



HIGHWAYS DEPARTMENT
MAJOR WORKS PROJECT MANAGEMENT OFFICE

路政署
主要工程管理處

Agreement No. CE44/2011 (HY)

Proposed Road Improvement Works in West Kowloon Reclamation Development – Phase 1 – Investigation, Design and Construction



EM&A Manual (September 2013)

**PARSONS
BRINCKERHOFF**

EM&A MANUAL (SEPTEMBER 2013)

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1. INTRODUCTION

1.1 Background

There will be substantial developments in West Kowloon Reclamation Development (WKRd). With the completion of one of the developments and the commissioning of the new transport facilities, their traffic impacts to the road network of WKRd and its vicinity will be significant.

Apart from the additional traffic impacts arising from the major developments and transport facilities in WKRd, several major junctions in the area are currently operating with insufficient capacity causing serious congestion to some existing major road corridors such as Jordan Road (JRD), Ferry Street (FST) and Canton Road (CRD).

To enhance the road network of the area, Transport Department commissioned the “West Kowloon Reclamation Development Traffic Study” which identified and recommended Core and Additional Schemes together with the improvement works at the junction of CRD/FST/JRD. Implementation of these schemes would enable most of the key road junctions in the study area to operate with spare capacity, and the traffic queue length would also be reduced avoiding blockage to the upstream junctions.

1.2 The Assignment

On 7 March 2012, the Government of Hong Kong Administration Region awarded Agreement No. CE44/2011 (HY) Proposed Road Improvement Works in West Kowloon Reclamation Development – Phase 1 – Investigation, Design and Construction to Parsons Brinckerhoff (Asia) Ltd.

The assignment involved construction and modification of road bridge and carriageway, road improvement and associated works for the proposed schemes and junction improvement works. An Environmental Impact Assessment (EIA) was conducted to identify and evaluate the environmental impacts due to the project and to recommend practical mitigation measures. The site location plan can be found in **DRAWING NO. CE44/T/ST/EM01**.

1.3 Purpose of the EM&A Manual

This EM&A Manual is prepared based on the findings and recommendations in the EIA and with reference to the requirements stipulated in Annex 21 Technical Memorandum under the Environmental Impact Assessment Ordinance (EIAO-TM):

- (a) To propose EM&A programme to monitor the environmental performance of the project
- (b) To check the implementation status of mitigation measures to minimize construction and operational impacts on the environment

- (c) To identify the need for additional mitigation measures
- (d) To advise the responsibilities of different parties involved in the project and communication flow among them
- (e) To detail monitoring requirements (locations, environmental parameters, frequency, duration) before and during the construction period and in the operational period
- (f) To propose monitoring equipment required and quality assurance
- (g) To determine action and limit levels of each environmental parameter based on the legislative criteria and standards for compliance checking
- (h) To set up event and action plans for remedial actions if exceedance of compliance is identified
- (i) To devise procedures for handling complaint/consultation
- (j) To detail reporting requirement

1.4 Work Programme

The expected construction period for this project is from the early of 2014 to the end of 2015.

1.5 Implementation Schedule

The implementation schedule of environmental mitigation proposed in the EIA report can be found in **Appendix A**.

2. PROJECT ORGANISATION

2.1 Project Organisation

Parties involved in the environmental protection works are the Contractor, Engineer's Representative (ER), Environmental Team (ET) and the Independent Environmental Checker (IEC)). Their respective roles and duties/responsibilities are shown in the following sub-sections. The proposed line of communication can be found in **DRAWING NO. CE44/T/ST/EM02**.

2.2 Project Proponent

The Project Proponent (Highways Department) shall appoint Independent Environmental Checker (IEC) to audit and verify the EM&A works of the Environmental Team (ET).

2.3 The Contractor

The Contractor implies all construction contractors and sub-contractors working on the project site. He should:

- (i) Engage the ET to carry out EM&A work
- (ii) Notify the ET construction activities that may have environmental concern
- (iii) Participate in the site inspection carried out by the ET and to rectify any environmental deficiency identified
- (iv) Propose and implement necessary measures to mitigate any exceedance in Action/Limit Level recorded in accordance to the Event/Action Plans
- (v) Investigate complaints according to the agreed procedures

2.4 Engineer's Representatives (ER)

The ER shall be responsible to oversee the construction work of all contractors to ensure that the contract specification can be met. He should:

- (i) Supervise the Contractor's activities to ensure that they comply with the requirement in the EIA, EM&A Manual, Environmental Permit (EP) and the contract specifications
- (ii) Follow the agreed procedures in the Event/Action Plan in case of any exceedance and instruct the Contractor to carry out remedial actions
- (iii) Investigate complaints according to the agreed procedures and instruct the Contractor to follow up
- (iv) Assist the ET in implementation of EM&A programme when required

2.5 Independent Environmental Checker (IEC)

The IEC shall be appointed by Highways Department to audit and verify the EM&A works of the ET and to oversee the environmental performance of the project site. He shall not have any association with the Contractor, ER or ET.

- (i) Review and verify EM&A Reports and submissions for EP prepared by the ET and advise for improvement
- (ii) Audit and confirm the validity and accuracy of monitoring activities and results. He may carry out random sample check and audit on monitoring data and sampling procedures, etc
- (iii) Review the implementation status and effectiveness of mitigation measures onsite and ensure that they are carried out properly
- (iv) Conduct monthly and random site inspection.
- (v) Investigate complaints according to the agreed procedures
- (vi) Review the proposal of mitigation measures by the Contractor in an event of exceedance according to the Event/Action Plan

2.6 Environmental Team (ET)

The ET shall be lead by the ET Leader to carry out EM&A programme and to check the Contractor's compliance with the environmental protection requirements in the EIA, EM&A Manual and EP. He should:

- (i) Set up monitoring station to carry out monitoring, statistical analysis and compliance checking against legislative standard and guidelines
- (ii) Repeat field measurement in case of exceedance and propose mitigation measures for improvement
- (iii) Conduct weekly site inspection to audit the Contractor's site practice on pollution prevention and the effectiveness and adequacy of mitigation measures
- (iv) Advise the Contractor rectification work required when environmental deficiency is identified
- (v) Prepare monthly and quarterly EM&A report to summarise environmental performance and to anticipate future key issues
- (vi) Review and comment on work schedule and methodology as necessary
- (vii) Support the Contractor for submissions required under the EP
- (viii) Investigate complaints and propose corrective measures according to the agreed procedures
- (ix) Liaise with the IEC on environmental performance

3. AIR QUALITY

3.1 Introduction

With implementation of dust suppression measures, no unacceptable construction air quality impact is anticipated. Regular air quality monitoring should be carried out at representative ASRs and to ensure that relevant air quality standard can be met.

Based on the modeling results, the results are complied with the air quality objectives for all modeled parameters at ASRs in the operational phase. No operational phase monitoring or audit is proposed.

This section outlines the monitoring requirement for air quality during the construction phase.

3.2 Monitoring Parameters

The ET shall evaluate the construction air quality impact by conducting 1-hour and 24-hour Total Suspended Particulates (TSP) measurements.

3.3 Monitoring Equipment

1-hour and 24-hour TSP levels will be measured in accordance to 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.

Other than using high volume sampler, 1-hour TSP levels can be measured alternatively by direct reading from portable dust meters upon approval from ER. The meters should be capable of producing comparable results as that by the high volume sampling method, to indicate short event impacts.

3.4 Monitoring Requirements

3.4.1 High Volume Sampler

The ET shall provide sufficient number of high volume samplers (HVSs) for measurement at different ASRs during each monitoring. The HVSs shall comply with the following specifications for carrying out the 1-hour and 24-hour TSP monitoring:

- (a) 0.6 - 1.7 m³ 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 cm²;
- (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) equipped with easily changeable filter; and
- (m) capable of operating continuously for a 24-hour period.

Clearly labelled calibration kit and filter papers shall also be provided. The HVSs should be equipped with an electronic mass flow controller and be calibrated against a traceable standard at regular intervals.

Calibration should first be conducted after installing the HVSs and repeated on bi-monthly basis. The transfer standard shall be traceable to the internationally recognised primary standard and be calibrated annually. The concern parties such as IEC shall properly document the calibration data for future reference. All the data should be converted into standard temperature and pressure condition.

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 in **Appendix B**.

3.4.2 Direct Reading Meter

If the ET prefers to adopt direct reading method for 1-hour TSP, he should provide adequate support to the IEC for verifying the capacity of the meter as with the HVSs in obtaining comparable measurements. The meter shall be calibrated at regular intervals in accordance to the specification in the manufacturer's manual. The calibration certificates shall be available to the IEC for checking upon request. The validity and accuracy of the meter shall also be tested against the results by the HVS periodically.

3.4.3 Collection of Wind Data

For recording wind speed and wind direction, the ET shall install wind data monitoring equipment near the dust monitoring locations. The installation location shall be proposed by the ET and agreed with the IEC. The installation and operation of the equipment shall meet the following criteria:

- (a) The wind sensors should be installed 10 m above ground so that they are clear of obstructions or turbulence caused by buildings.
- (b) The wind data should be captured by a data logger. The data shall be downloaded for analysis at least once a month.

(c) The wind data monitoring equipment should be re-calibrated at least once every six months.

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

If agreed by the ER and the IEC, the ET may obtain wind data using alternative method.

3.4.4 Laboratory Testing

Filter paper to be placed in the HVSSs should have a size of 8" x 10" and be labelled before sampling. It should be clean without pinholes, and be conditioned in a humidity-controlled chamber for over 24-hours and be pre-weighed before use for the sampling.

After air is passed through the HVSSs, the filter paper inside will be loaded with dust. It shall be collected inside a clean and tightly sealed plastic bag for transporting to a laboratory. It shall be reconditioned in the humidity-controlled chamber followed by accurate weighing by an electronic balance with accuracy up to 0.1 mg. The balance shall be regularly calibrated against a traceable standard.

All samples should be kept in good condition for 6 months before disposal.

The testing laboratory should be HOKLAS accredited. It should be clean and can maintain a stable temperature and humidity. Measuring and conditioning instruments should be available for handling the dust samples. It should be able to carry out result analysis, equipment calibration and maintenance.

If a site or non-HOKLAS laboratory will be responsible for conducting the testing, the laboratory equipment shall be approved by the ER and the measurement procedures shall be witnessed by the IEC. Any measurement performed by the laboratory shall be demonstrated to the satisfaction of the ER and the IEC. The IEC 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 A for his reference.

3.5 Monitoring Location

3.5.1 Monitoring Location

Four representative Air Quality Monitoring stations (AMSs) are proposed as follows:

Table 3.1 Proposed Construction Dust Monitoring Locations

| Monitoring Stations | Location |
|----------------------------|--|
| AM1 | Marine Department New Yau Ma Tei Public Cargo Working Area Administrative Building (YMT) |
| AM2 | Garden Building (GB) |
| AM3 | The Cullinan I (CLS) |

| Monitoring Stations | Location |
|---------------------|--------------------------------|
| AM4 | Lai Chack Middle School (LCMS) |

The location of the stations can be found in **Drawing No. CE44/T/ST/EM03-04**.

The status and locations of dust sensitive receivers may change after issuing this manual. In this case, the ET Leader shall propose alternative monitoring locations taken into account the following considerations and seek approval from the ER and the IEC:

- (a) locate at the site boundary or such locations close to the major dust emission source;
- (b) locate close to the sensitive receptors; and
- (c) take into account the prevailing meteorological conditions.

3.5.2 Placement of Equipment

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

- (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.

3.6 Baseline Monitoring

Baseline monitoring shall be conducted to determine the existing air quality in terms of 1-hour and 24-hour TSP levels before commencement of construction work. A consecutive measurement for 14 days shall be done for 24-hour TSP at all monitoring stations. At least 3 sets of 1-hour TSP data shall also be collected every day during this period, at the predicted time in which greatest impact is expected.

During the baseline monitoring, there should be no major construction or dust generating activities near the monitoring stations. As there are a number of concurrent projects in the West Kowloon Reclamation Development, the ET shall propose a monitoring schedule to the IEC so that he can conduct onsite audit to ensure the accuracy of the measurement where necessary.

Alternative baseline AMS that can give representative baseline result may be proposed for ER and IEC's approval with justifications.

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

The baseline monitoring data shall be reviewed once every three months. When there is seasonal change to ambient conditions, the baseline condition may need to be updated. Repeated measurement shall be conducted during which no dust generating activity is being carried out near the AMS. If a change in ambient condition is recorded, the baseline levels and therefore air quality criteria should be revised accordingly and agreed with the IEC and EPD.

