie Farm. The location of the Project was provided in Figure 2.1.

2.2 The scope of the Project comprises:

(a) upgrading of about 5.2 km long road section into standard width single two-lane carriageway;

(b) provision of laybys and crossing facilities; and

(c) associated slope and drainage works, traffic aids and street lighting modification, Landscaping works and environmental mitigation measures if required.

2.3 The construction of the Project is scheduled to be commenced in 2011 and completed in 2015.

EM&A Requirement

2.4 The EM&A programme for this Study, as recommended in the EIA, covers construction air quality and noise monitoring. This EM&A Manual also gives recommendations on protective measures to be undertaken by the Contractor to protect the surrounding natural and built environment from waste and water quality impacts which may be generated by the works.

3.0 PROJECT ORGANISATION

3.1 The proposed EM&A organization is shown in Figure 3.1 of this Manual. The responsibilities of respective parties for the EM&A programme are listed in later Clauses.

Environmental Team (ET)

3.2 An ET leaded by an ET Leader shall carry out the recommended EM&A programme for this Project. Neither ET Leader nor ET shall be in any way an associated body of Engineer's Representative, Independent Checker (Environmental) or Contractor. The ET Leader shall plan, organise and manage the implementation of the EM&A programme, and ensure that the EM&A works are undertaken to the required standards. The ET Leader shall have relevant professional qualifications in environmental control and possess at least 7 years experience in EM&A and/or environmental management subject to the approval of the Engineer's Representative.

3.3 The ET Leader shall be responsible for the implementation of the EM&A programme in accordance with the EM&A requirements specified in this Manual. The ET Leader shall keep a contemporaneous logbook for recording each and every instance or circumstance or change of circumstances that may affect the compliance with the recommendations of the EIA study. The Independent Checker (Environmental) and EPD shall keep this logbook readily available for inspection.

3.4 Sufficient and suitably qualified professional and technical staff shall be employed by the respective parties to ensure full compliance with their duties and responsibility, as required under the EM&A programme for the duration of the Project. The broad categories of works of the ET comprise the following:

1. Sampling, analysis and statistical evaluation of monitoring parameters with reference to the EIA study recommendations and requirements;
2. Environmental site surveillance;
3. Inspection and audit of compliance with environmental protection, and pollution prevention and control regulations;
4. Inspection and audit of compliance with procedures established to enable an effective response to environmental incidents, exceedances or non-compliance;
5. Assess the effectiveness of the environmental mitigation measures implemented;
6. Monitor the implementation of environmental mitigation measures;
7. Monitor compliance with the environmental protection clauses/specifications in the Contract;
8. Review the construction schedule and provide comments as necessary;
9. Review work methodologies which may affect the extent of environmental impact during the construction phase and comment as necessary;
10. Complaint investigation, evaluation and identification of corrective measures;
11. Liaison with the Project Independent Checker (Environmental) on all environmental performance matters, and timely submission of all relevant EM&A proforma for approval of the Independent Checker (Environmental);

12. Advice to the Contractor on environmental improvement, awareness, enhancement matters, etc., on site; and
13. Timely submission of the EM&A report to the Project Proponent and the EPD.

3.5 In the event of any exceedance of Action / Limit levels, the ET shall inform the Independent Checker (Environmental), Engineer's Representative and the Contractor within one working day (Monday to Friday except public holidays). The ET shall also advise of any change in circumstances or any non-compliance with the EIA study so that appropriate remedial actions may be taken promptly by the Contractor.

3.6 The ET is also responsible for the preparation of the monthly EM&A reports for submission to Independent Checker (Environmental), the Contractor and the Engineer's Representative, and through the Engineer's Representative, to EPD. The ET shall assist the Contractor and the Engineer's Representative in formulating any necessary corrective actions and/or additional mitigation measures, and liaising with relevant Government Departments where necessary.

Independent Checker (Environmental) [IC(E)]

3.7 The IC(E) shall be responsible for the duties defined in this EM&A Manual. The IC(E) shall audit the overall EM&A programme including the implementation of all environmental mitigation measures, submissions relating to EM&A, and any other submissions required in this EM&A Manual. The IC(E) shall also be responsible for verifying the environmental acceptability of permanent and temporary works, relevant design plans and submissions referred under this Manual.

3.8 The IC(E) shall verify the log-book prepared and kept by the ET Leader. The IC(E) shall notify EPD, within 24 hours of receipt of notification from the ET Leader of any such instance or circumstance or change of circumstances or non-compliance with the EIA study, which might affect the monitoring or control of adverse environmental impact.

3.9 The main duty of the IC(E) is to carry out independent environmental audit of the Project. This shall include, inter alias, the following:

1. Review and audit in an independent, objective and professional manner in all aspects of the EM&A programme;
2. Validate and confirm the accuracy of monitoring results, appropriateness of monitoring equipment, monitoring locations with reference to the locations of the nearby sensitive receivers, and monitoring procedures;
3. Carry out random sample check and audit on monitoring data and sampling procedures, etc;
4. Conduct random site inspection (at least once a month);
5. Audit the EIA study recommendations and requirements against the status of implementation of environmental protection measures on site;
6. Review the effectiveness of environmental mitigation measures and project environmental performance;
7. On an as needed basis, verify and certify the environmental acceptability of the construction methodology (both temporary and permanent works),

relevant design plans and submissions under the environmental permit. Where necessary, the IC(E) shall agree in consultation with the ET Leader and the Contractor the least impact alternative;

8. Verify investigation results of complaint cases and the effectiveness of corrective measures;
9. Verify EM&A report submitted and certified by the ET Leader; and
10. Feedback audit results to Engineer's Representative/ET by signing according to the Event/Action Plans specified in this EM&A Manual.

The Contractor

3.10 The term "Contractors" should be taken to mean all construction contractors, operators during the operational phase of the project and sub-contractors, working on site at any one time.

3.11 The Contractor is responsible for providing requested information to the ET in the event of any exceedance in the environmental criteria (Action/Limit levels) specified in this Manual or other current environmental standards and to rectify unacceptable practices. The Contractor shall discuss with the ET Leader, IC(E) and Engineer's Representative on any additional mitigation measures identified to be required by the ET and implement the agreed measures to alleviate any identified environmental impact to acceptable levels. The design and implementation of the control and mitigation measures shall be the responsibility of the Contractor.

3.12 In the event that the ET needs to undertake complaint investigation work, the Contractor and the Engineer shall co-operate with the ET Leader in providing all the necessary information and assistance for completion of the investigation. If mitigation measures are required following the investigation, the Contractor shall promptly carry out these measures.

3.13 The Contractor shall report to the ET Leader on the action(s) taken targeting at environmental protection for inclusion in the monthly report to be prepared by the ET.

Engineer's Representative (ER)

3.14 The ER, either from HyD or appointed by HyD, shall be responsible for overseeing the operations of the Contractor and the ET. The ER shall advise, co-ordinate and give appropriate instructions for the efficient implementation of specific environmental mitigation measures required, and / or outstanding EM&A works required to be conducted by ET.

3.15 The ER shall supervise the Contractor's activities and ensure that the requirements in the EM&A Manual and other government's standards are fully complied with. He shall inform the Contractor when action is required to reduce impacts in accordance with the Event/Action Plans. He shall review the EM&A Reports submitted by the ET and follow up the recommendations. He shall ensure that the Contractor is implementing the environmental controls and mitigation measures as set out in the EIA study and EM&A Manual, as well as additional measures necessary for compliance with the relevant environmental standards.

3.16 In the event that the ET needs to undertake complaint investigation work, the ER and the Contractor shall co-operate with the ET Leader in providing all the necessary information and assistance for completion of the investigation. If mitigation measures are required following the investigation, the ER shall ensure that the Contractor has carried them out.

4.0 AIR QUALITY

Introduction

4.1 Based on the air quality impact assessment in the EIA report, a construction EM&A is required. The air quality parameters, monitoring equipment/locations/details, laboratory analysis, event and action plan and dust mitigation measures are described as follows.

Air Quality Parameters

4.2 Monitoring of the Total Suspended Particulates (TSP) levels shall be carried out by the ET to ensure that any deteriorating air quality could be readily detected and timely action taken to rectify the situation.