3.7 Impact Monitoring

Impact monitoring shall be carried out throughout the construction period at all AMSs. 24-hour TSP sampling shall be conducted at a frequency of at least once in every 6 days, while that for 1-hour TSP shall be at least 3 times in every 6 days when the highest dust impact takes place. Similar to baseline monitoring, the ET shall submit a monitoring schedule to the IEC for onsite audit of the accuracy of the monitoring result where necessary.

The ET shall clearly define and strictly follow the starting and ending time for 24-hour TSP monitoring for each AMS.

If exceedance of air quality criteria is recorded, more frequent measurement shall be done within the specified timeframe in accordance to the Action Plan. The additional monitoring shall be continued until the excessive dust emission or the deterioration in air quality is rectified, and upon agreement with the IEC.

3.8 Air Quality Performance Limit

The Air Quality Objective sets the statutory limit for 1-hour and 24-hour TSP levels while the baseline monitoring results shall be interpreted to derive the action levels.

Table 3.2 Action / Limit Levels for Air Quality

| Parameters | Action | Limit |
|---|---|-----------------------|
| 24-hour TSP Level in $\mu\text{g m}^{-3}$ | For baseline level $\leq 200 \mu\text{g m}^{-3}$, Action level = (baseline level * 1.3 + Limit level)/2; For baseline level $> 200 \mu\text{g m}^{-3}$ Action level = Limit level | 260 $\mu\text{g/m}^3$ |
| 1-hour TSP Level in $\mu\text{g m}^{-3}$ | For baseline level $\leq 384 \mu\text{g m}^{-3}$, Action level = (baseline level * 1.3 + Limit level)/2; For baseline level $> 384 \mu\text{g m}^{-3}$, Action level = Limit level | 500 $\mu\text{g/m}^3$ |

3.9 Event and Action Plan

Should non-compliance of the air quality criteria occur, actions in accordance with the Action Plan in **Appendix C** shall be carried out.

3.10 Mitigation Measures

The EIA proposed a number of construction phase mitigation measures, examples as follows:

- (a) Good housekeeping to minimize dust generation, e.g. by properly handling and storing dusty materials
- (b) Adopt dust control measures, such as dust suppression using water spray on exposed soil, in areas with dusty construction activities and during material handling
- (c) Limit vehicle speed within site
- (d) Minimize exposed earth after completion of work in a certain area by hydroseeding, vegetating, soil compacting or covering with bitumen
- (e) Provide wheel washing at site exit to prevent carrying dust outside of the site
- (f) Hard pave the area at site exit with concrete, bitumen or hardcore
- (g) Cover materials on trucks before leaving the site

Detailed mitigation measures are listed out in the EMIS in **Appendix A**. Implementation status and the effectiveness of these measures shall be audited through regular site inspection.

4. NOISE

4.1 Introduction

Based on the modeling results, cumulative construction noise exceedance at NSRs is anticipated for the noise criteria during examination period even if mitigation measures are properly implemented. Regular noise monitoring should be carried out at representative NSRs to ensure that relevant noise standard can be met.

In the operational phase, the traffic noise impact arising from the Project is considered insignificant. Moreover, the traffic noise emanating from the Project roads would also comply with the relevant standard. No operational phase monitoring or audit is proposed.

This section outlines the monitoring requirement for noise during the construction phase.

4.2 Monitoring Parameters

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

As supplementary information for data auditing, statistical results such as L_{10} and L_{90} shall also be obtained for reference.

4.3 Monitoring Equipment

Sound level meters shall be employed to measure the construction noise level. It should comply with the International Electrotechnical Commission Publications 651: 1979 (Type 1) and 804: 1985 (Type 1) specifications in accordance to the Technical Memorandum (TM) issued under the NCO.

An acoustic calibrator shall be used to validate the accuracy of the sound level meter before and after each noise measurement. The calibrator can generate a known sound pressure level at a known frequency. The noise record will only be accepted if the calibration level from before and after the noise measurement agrees to within 1.0 dB.

Sufficient number of the above equipment shall be provided by the ET, who will also be responsible for installation, operation, maintenance and dismantlement. All equipment and instrumentation shall be clearly labelled.

4.4 Monitoring Requirement

Noise measurement shall normally be at a point 1 m from the exterior of the sensitive receiver building façade and be at a position 1.2 m above the ground. If the normal monitoring position cannot be accessed, an alternative position may be chosen, and a correction to the measurements shall be made. For reference, a correction of +3 dB(A) shall be made to the free field measurements. The ET shall agree with the IEC on the

monitoring position and the corrections adopted. The agreed position shall be chosen in subsequent baseline and impact monitoring.

Noise measurements should be made in accordance with standard acoustical principles and practices in relation to weather conditions.

4.5 Monitoring Location

Noise exceedance is expected at the following SRT, CLS, LCMS, YTB and schools LKPC and YCS during examination period. As such, five representative Noise Monitoring Stations (NMSs) are proposed as follows:

Table 4.1 Proposed Construction Noise Monitoring Locations

| Monitoring Stations | Location |
|---------------------|---|
| NM1 | Sorrento - Tower 1 (SRT) |
| NM2 | Yau Ma Ti Catholic Primary School (Hoi Wang Road) (YCS) |
| NM3 | The Cullinan I (CLS) |
| NM4 | Lai Chack Middle School (LCMS) |
| NM5 | Yue Tak Building (YTB) |

The location of the stations can be found in **Drawing No. CE44/T/ST/EM03 -04**.

The status and locations of noise sensitive receivers may change after issuing this manual. In this case, the ET Leader shall propose alternative monitoring locations taken into account the following considerations and seek approval from the ER and the IEC:

- (a) locate close to the major site activities which are likely to have noise impacts;
- (b) locate close to the most affected existing NSRs; and
- (c) take into account the possibility of minimizing disturbance to occupants at the NSRs during monitoring.

4.6 Baseline Monitoring

Baseline noise measurement shall be conducted to determine the background noise before commencement of work. Daily measurement of A-weighted levels L_{eq} , L_{10} and L_{90} shall be conducted for at least two weeks. The sample period shall be 30 minutes between 0700 and 1900.

During the baseline monitoring, there should be no major construction activities near the monitoring stations. As there are a number of concurrent projects in the West Kowloon Reclamation Development, the ET shall propose a monitoring schedule to the IEC prior to the monitoring so that he can conduct onsite audit to ensure the accuracy of the measurement where necessary.

Alternative baseline NMS that can give representative baseline result may be proposed for ER and IEC's approval with justifications.

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

4.7 Impact Monitoring

For daytime construction work on normal weekdays (0700-1900 Monday to Saturday), one set of 30-min measurement shall be carried out at each NMS every week based on the measurement procedures under the Noise Control Ordinance-TM. Similar to baseline monitoring, the ET shall submit a monitoring schedule to the IEC beforehand.

Should there be any education institute near the construction site, noise measurement should be carried out during the examination period. The ET shall ask for examination time during the contract period from school personnel and the Examination Authority.

If noise exceedance is being recorded, additional noise monitoring shall be conducted in accordance to the Event Action Plan. The monitoring shall consider complete if the exceedance is being rectified or proved to be from source other than the project construction work.

4.8 Noise Performance Limit

The EIAO-TM sets the statutory limit for noise level produced during construction work.

Table 4.2 Action / Limit Levels for Noise

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

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

4.9 Event and Action Plan

Should non-compliance of the noise criteria occur, actions in accordance with the Action Plan in **Appendix C** shall be carried out.

4.10 Mitigation Measures

The EIA proposed a number of construction phase mitigation measures, examples as follows:

- (a) Adopt good site practice, such as regular maintenance of plant equipment, throttle down unused machines
- (b) Use Quality Powered Mechanical Equipment (QPME) (e.g. Excavator/Loader (EPD-01431), Asphalt Paver (EPD-01226), Road Roller (EPD-00244) and Mobile Crane (EPD-01477))

- (c) Erect movable noise barrier of 3m height to shed large plant equipment (e.g. concrete pump, concrete lorry mixer, excavator/loader, road sweeper, asphalt paver, road roller and lorry) or hand-held items (e.g. Breaker and Poker) near low-rise NSR, with special design where necessary, e.g. with noise absorbing material or bend top. Its length should be at least five times greater than its height. The minimum surface density of the movable noise barrier is 7 kg/m^2 .

Detailed mitigation measures are listed out in the EMIS in **Appendix A**. Implementation status and the effectiveness of these measures shall be audited through regular site inspection.

5. WATER QUALITY

5.1 Introduction

Potential water quality impact may arise from surface runoff carrying high level of suspended solids, discharge of sewage effluent and accidental chemical spillage into the storm drain. No adverse construction water quality impact is expected if the mitigation measures are implemented properly.

In the operational phase, surface runoff will be collected and screened by road drainage system before entering the storm water drains. As limited water quality impact is anticipated, no monitoring or audit is proposed.

5.2 Site Inspection

Weekly site audit is recommended to monitor the implementation of the proposed water quality mitigation measures and check the Contractor's work practice on water pollution prevention during construction phase.

Should water pollution is observed (e.g. discharge of silty water into storm drains), the ET should record the environmental deficiency for investigation. The Contractor should be notified and responsible for carrying out rectification work immediately. The ET shall re-inspect the site and review the effectiveness of the remedial measure performed until satisfaction. The Contractor shall implement preventive measure to avoid causing the same problem.

5.3 Effluent Testing

Effluent testing should be carried out at interval stipulated in the discharge license issued by the EPD and should comply with the requirement.

Should non-compliance be recorded, the Contractor should notify the site management and carry out investigation to identify the source. Check if all mitigation measures are carried out. The Contractor shall employ remedial measures to improve effluent quality, e.g. further treatment if needed. No effluent should be discharged until the effluent quality meets the required standard. The Contractor shall implement preventive measure to avoid causing the same problem.

5.4 Mitigation Measures

The EIA proposed a number of construction phase mitigation measures, examples as follows:

- (a) Well manage construction materials, chemicals, sewage for proper storage and usage and to prevent accumulation onsite
- (b) Immediately clean up contaminated soil upon chemical and oil leakage
- (c) Label chemical waste containers as reminder. Store fuels, chemicals and waste at designated area with locks and bunds

- (d) Register as chemical waste producer
- (e) Settle surface runoff in sedimentation tank prior to discharge
- (f) Provide sufficient number of chemical toilets and employ licensed contractor for regular clean-up and maintenance
- (g) Provide wheel washing bay at site exit and maintain regularly to prevent dust and silty water from leaving the site
- (h) Cover slope and loose materials with tarpaulin before rainstorm and inspect the area afterwards
- (i) Cover manhole to prevent silty runoff from entering the foul sewer

Detailed mitigation measures are listed out in the EMIS in **Appendix A**. Implementation status and the effectiveness of these measures shall be audited through regular site inspection.

6. WASTE MANAGEMENT

6.1 Introduction

Waste includes Construction and Demolition (C&D) materials from excavation, site formation and demolition, chemicals from plant maintenance, general refuse and marine sediment. No adverse waste impact is expected if the mitigation measures are implemented properly.

During operational phase, limited amount of waste will be generated in the form of silt or grit from road gullies and litter. Therefore, the operational phase waste impact is negligible.

6.2 EM&A Requirement

The Contractor should apply for relevant licences/permits for waste disposal under different regulations and ordinances as follows:

- (a) Chemical Waste Permits/licenses under the Waste Disposal Ordinance (Cap 354);
- (b) Public Dumping Licence under the Land (Miscellaneous Provisions) Ordinance (Cap 28); and
- (c) Effluent Discharge Licence under the Water Pollution Control Ordinance.

Reference should be made to EPD's booklets on licences/permits. The Contractor shall also document recycling receipts/ disposal record to keep track of waste movement. The ET shall check with the Contractor that these licences/permits have been obtained. He should also review the above documentations regularly to ensure compliance with legislations and specifications. Testing should be carried out to verify the sediment quantity and quality as recommended in EIA report.

6.3 Waste Management Plan

The contractor should formulate waste management measures on waste minimization, storage, handling and disposal in a Waste Management Plan as part of Environmental Management Plan in accordance to ETWB TC (W) No.19/2005 for construction phase. The Environmental Management Plan should be submitted to the Engineer for approval. Mitigation measures proposed in the EIA Report and the EM&A Manual should be adopted.

6.4 Mitigation Measures

The EIA proposed a number of construction phase mitigation measures, examples as follows:

- (a) Reuse inert C&D materials onsite and dispose excess uncontaminated ones to public fill

- (b) Provide sufficient waste collection points for general refuse and regularly maintained to avoid accumulation. Dispose the waste at waste transfer or disposal facilities
- (c) Minimize wastage through careful planning and avoiding over-purchase of construction materials
- (d) Provide training to workers on site cleanliness, waste management (waste reduction, reuse and recycle) and chemical handling procedures
- (e) Hire licensed waste disposal contractors for waste collection and removal. Dispose waste at licensed waste disposal facilities

Detailed mitigation measures are listed out in the EMIS in **Appendix A**. Implementation status and the effectiveness of these measures shall be audited through regular site inspection.

7. LANDSCAPE AND VISUAL

7.1 Introduction

During the construction phase, construction activities, temporary stockpiling, storage of construction plant and materials, work area, traffic and road diversions and dust emission may lead to landscape and visual impacts. Mitigation measures are proposed to minimize the degree of impact.

During the operational phase, the newly built roads will be a source of landscape and visual impact. Mitigation measures are proposed to minimize the degree of impact.

7.2 EM&A Requirement

A Registered Landscape Architect should be employed by the Contractor as part of the ET. He should ensure that the mitigation measures are carried out in accordance to the recommendations in the EIA and any specification in the contract or agreement with relevant departments. He will inspect the site and audit the implementation of mitigation measures once every two weeks during construction phase and on monthly basis in the operational phase.

He will monitor adequacy of tree preservation, status of tree planting and removal during construction phase. He will also check maintenance of the transplanted and newly planted trees during the establishment period in the operational phase. Furthermore, he will review the compliance of the landscape work with the proposed design.

7.3 Mitigation Measures

The EIA proposed a number of mitigation measures to be implemented by HyD's contractor, examples as follows:

Construction Phase

- (a) Shorten the construction period whenever possible
- (b) Limit work within site area without encroaching into the landscape resources offsite.
- (c) Protect retained trees from damage during construction work
- (d) Maintain transplanted trees to ensure healthy development during the establishment period
- (e) Match the design and materials of road structure with the surrounding environment and with the future West Kowloon Reclamation Development and the Advisory Committee on the Appearance of Bridges and Associated Structures

Operational Phase

- (a) Carry out compensatory planting to mitigate the loss greenery
- (b) Provide vertical greening and shrub planting for hiding hard landscape

Detailed mitigation measures are listed out in the EMIS in **Appendix A**. Implementation status and the effectiveness of these measures shall be audited through regular site inspection.

8. SITE ENVIRONMENTAL AUDIT

8.1 Introduction

While a number of mitigation measures are proposed in the EIA report, regular site inspection is recommended for direct observation of the implementation progress to ensure they are properly implemented. Through a well-established action and reporting system, additional pollution control measures to identified environmental deficiency can be proposed and carried out at early stage. Site inspection is a useful way to enforce the environmental protection requirements onsite during construction.

8.2 Site Inspection

The ET Leader will be responsible for the site environmental audit. He will design the environmental site inspection, deficiency and action reporting system and conduct regular site inspection. He should prepare a proposal on the site inspection and reporting methodology to the Contractor for agreement and to the ER for approval.

Weekly site inspection shall be performed by the ET within the site where environmental protection measures will be implemented and also offsite where the construction activities may directly or indirectly be impacted upon. The following shall be noted during the inspection:

- (a) environmental protection and pollution control mitigation measures proposed in the EIA, contract specification, EP and this Manual
- (b) works progress and programme
- (c) ongoing results of the EM&A programme
- (d) individual works methodology proposals (including associated pollution control measures)
- (e) relevant environmental protection and pollution control laws
- (f) previous site inspection results

The Contractor shall inform the ET on any update of all relevant information on the construction contract necessary for him to carry out the site inspection. After each site inspection, the ET shall submit an inspection report to the Contractor and the ER within 24 hours. It should include inspection result on any identification of environmental deficiency and corresponding mitigation recommendations for taking immediate rectification action. Follow up of identified problem from the previous inspection shall also be included. The Contractor shall report on any rectification actions after the site inspection in accordance to the procedures and timeframe proposed by the ET in the environmental site inspection, deficiency and action reporting system.

If significant environmental issue is identified, additional site inspection shall be performed. This may also be required upon receipt or during investigation of

environmental complaint in accordance to the Action Plan for environmental monitoring and audit.

8.3 Compliance with Legal and Contractual Requirements

The environmental protection and pollution control laws in Hong Kong and project contract stipulate environmental protection and pollution control requirement for construction activities.

As such, the Contractor should submit all work method statements for ER's approval and ET Leader's review on environmental compliance with the contractual requirements. Sufficient environmental protection and pollution control measures shall be demonstrated in the method statement.

The ET Leader should also check that the work progress and programme can comply with legal requirement on environmental terms and to prevent violation in the future.

The Contractor shall regularly copy relevant documents to the ET for checking, including but not limited to updated Work Progress Reports, updated Works Programme, application letters for different licence/permits under the environmental protection laws, and all valid licences/permits. The site diary shall also be available for inspection upon ET Leader's request.

Should any non-compliance with the contractual and legislative requirements is identified after reviewing the documents, the ET should notify the ER and Contractor so that follow-up actions can be taken. He should also inform the ER and Contractor if the current status on licence/permit application and any environmental protection and pollution control preparation works may not meet the works programme or the construction work may lead to potential violation of environmental protection and pollution control requirements in due course.

The Contractor shall carry out remedial actions immediately upon receipt of ET's advice. The ER shall check with the Contractor to ensure that appropriate actions has been taken accordingly and can satisfy the environmental protection and pollution control requirement.

8.4 Environmental Complaints

Upon receipt of complaint, the following procedures shall be followed:

- (a) The Contractor to log complaint and date of receipt onto the complaint database and inform the ER, ET and IEC immediately;
- (b) The Contractor to investigate, with the ER and ET, the complaint to determine its validity, and assess whether the source of the problem is due to construction works of the Project with the support of additional monitoring frequency and stations, if necessary;
- (c) The Contractor to identify remedial measures in consultation with the IEC, ET and ER if a complaint is valid and due to the construction works of the Project;

- (d) The Contractor to implement the remedial measures as required by the ER and to agree with the ET and IEC any additional monitoring frequency and stations, where necessary, for checking the effectiveness of the remedial measures;
- (e) The ER, ET and IEC to review the effectiveness of the Contractor's remedial measures and the updated situation;
- (f) The ET/Contractor to undertake additional monitoring and audit to verify the situation if necessary, and oversee that circumstances leading to the complaint do not recur;
- (g) If the complaint is referred by the EPD, the Contractor to prepare interim report on the status of the complaint investigation and follow-up action stipulated above, including the details of the remedial measures and additional monitoring identified or already taken, for submission to EPD within the time frame assigned by the EPD; and
- (h) The ET to record the details of the complaint, results of the investigation, subsequent actions taken to address the complaint and updated situation including the effectiveness of the remedial measures, supported by regular and additional monitoring results in the monthly EM&A reports.”

9. REPORTING

9.1 Introduction

The ET shall prepare baseline monitoring report, monthly EM&A reports, quarterly EM&A report and final EM&A report. They shall be submitted to the EPD in paper and electronic formats in timely order.

9.2 Baseline Monitoring Report

Baseline monitoring of air quality and noise are proposed. The baseline monitoring report shall be submitted within 10 working days after completion of the monitoring work. The recipients include the IEC, Contractor and ER. It should first be verified by the IEC before formal submission to the EPD. The ET shall liaise with the relevant parties on the number of copies required. The report format and monitoring data format shall be agreed with the EPD prior to submission. The baseline monitoring report generally includes but not limited to the following:

- (a) up to half a page executive summary;
- (b) brief project background information;
- (c) drawings showing locations of the baseline monitoring stations;
- (d) monitoring results (in both hard and soft copies) together with the following information:
 - a. monitoring methodology;
 - b. equipment used and calibration details;
 - c. parameters monitored;
 - d. monitoring locations (and depth);
 - e. monitoring date, time, frequency and duration;
 - f. quality assurance (QA) / quality control (QC) results and detection limits;
- (e) details of influencing factors, including:
 - a. major activities, if any, being carried out on the site during the period;
 - b. weather conditions during the period; and
 - c. other factors which might affect results;
- (f) determination of the Action and Limit Levels for each monitoring parameter and statistical analysis of the baseline data;
- (g) revisions for inclusion in the EM&A Manual; and

(h) comments, recommendations and conclusions.

9.3 EM&A Report

The ET Leader shall prepare monthly EM&A reports which summarize the result and findings in all EM&A work conducted in accordance to the Manual, such as monitoring and site inspection. It shall be submitted within 10 working days of the end of each reporting month, with the first report due in the month after construction commences. The recipients include the IEC, Contractor, ER and the EPD. It should first be verified by the IEC before formal submission. The ET shall liaise with the relevant parties on the exact number of copies required and the report format for both paper and electronic format prior to submission of the first EM&A report.

As there may be changes in surrounding environment and nature of work in progress, the ET Leader shall review and update the number and location of monitoring stations and parameters to be monitored every 6 months or on as needed basis.

9.3.1 First EM&A Report

The first EM&A report generally includes but not limited to the following:

(a) Executive summary (1-2 pages):

- a. breaches of Action and Limit levels;
- b. complaint log;
- c. notifications of any summons and successful prosecutions;
- d. reporting changes; and
- e. future key issues.

(b) Basic project information:

- a. project organisation including key personnel contact names and telephone numbers;
- b. construction programme;
- c. management structure, and
- d. works undertaken during the month

(c) Environmental status:

- a. works undertaken during the month with illustrations (such as location of works); and
- b. drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations (with co-ordinates of the monitoring locations)

- (d) A brief summary of EM&A requirements including:
 - a. all monitoring parameters;
 - b. environmental quality performance limits (Action and Limit levels);
 - c. Event and Action Plans;
 - d. environmental mitigation measures, as recommended in the project EIA Report; and
 - e. environmental requirements in contract documents;
- (e) Implementation status:
 - a. advice on the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the project EIA Report;
- (f) Monitoring results (in both hard and diskette copies) together with the following information:
 - a. monitoring methodology;
 - b. equipment used and calibration details;
 - c. parameters monitored;
 - d. monitoring locations;
 - e. monitoring date, time, frequency, and duration;
 - f. weather conditions during the period;
 - g. major activities being carried out on site during the period;
 - h. any other factors which might affect the monitoring results; and
 - i. QA/QC results and detection limits;
- (g) Report on non-compliance, complaints, and notifications of summons and successful prosecutions:
 - a. record of all non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
 - b. 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;
 - c. record of all notification of summons and successful prosecutions for breaches of current environmental protection / pollution control legislation, including

locations and nature of the breaches, investigation, follow-up actions taken, results and summary;

- d. review of the reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures; and
- e. description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance;

(h) Others

- a. an account of the future key issues as reviewed from the works programme and work method statements;
- b. advice on the solid and liquid waste management status; and
- c. comments (for examples, effectiveness and efficiency of the mitigation measures), recommendations (for example, any improvement in the EM&A programme) and conclusions.

9.3.2 Subsequent EM&A Reports

Subsequent EM&A report generally includes but not limited to the following:

(a) Executive summary (1 - 2 pages):

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

(b) Basic project Information:

- a. project organization including key personnel contact names and telephone numbers;
- b. programme;
- c. management structure; and
- d. works undertaken during the month.

(c) Environmental status:

- a. works undertaken during the month with illustrations (such as location of works etc.); and

- b. drawing showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations.
- (d) Implementation status:
 - a. advice on the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the project EIA;
- (e) Monitoring results (in both hard and diskette copies) together with the following information:
 - a. monitoring methodology;
 - b. equipment used and calibration details;
 - c. parameters monitored;
 - d. monitoring locations;
 - e. monitoring date, time, frequency, and duration;
 - f. weather conditions during the period;
 - g. major activities being carried out on site during the period;
 - h. any other factors which might affect the monitoring results; and
 - i. QA / QC results and detection limits.
- (f) Report on non-compliance, complaints, and notifications of summons and successful prosecutions:
 - a. record of all non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
 - b. 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;
 - c. record of all notification of summons and successful prosecutions for breaches of current environmental protection / pollution control legislation, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;
 - d. review of the reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures; and
 - e. description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance.
- (g) Others

- a. an account of the future key issues as reviewed from the works programme and work method statements;
- b. advice on the solid and liquid waste management status; and
- c. comments (for examples, effectiveness and efficiency of the mitigation measures), recommendations (for example, any improvement in the EM&A programme) and conclusions.