4.3 One-hour and 24-hour TSP levels should be measured for the ad hoc monitoring to indicate the impacts of construction dust on air quality. The 24-hour TSP levels shall be measured by following the standard high volume sampling method as set out in the Title 40 of the Code of Federal Regulations, Chapter 1 (Part 50), (Appendix A). Upon approval of the ER, 1-hour TSP levels can be measured by direct reading methods which are capable of producing comparable results as that by the high volume sampling method, to indicate short event impacts.

4.4 All relevant data including temperature, pressure, weather conditions, elapsed-time meter reading for the start and stop of the sampler, identification and weight of the filter paper, and any other local atmospheric factors affecting or affected by site conditions, etc., shall be recorded down in detail. A sample data sheet is shown in Appendix C.

Monitoring Equipment

4.5 High volume samplers (HVSs) in compliance with the following specifications shall be used for carrying out the 1-hour and 24-hour TSP monitoring:

a) 0.6 - 1.7 m^3 per minute adjustable flow range;

b) equipped with a timing / control device with +/- 5 minutes accuracy for 24 hours operation;

c) installed with elapsed-time meter with +/- 2 minutes accuracy for 24 hours operation;

d) capable of providing a minimum exposed area of 406 cm^2;

e) flow control accuracy: +/- 2.5% deviation over 24-hour sampling period;

f) equipped with a shelter to protect the filter and sampler;

g) incorporated with an electronic mass flow rate controller or other equivalent devices;

h) equipped with a flow recorder for continuous monitoring;

i) provided with a peaked roof inlet;

j) incorporated with a manometer;

k) able to hold and seal the filter paper to the sampler housing at horizontal position;

l) easily changeable filter; and

m) capable of operating continuously for a 24-hour period.

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

4.7 Initial calibration of dust monitoring equipment shall be conducted upon installation and thereafter at bi-monthly intervals. The transfer standard shall be traceable to the internationally recognised primary standard and be calibrated annually. The concerned parties such as IC(E) shall properly document the calibration data for future reference. All the data should be converted into standard temperature and pressure condition.

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

4.9 If the ET proposes to use a direct reading dust meter to measure 1-hour TSP levels, he shall submit sufficient information to the IC(E) to prove that the instrument is capable of achieving a comparable result to the HVS. The instrument should also be calibrated regularly, and the 1-hour sampling shall be determined periodically by the HVS to check the validity and accuracy of the results measured by direct reading method.

Laboratory Measurement / Analysis

4.10 A clean laboratory with constant temperature and humidity control, and equipped with necessary measuring and conditioning instruments to handle the dust samples collected, shall be available for sample analysis, and equipment calibration and maintenance. The laboratory should be HOKLAS accredited.

4.11 If a site laboratory is set up or a non-HOKLAS accredited laboratory is hired for carrying out the laboratory analysis, the laboratory equipment shall be approved by the ER and the measurement procedures shall be witnessed by the IC(E). Any measurement performed by the laboratory shall be demonstrated to the satisfaction of the ER and IC(E). The IC(E) shall regularly audit the measurement performed by the laboratory to ensure the accuracy of measurement results. The ET Leader shall provide the ER with one copy of

the Title 40 of the Code of Federal Regulations, Chapter 1 (Part 50), (Appendix B) for his reference.

4.12 Filter paper of size 8" x 10" shall be labelled before sampling. It shall be a clean filter paper with no pinholes, and shall be conditioned in a humidity-controlled chamber for over 24-hours and be pre-weighed before use for the sampling.

4.13 After sampling, the filter paper loaded with dust shall be kept in a clean and tightly sealed plastic bag. The filter paper shall then be returned to the laboratory for reconditioning in the humidity-controlled chamber followed by accurate weighing by an electronic balance with readout down to 0.1 mg. The balance shall be regularly calibrated against a traceable standard.

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

Monitoring Locations

4.15 The status and locations of dust sensitive receivers may change after issuing this manual. If such cases exist, the ET shall propose updated monitoring locations and seek approval from ER and agreement from the IC(E).

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

a) at the site boundary or such locations close to the major dust emission source;

b) close to the sensitive receptors; and

c) take into account the prevailing meteorological conditions.

4.17 The ET shall agree with the ER in consultation with the IC(E) on the position of the HVS for the installation of the monitoring equipment. When positioning the samplers, the following points shall be noted:

a) a horizontal platform with appropriate support to secure the samplers against gusty wind should be provided;

b) no two samplers should be placed less than 2 meters apart;

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

d) a minimum of 2 meters of separation from walls, parapets and penthouses is required for rooftop samplers;

e) a minimum of 2 meters separation from any supporting structure, measured horizontally is required;

f) no furnace or incinerator flue is nearby;

g) airflow around the sampler is unrestricted;

h) the sampler is more than 20 meters from the dripline;

i) any wire fence and gate, to protect the sampler, should not cause any obstruction during monitoring;

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

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

Baseline Monitoring

4.18 The ET leader shall carry out at the designated baseline monitoring locations shown in Table 4.1 for at least 14 consecutive days prior to the commissioning of the construction works to obtain daily 24-hour TSP samples. One-hour sampling should also be done at least 3 times per day while the highest dust impact is expected. The proposed locations of the baseline monitoring stations are shown in Figure 4.1.

Table 4.1 Baseline Monitoring Location

Monitoring Location	Description
A6	Kam Tin Clinic
A53	Village house (No. 70 Lam Kam Road)

4.19 During the baseline monitoring, there should not be any construction or dust generation activities in the vicinity of the monitoring stations. Before commencing baseline monitoring, the ET shall inform the IC(E) of the baseline monitoring programme such that the ER can conduct on-site audit to ensure accuracy of the baseline monitoring results.

4.20 In case the baseline monitoring cannot be carried out at the designated monitoring locations during the baseline monitoring period, the ET Leader shall carry out the monitoring at alternative locations that can effectively represent the baseline conditions at the impact monitoring locations. The alternative baseline monitoring locations shall be approved by the ER and agreed with the IC(E).

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

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

revised baseline levels and air quality criteria should be agreed with the IC(E) and EPD.

Ad-hoc Monitoring During Construction Phase

4.23 Regular impact monitoring is considered not necessary. However, the ET shall carry out ad-hoc impact monitoring as required by the ER or IC(E) when the construction activities are undertaking. Before commencing monitoring, the ET shall inform the IC(E) of the impact monitoring programme such that the IC(E) can conduct on-site audit to ensure accuracy of the impact monitoring results.

4.24 In case of non-compliance with the air quality criteria, more frequent monitoring as specified in the following Action Plan, 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.

Event and Action Plan

4.25 The baseline monitoring results form the basis for determining the air quality criteria for the impact monitoring. The ET shall compare the impact monitoring results with air quality criteria set up for 1-hour TSP. Table 4.2 shows the air quality criteria, namely Action and Limit levels to be used. Should non-compliance of the air quality criteria occur, actions in accordance with the Action Plan in Appendix B should be carried out.

Table 4.2 Action / Limit Levels for Air Quality

Parameters	Action	Limit
1-hour TSP Level in mg m^{-3}	For baseline level $\leq$ 384 $\mu g/m^3$, Action level = (baseline level * 1.3 + Limit level)/2; For baseline level > 384 $\mu g/m^3$, Action level = Limit level	500 $\mu g/m^3$

Dust Mitigation Measures

4.26 In order that nuisance to air sensitive receivers is minimized, it is important to minimize dust emissions from construction activities. It is the contractor's responsibility to design and implement appropriate dust control measures should be during construction stage in accordance with the requirements in the *Air Pollution Control (Construction Dust) Regulation*. These measures include:

- Works area for site clearance shall be sprayed with water before, during and after the operation so as to maintain the entire surface wet;
- All dusty materials shall be sprayed with water immediately prior to any loading, unloading or transfer operation so as to maintain the dusty materials wet;
- Hoarding of not less than 2.4m above ground should be provide, as far as practicable, along the site boundary which is next to the public areas;

- Restricting heights not higher than 1.5m above the ground from which materials are to be dropped, as far as practicable to minimise the fugitive dust arising from unloading/ loading;

- Any stockpile of dusty materials shall be covered entirely by impervious sheeting; and/or placed in an area sheltered on the top and 4 sides;

- Immediately before leaving a construction site, all vehicles shall be washed to remove any dusty materials from its body and wheels;

- Where a vehicle leaving a construction site is carrying a load of dusty materials, the load shall be covered entirely by clean impervious sheeting to ensure that the dusty materials do not leak from the vehicle.