(h) Appendix

- a. Action and Limit levels;
- b. graphical plots of trends of monitored parameters at key stations over the past four reporting periods for representative monitoring stations annotated against the following:
 - i. major activities being carried out on site during the period;
 - ii. weather conditions during the period; and
 - iii. any other factors that might affect the monitoring results.
- c. monitoring schedule for the present and next reporting period;
- d. cumulative statistics on complaints, notifications of summons and successful prosecutions; and
- e. outstanding issues and deficiencies.

9.3.3 Quarterly EM&A Summary Reports

The quarterly EM&A summary report shall consist of around 5 pages (3 pages of text and tables and 2 pages of figures). It generally includes but not limited to the following:

- (a) up to half a page executive summary;
- (b) basic project information:
 - a. a synopsis of the project organisation, programme;
 - b. contacts of key management;
 - c. proponents' contacts and any hotline telephone number for the public to make enquiries; and
 - d. a synopsis of works undertaken during the quarter.
- (c) a brief summary of EM&A requirements:
 - a. monitoring parameters;

- b. environmental quality performance limits (Action and Limit Levels); and
- c. environmental mitigation measures, as recommended in the EIA Report;
- (d) environmental status:
 - a. a synopsis of work undertaken during the quarter;
 - b. drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;
- (e) implementation status:
 - a. 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;
- (f) 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:
 - a. the major activities being carried out on site during the period;
 - b. weather conditions during the period; and
 - c. any other factors which might affect the monitoring results;
- (g) advice on the solid and liquid waste management status;
- (h) summary of non-compliance
 - a. a summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit Levels);
 - b. a brief review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures;
 - c. a summary description of the actions taken in the event of non-compliance and any follow-up procedures related to earlier non-compliance;
 - d. a summary record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken;
- (i) 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; and

9.3.4 Final EM&A Report

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

- (a) completion of construction activities and insignificant environmental impacts of the remaining outstanding construction works;
- (b) trends analysis to demonstrate the narrow down of monitoring exceedance due to construction activities and the return of ambient environmental conditions in comparison with baseline data; and
- (c) no environmental complaint and prosecution involved.

The proposed termination may be required to consult related local community such as village representative/committee and/or District Board and the proposal should be endorsed by the IEC, ER and the project proponent prior to final approval from the Director of Environmental Protection.

A Final EM&A report shall be prepared summarizing the results and findings of the EM&A works throughout the construction period. It should be submitted within 14 working days after project completion. It generally includes but not limited to the following:

- (a) An executive summary;
- (b) Drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;
- (c) Basic project information:
 - a. a synopsis of the project organisation;
 - b. contacts of key management; and
 - c. a synopsis of work undertaken during the entire construction period.
- (d) A brief summary of EM&A requirements:
 - a. monitoring parameters;
 - b. environmental quality performance limits (Action and Limit levels); and
 - c. environmental mitigation measures, as recommended in the project EIA Report;
 - d. Event and Action Plans.
- (e) A summary of the implementation status of environmental protection and pollution control/mitigation measures, as recommended in the project EIA Report, summarised in the updated implementation schedule;
- (f) Graphical plots of the trends of monitored parameters over the construction period for representative monitoring stations, including the post-project monitoring annotated against:
 - a. the major activities being carried out on site during the period;

- b. weather conditions during the period; and
 - c. any other factors which might affect the monitoring results.
- (g) Summary of non-compliance:
- a. a summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
 - b. a brief review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures as appropriate;
 - c. a summary description of the actions taken in the event of non-compliance;
 - d. a summary record of notifications of summons and successful prosecutions for breaches of the current environmental protection/pollution control legislations, locations and nature of the breaches, investigation, follow-up actions taken and results;
- (h) A review of the validity of EIA predictions through comparison with the monitoring data and identification of shortcomings in EIA recommendations;
- (i) A review of the effectiveness and cost-effectiveness of the monitoring methodology
- (j) A review of the effectiveness and efficiency of the mitigation measures and of the performance of the overall EM&A programme;
- (k) Recommendations for improvement;
- (l) Evaluation on the return of environmental condition the baseline or predicted conditions in the EIA Report; and
- (m) Conclusion on the environmental acceptability of the project.

9.4 Data Keeping

The ET shall keep the site documents (such as monitoring field records, site inspection forms etc.) in order and make available for inspection upon request. These documents do not form part of the EM&A report. The monitoring data should also be input into electronic format for checking upon request. All documents and data shall be kept for at least one year after completion of the construction contract.

9.5 Real-time Reporting

A dedicated internet web-site will be set up for reporting the EM&A data for public inspection in real-time. Real-time reporting in this context refers to the posting of monitoring data after it has been through the appropriate processing, QA/QC checking by the ET and validation by the IEC.

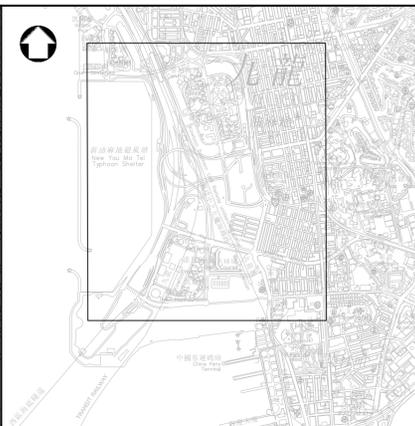
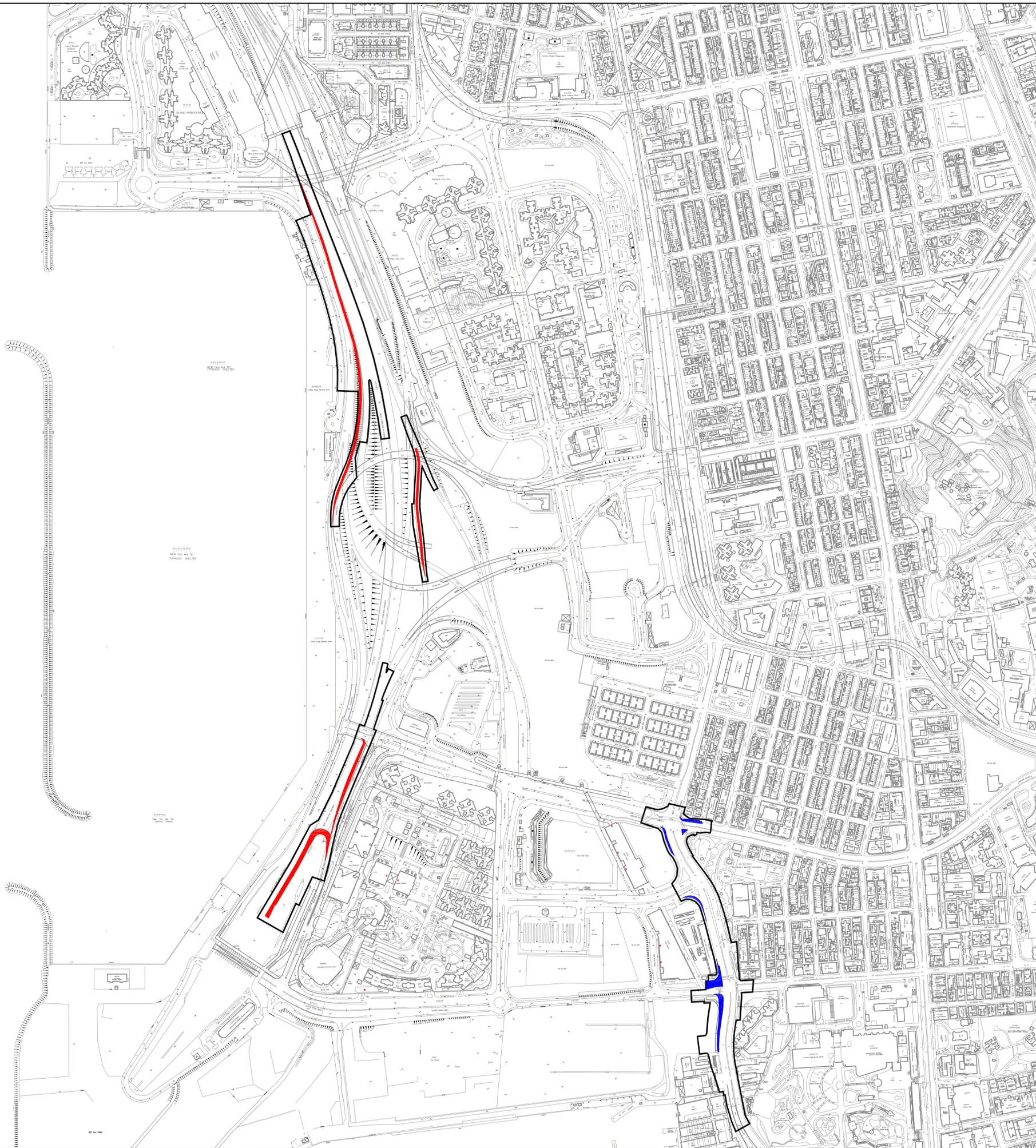
9.6 Interim Notification of Environmental Quality Limit Exceedances

Should any exceedance in environmental quality performance limit be recorded, the ET Leader should immediately inform the IEC, ER, Contractor and EPD as appropriate in accordance to the Event and Action Plan. He should advise to the IEC, ER, Contractor and EPD the investigation result, remediation actions performed, effectiveness of the measures and proposal of further actions required. A sample interim notification template can be found in **Appendix D**.

10. CONCLUSION

This Manual lists out the EM&A requirements for environmental parameters air quality, noise, water quality, waste management and landscape and visual. Environmental monitoring on air quality and noise are proposed and regular site inspection is recommended for all other parameters. Any non-compliance identified should be notified to all parties according to the Event and Action Plan and remediation measures should be carried out. Complaints received should be investigated and problems related to construction works should be solved till satisfaction. Baseline, monthly, quarterly and final EM&A reports shall be prepared to report on the continual monitoring results and evaluate the EM&A works.

Drawings



LOCATION PLAN

LEGEND:
 — WORKS BOUNDARY

| Rev | Description | By | Date |
|-----|-------------|----|------|
| | | | |

Consultant
PARSONS BRINCKERHOFF

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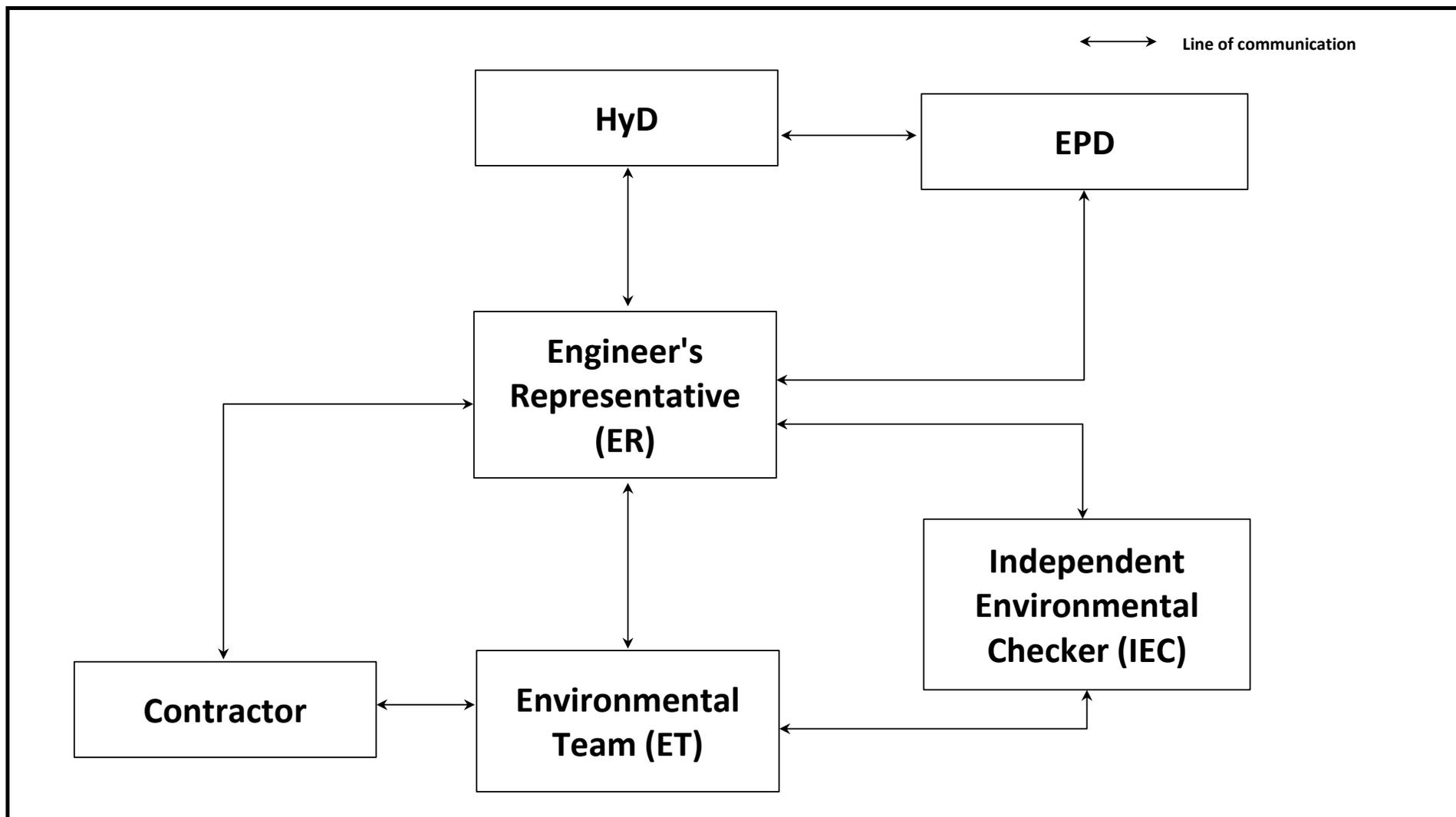
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 – PHASE 1 INVESTIGATION,
 DESIGN AND CONSTRUCTION