4.27 If the above measures are not sufficient to restore the air quality to acceptable levels upon the advice of the ET Leader, the Contractor shall liaise with the ET Leader and the IC(E) on some other mitigation measures, propose to the Engineer's Representative and IC(E) for approval, and implement the mitigation measures.

5.0 NOISE

Introduction

5.1 Based on the noise impact assessment in the EIA report, a construction EM&A is required. The noise parameters, monitoring equipment/locations/details, event and action plan and dust mitigation measures are described as follows.

Noise Monitoring Parameters

5.2 The construction noise levels shall be measured in terms of the A-weighted equivalent continuous sound pressure level (L_{eq}). $L_{eq(30\ min)}$ shall be used as the monitoring parameter for the time period between 0700-1900 hours on normal weekdays. For all other time periods, $L_{eq(5\ min)}$ shall be employed for comparison with the Noise Control Ordinance (NCO) criteria.

5.3 As supplementary information for data auditing statistical results such as L_{10} and L_{90} shall also be obtained for reference. A sample data record sheet is shown in Appendix C.

Monitoring Equipment

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

5.5 Immediately prior to and following noise measurement the accuracy of the sound level meter will be checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Measurements may be accepted as valid only if the calibration level from before and after the noise measurement agrees to within 1.0 dB. The acoustic calibrator to be used shall meet IC(E) 942, 1988 Class 1 specifications. Annual calibration of all sound level meters and acoustic calibrators shall be conducted by a laboratory in Hong Kong or the manufacturer in compliance with national standards as recommended by the manufacturer of the sound level meter and acoustic calibrator.

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

5.7 ET is responsible for the availability of monitoring equipments. He shall ensure sufficient noise measuring equipments and associated instrumentations are available for carrying out noise monitoring works. All the equipments and associated instrumentations shall be clearly labelled, stored and maintained according to the manufacturer's instructions. The ET shall also liaise with the concerned parties for gaining access to the monitoring stations for the installation of the monitoring equipment and carrying out monitoring.

Monitoring Locations

5.8 Three designated noise monitoring stations are selected for construction noise monitoring. Table 5.1 describes the construction noise monitoring locations, which are also depicted in Figure 5.1. The status and locations of noise sensitive receivers may change after this Manual is issued. If such cases exist, the ET shall propose updated monitoring locations and seek approval from ER and agreement from the IC(E) and EPD of the proposal.

Table 5.1 Noise Monitoring Stations for Construction Noise

I.D.	Description	Uses
N13	Village House near Season Villas	Residential
N29	Village House, 46 Wang Toi Shan Lo Uk Tsuen	Residential
N39	Village House near Pat Heung Old Temple	Residential

5.9 When alternative monitoring location(s) is/are proposed, the monitoring location(s) shall be chosen based on the following criteria:

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

5.10 The monitoring station shall normally be at a point 1 m from the exterior of the building facade of the sensitive receivers and be at a position 1.2 m above the ground.

5.11 If there is a problem with access to the normal monitoring position, an alternative position may be chosen, and a correction to the measurements shall be made. For reference, a correction of +3 dB(A) shall be made to the free field measurements. The ET shall agree with the IC(E) on the monitoring position and the corrections adopted. Once the position for the monitoring station is chosen, the baseline monitoring and the impact monitoring shall be carried out at the same position.

Baseline Monitoring

5.12 The ET shall carry out baseline monitoring prior to the commencement of the construction works. The baseline monitoring shall be carried out daily for a period of at least 14 consecutive days. A schedule on the baseline monitoring for construction noise prior to the commencement of the construction works shall be submitted to the IC(E) for approval before the monitoring starts.

5.13 Before commencing the baseline monitoring, the ET shall inform the IC(E) of the baseline monitoring programme such that the IC(E) can conduct on-site audit to ensure accuracy of the baseline monitoring results.

5.14 There shall not be any construction activities in the vicinity during the baseline monitoring. In exceptional cases, when insufficient baseline monitoring data

or questionable results are obtained, the ET shall liaise with IC(E) to agree on an appropriate set of data to be used as a baseline reference and submit to the EPD for approval.

5.15 Noise monitoring shall be carried out at all the designated monitoring stations. The monitoring frequency shall depend on the scale of the construction activities. The following is an initial guide on the regular monitoring frequency for each station on a per week basis when noise generating activities are underway:

a) one set of measurements between 0700-1900 hours on normal weekdays;
b) one set of measurements between 1900-2300 hours;

5.16 For the measurements (b) above, one set of measurements shall at least include 3 consecutive $L_{eq\ (5\ min)}$ results.

Impact Monitoring

5.17 The ET shall conduct noise monitoring at the designated monitoring station on a weekly basis when noise-generating activities are underway. One set of measurements is to be taken between 0700-1900 hours on Mondays to Fridays, except public holidays.

5.18 General construction works conducted during restricted hours are controlled under the Construction Noise Permit (CNP) system, under the NCO. The Contractor shall apply for a CNP and abide by the permit requirements should works be necessary during restricted hours.

5.19 In case of non-compliance with the construction noise criteria, more frequent monitoring as specified in the Event / Action Plan (in Appendix B) shall be carried out. This additional monitoring shall be continued until the recorded noise levels are rectified or proved to be irrelevant to the construction activities.

Event and Action Plan

5.20 The Action and Limit levels for construction noise are defined in Table 5.2. Should non-compliance of the criteria occur, action in accordance with the Event/Action Plan in Appendix B, shall be carried out.

Table 5.2 Action and Limit Levels for Construction Noise

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

Construction Noise Mitigation Measures

5.21 The following mitigation measures are recommended:

ADOPTION OF QUIET PME

5.22 The contractor should be requested, as far as possible, to use quiet PME, whose actual SWL is less than the value specified in "*Technical Memorandum on Noise from Construction Work other than Percussive Piling (GW-TM)*". This is one of the most effective measures and is increasingly practicable because of the availability of quiet equipment.

ERECTION OF TEMPORARY NOISE BARRIERS

5.23 Temporary noise barriers could be very effective in screening noise from particular items of plant. A noise barrier located close to the noise generating component of a PME in order to block the line of sight from the plants to the affected NSRs to produce at least 10 dB(A) screening for stationary plant and 5 dB(A) for mobile plant. The use of movable barriers with skid footing and a small cantilevered upper portion can be adopted. The height of the noise barriers shall be designed such that the active PME cannot be directly viewed from the affected NSRs and with a length to height ratio at least 5:1 and a superficial material surface density > 10 kgm^{-2}.

ACOUSTIC SCREEN / ENCLOSURE

5.24 Acoustic enclosures, which completely cover the noisy part of PME, can provide significant noise reduction. Enclosing the hand-held breaker in an acoustic enclosure with suitable ventilation can provide a noise reduction up to 20 dB(A). The enclosure shall be built with a material density of > 7 kgm^{-2} with sound absorption lining of at least 25 mm thick, 80 kg/m^3 mineral wool to reduce the noise reverberation and noise being reflected out through openings and enclosed the hand-held breaker as much as possible.

5.25 For the soldier pile wall construction, an acoustic screen should be installed at the crawler rig, with minimum 50mm thick sound absorbing lining (e.g. 96 kgm^{-3} mineral wool) and 6mm thick steel backing, to block the line of sight from the plants to the affected NSRs. At least a 5 dB(A) noise reduction can be achieved.

REDUCING THE NUMBER OF PLANT OPERATING CLOSE TO NSRS

5.26 With the use of quiet plant and movable noise barriers, the predicted noise levels at some NSRs still exceeded the noise criteria. It is recommended to restrict the number of particularly noisy plant operating within certain parts of the site that are very close to the affected NSRs.

5.27 Good site practice and noise management can also significantly reduce the impact of construction site activities on nearby NSRs. The following mitigation measures should be followed during of construction:

- PMEs should be kept to a minimum and the parallel use of them should be avoided;
- Intermittent use of PME which can be shut down between work periods or throttled down to a minimum;
- Any mobile PME should be sited as far from NSRs as possible;
- PME known to emit noise strongly in one direction should be orientated to direct away from the nearby NSRs;

- Only well-maintained plant should be operated on-site and PME should be serviced regularly during the construction programme;
- Material stockpiles and other structures (e.g. site hoarding) should be effectively utilised, wherever practicable, in screening noise from on-site construction activities;
- Regular maintenance of all plant and equipment;
- Locating noisy equipment and noisy activities as far from NSRs as is practical; and
- Turn off any unused equipment.

5.28 If the noise levels exceed the limit level after adopting the above measures upon ET Leader's advices, the Contractor shall liaise with the ET Leader on some other mitigation measures, propose them to ER and IC(E) for approval and carry out the mitigation measures after approval.

6.0 WATER QUALITY

Introduction

6.1 The water quality impact assessment in the EIA report recommended that regular site inspections are required, in order to ensure all mitigation measures proposed during the construction phase are implemented properly.

Site Inspection

6.2 The site inspection shall be conducted in weekly basis. The ET is responsible for formulating an environmental site inspection, deficiency and action reporting system, and for carrying out site inspections under the EM&A programme.

Water Quality Mitigation Measures

6.3 Construction site runoff and drainage should be prevented or minimized in accordance with the guidelines stipulated in the "*EPD's Practice Note for Professional Persons, Construction Site Drainage (ProPECC PN 1/94)*". In order to check that the water quality mitigation measures have been implemented by the Contractor as good site practices, the ET shall include the following items as part of their site inspections and audit:

- Wastewater from temporary site facilities should be controlled to prevent direct discharge to surface waters;
- Sewage effluent and discharges from on-site kitchen facilities shall be directed to Government sewer in accordance with the requirements of the *Water Pollution Control Ordinance* (WPCO) or collected for disposal offsite. The use of soakaways shall be avoided;
- Storm drainage shall be directed to storm drains via adequately designed sand/silt removal facilities such as sand traps, silt traps and sediment basins. Channels, earth bunds or sand bag barriers should be provided on site to properly direct stormwater to such silt removal facilities. Catchpits and perimeter channels should be constructed in advance of site formation works and earthworks;
- Silt removal facilities, channels and manholes shall be maintained and any deposited silt and grit shall be removed regularly, including specifically at the onset of and after each rainstorm;
- Rainwater pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities;
- Measures should be taken to prevent the washout of construction materials, soil, silt or debris into any drainage system;
- Discharges of surface run-off into foul sewers must always be prevented in order not to unduly overload the foul sewerage system;
- Vehicles and plant should be cleaned before they leave the construction site to ensure that no earth, mud or debris is deposited by them on roads. A wheel washing bay should be provided at every site exit;
- Wheel-wash overflow shall be directed to silt removal facilities before being discharged to the storm drain;
- Open stockpiles should be covered with a tarpaulin to avoid erosion which may wash fines into stormwater;

- Regular inspections of stilling basins and/or silt traps to ensure that sediment is not conveyed into the existing drainage system;
- During the wet season, any exposed top soils should be covered with a tarpaulin as soon as possible;
- Proper site management and good housekeeping practices would also be required to ensure that construction wastes would not enter the nearby open drainage channels;
- Sewage effluent arising from the construction workforce would also require appropriate treatment through provision of portable toilets;
- On-site debris and refuse generated should be collected, handled and disposed properly;
- The contractor shall prepare an oil / chemical cleanup plan and ensure that leakages or spillages are contained and cleaned up immediately;
- Any fuels should be stored in bunded areas such that spillage can be easily collected. Waste oil should be collected and stored for recycling or disposal, in accordance with the *Waste Disposal Ordinance* (WDO).

6.4 The Contractor shall also observe and comply with the relevant statutory requirements and guidelines and their updated versions.

7.0 WASTE MANAGEMENT

Introduction

7.1 Based on the EIA study, it has been identified that minimal volumes of construction wastes (including inert and non-inert wastes), chemical waste and general refuse will be generated from the construction activities.

7.2 Through proper on-site handling and storage (covered containers), reuse (of inert construction wastes) and off-site disposal (via approved waste collectors to approved waste facilities and/or disposal grounds) the generation, handling and disposal of these wastes will not give rise to any adverse environmental impacts during the construction phase. However, given the potential for environmental impacts to arise from improper waste management (e.g. visual impact, nuisance, etc.), it is recommended that waste control and mitigation measures be implemented as part of general good site practices.

7.3 The EIA study has identified nine car repairing workshops (i.e. Site 1 to 9 as shown in Figure 7.1) and five petrol filling stations (i.e., PFS 1 to PFS 5 as shown in Figure 7.1) were found along the Project boundary having a potential of land contamination and recommended for further investigation prior to the works at these locations. Prior to the commencement of site clearance / excavation works at these locations, a sampling and analysis programme shall be prepared and implemented.

Environmental Audit

7.4 The ET Leader is responsible for formulating an environmental site inspection, deficiency and action reporting system, and for carrying out site inspections under the EM&A programme.

7.5 In order to check that the waste control and mitigation measures have been implemented by the Contractor as good site practices, the ET shall include the following items as part of their site inspections and audit:

- The reuse/recycling of all materials on site shall be investigated prior to treatment/disposal off site;
- Good site practices shall be adopted from the commencement of works to avoid the generation of waste, reduce cross contamination of waste and to promote waste minimisation practices;
- All waste materials shall be sorted on site into inert and non-inert construction wastes, and where the materials will be recycled or reused these shall be further segregated. The Contractor shall be responsible for identifying which materials can be recycled/reused, whether on site or off site. In the event of the latter, the Contractor shall make arrangements for the collection of the recyclable materials. Any remaining non-inert waste shall be collected and disposed of to the refuse transfer station whilst any inert construction wastes shall be re-used on site as far as possible. Alternatively, if no use of the inert material can be found on site, the material should be delivered to a public filling area or a public fill bank after obtaining the appropriate licence;
- With reference to ETWBTC (W) No.31/2004, Trip-ticket System for Disposal of Construction and Demolition Material, a trip ticket system

should be established at the outset of the construction of the proposed road to monitor the disposal of C&D and solid wastes from the site to public filling facilities and landfills;

- Under the Waste Disposal (Chemical Waste) (General) Regulation, the Contractor shall register with EPD as a Chemical Waste Producer if there is any use of chemicals on site including lubricants, paints, diesel fuel, etc. Only licensed chemical waste collectors shall be employed to collect any chemical waste generated at site. The handling, storage, transportation and disposal of chemical wastes shall be conducted in accordance with the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes and A Guide to the Chemical Waste Control Scheme both published by EPD;
- Stockpiling is not envisaged, however if it becomes unavoidable, stockpiling in any vegetated areas shall be avoided (as far as possible) and shall be covered with tarpaulin and/or watered to prevent windblown dust and/or surface runoff;
- A sufficient number of covered bins shall be provided on site for the containment of general refuse to prevent visual impacts and nuisance to sensitive receivers. These bins shall be cleared daily and the collected waste disposed of to the refuse transfer station. Further to the issue of ETWBTC (Works) No. 6/2002A, Enhanced Specification for Site Cleanliness and Tidiness, the Contractor is required to maintain a clean and hygienic site by performing daily cleaning and weekly tidying throughout the project works;
- All chemical toilets shall be regularly cleaned and the nightsoil collected and transported by a licensed contractor to a Government Sewage Treatment Works facility for disposal;
- Tool-box talks should be provided to workers about the concepts of site cleanliness and appropriate waste management procedures, including waste reduction, reuse and recycling; and
- The contractor shall propose a recording system for the amount of wastes generated, recycled and disposed of (including the disposal sites), and the ET Leader shall include a summary of such information in each monthly EM&A Report.

7.6 The Contractor shall also observe and comply with the relevant statutory requirements and guidelines and their updated versions.

Land Contamination Assessment

7.7 Once area of car repairing workshops of Site 1, Site 3 and Site 4 encroached upon the project boundary have been vacated or access has been granted, site investigation shall be arranged. The land contamination assessment will include sampling and analysis of soil to confirm the presence and level of contamination (if any), and the quantity of the contaminated soil. The handling and disposal requirements of the excavated materials will be determined based on the land contamination assessment findings with disposal at landfill considered as the last resort. Investigation shall also be carried out at the works area within Project boundary.

7.8 The project Contractor shall engage an experienced land contamination specialist, upon approval by the ER, to prepare the Contamination Assessment Plan(s) (CAP) for EPD's approval prior to the investigation.

Upon approval of the CAP, the Contractor(s) shall carry out site investigation and sampling works in accordance with the sampling proposal detailed in the approved CAP. The results of the sampling works will be reported in a Contamination Assessment Report(s) (CAR) and submitted to EPD for approval. Should contamination be identified during the investigation, a Remediation Action Plan(s) (RAP) shall also be prepared and submitted to EPD for approval. Remediation measures as recommended in the CAR/RAP shall be fully implemented by the Contractor prior to commencement of works.