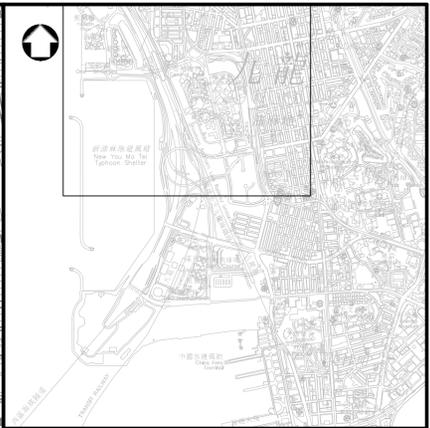
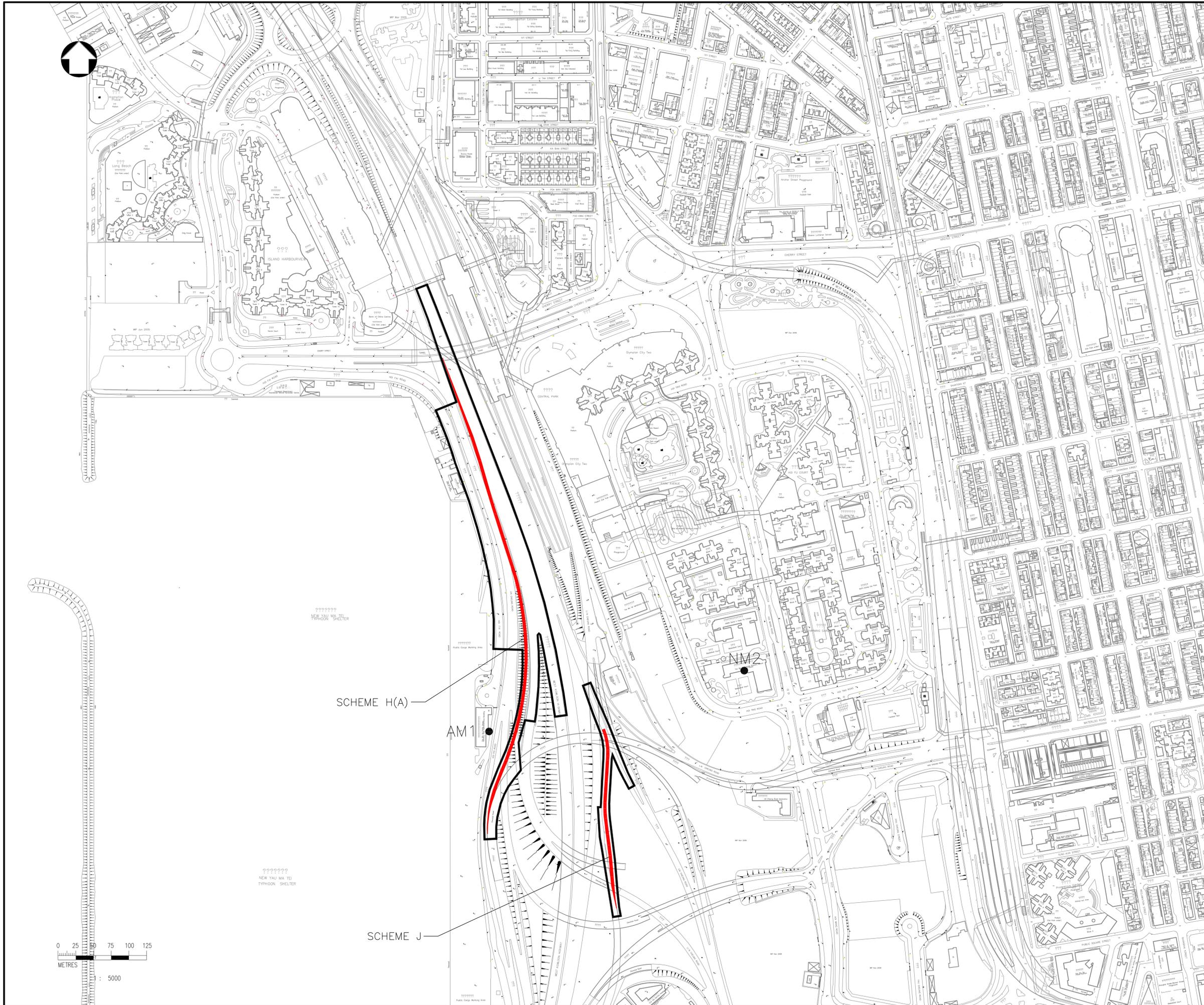
Drawing title
 SITE LOCATION PLAN

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|-------------|----------------|----------|-------------|
| Drawing no. | CE44/T/ST/EM01 | Rev. | — |
| Drawn | BC | Date | JUL12 |
| Checked | KS | Approved | LC |
| Scale | A1 NTS | Status | Preliminary |

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LOCATION PLAN

- LEGEND:
- AM1/NM1 (AIR MONITORING STATION/NOISE MONITORING STATION)
 - WORKS BOUNDARY

| Rev | Description | By | Date |
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Consultant
PARSONS BRINCKERHOFF

漢臻 **CINOTECH**

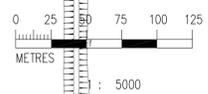
Project title
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 PROPOSED ROAD IMPROVEMENT WORKS IN WEST KOWLOON RECLAMATION DEVELOPMENT – PHASE 1 INVESTIGATION, DESIGN AND CONSTRUCTION

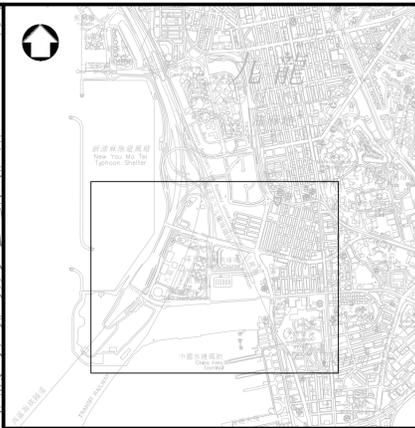
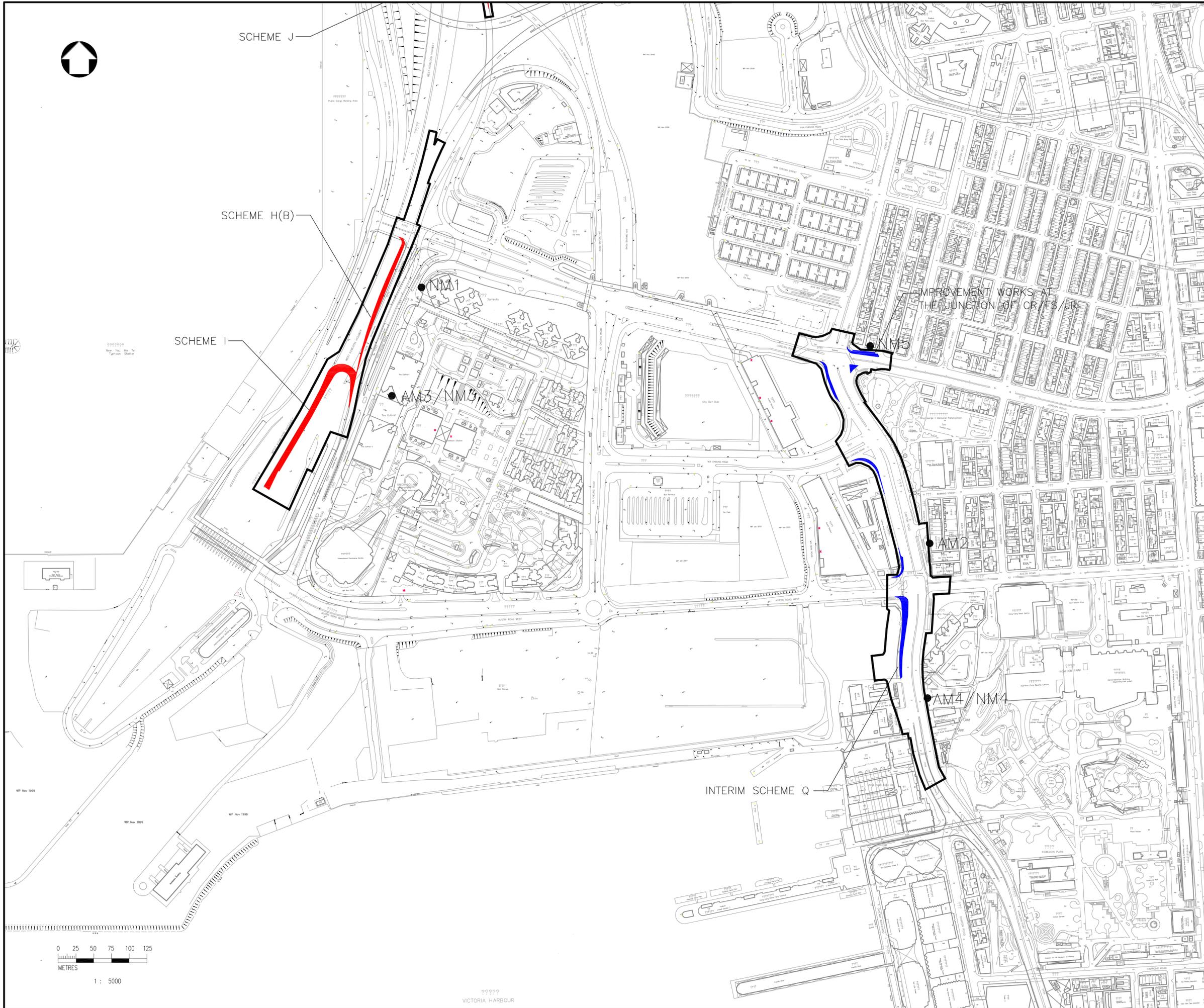
Drawing title
LOCATION OF MONITORING STATIONS (PAGE 1 OF 2)

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|-----------------------------------|-------------------|---------------------------|--------------------|
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| Drawn MC | Date AUG13 | Checked KS | Approved LC |
| Scale A3 1:5000 | | Status PRELIMINARY | |

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LOCATION PLAN

LEGEND:

- AM1/NM1
(AIR MONITORING STATION/NOISE MONITORING STATION)
- WORKS BOUNDARY

| Rev | Description | By | Date |
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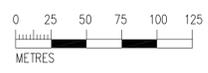
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 PROPOSED ROAD IMPROVEMENT WORKS IN WEST KOWLOON RECLAMATION DEVELOPMENT – PHASE 1 INVESTIGATION, DESIGN AND CONSTRUCTION

Drawing title
LOCATION OF MONITORING STATIONS (PAGE 2 OF 2)

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VICTORIA HARBOUR

Appendix A

**Environmental Mitigation
Implementation Schedule**

Appendix A - Implementation Schedule of Recommended Mitigation Measures

| EIA Ref. | EM&A Ref. | Recommended Mitigation Measures | Objectives of the Recommended Measure & Main Concerns to address | Who to Implement the measure | Location of the measure | When to implement the measure | What requirements or standard for the measure to achieve |
|---------------------------|-----------|--|--|------------------------------|-------------------------|-------------------------------|--|
| Air Quality Impact | | | | | | | |
| Construction Phase | | | | | | | |
| 4.8 | A1 | Good housekeeping to minimize dust generation, e.g. by properly handling and storing dusty materials | To minimize dust generation | HyD's Contractor | Whole construction site | Throughout construction phase | EIAO-TM, APCO |
| 4.8 | A2 | Adopt dust control measures, such as dust suppression using water spray on exposed soil (at least 8 times per day), in areas with dusty construction activities and during material handling | To minimize dust generation due to erosion | HyD's Contractor | Whole construction site | Throughout construction phase | EIAO-TM, APCO |
| 4.8 | A3 | Store cement bags in shelter with 3 sides and the top covered by impervious materials if the stack exceeds 20 bags | To prevent leakage of cement | HyD's Contractor | Whole construction site | Throughout construction phase | EIAO-TM, APCO |
| 4.8 | A4 | Maintain a reasonable height when dropping excavated materials to limit dust generation | To minimize dust generation during movement of excavated materials | HyD's Contractor | Whole construction site | Throughout construction phase | EIAO-TM, APCO |
| 4.8 | A5 | Limit vehicle speed within site to 10km/hr and confine vehicle movement in haul road | To minimize dust generation due to traffic movement | HyD's Contractor | Whole construction site | Throughout construction phase | EIAO-TM, APCO |
| 4.8 | A6 | Minimize exposed earth after completion of work in a certain area by hydroseeding, vegetating, soil compacting or covering with bitumen | To minimize dust generation due to erosion | HyD's Contractor | Whole construction site | Throughout construction phase | EIAO-TM, APCO |
| 4.8 | A7 | Provide wheel washing at site exit to clean the vehicle body and wheel | To prevent dust from being brought offsite | HyD's Contractor | Whole construction site | Throughout construction phase | EIAO-TM, APCO |
| 4.8 | A8 | Hard pave the area at site exit with concrete, bitumen or hardcores | To prevent dust from being brought offsite | HyD's Contractor | Whole construction site | Throughout construction phase | EIAO-TM, APCO |
| 4.8 | A9 | Cover materials on trucks before leaving the site to prevent debris from dropping during traffic movement or being blown away by wind | To prevent falling of debris during traffic movement and by wind | HyD's Contractor | Whole construction site | Throughout construction phase | EIAO-TM, APCO |
| 4.8 | A11 | Regular maintenance of plant equipment to prevent black smoke emission | To minimize black smoke emission | HyD's Contractor | Whole construction site | Throughout construction phase | EIAO-TM, APCO |
| 4.8 | A12 | Throttle down or switch off unused machines or machine in intermittent use | To minimize unnecessary emission | HyD's Contractor | Whole construction site | Throughout construction phase | EIAO-TM, APCO |

Appendix A - Implementation Schedule of Recommended Mitigation Measures

| EIA Ref. | EM&A Ref. | Recommended Mitigation Measures | Objectives of the Recommended Measure & Main Concerns to address | Who to Implement the measure | Location of the measure | When to implement the measure | What requirements or standard for the measure to achieve |
|---------------------------|----------------------|---|---|-------------------------------------|--------------------------------|--|---|
| 4.8 | A13 | Carry out regular site inspection to audit the implementation of mitigation measures | To check the implementation status and effectiveness of mitigation measures | HyD's Contractor | Whole construction site | Throughout construction phase | EIAO-TM, APCO |
| 4.8 | A14 | Carry out air quality monitoring throughout the construction period | To monitor construction dust level | HyD's Contractor | At representative ASRs | Prior to and throughout construction phase | EIAO-TM |
| Noise Impact | | | | | | | |
| Construction Phase | | | | | | | |
| 3.8 | N1 | Adopt good site practice, such as regular maintenance of plant equipment, throttle down unused machines | To minimize construction noise level | HyD's Contractor | Whole construction site | Throughout construction phase | NCO, EIAO-TM |
| 3.8 | N2 | Use Quality Powered Mechanical Equipment (QPME) which produces lower noise level (e.g. Excavator/Loader (EPD-01431), Asphalt Paver (EPD-01226), Road Roller (EPD-00244) and Mobile Crane (EPD-01477)) | To minimize construction noise level | HyD's Contractor | Whole construction site | Throughout construction phase | NCO, EIAO-TM |
| 3.8 | N3 | Erect movable noise barrier at significant noise source (e.g. Concrete Pump, Concrete Lorry Mixer, Excavator/Loader, Road Sweeper, Asphalt Paver, Road Roller, Lorry, Breaker and Poker) | To lower noise transmission | HyD's Contractor | Whole construction site | Throughout construction phase | NCO, EIAO-TM |
| 3.8 | N5 | Regular maintenance of plant equipment to prevent noise emission due to impair | To prevent noise emission due to impair | HyD's Contractor | Whole construction site | Throughout construction phase | NCO, EIAO-TM |
| 3.8 | N6 | Position mobile noisy equipment in location and direction away from NSR | To minimize noise transmission to NSR | HyD's Contractor | Whole construction site | Throughout construction phase | NCO, EIAO-TM |
| 3.8 | N7 | Use silencer or muffler on plant equipment and should be properly maintained | To minimize noise transmission | HyD's Contractor | Whole construction site | Throughout construction phase | NCO, EIAO-TM |
| 3.8 | N8 | Throttle down or switch off unused machines or machine in intermittent use between work | To minimize noise production | HyD's Contractor | Whole construction site | Throughout construction phase | NCO, EIAO-TM |
| 3.8 | N9 | Make good use of stockpiles or other structures for noise screening | To minimize noise transmission | HyD's Contractor | Whole construction site | Throughout construction phase | NCO, EIAO-TM |

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|-----------------------------|----------------------|--|---|-------------------------------------|--------------------------------|--|---|
| 3.8 | N10 | Avoid carrying out noisy activities at the same time | To minimize noise production | HyD's Contractor | Whole construction site | Throughout construction phase | NCO, EIAO-TM |
| 3.8 | N11 | Reduce the percentage on-time for some noisy PMEs | To minimize noise production | HyD's Contractor | Whole construction site | Throughout construction phase | NCO, EIAO-TM |
| 3.8 | N12 | Carry out noise monitoring | To monitor construction noise level | HyD's Contractor | At representative NSRs | Prior to and throughout construction phase | EIAO-TM |
| Water Quality Impact | | | | | | | |
| Construction Phase | | | | | | | |
| 5.8 | W1 | Recirculate settled water for ground boring and drilling during site investigation or rock/soil anchoring. | To minimize wastewater generation | HyD's Contractor | Whole construction site | Throughout construction phase | ProPECC PN 1/94, EIAO-TM |
| 5.8 | W2 | Set up sedimentation tank for settling suspended solids in wastewater before discharge into storm drains. Sand/silt removal facilities such as sand traps, silt traps and sedimentation basin should be provided with adequate capacity. | To reduce the amount of suspended solid in wastewater | HyD's Contractor | Whole construction site | Throughout construction phase | ProPECC PN 1/94, EIAO-TM |
| 5.8 | W3 | Pave the construction road between the wheel washing bay and the public road with backfall | To prevent soil and site runoff from leaving the site | HyD's Contractor | Whole construction site | Throughout construction phase | ProPECC PN 1/94, EIAO-TM |
| 5.8 | W4 | Follow ProPECC PN 1/94 "Construction Site Drainage" as far as practicable | To minimize surface runoff and chance of erosion | HyD's Contractor | Whole construction site | Throughout construction phase | ProPECC PN 1/94, EIAO-TM |
| 5.8 | W5 | Provide perimeter channels at site boundaries. | To stop offsite storm runoff from entering the site | HyD's Contractor | Whole construction site | Throughout construction phase | ProPECC PN 1/94, EIAO-TM |
| 5.8 | W6 | Construct catchpits and perimeter channels prior to commencement of site formation works and earthworks. | To stop runoff from flowing across the site | HyD's Contractor | Whole construction site | Throughout construction phase | ProPECC PN 1/94, EIAO-TM |
| 5.8 | W7 | Maintain silt removal facilities, channels, manholes before and after rainstorm. | To prevent failure that may lead to flooding | HyD's Contractor | Whole construction site | Throughout construction phase | ProPECC PN 1/94, EIAO-TM |

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|-----------------|----------------------|--|---|-------------------------------------|--------------------------------|--------------------------------------|---|
| 5.8 | W8 | Remove sediment from silt and grit at regular interval. | To prevent blockage the may lead to flooding | HyD's Contractor | Whole construction site | Throughout construction phase | ProPECC PN 1/94, EIAO-TM |
| 5.8 | W9 | Consider environmental requirements when diverting or realigning drainage. | To ensure adequate hydraulic capacity of all drains | HyD's Contractor | Whole construction site | Throughout construction phase | ProPECC PN 1/94, EIAO-TM |
| 5.8 | W10 | Maintain a minimum distance of 100m between discharge point of construction site runoff and the existing saltwater intakes. No effluent will be discharged into typhoon shelter. (for loations of seawater intakes, please refer to Figure 5.1 in EIA Report) | To prevent mixing | HyD's Contractor | Whole construction site | Throughout construction phase | ProPECC PN 1/94, EIAO-TM |
| 5.8 | W11 | <p>Arrange soil excavation works outside rainy seasons (April to September) as far as possible. If this cannot be achieved, the following measures should be implemented:</p> <ul style="list-style-type: none"> - Cover temporary exposed slope surfaces with impermeable materials, e.g. tarpaulin - Protect temporary access roads by crushed stone or gravel - Proved intercepting channels along crest/edge of excavation - Carry out adequate surface protection measures well before the arrival of a rainstorm | To minimize surface runoff and chance of erosion | HyD's Contractor | Whole construction site | Throughout construction phase | ProPECC PN 1/94, EIAO-TM |
| 5.8 | W12 | Compact soil after earthwork. Provide permanent work or surface protection with appropriate drainage channels immediately after forming the final surfaces. | To prevent soil erosion under rainstorm | HyD's Contractor | Whole construction site | Throughout construction phase | ProPECC PN 1/94, EIAO-TM |
| 5.8 | W13 | Prevent rainwater from entering trenches. Excavation of trenches should be dug and backfilled in short sections during rainy seasons. Remove silt in rainwater collected from the trenches or foundation excavations prior to discharge to storm drains. | To prevent soil erosion under rainstorm | HyD's Contractor | Whole construction site | Throughout construction phase | ProPECC PN 1/94, EIAO-TM |
| 5.8 | W14 | Cover open stockpiles of construction materials (e.g. aggregates, sand and fill materials) with impermeable materials such as tarpaulin during rainstorms. | To prevent soil erosion under rainstorm | HyD's Contractor | Whole construction site | Throughout construction phase | ProPECC PN 1/94, EIAO-TM |

Appendix A - Implementation Schedule of Recommended Mitigation Measures

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|-----------------|----------------------|--|---|-------------------------------------|--------------------------------|--------------------------------------|---|
| 5.8 | W15 | Cover and temporary seal manholes (including newly constructed ones) to prevent silt, construction materials or debris and surface runoff from entering foul sewers. | To prevent overloading of foul sewers | HyD's Contractor | Whole construction site | Throughout construction phase | ProPECC PN 1/94, EIAO-TM |
| 5.8 | W16 | Remove waste from the site regularly. | To prevent waste accumulation | HyD's Contractor | Whole construction site | Throughout construction phase | ProPECC PN 1/94, EIAO-TM |
| 5.8 | W17 | Apply discharge license for effluent discharge. Treat the discharge to comply with the requirement in TM-DSS. | To ensure compliance with effluent discharge requirement | HyD's Contractor | Whole construction site | Throughout construction phase | WPCO, TM-DSS, EIAO-TM |
| 5.8 | W18 | Reuse treated effluent onsite, e.g. dust suppression, wheel washing and general cleaning. | To minimize wastewater generation | HyD's Contractor | Whole construction site | Throughout construction phase | Waste Disposal Ordinance, EIAO-TM |
| 5.8 | W19 | Monitor effluent water quality. | To ensure compliance with effluent discharge requirement | HyD's Contractor | Whole construction site | Throughout construction phase | WPCO, EIAO-TM |
| 5.8 | W20 | Register as chemical waste producer if chemical waste will be generated. | To control chemical waste | HyD's Contractor | Whole construction site | Throughout construction phase | Waste Disposal (Chemical Waste) (General) Regulation, EIAO-TM |
| 5.8 | W21 | Perform maintenance of vehicles and equipment that have oil leakage and spillage potential on hard standings within a bunded area with sumps and oil interceptors. | To prevent oil leakage or spillage | HyD's Contractor | Whole construction site | Throughout construction phase | Waste Disposal (Chemical Waste) (General) Regulation, EIAO-TM |
| | | Dispose chemical waste in accordance to Waste Disposal Ordinance. Follow the <i>Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes</i> , examples as follows: | | | | | |