Mitigation Measures

7.9 As a general measures, when handling identified contaminated materials, the following control measures should be implemented by the Contractor and the implementation status of the following measures should be monitored through the site audit programme by the ET:

- Exposure to any contaminated materials can be minimised by the wearing of appropriate clothing and personal protective equipment;
- Adequate training and instructions of the potential hazards associated with the contaminated materials shall be provided to site staff and workers;
- Measures shall be implemented to prevent non-workers from approaching the identified potential contamination areas in order to avoid exposure to contaminants;
- Where appropriate, the use of bulk handling equipment should be maximised to reduce the potential contacts between excavated contaminated materials and associated workers;
- All temporary stockpiles of the materials shall be completely covered with waterproof material to avoid leaching of contaminants, especially during rainy season; and
- Surface water shall be diverted around any contaminated areas or stockpiles to minimise potential runoff into excavations.

8.0 ECOLOGY

Introduction

8.1 Since the impact from habitat loss due to the Project is predicted to be low, and there is no significant and adverse impact from disturbance to wildlife and indirect / induced impacts resulted from the proposed works during construction and operation, ecological monitoring is considered not necessary. However, regular site inspection is recommended to ensure adequate mitigation measures / best practice guidelines are implemented throughout construction of the Project.

Mitigation Measures / Construction Management

8.2 The best practice guidelines for control of construction site run-off and for managing construction waste as given in Section 5 and Section 6 respectively shall be implemented as far as practicable, in order to avoid any indirect / induced construction impacts upon wildlife.

8.3 The following precautionary measures as referred in ETWB TC No. 5/2005 to avoid any possible impacts on natural stream courses and/ or nearby vegetation during construction phase shall be implemented:

- Temporary storage of construction materials shall be properly covered and located away from any stream courses.
- Construction debris and spoil shall be covered properly and disposed of as soon as possible to avoid being washed into nearby stream courses.
- Temporary access to the site shall be carefully planned and located to avoid disturbance impacts upon surface waters.
- Consideration shall be given to conducting the proposed works during the dry season when stream flow is low.

8.4 No plant species of conservation concern including *Aquilaria sinensis* shall be removed due to the Project. Identification labels shall be attached to the two tree specimens of *Aquilaria sinensis* to notify the site workers that the two tree individuals or any tree specimens of *A. sinensis* shall not be removed or damaged during construction works. Protection measures shall be implemented to avoid any possible construction impacts upon the fruit bat roost on the Chinese Fan-palm *Livistona chinensis* on Lam Kam Road. These measures shall include but not limited to the following:

- Establishment of a Tree Protection Zone in accordance with Environment, Transport and Works Bureau Technical Circular (Works) No. 29/2004, clause 17. No construction activities or construction storage shall be intruded into the designated Tree Protection Zone.
- Provision of a tree identification label to notify the site workers to protect the tree from construction damage throughout the construction period.

9.0 CULTURAL HERITAGE

Introduction

9.1 The presence of archaeological material has been classified as low in the project study area, even though sections of the Study Area fall within the boundary of the Pat Heung Sheung Tsuen Archaeological Site (A Site of Cultural Heritage) and no further archaeological investigation has been recommended. However, the following precautionary measures must be abided by during the construction phase.

Mitigation Measures

9.2 If any antiquity or supposed antiquity is discovered during the course of the excavation works undertaken by the contractor, the project proponent shall report the discovery to the AMO immediately and shall take all necessary archaeological mitigation measures to preserve it'.

10.0 LANDSCAPE AND VISUAL

Introduction

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

Mitigation Measures

10.2 The Landscape and Visual Assessment of the EIA recommended a series of mitigation measures for both the construction and operation phases to ameliorate the landscape and visual impacts of the Project. These measures include the following as shown in Table 8-1 and Table 8-2, which are also summarised in the environmental mitigation implementation schedules provided in Chapter 10 of the EIA report:

Table 10-1 Proposed Construction Stage Mitigation Measures

Mitigation Code	Mitigation Measure
CP1	**Preservation of Existing Vegetation** - The proposed works should avoid disturbance to the existing trees as far as practicable within the works areas. Based on the preliminary tree survey some 1286 trees can be preserved in-situ including 107 numbers of the large *Melaleuca quinquenervia* and approximately 224 numbers of the large trees with a trunk diameter of over 500mm. It is recommended that a full tree survey and tree removal application be undertaken and submitted for approval by the relevant government departments in accordance with ETWB TCW No. 03/2006, 'Tree Preservation' during project detailed design. The application will include details of the compensatory planting proposals and specifications for the protection of existing trees. Trees not in conflict with the proposals will be protected by fencing as appropriate to prevent canopy and root zone damage from excavation works, vehicles and material storage.
CP2	**Preservation of Existing Topsoil** - Topsoil disturbed during the construction phase will be tested using a standard soil testing methodology and where it is found to be worthy of retention stored for re-use. The soil will be stockpiled to a maximum height of 2m and will be either temporarily vegetated with hydroseeded grass during construction or covered with a waterproof covering to prevent erosion. The stockpile should be turned over on a regular basis to avoid acidification and the degradation of the organic material, and reused after completion. Alternatively, if this is not practicable, it should be

Mitigation Code	Mitigation Measure
	considered for use elsewhere, including other projects.
CP3	**Works Area and Temporary Works Areas** - The landscape of these works areas should be restored to its original status or new amenity area following the completion of the construction phase. Construction site controls shall be enforced, where possible, to ensure that the landscape and visual impacts arising from the construction phase activities are minimised including the storage of materials, the location and appearance of site accommodation and the careful design of site lighting to prevent light spillage. Screen hoarding will be erected around the temporary works area.
CP4	**Programme for Mitigation Planting** - Replanting of disturbed vegetation should be undertaken at the earliest possible stage during the construction phase of the project to maximise its effect during the operational phase.
CP5	**Transplantation of Existing Trees** – Where existing trees cannot be avoided the potential for transplanting the trees to new locations within the road corridor would be examined. As a result some 6 trees are recommended to be transplanted under the current proposal, final recipient site should be, as far as space allows, adjacent to their current locations alongside of the carriageway to retain their contribution to the local landscape context, the recipient site will subject to the findings of the detailed tree survey and felling application undertaken at the detailed design stage and upon to the approval by relevant departments.

Table 10-2 Proposed Operational Stage Mitigation Measures

Mitigation Code	Mitigation Measure
OP1	**Implementation of the road widening proposals will include:** **Integrated design approach** – the alignment and structures associated with the widened road should integrated, as far as technically feasible, with existing roadside structures and the landscape context to reduce the potential cumulative impact of the proposed works. The location and orientation of the associated structures should where possible avoid landscape and visually sensitive areas such woodland, shrubland and agricultural fields. **Treatment of highway structures** - the architectural design should seek to reduce the apparent visual mass of the engineering structures through the use of textured finishes and colour blocking. Earth tones are preferred as these match the existing landscape and visual context.
OP2	**Roadside Planting** – These planting areas will utilise largely native tree and shrub species either with high canopy and thin foliage to allow visual access in the views from the adjacent landscape to the distant roadside or rural landscape or dense foliage at selected locations to provide shaded environment for pedestrians and the creation, where space allows, of the avenue effect originally created through the planting of an *Melaleuca quinquenervia,* along the edge of the carriageway. Native tree planting on the existing and proposed cut slopes will improve the ecological connectivity between existing woodland habitats with the advantage of creating a more coherent landscape framework. These

Mitigation Code	Mitigation Measure
	areas include the planting of approximately 3,031m^2 of mass woodland planting. The species selection will include *Bischofia trifoliata, Bridelia tomentosa, Castanopsis fissa, Celtis sinensis, Cinnamomum camphora, Cratoxylum cochinchinense, Cyclobalanopsis myrsininfolia, Ficus hispida, Gordonia axillaris, Litsea glutinosa, Macaranga tanarius, Mallotus paniculatus, Microcos paniculatus, Sapium discolour, Sapium sebiferum* and *Schima superba.* Approximately 559 number large specimens of *Melaleuca quinquenervia* will be utilised within the immediate roadside areas and within the new central median. These species are considered in the planting proposal to create a comprehensive planting framework that could enhance both ecological and landscape value of the context. The extent of the proposed mitigation planting is indicated in Figures 9.12 A to H in the EIA report.
OP3	**Compensatory Planting Proposals** - the preliminary planting proposals for the proposed works include some 3,031m^2 of new mass woodland planting and 559 specimen trees utilising a combination of light standard to standard sized stock in general roadside planting areas as shown in Figures 9.12A to H in the EIA report. Trees forming part of the roadside and slope planting will provide amenity and shaded area for the pedestrians using the roadside pavements and utilise species native to Hong Kong. These proposals will be subject to the detailed design stage of the project.
OP4	**Treatment of Retaining Wall and Slopes** – The design and implementation of the aesthetic appearance of the retaining wall and slopes will be undertaken in accordance with GEO Publication No. 1/2000 "Technical Guidelines on Landscape Treatment and Bio-engineering for Man-made Slopes and Retaining Walls", WBTC No. 29/93 on control of Visual Impact of Slopes and WBTC No. 17/2002 on Improvement to the Appearance of Slopes. The engineered structures will be aesthetically enhanced through the use of soft landscape works including tree and shrub planting to give these man-made features a more natural appearance and blending them into the local rural landscape. Light standard sized tree planting will be used on the face of soil cut slopes with a gradient of less than 30 degrees, at the crest and toe of the slope, and within berm planters as has been described in OP2 above. These smaller, younger plants will adapt to their new growing conditions more quickly than larger sized stock and establish a naturalistic effect more rapidly. Slopes with a gradient of greater than 30 degrees will be hydroseeded using a mixture of native trees and shrubs. Based on the current proposals some 6,173m^2 of hyrdoseeding will be applied to the road slopes. Vertical greening measures shall also be considered on engineering structures. This includes the use of climbing and trailing plants both planted at the crest and toe of the features, and within pockets within the slopes. It is proposed that native species be used to enhance the ecological value of the road corridor and minimise potential maintenance requirements. These measures will be applied to the retaining walls and

Mitigation Code	Mitigation Measure
	newly regarded slopes features. The extent of the proposed mitigation planting and the location of the proposed retaining walls and regarded slopes are indicated in Figures 9.12 A to H in the EIA report.

10.3 The landscape measures proposed within the EIA to mitigate the landscape and visual impacts arising from the proposed scheme should be incorporated within the detailed landscape design drawings and contract documents including the protection of existing trees where possible, the transplanting of existing trees and the planting of new trees and shrubs.

Baseline Monitoring

10.4 Baseline monitoring for the landscape will comprise a vegetation survey of the vegetation and trees on the site. Representative vegetation types will be identified along with typical species composition.

10.5 The landscape and visual baseline will be determined with reference to the landscape and visual impact assessments included in the EIA Report.

10.6 Construction and Operational Phase Review

10.7 A specialist Landscape Sub-Contractor should be employed by the Contractor for the implementation of landscape construction works and subsequent maintenance operations during the 12 month establishment period. It is proposed that where the construction activities and the programme allow the tree and shrub planting proposals will be undertaken using a phased implementation approach as areas of the upgrading works are completed. Thus, the establishment works will be undertaken through the latter half of the construction contract. The intention is to provide at least 12 months establishment period for the majority of the planting works.

10.8 All measures undertaken by both the Contractor and the specialist Landscape Sub-Contractor during the construction phase and first year of the operational phase shall be reviewed by a Registered Landscape Architect, 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 review is detailed below but should also be undertaken with reference to the more specific checklist provided in Table 10-3. Operational phase auditing will be restricted to the last 12 months of the establishment works of the landscaping proposals 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 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;
- 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;
- Preparation, lifting transport and re-planting operations for any transplanted trees;
- All landscaping works are carried out in accordance with the specifications;
- The planting of new trees, shrubs, groundcover, climbers, ferns, grasses and other plans, together with the replanting of any transplanted trees are carried out properly and within the right season; and
- All necessary horticultural operations and replacement planting are undertaken throughout the Establishment Period to ensure the healthy establishment and growth of both transplanted trees and all newly established plants.

Table 10-3 Construction / Operational Phase Audit Checklist

Area of Works	Items to be Monitored
Advance planting (Where feasible in accordance with the construction programme)	• Monitoring of implementation and maintenance of planting, and against possible incursion, physical damage, fire, pollution, surface erosion, etc.
Protection of all trees to be retained	• Identification and demarcation of trees / vegetation to be retained; • Creation of precautionary area around trees to be retained equal to half of the trees canopy diameter and fenced the precautionary area; • Prohibition of the storage of materials including fuel, the movement of construction vehicles, and the refuelling and washing of equipment including concrete mixers within the precautionary area; • Phased segmental root pruning for trees to be retained over a suitable period (determined by species and size) prior to lifting or site formation works which affect the existing rootball of trees identified for retention. The extent of the pruning will be based on the size and the species of the tree in each case; • Pruning of the branches of existing trees identified for retention to be based on the principle of crown thinning maintaining their form and amenity value in accordance with ETWB 2/2007 Guidelines on Tree Pruning; • The watering of existing vegetation particularly during periods of excavation when the water table beneath the existing vegetation is lowered; and • The rectification and repair of damaged vegetation following the construction phase to its original condition prior to the commencement of the works or replacement using specimens of the same species, size and form where appropriate to the design intention of the area affected.
Clearance of existing vegetation	• Identification and demarcation of trees / vegetation to be cleared; and • Checking of extent of works to minimise damage, monitoring of adjacent areas against possible incursion, physical damage, fire, pollution, surface erosion, etc.
Transplanting of trees	• Identification and demarcation of trees / vegetation to be transplanted; • Phased segmental root pruning for trees to be transplanted over a suitable period (determined by species and size) prior to lifting or site formation works which affect the existing rootball of trees identified for retention. The extent of the pruning will be based on the size and the species of the tree in

Area of Works	Items to be Monitored
	each case; • Pruning of the branches of existing trees identified for transplantation to be based on the principle of crown thinning maintaining their form and amenity value; and • Monitoring of extent of pruning / lifting works to minimise damage, timing of operations, implementation of all stages of preparatory and translocation works, and maintenance of transplanted vegetation, etc.
Plant supply	• Monitoring of operations relating to the supply of specialist plant material (including the collecting, germination and growth of plants from seed) to ensure that plants will be available in time to be used within the construction works.
Soiling, planting, etc.	• Monitoring of implementation and maintenance of soiling and planting works and against possible incursion, physical damage, fire, pollution, surface erosion, etc.
Site hoarding for Temporary Works Area	• Implementation and maintenance, to ensure compliance with agreed designs.
Aesthetic design and treatment of structures and associated engineering works	• Implementation and maintenance of mitigation measures, to ensure compliance with agreed designs.
Establishment Works	• Monitoring of implementation of maintenance operations during Establishment Period
Lighting operation and management scheme	• Implementation and maintenance of mitigation measures during operation phase, to ensure compliance with agreed designs.

10.9 In the event of non compliance the responsibilities of the relevant parties is detailed in the Event /Action plan provided on Table 10-4

Table 10-4 Responsibilities of Parties in the Event of Non-compliance

Action Level	Environmental Specialist (ES)	Independent Checker (Environmental) (IC(E))	Franchisee's Site Representative (FSR)	Contractor
Non-conformity on one occasion	1. Identify Source; 2. Inform the Contractor, IC(E) and the FSR; 3. Discuss remedial actions with the IC(E),	1. Check report; 2. Check the Contractor's working method; 3. Discuss with the ES and the Contractor on possible	1. Notify Contractor; and 2. Ensure remedial measures are properly implemented.	1. Amend working methods; 2. Rectify damage and undertake any necessary replacemen

Action Level	Environmental Specialist (ES)	Independent Checker (Environmental) (IC(E))	Franchisee's Site Representative (FSR)	Contractor
	the FSR and the Contractor; and 4. Monitor remedial actions until rectification has been completed	remedial measures; 4. Advise the FSR on effectiveness of proposed remedial measures; and 5. Check implementation of remedial measures.		t.
Repeated Non-conformity	1. Identify Source; 2. Inform the Contractor, ICE and the FSR; 3. Increase monitoring frequency; 4. Discuss remedial actions with the IC(E), the FSR and the Contractor; 5. Monitor remedial actions until rectification has been completed; and 6. If exceedance stops, cease additional monitoring.	1. Check monitoring report; 2. Check the Contractor's working method; 3. Discuss with the ES and the Contractor on possible remedial measures; 4. Advise the FSR on effectiveness of proposed remedial measures; and 5. Supervise implementation of remedial measures.	1. Notify the Contractor; and 2. Ensure remedial measures are properly implemented.	1. Amend working methods; and 2. Rectify damage and undertake any necessary replacement.