Appendix A - Implementation Schedule of Recommended Mitigation Measures

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|---------------------------|----------------------|---|---|-------------------------------------|--------------------------------|--------------------------------------|---|
| 5.8 | W22 | - Store chemical wastes with suitable containers to avoid leakage or spillage during storage, handling and transport | To avoid accident in waste storage and handling | HyD's Contractor | Whole construction site | Throughout construction phase | Waste Disposal Ordinance, EIAO-TM |
| | | - Label chemical waste containers according to the CoP to notify and warn the waste handlers | | | | | |
| | | - Store chemical wastes at designated safe location with adequate space | | | | | |
| 5.8 | W23 | Provide sufficient chemical toilets with regular maintenance by licensed chemical waste collector | To proper collection of taskforce waste | HyD's Contractor | Whole construction site | Throughout construction phase | Waste Disposal Ordinance, EIAO-TM |
| Operational Phase | | | | | | | |
| 5.8 | W24 | Direct surface runoff for silt removal through silt trap before flowing to public storm water drainage system | To remove silt in surface runoff | HyD | Along road alignment | Operational phase | WPCO, EIAO-TM |
| 5.8 | W25 | Regularly maintain the silt traps | To prevent blockage | HyD | Along road alignment | Operational phase | WPCO, EIAO-TM |
| Waste Management | | | | | | | |
| Construction Phase | | | | | | | |
| 6.5 | WM1 | Allocate an area for waste sorting and storage of C&D materials into the following categories for reuse, recycle or disposal: | To minimize waste generation | HyD's Contractor | Whole construction site | Throughout construction phase | Waste Disposal Ordinance, EIAO-TM |
| | | - excavated material suitable for reuse | | | | | |
| | | - inert C&D material for disposal offsite | | | | | |
| | | - non-inert C&D materials for disposal at landfills | | | | | |
| | | - chemical waste | | | | | |
| | | - general refuse | | | | | |

Appendix A - Implementation Schedule of Recommended Mitigation Measures

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|--|-----------|---|--|------------------------------|-------------------------|-------------------------------|--|
| 6.5 | WM2 | Adopt good site practice as follows: | To proper handling of waste | HyD's Contractor | Whole construction site | Throughout construction phase | Waste Disposal Ordinance, EIAO-TM |
| | | - Provide training to workers on site cleanliness, waste management (waste reduction, reuse and recycle) and chemical handling procedures | | | | | |
| | | - Provide sufficient waste collection points and regular removal | | | | | |
| | | - Cover waste materials with tarpaulin or in enclosure during transportation | | | | | |
| | | - Maintain drainage systems, sumps and oil interceptors | | | | | |
| - Sort out chemical waste for proper handling and treatment | | | | | | | |
| 6.5 | WM3 | Adopt waste reduction measures as follows: | To minimize waste generation | HyD's Contractor | Whole construction site | Throughout construction phase | Waste Disposal Ordinance, EIAO-TM |
| | | - Allocate area/containers for sorting, recovering and storing waste for reuse, recycle or disposal (e.g. demolition debris and excavated materials, general refuse like aluminium cans) | | | | | |
| | | - Allocate area for proper storage of construction materials to prevent contamination | | | | | |
| - Minimize wastage through careful planning and avoiding over-purchase of construction materials | | | | | | | |
| 6.5 | WM4 | Prepare and implement a site specific Waste Management Plan (WMP) as part of Environmental Management Plan (EMP) in accordance with ETWB TCW No. 19/25. Detail waste management method in the form of avoidance, reuse, recovery, recycling, storage, collection, treatment and disposal according to the recommendations on the EIA and EM&A Manual. It should be approved by the ER and | To provide guidance to waste management | HyD's Contractor | Whole construction site | Throughout construction phase | ETWB TCW No. 19/2005, EIAO-TM |
| 6.5 | WM5 | Store waste materials properly as follows: | To properly store waste | HyD's Contractor | Whole construction site | Throughout construction phase | ProPECC PN 1/94, EIAO-TM |
| | | - Avoid contamination by proper handling and storing waste | | | | | |
| | | - Prevent erosion by covering waste or applying water spray | | | | | |
| | | - Maintain and clean storage area regularly | | | | | |
| - Sort and stockpile different materials at designated location to enhance reuse | | | | | | | |

Appendix A - Implementation Schedule of Recommended Mitigation Measures

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|-----------------|----------------------|--|---|-------------------------------------|--------------------------------|--------------------------------------|---|
| 6.5 | WM6 | Apply for relevant waste disposal permits in accordance with the Waste Disposal Ordinance (Cap. 354), Waste Disposal (Charges for Disposal of Construction Waste) Regulation (Cap. 345) and the Land (Miscellaneous Provisions) Ordinance (Cap. 28). | To properly dispose waste | HyD's Contractor | Whole construction site | Throughout construction phase | Waste Disposal Ordinance (Cap. 354), Waste Disposal (Charges for Disposal of Construction Waste) Regulation (Cap. 345) and the Land (Miscellaneous Provisions) Ordinance (Cap. 28), EIAO-TM |
| 6.5 | WM7 | Hire licensed waste disposal contractors for waste collection and removal. Dispose waste at licensed waste disposal facilities | To properly dispose waste | HyD's Contractor | Whole construction site | Throughout construction phase | Waste Disposal Ordinance, EIAO-TM |
| 6.5 | WM8 | Implement trip-ticket system for recording the amount of waste generated, recycled and disposed, including chemical wastes | To monitor movement of waste | HyD's Contractor | Whole construction site | Throughout construction phase | Waste Disposal (Chemical Waste) (General) Regulation, Waste Disposal Ordinance, EIAO-TM |
| 6.5 | WM9 | Provide wheel washing bay at site exit to clean the vehicle body and wheel | To prevent dust from being brought offsite | HyD's Contractor | Whole construction site | Throughout construction phase | ProPECC PN 1/94, EIAO-TM |
| 6.5 | WM10 | Reduce water content in wet spoil generated from piling work by mixing with dry materials. Only dispose treated spoil with less than 25% dry density to Public Fill Reception Facilities | To minimize load to reception facilities | HyD's Contractor | Whole construction site | Throughout construction phase | Waste Disposal Ordinance, EIAO-TM |
| 6.5 | WM11 | Dispose dry waste or waste with less than 70% water content by weight to landfill | To minimize load to reception facilities | HyD's Contractor | Whole construction site | Throughout construction phase | Waste Disposal Ordinance, EIAO-TM |
| | | Follow the <i>Code of Practice on the Packaging, Labelling and Storage of Chemical Waste</i> as follows: | | | | | |

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|-----------------|----------------------|---|---|-------------------------------------|--------------------------------|--------------------------------------|---|
| 6.5 | WM12 | <ul style="list-style-type: none"> - Store chemical wastes with suitable containers. Seal and maintain the container to avoid leakage or spillage during storage, handling and transport - Label chemical waste containers in both English and Chinese with instructions in accordance to Schedule 2 of the Waste Disposal (Chemical Waste) (General) Regulation - The container capacity should be smaller than 450 litres unless agreed by the EPD | To avoid accident in waste storage and handling | HyD's Contractor | Whole construction site | Throughout construction phase | Waste Disposal Ordinance, EIAO-TM |

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|-----------------|----------------------|---|---|-------------------------------------|--|--------------------------------------|---|
| 6.5 | WM13 | <p>Comply with the requirement of the chemical storage area:</p> <ul style="list-style-type: none"> - Store only chemical waste and label clearly the chemical characters of the waste - Have at least 3 sides enclosed and protected from rainfall with cover - Provide sufficient ventilation - Have impermeable floor and has bunds to contain 110% of the capacity of the largest container or 20% of the total volume of the stored waste in the area, whichever is larger - Adequately spaced incompatible materials | To ensure proper storage of chemical waste | HyD's Contractor | Whole construction site | Throughout construction phase | Waste Disposal Ordinance, EIAO-TM |
| 6.5 | WM14 | Transfer used lubricants, waste oils and other chemicals to oil recycling companies, if possible, and empty oil drums for reuse or refill. No direct or indirect discharge is permitted | To ensure proper disposal of chemical waste | HyD's Contractor | Whole construction site | Throughout construction phase | Waste Disposal (Chemical Waste) (General) Regulation, EIAO-TM |
| 6.5 | WM15 | Hire licensed chemical waste disposal contractors for waste collection and removal. Dispose chemical waste at the approved CWTC at Tsing Yi or other licensed facility | To ensure proper disposal of chemical waste | HyD's Contractor | Whole construction site | Throughout construction phase | Waste Disposal (Chemical Waste) (General) Regulation, EIAO-TM |
| 6.5 | WM16 | Hire reputable waste collector to separately collect and dispose general refuse from other wastes. Cover the waste to prevent being blown away | To ensure proper disposal of general refuse | HyD's Contractor | Whole construction site | Throughout construction phase | Waste Disposal (Chemical Waste) (General) Regulation, EIAO-TM |
| 6.5 | WM17 | Provide recycling bins for sorting out recyclables for collection by recycling companies. Non-recyclables should be removed to designated landfills every day by licensed collectors to prevent environmental and health nuisance. | To ensure proper recycling and disposal of general refuse | HyD's Contractor | Whole construction site | Throughout construction phase | Waste Disposal Ordinance, EIAO-TM |
| 6.5 | WM18 | Organize training and reminders to site staff on waste minimization through avoidance and reduction, reusing and recycling | To ensure proper management of general refuse | HyD's Contractor | Whole construction site | Throughout construction phase | EIAO-TM |
| 6.5 | WM19 | Carry out testing to verify sediment quantity and quality | To verify the categories of sediment to be disposed in accordance with ETWB TC(W) No. 34/2002 | HyD's GI Contractor | Drillholes CB1 to 5 as shown in Sediment Sampling and Testing Plan | Before sediment removal works | ETWB TC(W) No. 34/2002 |

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|-----------------------------|-----------|---|--|------------------------------|---------------------------------|---|--|
| Landscape and Visual | | | | | | | |
| 7.9.3 | CM1 | Shorten the construction period | To minimize duration of landscape and visual impact | HyD's Contractor | Whole construction site | Throughout construction phase | EIAO-TM |
| 7.9.3 | CM2 | Limit work within site area without encroaching into the landscape resources offsite. | To minimize landscape and visual impact | HyD's Contractor | Whole construction site | Throughout construction phase | EIAO-TM |
| 7.9.3 | CM3 | Protect retained trees from damage during construction work according to the recommended in the detailed tree assessment report and the approval of Tree Removal Application under ETWB TCW No. 3/2006 Tree Preservation | To maintain and minimize damage to existing greenery | HyD's Contractor | Whole construction site | Throughout construction phase | ETWB TCW 3/2006, EIAO-TM |
| 7.9.3 | CM4 | Transplant unavoidably affected trees wherever possible in accordance with ETWB TCW No. 3/2006 Tree Preservation. Maintain transplanted trees to ensure healthy development during the establishment period | To minimize tree loss and ensure survival of transplanted trees | HyD's Contractor | Whole construction site | Throughout construction phase and establishment period in operational | ETWB TCW 3/2006, EIAO-TM |
| 7.9.2 6 | OM1 | Carry out compensatory planting in areas proposed in the Tree Survey and Landscape and Greening Study Report in accordance to ETWB TCW 3/2006, which will be subjected to refinement in detailed design stage. Compensatory planting of a ratio no less than 1:1 in terms of quality and quantity will be provided for any potential tree felling within the site. Offsite planting may be required due to land constraint. 410 nos. of compensatory trees have been proposed | To compensate for loss greenery | HyD's Contractor | Whole construction site/Offsite | Construction phase | ETWB TCW 3/2006, EIAO-TM |
| 7.9.2 6 | OM2 | Provide vertical greening at piers of elevated roads and shrub planting near amenity planting strips to soften the hard landscape (e.g. climber and shrub for hiding central divider and enclosures). Early comments from the ACABAS and relevant departments, implementation and maintenance agents shall be sought at the earlier stage. | To soften hard landscape | HyD's Contractor | Whole construction site | Construction phase | ETWB TCW 36/2004 |