11.0 SITE ENVIRONMENTAL AUDIT

Site Surveillance

11.1 Site surveillance provides a direct means to trigger and enforce the specified environmental protection and pollution control measures are in compliance with the contract specifications. They shall be undertaken regularly and routinely by ET to inspect the activities at the fill bank site in order to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented by the Contractor in accordance with the EM&A recommendations. With well-defined pollution control and mitigation specifications and a well-established site inspection, deficiency and action reporting system, the site inspection is one of the most effective tools to enforce the environmental protection requirements on the site.

11.2 The ET Leader is responsible for formulation of the environmental site inspection, deficiency and action reporting system, and for carrying out the site inspections under the EM&A works. He shall prepare and submit a proposal on the site inspection, deficiency and action reporting procedures within 21 days of the construction contract commencement to the Contractor for agreement and to the ER and IC(E) for approval.

11.3 Regular site inspections shall be carried out at least once per week during the construction period of the proposed road. The areas of inspection shall include but not be limited to compliance with environmental legislation, pollution control and mitigation measures within the site. It should also review the environmental situation outside the site area that is likely to be affected, directly or indirectly, by the site activities. The ET Leader shall make reference to the following information in conducting the inspection:

1. The EIA recommendations on environmental protection and pollution control mitigation measures with regard to air quality, noise, waste management and water quality impacts;.

2. On-going results of the EM&A programme;

3. Works progress and programme;

4. Individual works methodology proposals (which shall include proposals on associated pollution control measures);

5. The contract specifications on environmental protection and pollution prevention;

6. The relevant environmental protection and pollution control laws, ProPECC Notes; and

7. Previous site inspection results.

11.4 The Contractor shall update with the ET on all relevant information of the contract for him to carry out the site inspections. The inspection results and its associated recommendations on improvements to the environmental protection and pollution control works shall be submitted to the IC(E) and the

Contractor in a site inspection proforma 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, deficiency and action reporting system formulated by the ET to report on any remedial measures subsequent to the site inspections.

11.5 The ET shall conduct ad hoc site inspections if significant environmental problems are identified. The IC(E) shall also conduct independent site audits. Inspections may also be required subsequent to receipt of any environmental complaints, or as part of the investigation work, as specified in the Event/Action Plan for environmental monitoring and audit.

Compliance with Legal and Contractual Requirements

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

11.7 The ET shall 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.

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

11.9 After reviewing the document, the ET shall advise 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. If the ET's review concludes that the current status on licence/permit application and any environmental protection and pollution control preparation works may not cope with the works programme or may result in potential violation of environmental protection and pollution control requirements by the works in due course, he shall also advise the Contractor and the ER accordingly. The review shall be copied to IC(E) for any follow-up action.

11.10 Upon receipt of the advice, the Contractor shall undertake immediate action to remedy the situation. The ER shall check that the Contractor has taken appropriate action in order that the environmental protection and pollution control requirements are fulfilled.

Environmental Complaints

11.11 Complaints reviewed on environmental issues shall be referred to the ET Leader for carrying out complaint investigation procedures. Upon receipt of complaints the ET shall undertake the tasks outlined in points 1-9 below:

1. Log complaint and date of receipt onto the complaint database and inform the IC(E) immediately;

2. Investigate the complaint to determine its validity, and to assess whether the source of the problem is due to works activities;

3. If a complaint is valid and due to works, identify mitigation measures in consultations with the IC(E);

4. If mitigation measures are required, advise the Contractor accordingly;

5. Review the Contractor's implementation of the identified mitigation measures, and the concurrent situation;

6. If the complaint is transferred from EPD, submit interim report to EPD on status of the complaint investigation an follow-up action within the time frame assigned by EPD;

7. Undertake additional monitoring and audit to verify the complaint if necessary, and ensure that any valid reason for complaint does not recur through proposed amendments to work methods, procedures, machines and/or equipment, etc;

8. Report the investigation results and the subsequent actions to the source of complaint. (If the source of complaint is identified through EPD, the results should be reported within the time frame assigned by EPD); and

9. Log a record on the complaint, investigation, the subsequent actions and the results in the monthly EM&A reports.

11.12 The ER shall immediately notify the Contractor, ER, Project Proponent and EPD (Local Control Office) of any complaints received and keep him well informed of the actions being taken to settle these complaints.

11.13 During the complaint investigation work, the Contractor and ER shall co-operate with the ET Leader in providing all the necessary information and assistance for completion of the investigation. If mitigation measures are identified to be required in the investigation in consultation with the IC(E), the Contractor shall promptly carry out the measures. The ER shall ensure that the Contractor has implemented the mitigation measures.

Documentation

11.14 All documentation is required to be filed in a traceable and systematically manner and ready for inspection upon request. All EM&A results and findings shall be documented in the EM&A report prepared by the ET and endorsed by IC(E) prior to circulation to the Contractor, ER and EPD.

12.0 REPORTING

General

12.1 The following reporting requirements are based upon a paper-documented approach. However, the same information shall be provided in an electronic medium upon agreeing the format with the ER and EPD. All the monitoring data (baseline and impact) shall also be submitted in an agreed electronic format in accordance with the requirements under Annex 21 of the EIAO TM. This would enable a transition from a paper/historic and reactive approach to an electronic/real time proactive approach.

Baseline Monitoring Report

12.2 The ET Leader shall prepare and submit a Baseline Environmental Monitoring Report within 10 working days of completion of the baseline monitoring. Copies of the Baseline Environmental Monitoring Report shall be submitted to each of the four parties: the Contractor, the IC(E), the ER and EPD. The ET Leader shall liaise with the relevant parties on the exact number of copies needed. The format and content of the report and the presentation of the baseline monitoring data to be submitted to EPD shall be agreed with EPD prior to submission.

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

1. Up to half a page executive summary;
2. Brief project background information;
3. Drawings showing locations of the baseline monitoring stations;
4. An updated programme on construction of the proposed road with milestones of environmental protection/mitigation activities annotated;
5. Monitoring results (in both hard and diskette copies) together with the following information:
   - Monitoring methodology;
   - Types of equipment used and calibration details;
   - Parameters monitored;
   - Monitoring locations;
   - Monitoring date, time, frequency and duration; and
   - QA/QC results and detection limits.
6. Details on influencing factors, including:
   - Major activities, if any, being carried out on the site during the period;
   - Weather conditions during the period; and
   - Other factors which might affect the results.
7. Determination of the Action Limit levels for each monitoring parameter and statistical analysis of the baseline data, the analysis shall conclude if there is any significant difference between control and impact actions for the parameters monitored;
8. Revisions for inclusion in the EM&A Manual; and
9. Comments and conclusions.

Monthly EM&A Reports

12.4 The results and findings of all EM&A work required in the Manual shall be presented in a monthly EM&A report that shall be prepared by the ET Leader.

The EM&A report shall be endorsed by IC(E), and then submitted to EPD within 10 working days of the end of each reporting month. The first report is due in the month after the establishment phase commences. A maximum of 4 copies of each monthly EM&A report shall be submitted to each of the four parties: the Contractor, the IC(E), the ER and EPD. Before submission of the first EM&A report, the ET Leader shall liaise with the parties on the exact number of copies and format of the monthly reports in both hard copy and electronic medium required.

12.5 The ET Leader shall review the number and location of monitoring stations and parameters to be monitored every 6 months or on a needed basis in order to cater for the changes in surrounding environment and nature works in progress.