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|-----------------|----------------------|---|---|-------------------------------------|--------------------------------|--------------------------------------|---|
| 7.9.2 6 | OM3 | Match the design and materials of road structure with the surrounding environment and with the schematic theme paving of the future West Kowloon Reclamation Development and the Advisory Committee on the Appearance of Bridges and Associated Structures (ACABAS) | To match with existing landscape character | HyD's Contractor | Whole construction site | Construction phase | ETWB TCW 36/2004 |

Appendix B
Sample Data Sheet for Monitoring

Agreement No. CE44/2011 (HY)

Proposed Road Improvement Works in West Kowloon Reclamation Development – Phase 1 – Investigation, Design and Construction

1-hr / 24-hr TSP Air Quality Monitoring

Field Operation Data Log Sheet

Station: _____

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

Operators: _____ Weather: Sunny Cloudy Windy Rainy
 Wind: Strong Mild Calm

| | | |
|---------------------|-------------------------|--|
| High Volume Sampler | Model no. | |
| | Blower Motor Serial no. | |

| TSP - Total Suspended Particulates Sampler | | | |
|--|-------------------------|--------------|----------|
| Equipment No. | | Set Point | |
| Slope, m | | Intercept. b | |
| | | Initial, I | Final, f |
| Ambient Pressure (mmHg), Pa | | | |
| Ambient Temperature (K), Ta | | | |
| Delta (in. of Water), W | | | |
| $Y = [W \times (Pa/760) \times (298/Ta)]^{1/2}$ | | | |
| Standard flow, Qstd (m ³ /min) = (Y - b)*0.0283/m | | | |
| Elapsed Timer Indicator (Hours), T | | | |
| Filter Identification no. | | | |
| Weight of Filter (g) | | | |
| Weight of Particulate (g) | | | |
| Mean Standard Flow, $Qstd_{avg} = (Qstd_i + Qstd_f)/2$ | | | |
| Total Time, Total Time = (Tf - Ti) x 60 | | | |
| Standard Volume, $Vstd (m^3) = Qstd_{avg} \times Total\ Time$ | | | |
| Particulate Concentration (µg/m³) | | | |
| Observed Construction Activities | Main Construction Site | | |
| | Other Construction Site | | |

Remarks: _____

Conducted by: _____ Signature: _____ Date: _____

Checked by: _____ Signature: _____ Date: _____

Agreement No. CE44/2011 (HY)

**Proposed Road Improvement Works in West Kowloon Reclamation Development – Phase 1 –
Investigation, Design and Construction
1-hr TSP Air Quality Monitoring**

Field Operation Data Log Sheet

| Equipment | Model | Equipment No. | Last Calibration/Due Date |
|-----------|-------|---------------|---------------------------|
| | | | / |

| | | | | |
|---|-------------------------|---------------------------------------|----------|----------|
| Monitoring Location | | | | |
| Description of Location | | | | |
| Sampling Date and Time | | | | |
| Weather Condition | | Sunny / Fine / Cloudy / Windy / Rainy | | |
| Measuring Parameters | | TSP | | |
| | | 1st hour | 2nd hour | 3rd hour |
| Count Value | | | | |
| Count Value ÷ 60 mins x (K Factor:) | | | | |
| Mass Concentration ($\mu\text{g}/\text{m}^3$) | | | | |
| Site Condition | Main Construction Site | | | |
| | Other Construction Site | | | |
| Remarks | | | | |

| | Name | Signature | Date |
|-------------|------|-----------|------|
| Recorded By | | | |
| Checked By | | | |

Agreement No. CE44/2011 (HY)

**Proposed Road Improvement Works in West Kowloon Reclamation Development – Phase 1 –
Investigation, Design and Construction
Noise Monitoring**

Field Record Sheet

| Equipment | Model | Equipment No. | Last Calibration/Due Date |
|-----------|-------|---------------|---------------------------|
| | | | / |
| | | | / |

| Noise Monitoring Period | Before Measurement | | | After Measurement | | |
|-------------------------|--------------------|-----------------------|--------------|-------------------|-----------------------|--------------|
| | Noise Level (dB) | Freq. of Signal (KHz) | Display (dB) | Noise Level (dB) | Freq. of Signal (KHz) | Display (dB) |
| 07:00 – 19:00 | | | | | | |

| Monitoring Location | | | | | | |
|---|-----------------------|---|----------|---------------------------------|--|--|
| Description of Location | | | | | | |
| Date of Monitoring | | | | | | |
| Weather Condition | | Sunny / Cloudy / Rainy | | | | |
| Measurement Start Time (hh:mm) | | | | | | |
| Measurement Time Length (min/hr) | | | | | | |
| Measurement Results | Parameter | Measured | Baseline | Actual Construction Noise Level | | |
| | L _{eq} dB(A) | | | | | |
| | L ₁₀ dB(A) | | | | | |
| | L ₉₀ dB(A) | | | | | |
| Major Construction Noise Source(s) During Measurement | | Excavator / backhoe | | Bulldozer | | |
| | | Dump truck / lorry | | Roller | | |
| | | Other, pls specify: | | | | |
| Other Noise Source(s) During Measurement | | Road traffic noise | | Air traffic noise | | |
| | | Construction noise from other sites (e.g. piling) pls specify: | | | | |
| Remarks | | Façade Measurement / Free Field Measurement | | | | |

Note:
During daytime (0700-1900): 1 no. of L_{eq(30-min)}

| | Name | Signature | Date |
|-------------|------|-----------|------|
| Recorded By | | | |
| Checked By | | | |

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

Appendix C

Event and Action Plan

Appendix C Event / Action Plan

Event / Action Plan for Construction Air Quality

| EVENT | ACTION | | | |
|---|---|--|---|--|
| | ET | IEC | ER | CONTRACTOR |
| ACTION LEVEL | | | | |
| 1. Exceedance for one sample | 1. Inform IEC, ER and Contractor; 2. Identify source, investigate the causes of exceedance and propose remedial measures; 3. Repeat measurement to confirm finding. | 1. Check monitoring data submitted by ET; 2. Check Contractor's working method. | 1. Notify Contractor. | 1. Rectify any unacceptable practice; 2. Amend working methods if appropriate. |
| 2. Exceedance for two or more consecutive samples | 1. Inform IEC, ER and Contractor; 2. Identify source; 3. Advise the ER on the effectiveness of the proposed remedial measures; 4. Repeat measurements to confirm findings; 5. Increase monitoring frequency to daily; 6. Discuss with IEC, ER and Contractor on remedial actions required; 7. If exceedance continues, arrange meeting with IEC and ER; 8. If exceedance stops, cease additional monitoring. | 1. Check monitoring data submitted by ET; 2. Check Contractor's working method; 3. Discuss with ET and Contractor on possible remedial measures; 4. Advise the ET/ER on the effectiveness of the proposed remedial measures; 5. Supervise Implementation of remedial measures. | 1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. Ensure remedial measures properly implemented. | 1. Submit proposals for remedial to ER and IEC within 3 working days of notification; 2. Implement the agreed proposals; 3. Amend proposal if appropriate. |

Appendix C Event / Action Plan

| LIMIT LEVEL | | | | |
|--|---|---|---|---|
| 1.Exceedance for one sample | 1. Inform IEC, ER, Contractor and EPD; 2. Identify source, investigate the causes of exceedance and propose remedial measures; 3. Repeat measurement to confirm finding; 4. Increase monitoring frequency to daily; 5. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results. | 1. Check monitoring data submitted by ET; 2. Check Contractor's working method; 3. Discuss with ET and Contractor on possible remedial measures; 4. Advise the ER on the effectiveness of the proposed remedial measures; 5. Supervise implementation of remedial measures. | 1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. Ensure remedial measures properly implemented. | 1. Take immediate action to avoid further exceedance; 2. Discuss with ET and IEC on remedial actions 3. Submit proposals for remedial actions to IEC within 3 working days of notification; 4. Implement the agreed proposals; 5. Amend proposal if appropriate. |
| 2.Exceedance for two or more consecutive samples | 1. Notify IEC, ER, Contractor and EPD; 2. Identify source; 3. Repeat measurement to confirm findings; 4. Increase monitoring frequency to daily; 5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented; 6. Arrange meeting with IEC and ER and Contractor to discuss the remedial actions to be taken; | 1. Check monitoring data submitted by ET; 2. Check Contractor's working method; 3. Discuss amongst ER, ET, and Contractor on the potential remedial actions; 4. Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly; | 1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. In consultation with the IEC, agree with the Contractor on the remedial measures to be implemented; 4. Ensure remedial measures properly implemented; 5. If exceedance continues, consider what portion of the | 1. Take immediate action to avoid further exceedance; 2. Discuss with ET and IEC on remedial actions 3. Submit proposals for remedial actions to ER and IEC within 3 working days of notification; 4. Implement the agreed proposals; 5. Resubmit proposals if problem still not under control; 6. Stop the relevant portion of works as determined by the ER until the exceedance ceases. |

Appendix C Event / Action Plan

| | | | | |
|--|---|--|---|--|
| | <p>7. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results;</p> <p>8. If exceedance stops, cease additional monitoring.</p> | <p>5. Supervise the implementation of remedial measures.</p> | <p>work is responsible and instruct the Contractor to terminate that portion of work until the exceedance ceases.</p> | |
|--|---|--|---|--|

Appendix C Event / Action Plan

Event / Action Plan for Construction Noise

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

Appendix C Event / Action Plan

| EVENT | ACTION | | | |
|-------|--|-----|---|---|
| | ET | IEC | ER | CONTRACTOR |
| | the results; 8. If exceedance stops, cease additional monitoring. | | Contractor to terminate that portion of work until the exceedance ceases. | portion of works as determined by the ER until the exceedance ceases. |

Appendix C Event / Action Plan

Action Plan for Landscape and Visual Works

| EVENT | ACTION | | | |
|--------------------------------|--|---|--|---|
| | ET | IEC | ER | CONTRACTOR |
| Non-conformity on one occasion | <ol style="list-style-type: none"> 1. Identify Source 2. Inform IEC and ER 3. Discuss remedial actions with IEC, ER and Contractor 4. Monitor remedial actions until rectification has been completed | <ol style="list-style-type: none"> 1. Check report 2. Check Contractor's working method 3. Discuss with ET and Contractor on possible remedial measures 4. Advise ER on effectiveness of proposed remedial measures. 5. Check implementation of remedial measures. | <ol style="list-style-type: none"> 1. Notify Contractor 2. Ensure remedial measures are properly implemented | <ol style="list-style-type: none"> 1. Amend working methods 2. Rectify damage and undertake any necessary replacement |
| Repeated Non-conformity | <ol style="list-style-type: none"> 1. Identify Source 2. Inform IEC and ER 3. Increase monitoring frequency 4. Discuss remedial actions with IEC, ER and Contractor 5. Monitor remedial actions until rectification has been completed 6. If non-conformity stops, cease additional monitoring | <ol style="list-style-type: none"> 1. Check monitoring report 2. Check Contractor's working method 3. Discuss with ET and Contractor on possible remedial measures 4. Advise ER on effectiveness of proposed remedial measures 5. Supervise implementation of remedial measures. | <ol style="list-style-type: none"> 1. Notify Contractor 2. Ensure remedial measures are properly implemented | <ol style="list-style-type: none"> 1. Amend working methods 2. Rectify damage and undertake any necessary replacement |

Appendix D
Sample Template for Interim
Notification

**Proposed Road Improvement Works in West Kowloon Reclamation Development –
Phase 1 – Investigation, Design and Construction**

Sample Template for Interim Notifications of Environmental Quality Limits Exceedances

Report No.: _____

| | |
|---|--|
| Monitoring Date | |
| Monitoring Parameter | |
| Action Level | |
| Limit Level | |
| Monitoring Station | |
| Measured Level | |
| Level Exceeded | |
| Cause of Exceedances | |
| | |
| Action required under the Event and Action Plan | |
| | |
| Action taken under the Event and Action Plan | |
| | |
| ET's conclusions and recommendations for mitigation | |
| | |
| Contractor's actions to implement the mitigation | |
| | |
| Contractor's comment | |
| | |

Prepared by: _____ Signature: _____ Date: _____

Reviewed by: _____ Signature: _____ Date: _____