First Monthly EM&A Report

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

1. Executive Summary (1-2 pages);
   - Breaches of Action Limit levels;
   - Complaint Log;
   - Notifications of any summons and successful prosecutions;
   - Reporting Changes; and
   - Future key issues.
2. Basic Project Information
   - Project organisation including key personnel contact names and telephone numbers;
   - Programme with fine tuning of activities showing the inter-relationship with environmental protection/mitigation measures for the month;
   - Management structure; and
   - Work undertaken during the month.
3. Environmental Status
   - Works undertaken during the month with illustrations (such as location of works); and
   - Drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations.
4. Summary of EM&A requirements including:
   - All monitoring parameters;
   - Environmental quality performance limits (Action Limit levels);
   - Event/Action Plans;
   - Environmental mitigation measures, as recommended in the EIA report; and
   - Environmental requirements in contract documents.
5. Implementation Status
   - Advice on the implementation status of environmental protection and pollution control/mitigation measures as recommended in the EIA study report, summarised in the updated implementation schedule.
6. Monitoring Results (in both hard and electronic copies) together with the following information:
   - Monitoring methodology;
   - Types of equipment used and calibration details;
   - Parameters monitored;
   - Monitoring locations;

- Monitoring date, time, frequency, and duration;
- Weather conditions during the period;
- Graphical plots of the monitored parameters in the month annotated against;
  - Major activities being carried out on site during the period;
  - Weather conditions that may affect the results; and
  - Any other factors which might affect the monitoring results.
- QA/QC results and detection limits;
- Waste generation and disposal records; and
- All monitoring results should be tabulated with exceedances highlighted for ease of reference.

7. Report on Non-compliance, Complaints, Notifications of Summons and Successful Prosecutions
   - Record of all non-compliance (exceedances) of the environmental quality performance limits (Action Limit levels);
   - Record of all complaints received (written or verbal) for each media, including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
   - Record of all notifications of summons and successful prosecutions for breaches of the current environmental protection/pollution control legislation, including locations and nature of the breaches, investigation, follow-up actions taken, result and summary;
   - Review of the reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures; and
   - Description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance.
8. Comments, Recommendations and Conclusions
   - An account of the future key issues reviewed from the works programme and work method statements;
   - Advice on the waste management status; and
   - Submission of implementation status proforma, proactive environmental protection proforma, regulatory compliance proforma, site inspection proforma, data recovery schedule and complaint log summarising the EM&A of the period.

Subsequent Monthly EM&A Reports

12.7 The subsequent monthly EM&A reports shall including the following:

1. Executive Summary (1-2 pages)
   - Breaches of Action Limit levels;
   - Complaint log;
   - Notifications of any summons and successful prosecutions;
   - Reporting changes; and
   - Future key issues.
2. Environmental Status
   - Programme with fine tuning of activities showing the inter-relationship with environmental protection/mitigation measures for the month;
   - Work undertaken during the month with illustrations included (such as location of works); and

- Drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations.

3. Monitoring Results to provide monitoring results (in both hard and electronic copies) together with the following information.
   - Monitoring methodology;
   - Types of equipment used and calibration details;
   - Parameters monitored;
   - Monitoring locations;
   - Monitoring date, time, frequency, and duration;
   - Weather conditions during the period;
   - Graphical plots of the monitored parameters in the month annotated against;
     - Major activities being carried out on site during the period;
     - Weather conditions that may affect the results; and
     - Any other factors which might affect the monitoring results.
   - QA/QC results and detection limits;
   - Waste generation and disposal records; and
   - All monitoring results should be tabulated with exceedances highlighted for ease of reference.
4. Implementation Status
   - Advice on the implementation status of environmental protection and pollution control/mitigation measures as recommended in the EIA study report, summarised in the updated implementation schedule.
5. Report on Non-compliance, Complaints, Notifications of Summons and Successful Prosecutions
   - Record of all non-compliance (exceedances) of the environmental quality performance limits (Action Limit levels);
   - Record of all complaints received (written or verbal) for each media, including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
   - Record of all notifications of summons and successful prosecutions for breaches of the current environmental protection/pollution control legislation, including locations and nature of the breaches, investigation, follow-up actions taken, result and summary;
   - Review of the reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures; and
   - A description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance.
6. Comments, Recommendations and Conclusions
   - An account of the future key issues reviewed from the works programme and work method statements;
   - Advice on the waste management status; and
   - Submission of implementation status proforma, proactive environmental protection proforma, regulatory compliance proforma, site inspection proforma, data recovery schedule and complaint log summarising the EM&A of the period.
7. Appendix
   - Action 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 periods;
  - 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 statistics on complaints, notifications of summons and successful prosecutions; and
- Outstanding issues and deficiencies.

Quarterly EM&A Summary Reports

12.8 The quarterly EM&A summary report, which should generally be around 5 pages (~3 pages of text / tables and ~2 pages of figures), should contain at least the following listed information. Apart from these, the first quarterly summary report should also confirm that the monitoring work is proving effective and that it is generating data with the necessary statistical power to categorically identify or confirm the absence of impact attributable to the works.

1. Up to half a page executive summary;
2. Basic project information including a synopsis of the project organisation, programme, contacts of key management, and a synopsis of work undertaken during the quarter;
3. A brief summary of EM&A requirements including:
   - Monitoring parameters;
   - Environmental quality performance limits (Action Limit levels); and
   - Environmental mitigation measures, as recommended in the EIA report.
4. Advice on the implementation status of environmental protection and pollution control/mitigation measures, as recommended in the EIA report, summarised in the updated implementation schedule, including waste generation and disposal records;
5. Drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;
6. 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 that might affect the monitoring results.
7. Comments, Recommendations and Conclusions
   - Advice on the solid and liquid waste management status;
   - A summary of non-compliance (exceedances) of the environmental quality performance limits (Action Limit levels);
   - A brief review of the reasons for an the implications of non-compliance including review of pollution sources and working procedures;
   - A summary description of the action taken in the event of non-compliance and any follow-up procedures related to earlier non-compliance;

- A summary record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken;
- A summary record of all notifications of summons and successful prosecutions for breaches of the current environmental protection/pollution control legislation, locations and nature of the breaches, investigation, follow-up actions taken and results; and
- 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.

12.9 Apart from the above, the first quarterly summary report should also confirm that the monitoring works are proven to be effective, and the monitoring works are generating data with the necessary statistical power to categorically identify or confirm the absence of impact attributable to the works.

Final EM&A Summary Report

12.10 Timing for completion of the EM&A Programme shall be confirmed by Engineer's Representative in liaison with the IC(E). Impact monitoring shall continue until the completion of all construction works as approved by the ER.

12.11 The final EM&A summary report shall include the following:

1. An executive summary;
2. Basic project information including a synopsis of the project organisation, programme, contacts of key management, and a synopsis of work undertaken during the entire construction phase, including baseline phase activities, of the works;
3. A brief summary of EM&A requirements including:
   - Monitoring parameters;
   - Environmental quality performance limits (Action Limit levels); and
   - Environmental mitigation measures, as recommended in the EIA report.
4. Advice on the implementation status of environmental protection and pollution control/mitigation measures, as recommended in the EIA report, summarised in the updated implementation status proformas, including waste generation and disposal records;
5. Drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;
6. Graphical plots of the trends of monitored parameters over the period of construction for representative monitoring stations annotated against;
   - The major activities being carried out on site during the period;
   - Weather conditions during the period;
   - Any other factors which might affect the monitoring results; and
   - The return of ambient environmental conditions in comparison with baseline data.
7. Provide clear-cut decisions on the environmental acceptability of the project with reference to the specific impact hypothesis;
8. Advice on the solid and liquid waste management status;
9. Comments, Recommendations and Conclusions
   - A summary of non-compliance (exceedances) of the environmental quality performance limits (Action Limit levels);

- A brief review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures;
- A summary description of the actions taken in the event of non-compliance and any follow-up procedures related to earlier non-compliance;
- A summary record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken;
- Review the monitoring methodology adopted and with the benefit of hindsight, comment on its effectiveness (including cost effectiveness);
- A summary record of all notification of summons and successful prosecutions for breaches of the current environmental protection/pollution control legislation, locations and nature of the breaches, investigation, follow-up actions taken and results;
- Recommend any improvement in the EM&A programme; and
- A conclusion to state the return of ambient.

Data Keeping

12.12 The site document such as the monitoring field records, laboratory analysis records, site inspection forms, etc. are not required to be included in the monthly EM&A reports, for submission. However, the document shall be well kept by the ET and be ready for inspection upon request. All relevant information shall be clearly and systematically recorded in the document. The monitoring data shall also be recorded in magnetic media form, and the software copy can be available upon request. All the documents and data shall be kept for at least one year after completion of the Project.

Interim Notifications of Environmental Quality Limit Exceedances

12.13 With reference to Event/Action Plans in previous sections, when the environmental quality limits are exceeded, the ET shall immediately notify the IC(E), Engineer's Representative and EPD, as appropriate. The notification shall be followed up with advice to EPD 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 presented in Appendix C.